AJAX ENGINEERING

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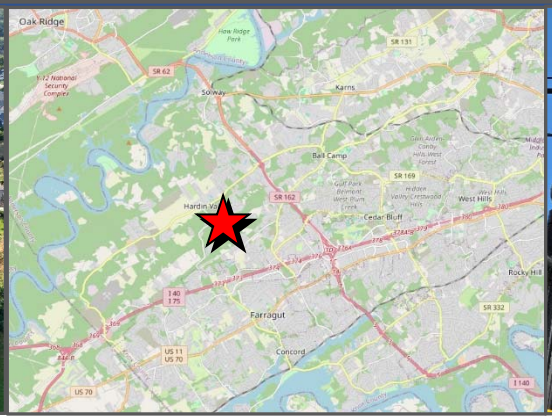
Transportation Impact Study

N Campbell Station Road Subdivision

Knox County, Tennessee



September 2025

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EXECUTIVE SUMMARY

Preface:

S&E Properties proposes a residential subdivision off N Campbell Station Road in West Knox County, TN. This subdivision will include the construction of up to a maximum of 122 single-family detached houses on approximately 61 acres. The development is referred to as "N Campbell Station Road Subdivision" in this study, as a formal name has not yet been chosen. The development proposes one entrance to N Campbell Station Road, and the subdivision is anticipated to be fully built and occupied by 2029.

This proposed site property's access was initially reviewed in a Transportation Impact Letter (TIL) produced by Fulghum MacIndoe in 2021. This TIL analyzed the property with the assumption that 244 single-family houses would be built and occupied by 2024, which is double the current proposal by S&E Properties. The TIL did not find any significant transportation issues with a potential 244-lot subdivision and determined that a larger-sized residential subdivision would not necessitate constructing separate turn lanes on N Campbell Station Road at the entrance into the subdivision in 2024.

The primary purpose of this study is to determine and evaluate the potential impacts of the smaller proposed S&E Properties development on the adjacent transportation system. The study includes a review of the primary access road and the entrance intersection at N Campbell Station Road. This report 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 N Campbell Station Road Subdivision, with up to a maximum of 122 single-family detached houses, is estimated to generate 1,250 vehicle trips on an average weekday at full build-out and occupancy in 2029. Of these daily trips, 87 are estimated to occur during the AM peak hour and 116 in the PM peak hour.
- The Proposed Entrance intersection for the subdivision at N Campbell Station Road is calculated to have minimal vehicle delays and queues during the projected 2029 morning and afternoon peak hours, operating under two-way stop-controlled conditions.

- The projected 2029 entering vehicular volumes into the subdivision from N Campbell Station Road were determined and estimated not to meet Knox County warrant thresholds for separate entering turn lanes.

Recommendations:

The following summary recommendations are presented based on the study's analyses to minimize the impacts of the proposed development on the adjacent transportation system, while aiming to achieve an acceptable traffic flow and improved safety. More details regarding all the recommendations are discussed at the end of the report. The last recommendation marked with an asterisk indicates an existing transportation need and is not associated with the proposed development's projected impacts.

N Campbell Station Road at Proposed Entrance:

- A single exit lane for the N Campbell Station Road Subdivision, allowing both left and right turn movements at N Campbell Station Road, will be sufficient according to the calculations. The delays associated with these exiting vehicle movements are projected to be minimal in the projected 2029 conditions.
- Future landscaping, existing vegetation, or proposed signage must not impact the intersection sight distances looking from the Proposed Entrance to the north and south on N Campbell Station Road.
- Based on a posted speed limit of 30 mph on N Campbell Station Road, the required intersection sight distance is 300 feet for exiting left and right-turning vehicles. The existing sight distances from N Campbell Station Road at the Proposed Entrance location were visually estimated to be adequate in both directions, but require further confirmation.
- It is recommended that a Stop Sign (R1-1) be posted and a 24" white stop bar be applied to the Proposed Entrance approach at N Campbell Station Road. The stop bar should be applied a minimum of 4 feet away from the edge of N Campbell Station Road and placed at the desired stopping point that maximizes the sight distance.
- The curb radius returns at the Proposed Entrance on N Campbell Station Road are recommended to be greater than the minimum to facilitate entering right turns and increase the speed at which these vehicles can be removed from the northbound thru movements on N Campbell Station Road. A larger radius will also help facilitate exiting right turns onto northbound N Campbell Station Road.

N Campbell Station Road Subdivision Internal Roads:

- A 25-mph Speed Limit Sign (R2-1) with additional plaque signage, as shown in the report, is recommended to be posted near the beginning of the Proposed Entrance road off N Campbell Station Road. It is also recommended that a "No Outlet" Sign (W14-2a) be posted at the front of the subdivision. This sign can be posted above or below the street name sign.
- Stop Signs (R1-1) with 24" white stop bars are recommended to be installed on the minor approaches at the internal roadway t-intersections, as shown in the report.
- Sight distances at the new internal intersections must not be impacted by new signage, parked cars, or future landscaping. The civil site designer should ensure that appropriate internal sight distances are met.
- If directed by the local post office, the site designer should include a parking area and a centralized mail delivery center within the development for the subdivision residents.
- All drainage grates and covers for the residential development must be pedestrian and bicycle-safe.
- All road and intersection elements should be designed in accordance with the American Association of State Highway and Transportation Officials (AASHTO) and Knox County specifications and guidelines to ensure proper transportation operations.

Existing Transportation Need:

* - A warning curve sign near the development property is missing on N Campbell Station Road for southbound traffic. This sign location is just south of the existing entrance to the sanitary pump station for The Highlands Subdivision and on the west side of N Campbell Station Road. This sign needs to be reinstalled by Knox County in advance of the sharp horizontal curve on N Campbell Station Road for southbound traffic. In addition, the County should consider including an additional warning curve sign on N Campbell Station Road in advance of the same sharp horizontal curve in the opposite direction for northbound travel.

DESCRIPTION OF EXISTING CONDITIONS

- **STUDY AREA:**

The location of the proposed N Campbell Station Road Subdivision is shown on a map in Figure 1. This development will be situated on the east side of N Campbell Station Road, south of Hardin Valley Road and north of Yarnell Road in West Knox County, Tennessee, within the Hardin Valley community. External road access to the new subdivision will be provided by a single entrance on the east side of N Campbell Station Road and near The Highlands Subdivision. As requested, transportation impacts associated with the development were primarily analyzed at the intersection of N Campbell Station Road at the Proposed Entrance, where the development will have sole road access to and from external destinations.

The development will be constructed from one existing parcel that is currently 100% forested and completely undeveloped. The topography of the proposed subdivision property is characterized by steep terrain, with the southern property edge along Beaver Ridge. The property is also partially bisected by two unnamed tributaries that flow from south to north towards Conner Creek, which runs on the north side of Hardin Valley Road.

View of Existing Development Site at N Campbell Station Road (Looking East)

The proposed development property is situated in a transitional area of Knox County, massively transitioning from a rural to a more suburban setting. Besides the proposed N Campbell Station Road Subdivision, several other residential subdivisions have been constructed in the surrounding area. These other nearby subdivisions, located off and along N Campbell Station Road, include Catatoga, Brandywine at Pepper Ridge, El Rancho Trails, and The Highlands.

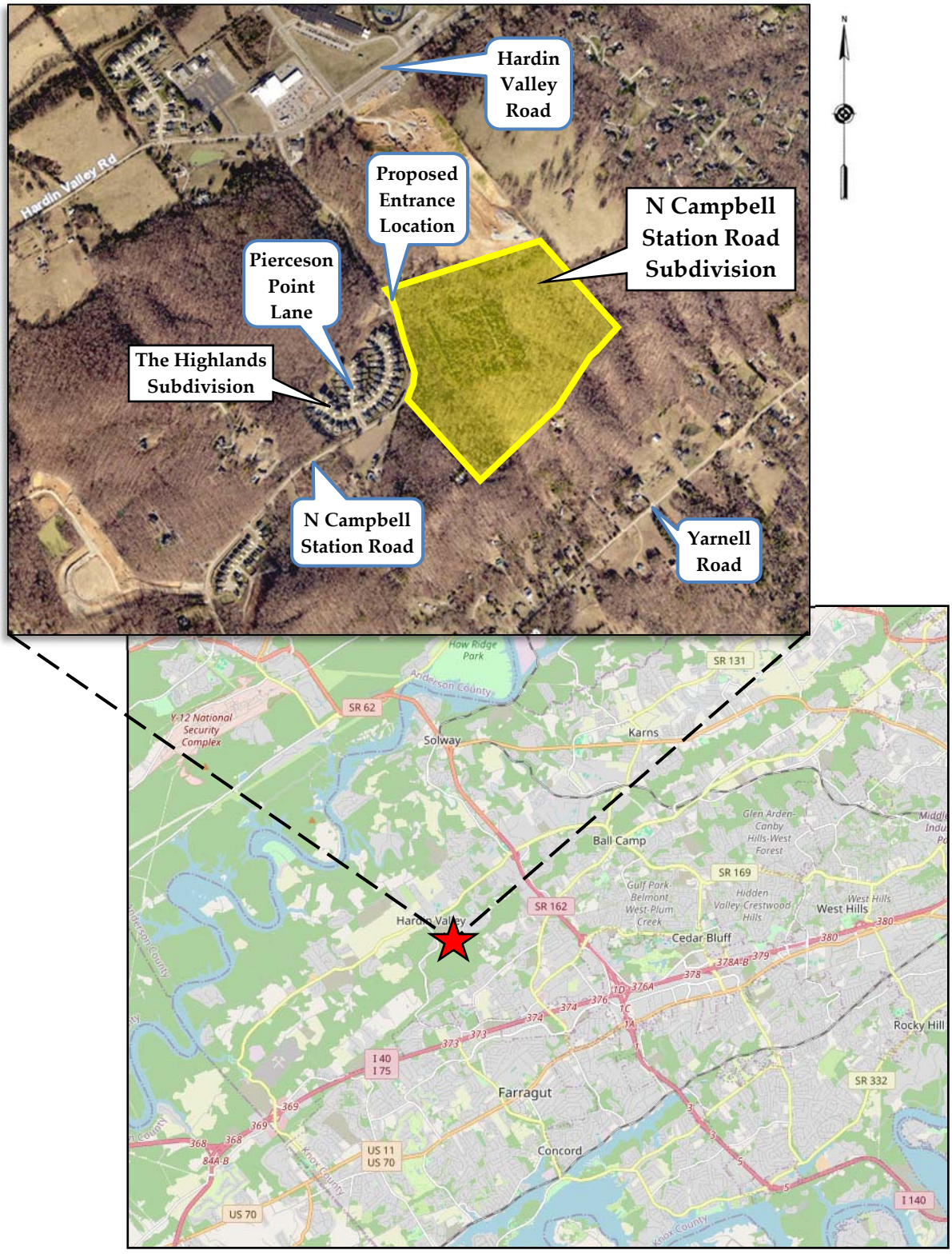


Figure 1
Location Map

- **EXISTING ROADWAYS:**

Table 1 lists the characteristics of the existing primary roadway near 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
N Campbell Station Road	Minor Arterial	30 mph	2 undivided	20.5 feet	None	No sidewalks along roadway	No bike lanes

[1] 2018 Major Road Plan by Knoxville/Knox County Planning
[2] Edge of pavement near project site
[3] According to Knoxville Area Transit System Map

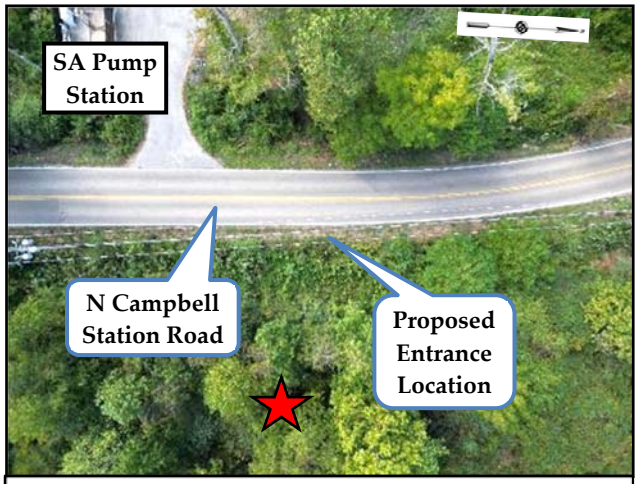
N Campbell Station Road is classified as a Minor Arterial and traverses in a general north-south direction but makes several turns along its length. On its south side, N Campbell Station Road begins at the signalized intersection of Kingston Pike (US 11/US 70/SR 1) in the Town of Farragut. On its north side, the road terminates at an unsignalized four-way intersection with Hardin Valley Road and a private commercial entrance for a total length of 4.8 miles. N Campbell Station Road provides access to Interstate 40/75 at Exit 373. This Interstate access is 2.8 miles to the south of the proposed N Campbell Road Station Subdivision entrance. The Proposed Entrance will also be 2.4 miles away from Pellissippi Parkway (SR 162) to the northeast via Hardin Valley Road.

At the location of the subdivision's Proposed Entrance, N Campbell Station Road consists of a 2-lane pavement section with white edge lines and a double yellow centerline. Pavement widths along North Campbell Road are variable over its length. At the location of the Proposed Entrance, the pavement was measured to be slightly fluctuating between 20.5 and 20.75 feet in width.

The posted speed limit of N Campbell Station Road is 30 mph. Roadway lighting, sidewalks, and bike lanes are not present in the adjacent area along N Campbell Station Road.

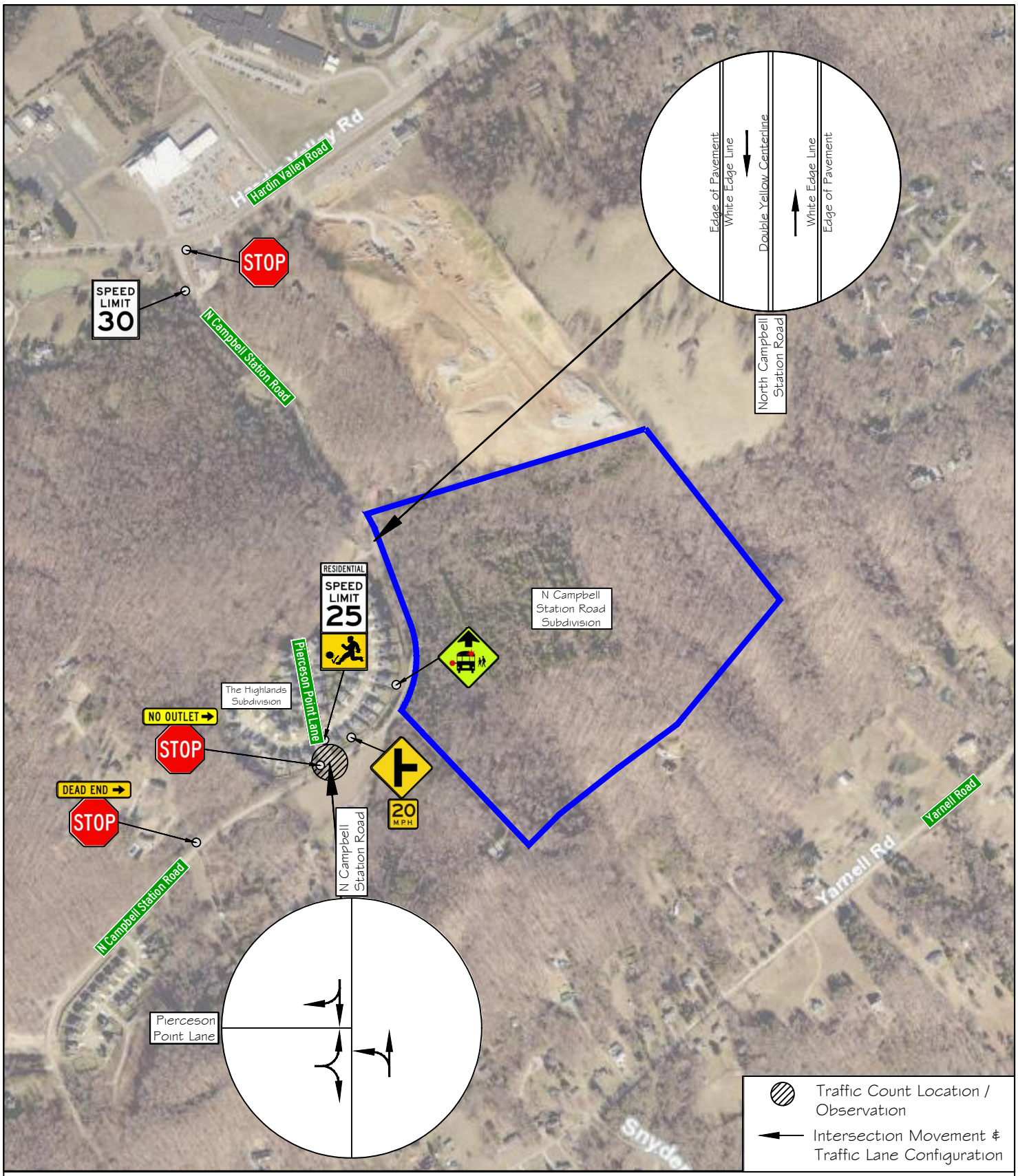
N Campbell Station Road has a substantial downhill grade (~12%) from south to north as it traverses towards Hardin Valley Road. Additionally, N Campbell Station Road features several horizontal curves near the site, including a few reverse curves to the north. The most substantial horizontal road curve on N Campbell Station Road is approximately 700' to the south, with a turn in direction of nearly 90 degrees, with a path from the east-northeast to a northerly direction.

The subdivision's proposed access point will intersect N Campbell Station Road just slightly north and across the road where an existing driveway is located for a sanitary pump station constructed for the adjacent The Highlands Subdivision. The Highlands Subdivision will be directly across N Campbell Station Road from the proposed subdivision on the western side. This nearby subdivision has a single entrance to N Campbell Station Road provided by Pierceson Point Lane.



N Campbell Station Road at Proposed Entrance Location

Figure 2 shows the traffic count location for the study and the current traffic signage along N Campbell Station Road in the vicinity of the development site. The signage only includes warning and regulatory signage and does not show directional road signage. The pages following Figure 2 provide a further overview of the site study area, accompanied by photographs.



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NOT TO SCALE

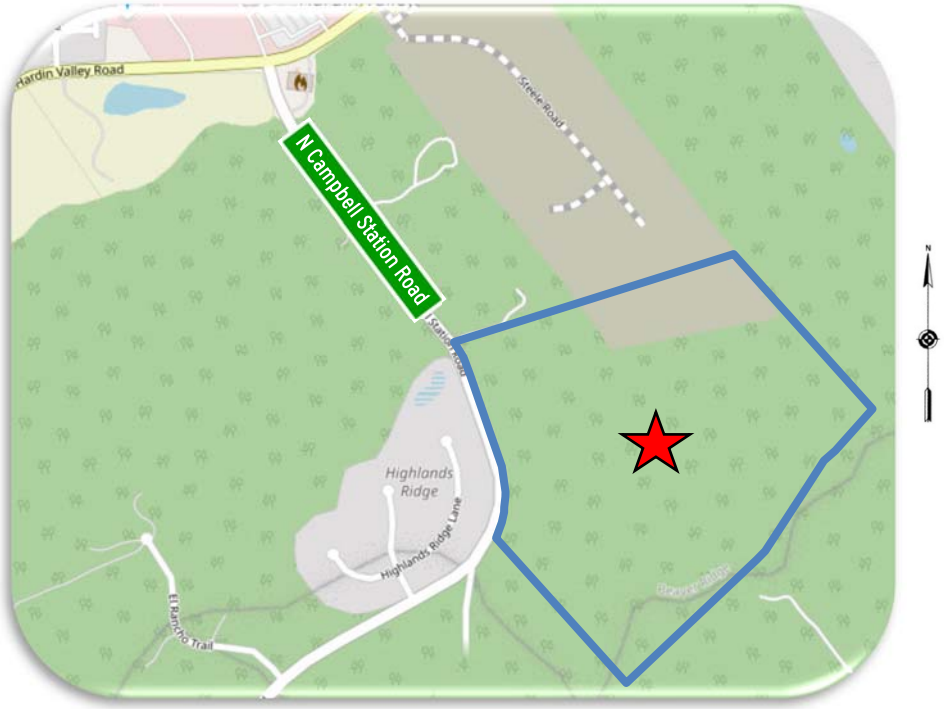
NORTH

FIGURE 2

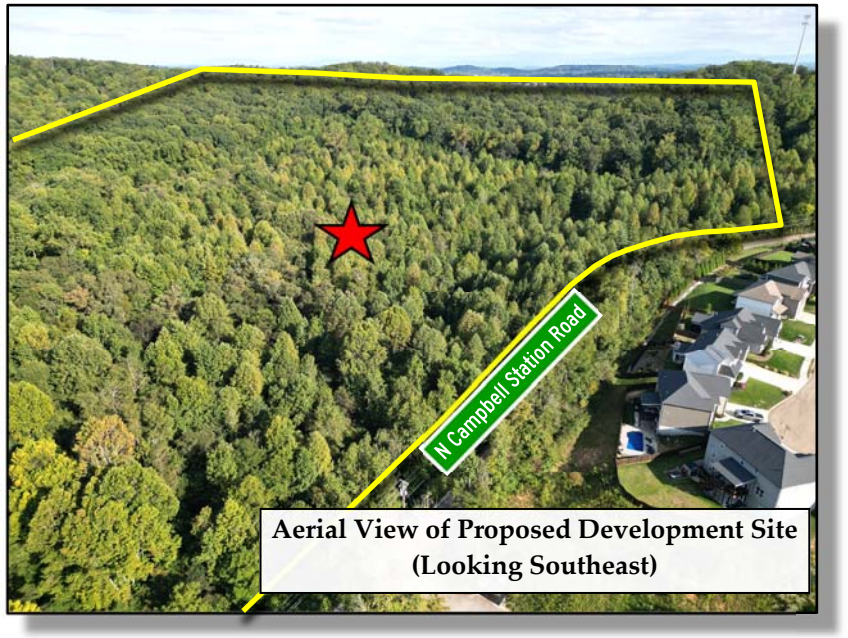
N Campbell Station Road Subdivision

Traffic Count Location, Traffic Signage & Existing Lane Configurations

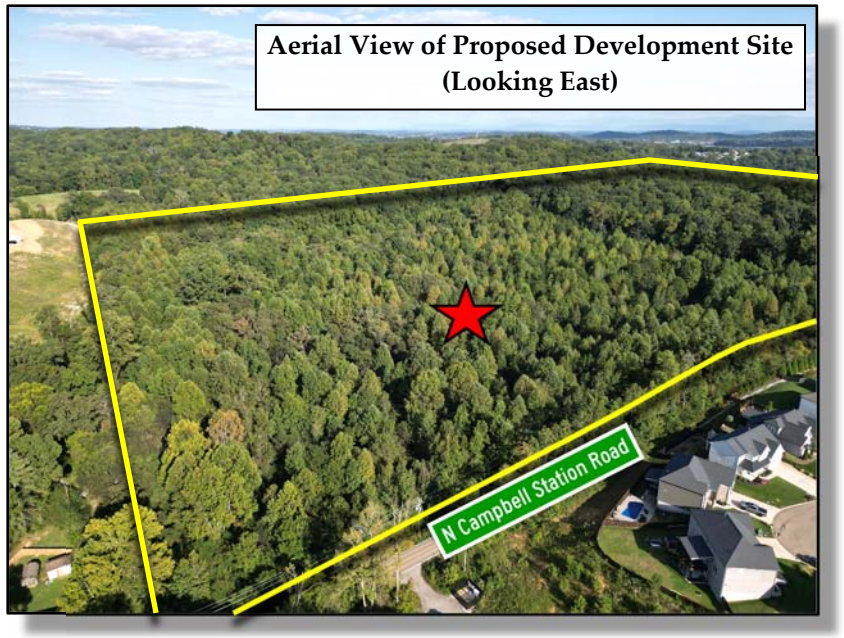
PHOTO EXHIBITS



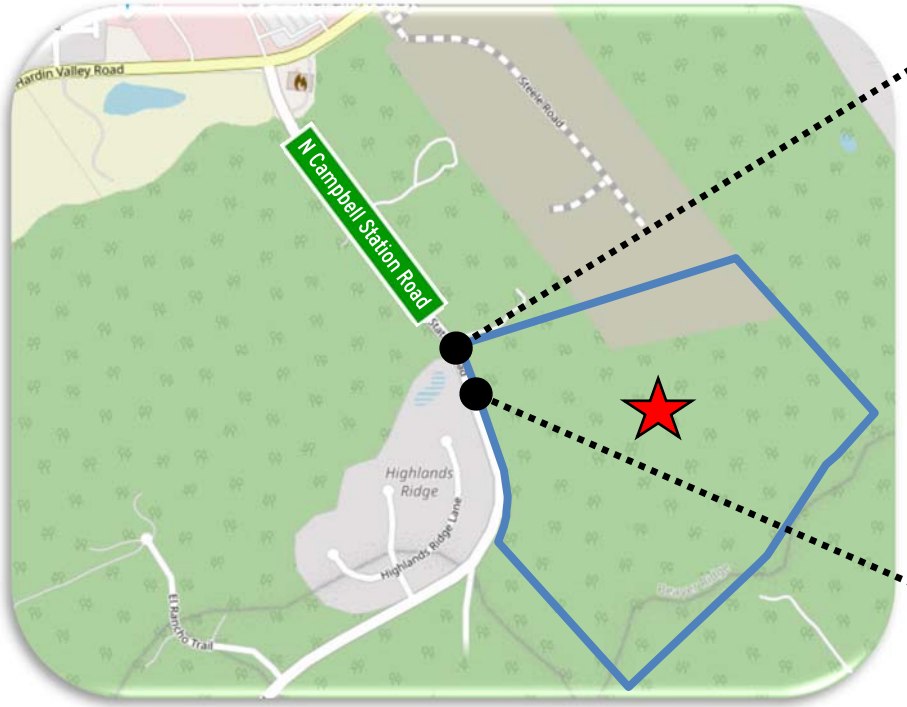
Proposed Development Site



Aerial View of Proposed Development Site (Looking Southeast)

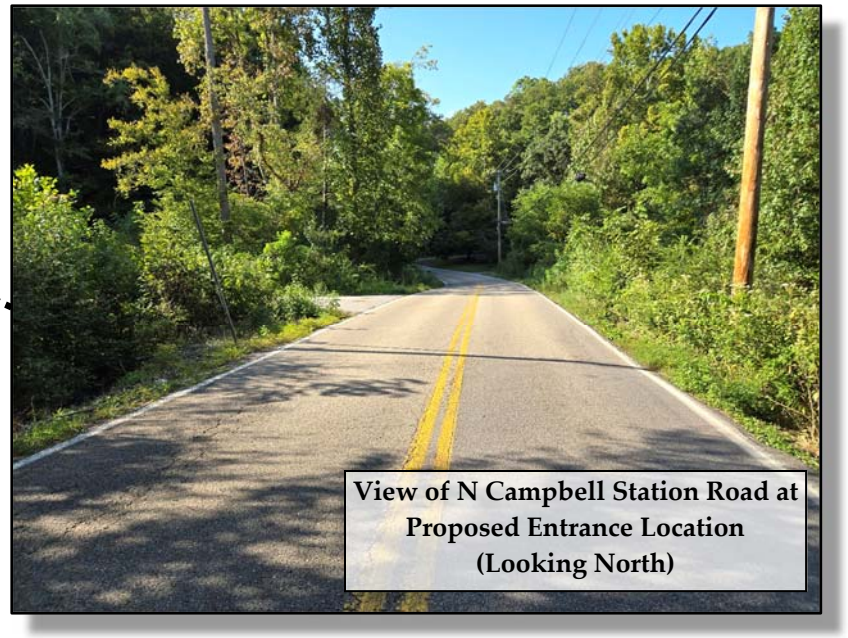


Aerial View of Proposed Development Site (Looking East)



Proposed Development Site

View of N Campbell Station Road at Proposed Entrance Location (Looking South)



View of N Campbell Station Road at Proposed Entrance Location (Looking North)

- **EXISTING TRANSPORTATION VOLUMES PER MODE**:

A couple of annual vehicular traffic count locations are located nearby. They are conducted by the Knoxville Regional Transportation Planning Organization (TPO) and the Tennessee Department of Transportation (TDOT). The count location data is the following and can be viewed with further details in Appendix A:

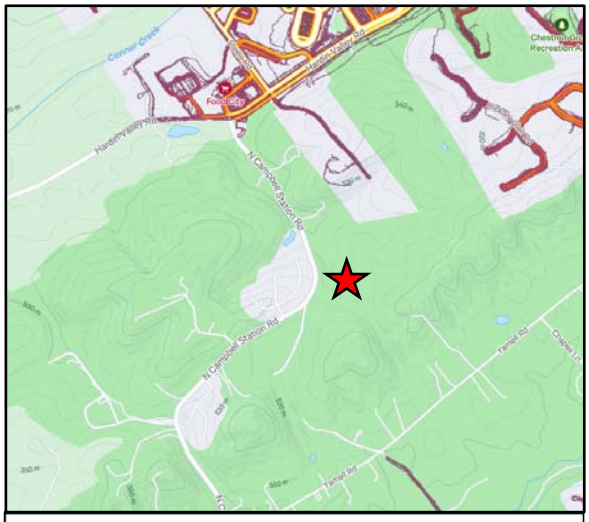
- Existing vehicular roadway traffic:
  The TPO reported the following Average Daily Traffic (ADT):
  - N Campbell Station Road, located south of Hardin Valley Road and north of the development site, with 4,890 vehicles per day in 2024. Between 2014 and 2024, this count station has reported an average annual growth rate of 1.2%.

  The TDOT reported the following Average Annual Daily Traffic (AADT):
  - N Campbell Station Road, located south of Yarnell Road and the development site, with 5,932 vehicles per day in 2024. Between 2014 and 2024, this count station has reported an average annual growth rate of 3.2%.

- Existing bicycle and pedestrian volumes:
  The average daily pedestrian and bicycle traffic along N Campbell Station Road is unknown, but is assumed to be minimal to non-existent due to the lack of sidewalks, relatively high vehicular volumes, and the road's geometry. During the 6-hour traffic count for this project at the intersection of N Campbell Station Road at Pierceson Point Lane, no bicyclists or pedestrians were observed, other than school-age children from residences in The Highlands Subdivision departing and arriving from public school bus stops that occurred on N Campbell Station Road.

  An online website, strava.com, provides "heat" maps detailing routes taken by pedestrians, joggers, and bicyclists. The provided heat maps display data from the last two years, are updated monthly, and are compiled from individuals who have allowed their smart devices to track and record their routes (millions of users). The activities in the maps are represented on the roads by color intensities, with darker colors indicating higher activity. The Strava heat maps indicate that there is no pedestrian traffic on N Campbell Station Road near the development site. However, a minor amount of bicyclist traffic is shown occurring on N Campbell Station Road, which is unexpected given the known road's constraints. Much larger amounts of pedestrian and bicyclist activity are shown to the north, along Hardin Valley Road, the commercial development

near the intersection of N Campbell Station Road, and at the corner of Hardin Valley Road at Steele Road, where Hardin Valley Elementary School is located.



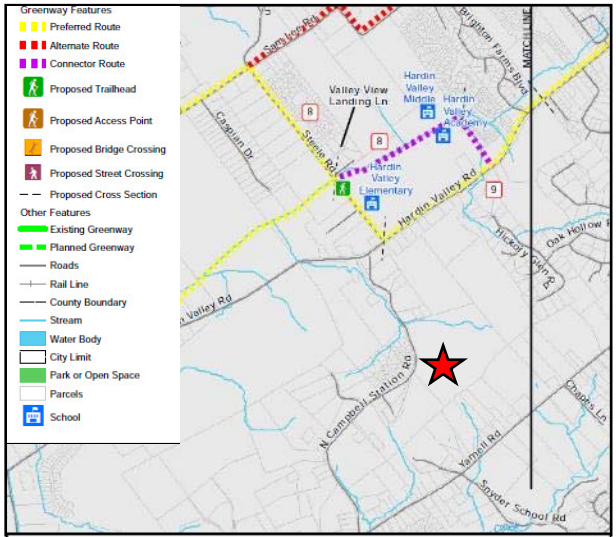
Strava Heat Map for Pedestrian and Joggers

Strava Heat Map for Bicyclists

- **PEDESTRIAN AND BICYCLE FACILITIES**:

Bicycle lanes are unavailable on N Campbell Station Road or on any of the nearby streets to the proposed development site. The closest bicycle facilities are at the Pellissippi Parkway Greenway, 3.3 miles away to the northeast on the Pellissippi State Community College campus. The Pellissippi Parkway Greenway runs from Pellissippi State Community College south to Carmichael Road and parallels Pellissippi Parkway to the west. The greenway is paved and is approximately one mile in length.

Knox County completed a Greenway Corridor Study in 2020. This study evaluated potential alignments for greenways throughout Knox County. The study identified and evaluated one of the corridors, Beaver Creek West. This corridor would run from Melton Hill Park in Hardin Valley to Interstate 75 in Powell. One of the preferred routes for this corridor is shown along Hardin Valley Road near N Campbell Station Road, and just north of the proposed development site. As shown in the image from the greenway study, the yellow dashed lines

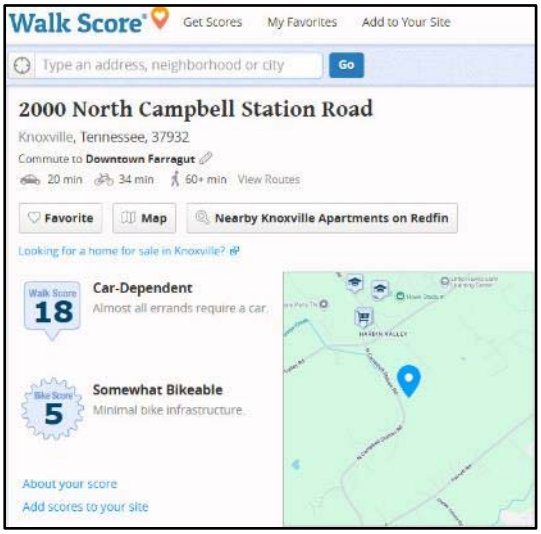


Knox County Greenway Corridor Study (2020)
Beaver Creek West Greenway
Potential Routes

represent the preferred route, the red dashed line represents the alternate route, and the purple line represents a proposed connector route. While the preferred route for the potential Beaver Crest West Greenway will not traverse adjacent to the proposed N Campbell Station Road Subdivision, it will be within a half-mile if built at its preferred location. Sidewalks currently line Hardin Valley Road on both sides, east of the intersection with N Campbell Station Road, but are not provided on N Campbell Station Road.

- **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 to the Walk Score and Bike Score are based on the distance to the closest amenity in various relevant categories (such as businesses, schools, and parks) and are graded from 0 to 100.



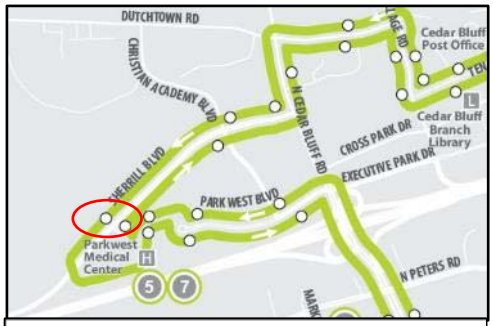
The project site location is graded with a Walk Score of 18 at the approximate development property address (2000 N Campbell Station Road). This Walk Score indicates that almost all errands currently require a vehicle for travel at the development property location. The Walk Score is graded very low due to the lack of sidewalks and nearby amenities. The site is assigned a Bike Score of 5, indicating minimal bike infrastructure. A Transit Score is not provided since there are no public transportation opportunities near the development site. Overall, this study assumed no reductions in vehicle trips due to pedestrian or bicyclist activity by future residents of the N Campbell Station Road Subdivision.

- **TRANSIT SERVICES:**

The City of Knoxville offers a network of public transit options through Knoxville Area Transit (KAT). However, bus service is not available near the development site.

The closest public transit bus stop to the development site is 7.1 miles to the southeast on Route 16, "Middlebrook/Cedar Bluff". The closest bus station is located at the corner of Sherrill

Boulevard and Parkwest Boulevard. This route has established bus service every 60 minutes at this bus stop, and this route map is also included in Appendix B. It operates on weekdays and weekends. Other transit services in the area include the East Tennessee Human Resource Agency (ETHRA) and the Community Action Committee (CAC), which provide transportation services upon request.



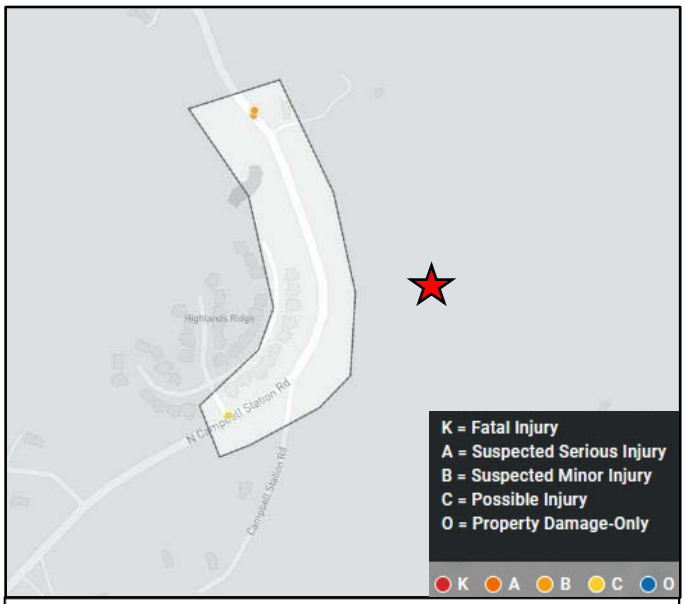
KAT Route 16
"Middlebrook/Cedar Bluff"

Given that the distance to the nearest public bus service is several miles, with no sidewalks or bike lanes available to access the bus stop without a vehicle, the proposed subdivision is not expected or assumed to experience a reduction in vehicle trips due to public transit usage.

- **CRASH DATA**:

For this project, access to the AASHTOWare Safety online platform was provided. This AASHTO (American Association of State Highway and Transportation Officials) platform is a component of several offerings that include compiling crash data for local state DOTs to use in safety analyses. TDOT provides vehicle crash data to this system and is an extension of its existing E-TRIMS (Enhanced Tennessee Roadway Information Management System) database. The crash data in the E-TRIMS system is from the statewide TITAN (Tennessee Integrated Traffic Analysis Network) database. The TITAN database includes all reportable vehicle crash data from Tennessee law enforcement agencies.

In the vicinity of the Proposed Entrance for the development and along the nearby corridor of N Campbell Station Road, three crashes occurred during the past 3 years between September 11th, 2022, and September 11th, 2025. Of the three crashes, one involved a distracted driver, one involved a driver following improperly, and the other involved a lane departure.



Crashes in Study Area from
AASHTOWare Safety Platform

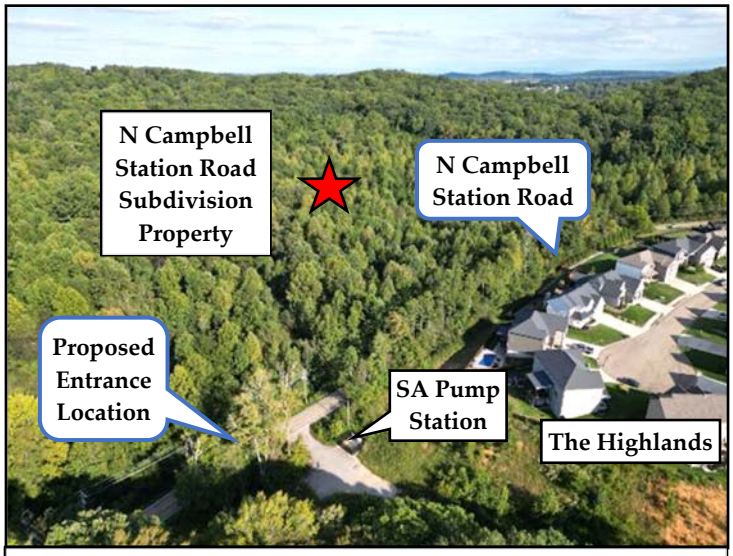
Of the three crashes, one resulted in a possible injury, and the other two had suspected minor injuries. The crash types included an overturn, a rear-end collision, and a vehicle striking a ditch/culvert.

Overall, the crash data along N Campbell Station Road does not readily indicate potential issues with additional vehicles generated to and from the proposed subdivision. However, by default, the additional trips generated by the development will slightly increase exposure and the potential for vehicle conflicts.

PROJECT DESCRIPTION

- **LOCATION AND SITE PLAN:**

The proposed plan layout, featuring a maximum of 122 single-family detached houses, is designed by Urban Engineering and is illustrated in Figure 3. As shown in the figure, one entrance will be constructed for the development to the eastern edge of N Campbell Station Road. The Proposed Entrance on N Campbell Station Road will be 50 feet to the north of the driveway entrance to the sanitary pump station for The Highlands Subdivision (centerline to centerline). The Proposed Entrance will also be approximately 1,800 feet south of Hardin Valley Road and 1,350 feet to the north-northeast of Pierceson Point Lane.



View of Development Site (Looking Southeast)

The civil site design includes four new internal streets, all of which terminate at cul-de-sacs and intersect with one another at t-intersections. The N Campbell Station Road Subdivision will have a substantial amount of undeveloped space and common areas for the residents.

The typical lot dimensions for the single-family detached houses in the subdivision will be between 120 and 145 feet deep and 60 feet wide, providing a typical lot area of between 7,200 to 8,700 square feet. Each house will have a separate garage and driveway.

The completion schedule for this residential development depends on economic factors and construction timelines and will require an extensive effort to develop due to the site's topography and features. This project is also contingent on permitting, design, and other regulatory approvals. Overall, the local real estate market for new housing remains quite competitive due to population growth and other factors. Thus, this study assumed that the total construction build-out of the N Campbell Station Road Subdivision and full occupancy would occur by 2029.

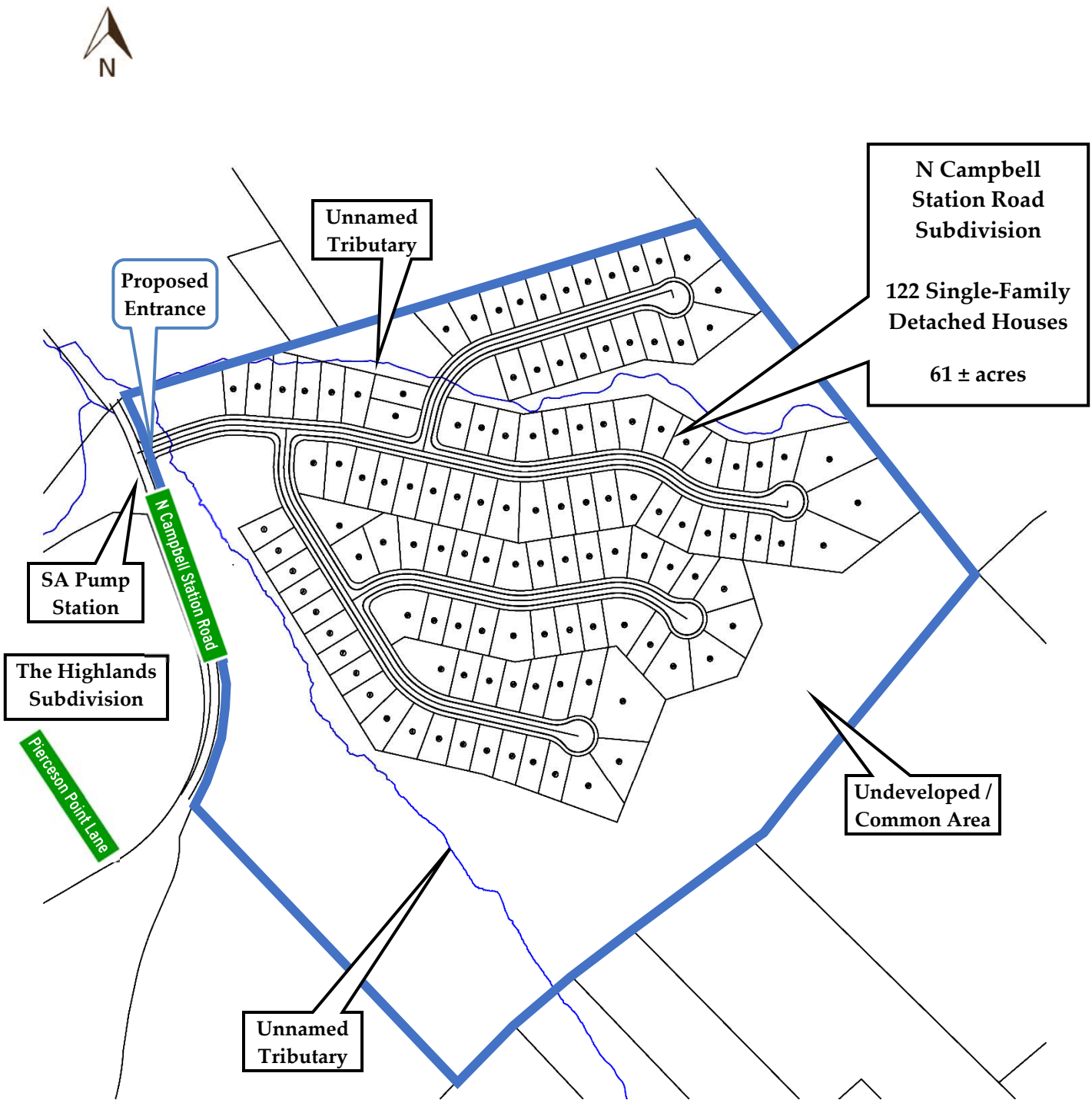
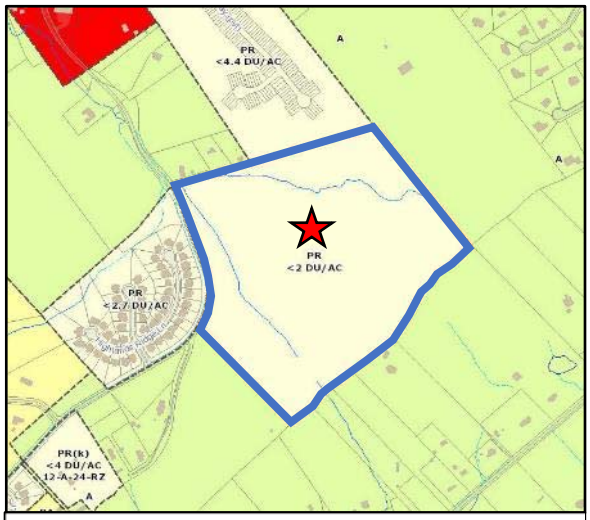


Figure 3
Proposed Plan Layout
N Campbell Station Road Subdivision

Not to Scale – Annotated by Ajax Engineering for Display Purposes

- **PROPOSED USES AND ZONING REQUIREMENTS:**

The existing single parcel, comprising the N Campbell Station Road Subdivision development property, is located in Knox County, TN, and is zoned as Planned Residential (PR) with a density of less than 2 units per acre. Knox County approved this rezoning in September 2021, and the previously mentioned TIL was produced for this rezoning. 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 C and shown here. The existing adjacent surrounding zoning and land uses are the following:



KGIS Existing Zoning Map

- Nearly all the adjacent properties are zoned as Agricultural (A). The exception is two adjacent residential developments that are also zoned as Planned Residential (PR).
- Three adjacent properties to the northwest are zoned Agricultural (A), and all three consist of single-family detached houses with two driveways providing access to the west at N Campbell Station Road. To the northeast, the proposed subdivision will be adjacent to the Steele Landing Apartments development, which is currently finishing construction. This apartment complex is on property zoned as Planned Residential (PR) with a density of less than 4.4 units per acre. This apartment complex, located to the northeast, has access to Hardin Valley Road to the north and comprises the southern leg at the signalized intersection of Hardin Valley Road and Steele Road.
- The development is bound by N Campbell Station Road to the west. Across N Campbell Station Road, the property is zoned as Planned Residential (PR) and is occupied by 48 single-family detached houses in The Highlands Subdivision. There are two public streets in this other subdivision, and Pierceson Point Lane provides the external road access to N Campbell Station Road at a t-intersection.
- To the east, the development property is bound by a single large parcel zoned as Agricultural (A) that has a single-family detached house adjacent to Hardin Valley Road on its northern end and a barn on its southern end. This large parcel is roughly half pasture and half forested outside the building structures. Access to this parcel is

currently provided by a private driveway adjacent to a single-family detached house, located on Hardin Valley Road across from the Hardin Valley Academy High School.

- To the south, the development property abuts five large parcels along Beaver Ridge, all of which are occupied by single-family detached houses, except for one, and are covered mainly by forested areas. All of these parcels are zoned as Agricultural (A) and have road access to the south on Yarnell Road via private driveways.
- A large single parcel abuts the development property to the southwest, is zoned as Agricultural (A), and is entirely forested except for a small area along the top of Beaver Ridge that is occupied by a cell phone tower. This property, and access to the tower, is provided to N Campbell Station Road to the north by a gravel road that runs along the property edge abutting the proposed N Campbell Station Road Subdivision property.

- **ON-SITE CIRCULATION:**

The total length of the four internal roads in the N Campbell Station Road Subdivision will be 4,511 feet (0.85 miles), designed and constructed to Knox County specifications. The development will have asphalt-paved internal roadways with concrete curbs. The lane widths internally will be 13 feet each, for a total pavement width of 26 feet. The public right-of-way within the development will be 50 feet wide. Knox County will maintain the streets in the subdivision after construction, and these will be dedicated public roads.

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

In addition to residential passenger vehicles, the internal roadways will provide service, delivery, maintenance, and access for 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, as was recently observed for The Highlands Subdivision during the traffic count.

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 larger vehicle types, as well as residents' standard passenger vehicles. They will be sufficiently sized to allow vehicles to turn around in the proposed cul-de-sacs.

ANALYSIS OF EXISTING AND PROJECTED CONDITIONS

- **EXISTING TRAFFIC CONDITIONS:**

This study conducted a 6-hour traffic count at the nearby unsignalized t-intersection of N Campbell Station Road at Pierceson Point Lane on Wednesday, September 10th, 2025. Manual traffic counts were conducted to identify and tabulate the morning and afternoon peak period volumes, as well as the travel directions, at and near the proposed development site. The intersection had an observed morning peak hour from 7:30 to 8:30 am and an afternoon peak hour from 3:30 to 4:30 pm. The manual tabulated traffic counts at the intersection and at the Proposed Entrance location on N Campbell Station Road can be reviewed in Figure 4 and Appendix D. The thru volumes shown on N Campbell Station Road at the Proposed Entrance location were derived from the traffic volumes tabulated at the intersection. Some observations of the traffic on the adjacent N Campbell Station Road corridor include the following:

- The majority of observed vehicles during the traffic count were passenger cars. However, many public school buses and a single semi-tractor-trailer were observed on N Campbell Station Road. Two different private trash collection trucks were observed entering and exiting The Highlands Subdivision.
- During the 6-hour count, no pedestrians were observed on N Campbell Station Road. However, 16 school-age children were observed being picked up and dropped off at the intersection of N Campbell Station Road at Pierceson Point Lane. All of these children were from The Highlands Subdivision. Three school bus stops were observed at this intersection during the traffic counts.
- Overall, the majority of traffic volumes on N Campbell Station Road were from the north towards the south in both the AM and PM peak hours. The afternoon peak hour was observed to occur from 3:30 to 4:30 pm, earlier than the traditional afternoon "rush hour", and is highly attributable to the nearby Hardin Valley public schools, located fairly close to the N Campbell Station Road at Hardin Valley Road intersection.

The previous TIL conducted traffic counts during the Covid-19 pandemic, and as a result, the TIL's vehicle count was increased by 20% to account for potential reduced traffic. With a 20% increase, this previous count in 2021, as compared to the count conducted for this study, roughly approximates the observed existing AM peak hour flows on N Campbell Station Road, but largely underestimates the current southbound traffic flows and overestimates the current northbound traffic during the PM peak hour.

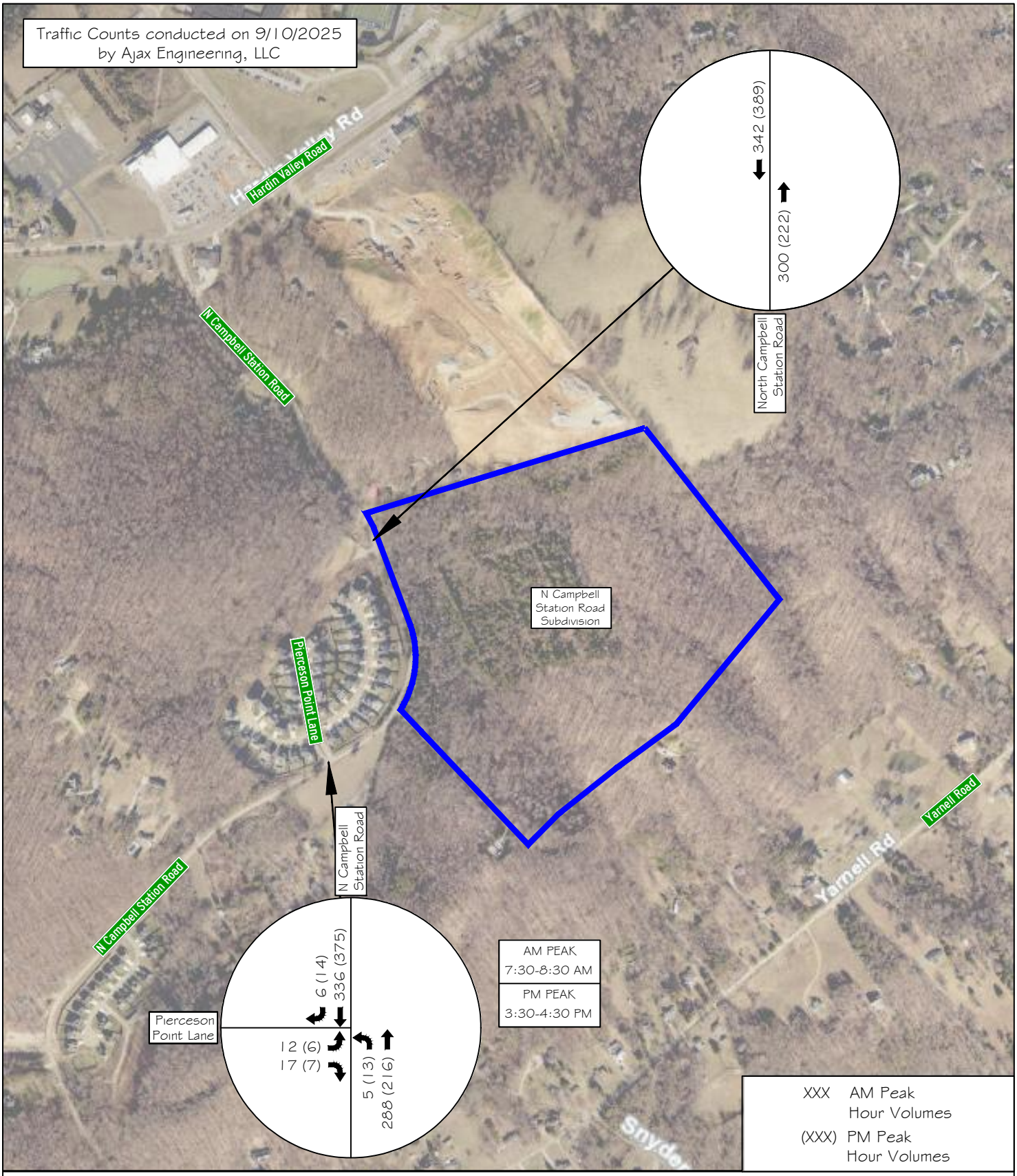


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FIGURE 4

N Campbell Station Road Subdivision

2025 Peak Hour Traffic Volumes - EXISTING TRAFFIC CONDITIONS

Capacity analyses were conducted to determine the Level of Service (LOS) for the existing 2025 intersection traffic volumes, as shown in Figure 4, at the unsignalized intersection of N Campbell Station Road at Pierceson Point Lane. These results are being provided as a courtesy, as this intersection was not included in the scope of work provided by Knoxville/Knox County Planning. The capacity analyses were calculated following the Highway Capacity Manual (HCM) methods and utilizing Synchro (Version 12) traffic software.

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 the 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 the 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.

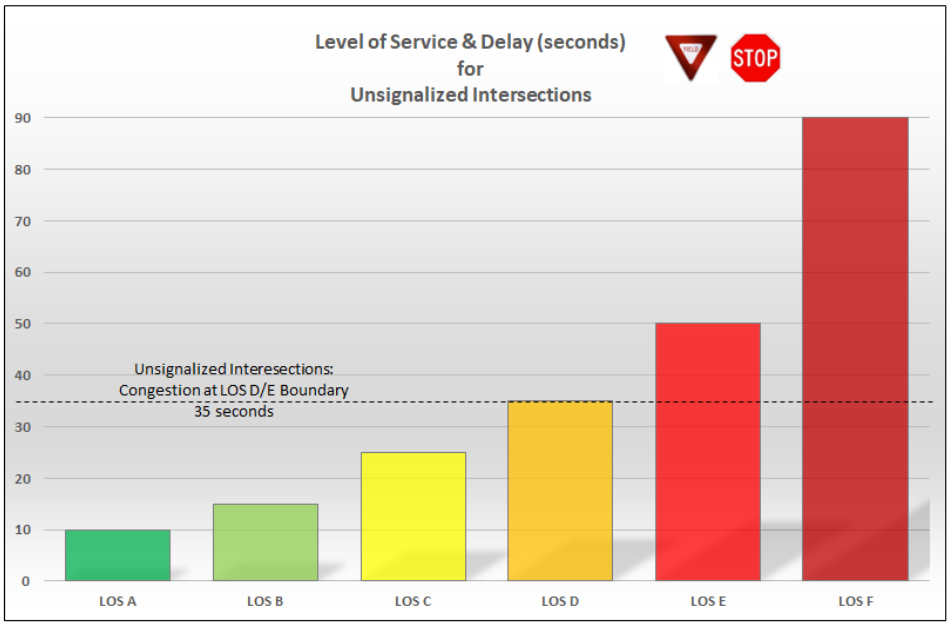
For unsignalized intersections, LOS is measured in terms of delay (in seconds). This measure attempts to quantify delay, including travel time, driver discomfort, and fuel consumption. For unsignalized intersections, the analysis assumes that the mainline thru

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 the left-turn movements on the major street. Table 2 lists the level of service criteria for unsignalized intersections. The analysis results of unsignalized intersections using the HCM methodologies are conservative due to the more significant vehicle gap parameters used. 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 that nearby upstream and downstream signalized intersections can sometimes produce. For unsignalized intersections, in most instances, the upper limit of acceptable delay during peak hours is the LOS D/E boundary at 35 seconds.

TABLE 2
LEVEL OF SERVICE AND DELAY FOR UNSIGNALIZED INTERSECTIONS

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

Source: Highway Capacity Manual, 7th Edition



The intersection capacity results for the existing 2025 peak hour traffic are shown in Table 3. The intersection in the table is shown with a LOS (Level of Service) designation, delay (in seconds), and v/c ratio (volume-to-capacity ratio) for the AM and PM peak hours. Appendix E includes the worksheets for the existing 2025 peak hour capacity analyses.

As shown in Table 3, the intersection of N Campbell Station Road at Pierceson Point Lane is calculated to operate with very good LOS and short vehicle delays in the existing peak hour 2025 conditions for residents and motorists in The Highlands Subdivision.

TABLE 3
2025 INTERSECTION CAPACITY ANALYSIS RESULTS -
EXISTING TRAFFIC CONDITIONS

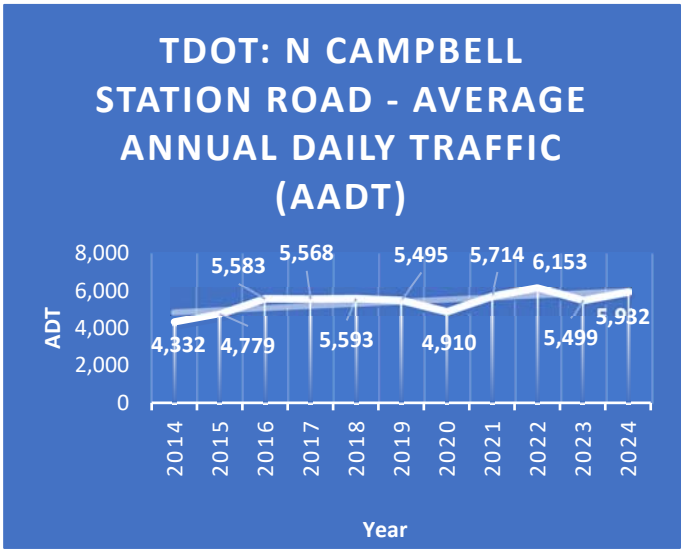
INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
N Campbell Station Road (SB & NB) at Pierceson Point Lane (EB)	STOP Unsignalized	Northbound Left	A	8.1	0.006	A	8.7	0.016
		Eastbound Left/Right	B	11.9	0.085	B	13.0	0.051

Note: All analyses were calculated in Synchro 12 software and reported using 7th Edition intersection methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio

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

Horizon year traffic conditions represent the projected traffic volumes in the study area without the proposed project being developed (no-build option). This proposed development's build-out and full occupancy are assumed to occur by 2029.

According to the nearby TPO and TDOT count stations, vehicular traffic has experienced moderate growth over the past few years. Specifically, the TDOT data shown in Appendix A indicates that N Campbell Station Road, to the south of the development site, has experienced an annual growth rate of 3.2% over the past decade, from 2014 to 2024. While sporadically collected, the TPO data shows that N Campbell Station Road, to the north of the development site, has experienced a growth rate of 1.2% from 2014 to 2024.



Thus, to account for higher future growth due to its location in the high-growth Hardin Valley area, this study used an annual growth rate of +4% to calculate future growth on N Campbell Station Road, ensuring a conservative result. The annual growth rates were applied to the existing 2025 volumes tabulated on N Campbell Station Road to estimate future volumes in the horizon year of 2029, without the proposed development traffic. This growth assumption is the same percentage that was assumed and used for the previous TIL.

Figure 5 shows the projected horizon year traffic volumes at the intersection tabulated during the traffic count and at the Proposed Entrance location on N Campbell Station Road for the 2029 AM and PM peak hours without the proposed residential subdivision.

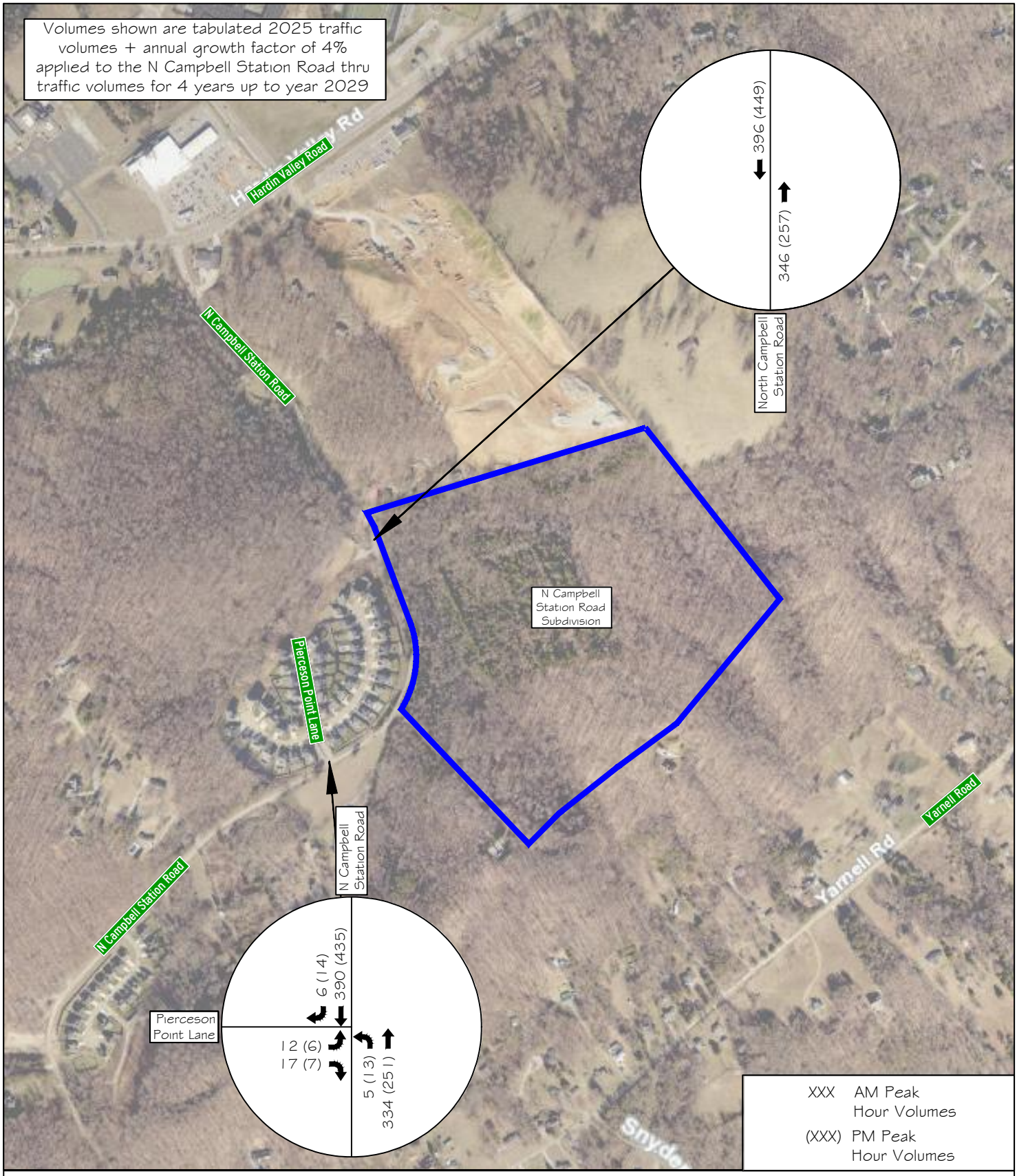


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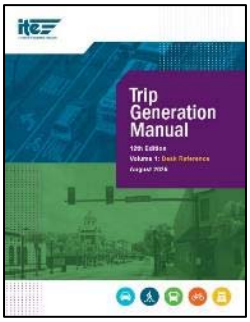
FIGURE 5

N Campbell Station Road Subdivision

2029 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 122 single-family detached houses in the N Campbell Station Road Subdivision will generate was calculated based on rates and equations provided by the Trip Generation Manual, 12th Edition, an Institute of Transportation Engineers (ITE) publication. The Trip Generation Manual is the traditional and most popular resource for determining trip generation rates in transportation impact studies. 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 4
TRIP GENERATION FOR N CAMPBELL STATION ROAD SUBDIVISION
122 Single-Family Detached Houses

ITE LAND USE CODE	LAND USE DESCRIPTION	# OF 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	122	1,250	27%	73%		62%	38%	
				24	63	87	72	44	116
Total New Volume Site Trips			**1,250**	**24**	**63**	**87**	**72**	**44**	**116**

ITE Trip Generation Manual, 12th Edition
Trips calculated by using Fitted Curve Equations

For the proposed N Campbell Station Road Subdivision, it is estimated that 24 vehicles will enter and 63 will exit, resulting in a total of 87 generated trips during the AM peak hour in 2029. Similarly, it is estimated that 72 vehicles will enter and 44 will exit, resulting in a total of 116 generated trips during the PM peak hour in 2029. The calculated trips generated for an average weekday are estimated to be 1,250 vehicles for the proposed development. As discussed earlier, no vehicle trip reductions were included in the calculations or analysis.

- **TRIP DISTRIBUTION AND ASSIGNMENT:**

The projected trip distribution and assignment for the N Campbell Station Road Subdivision are based on several sources and engineering judgment. The first source is based on the existing traffic count volumes and observed travel directions collected on N Campbell Station Road at Pierceson Point Lane. Overall, during both morning and afternoon peak hours, the predominant traffic flow on N Campbell Station Road was from the north towards the south, more so in the afternoon than in the morning.

The observed entering and exiting splits on Pierceson Point Lane for the nearby, existing The Highlands Subdivision are projected to be a good analog for the future residents of the N Campbell Station Road development, since this intersection serves a similar residential land use as proposed for the development site and is adjacent. This other subdivision has 48 occupied single-family detached houses. The entering and exiting percentages during the observed AM and PM peak hours to and from Pierceson Point Lane at N Campbell Station Road are shown in the adjacent table:

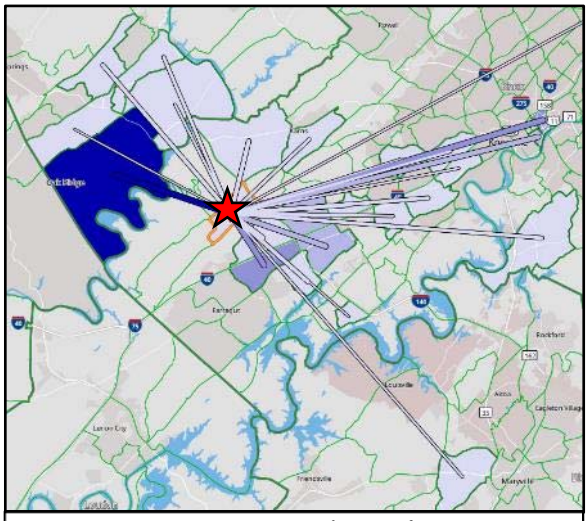
Observed Peak Hour Entering and Exiting Vehicle Distribution at The Highlands Subdivision

	Volumes	%
AM PEAK HOUR		
ENTER FROM NORTH	6	55%
ENTER FROM SOUTH	5	45%
EXIT TO NORTH	12	41%
EXIT TO SOUTH	17	59%
PM PEAK HOUR		
ENTER FROM NORTH	14	52%
ENTER FROM SOUTH	13	48%
EXIT TO NORTH	6	46%
EXIT TO SOUTH	7	54%

Overall, the entering and exiting volumes for The Highlands Subdivision showed a fairly even distribution of entering and exiting traffic during both morning and afternoon peak hours. However, the majority of entering traffic came from the north, and the majority of exiting traffic headed to the south on N Campbell Station Road.

Another source for determining the projected trip distribution is based on work-related trips in the local area. Work-based trips will be a significant impetus for trips generated by the development, and these trips are more likely to travel to and from the west, south, and east. This assertion is based on data from the United States Bureau website for Census Tract 59.10, where the proposed subdivision property is located. Based on the 2022 (latest available) census data, as presented in Appendix G, most work-based trips in the surrounding area correspond to Oak Ridge, TN; downtown Knoxville; the University of Tennessee; areas of West Knoxville; and Maryville, TN. Some of the work-based trips also correspond to the Forks of the River Industrial

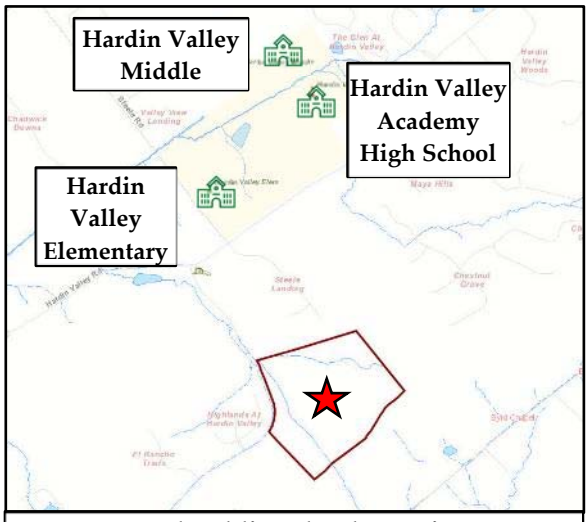
Park and Karns areas. This data suggests a fairly even split and an inclination to travel to and from both the north and south on N Campbell Station Road for work-based trips by future residents. Many of these external work locations will be accessed both by utilizing Pellissippi Parkway (SR 162) to the northeast and Interstate 40/75 to the south.



Top 25 Locations of 2022 Census Bureau Work-Based Trips to & from Census Tract 59.10

In addition to employment centers, some generated traffic will travel to and from public and private schools. Schools will be another incentive for making external trips. The proposed subdivision parcel is currently zoned for all the Hardin Valley public schools: Hardin Valley Elementary, Hardin Valley Middle, and Hardin Valley Academy High School. These zoned public schools for the development property are located nearby to the north, just off Hardin Valley Road, and just east of N Campbell Station Road. The zoned schools are between 0.7 and 1.2 miles from the proposed subdivision by roadway. All public school-related travel to and from the proposed subdivision will utilize the section of N Campbell Station Road to the north. The closest school is Hardin Valley Elementary, located 0.7 miles to the northeast, and the middle and high school will both be 1.2 miles away to the northeast.

The Knox County Schools Transportation Department has developed Parental Responsibility Zones (PRZs) to determine whether students are eligible for 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. All school-age children in the proposed subdivision attending Hardin Valley elementary, middle, and high schools will likely be within the PRZs, depending on the exact measurement point, and will require private transportation, which will prevent them from utilizing the public school bus service.



Zoned Public School Locations

Based on all these factors, Figure 6 shows the projected distribution of traffic entering and exiting the residential subdivision at the Proposed Entrance on N Campbell Station Road and the subsequent travel thru the nearby intersection of N Campbell Station Road at Pierceson Point Lane. The percentages shown in the figure pertain only to the trips generated by the proposed dwellings in the N Campbell Station Road Subdivision, calculated from the ITE trip rates. Ultimately, the projected trip distribution was heavily based on the observed residential traffic at the intersection of N Campbell Station Road and Pierceson Point Lane, the entrance for the nearby The Highlands Subdivision. This assumed distribution of future travel roughly approximated what was assumed and used in the previous TIL produced for this proposed site property.

Figure 7 shows the traffic assignment of the computed trips generated by the N Campbell Station Road Subdivision based on the assumed distribution of trips shown in Figure 6.

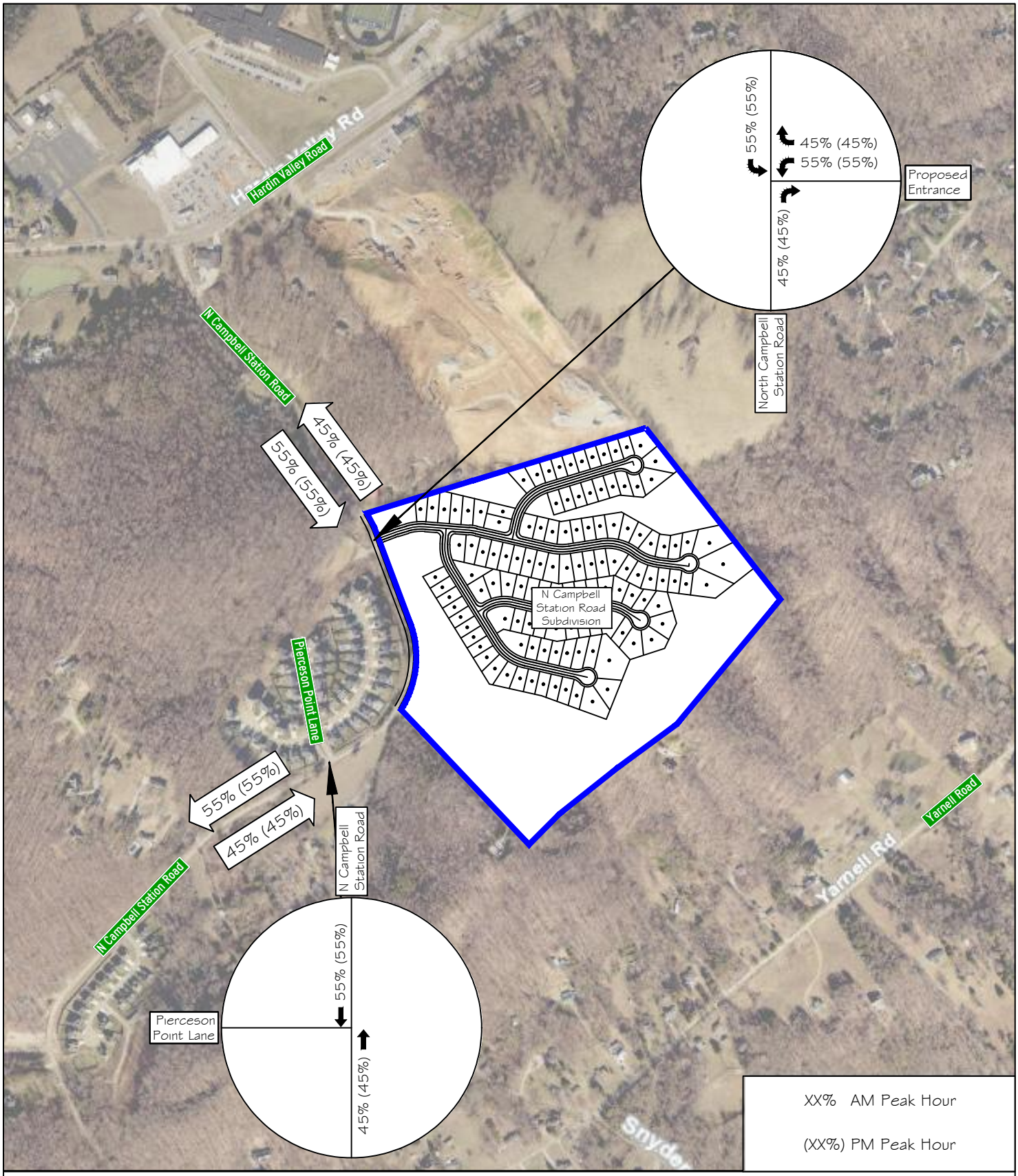


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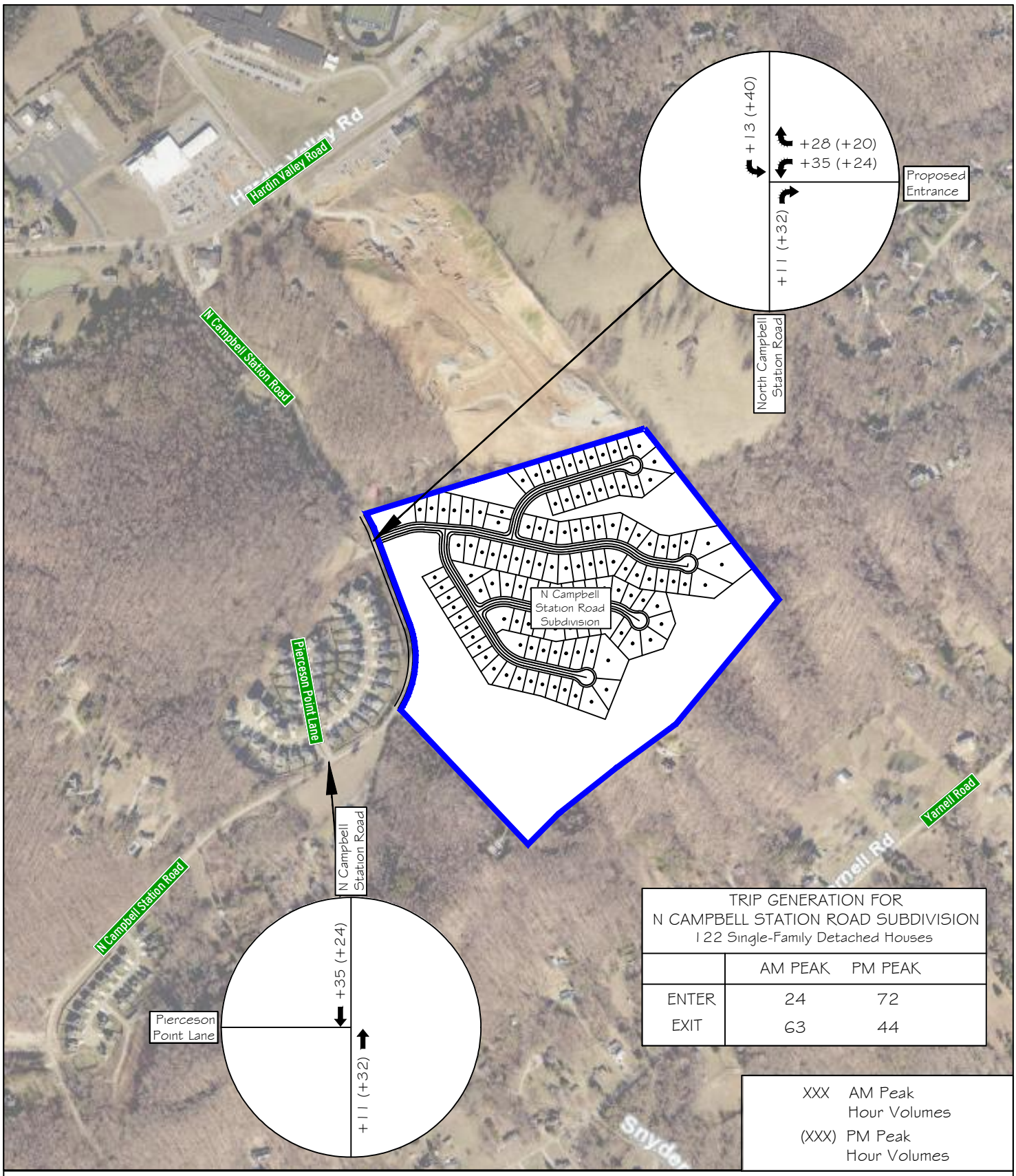
FIGURE 6

N Campbell Station Road Subdivision

Directional Distribution of Generated Traffic during AM and PM Peak Hours



TRIP GENERATION FOR
N CAMPBELL STATION ROAD SUBDIVISION
122 Single-Family Detached Houses

	AM PEAK	PM PEAK
ENTER	24	72
EXIT	63	44

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

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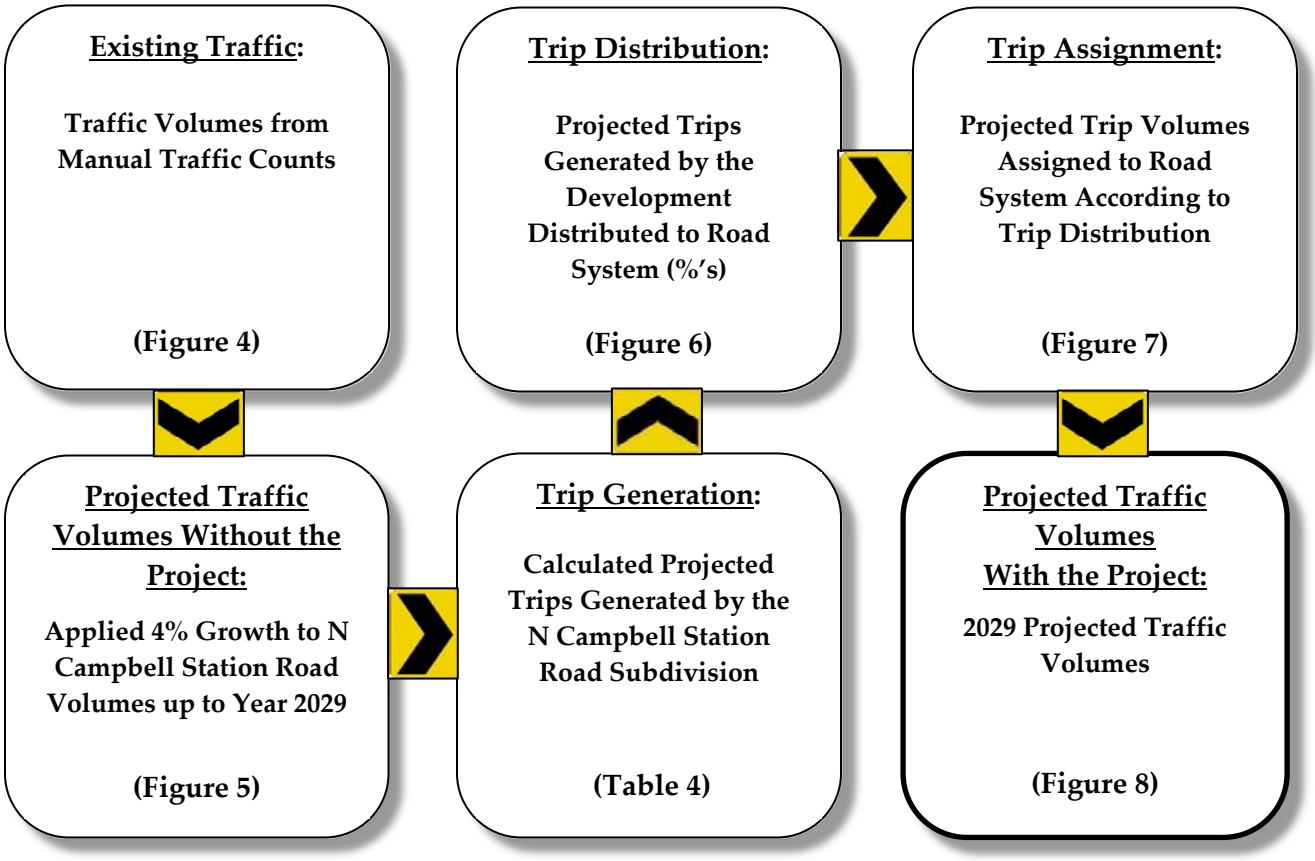
FIGURE 7

N Campbell Station Road Subdivision

Traffic Assignment of Generated Trips during AM and PM Peak Hours

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

Several additive steps were taken to estimate the total projected traffic volumes at the Proposed Entrance at N Campbell Station Road, and also at the nearby intersection of N Campbell Station Road and Pierceson Point Lane, when the N Campbell Station Road Subdivision is constructed and fully occupied in 2029. The steps are illustrated below for clarity and review:



The calculated peak hour traffic generated by the N Campbell Station Road Subdivision was added to the 2029 horizon year traffic by following the predicted trip distributions and assignments. Figure 8 shows the projected volumes at these intersections in 2029.

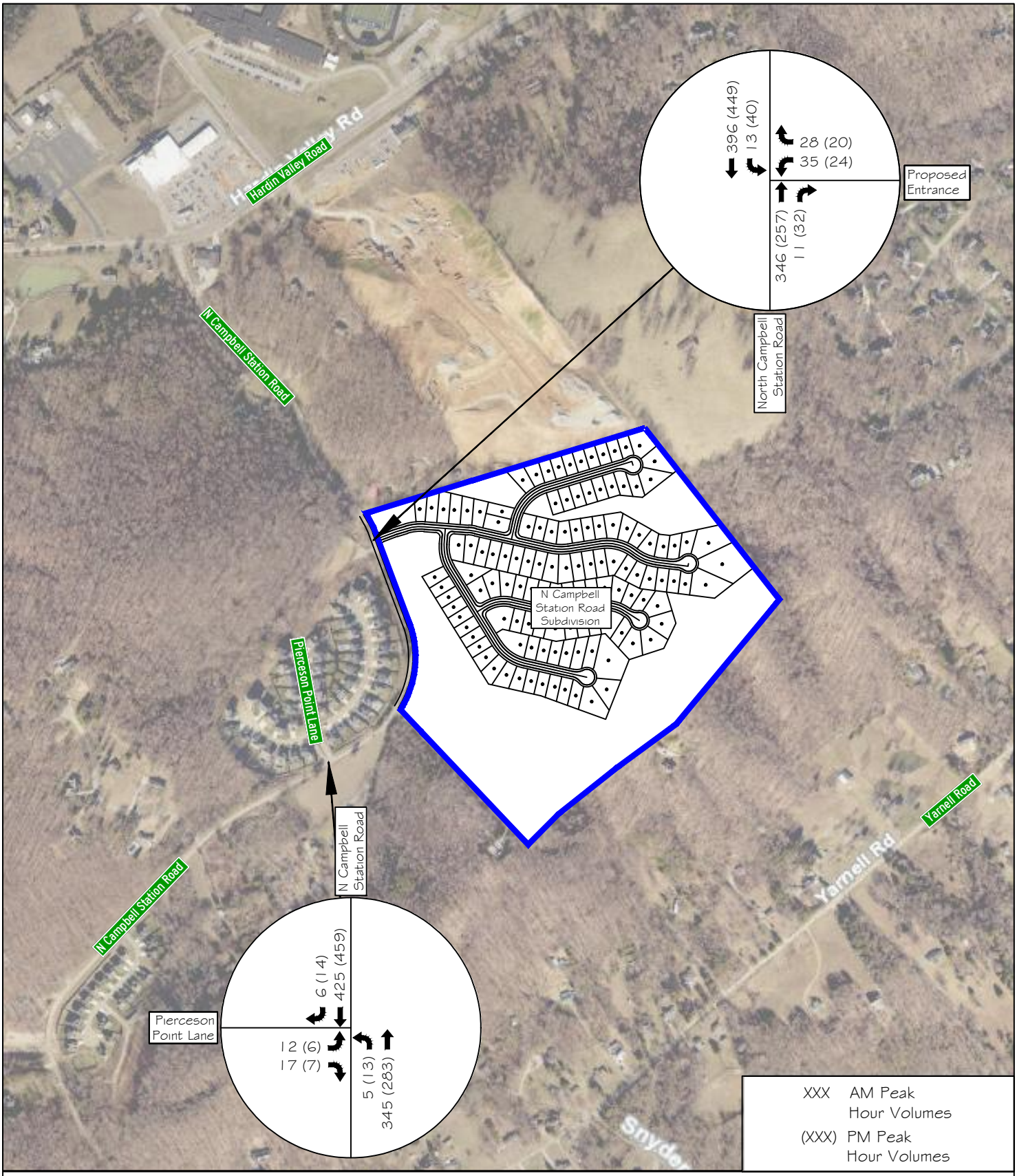


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FIGURE 8

N Campbell Station Road Subdivision

2029 Peak Hour Traffic Volumes - PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT

The intersection capacity results from the projected 2029 peak hour traffic with the new residential subdivision are shown in Table 5. The results in the table show that both intersections are projected to operate with average to very good LOS and average to short vehicle delays in the 2029 AM and PM peak hours. Appendix E includes the capacity analysis worksheets from the software.

TABLE 5
2029 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
N Campbell Station Road (SB & NB) at Pierceson Point Lane (EB)	STOP Unsignalized	Northbound Left	A	8.3	0.006	A	9.1	0.018
		Eastbound Left/Right	B	13.3	0.100	B	14.8	0.062
N Campbell Station Road (SB & NB) at Proposed Entrance (WB)	STOP Unsignalized	Westbound Left/Right	C	15.3	0.167	B	14.9	0.119
		Southbound Left	A	8.1	0.012	A	8.0	0.036

Note: All analyses were calculated in Synchro 12 software and reported using 7th Edition intersection methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio

- **POTENTIAL TRANSPORTATION SAFETY ISSUES:**

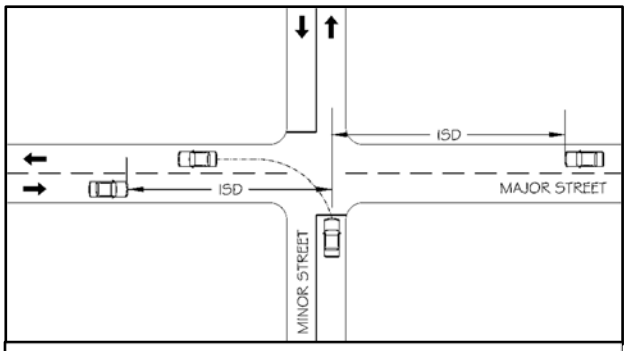
The study area was investigated for potential existing and future safety issues when the development is constructed. These transportation features are discussed in the following pages.

- **EVALUATION OF SIGHT DISTANCE**

For intersections, sight distance evaluations are categorized into two types: 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. 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) a left-turn, (2) a right-turn, or (3) a crossing maneuver across the major street. For turns from the minor street, the 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 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.



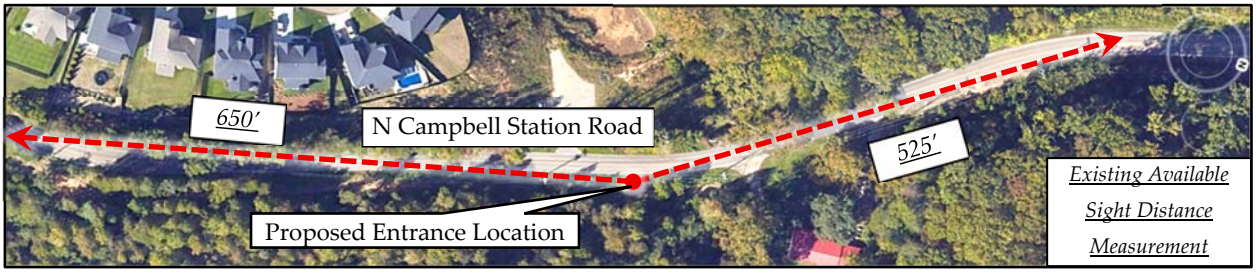
Intersection Sight Distance Diagram

N Campbell Station Road has a posted speed limit of 30 miles per hour. Based on Knox County's policy of requiring 10 feet of sight distance per 1 mph of speed, the required intersection sight

distance is 300 feet. This distance is required for a motorist to exit safely to the left or right from the Proposed Entrance onto N Campbell Station Road.

As a safety check, visual observations of the sight distances from the Proposed Entrance location at N Campbell Station Road were undertaken. Using a Nikon Laser Rangefinder, the available sight distance was visually estimated to be 650 feet to the south and 525 feet to the north on N Campbell Station Road. However, vegetation along the side of N Campbell Station Road hampered the measurements. Overall, sight distance to the south beyond 650 feet is not available due to the nearly 90-degree sharp horizontal curve on N Campbell Station Road. Sight distance to the north beyond 525 feet is not available due to reverse curves and vegetation along N Campbell Station Road. Based on visual observation, the available sight distances from the Proposed Entrance location will be adequate for vehicles exiting the development; however, further confirmation is needed due to the vegetation obstructing the views.

Images of the existing sight distances from the Proposed Entrance location are labeled in the following with the required ISD and rangefinder-measured sight distances.



View of Sight Distance on N Campbell Station Road at Proposed Entrance Location (Looking South)

View of Sight Distance on N Campbell Station Road at Proposed Entrance Location (Looking North)

- **EVALUATION OF TURN LANE THRESHOLDS**

The need for a separate northbound right-turn or a southbound left-turn entering lane on N Campbell Station Road at the Proposed Entrance was evaluated in the projected 2029 conditions.

The criteria used for this turn lane evaluation 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 intersection is within a 30 mph speed zone; thus, the intersection was evaluated based on this posted speed. The worksheets for these evaluations are provided in Appendix H.

Based on the projected 2029 traffic volumes at the Proposed Entrance intersection, separate left and right-turn entering lanes on N Campbell Station Road will not be warranted. This evaluation yielded the same result as the previous TIL, which assumed twice as many houses would be constructed on this property.

- **PROJECTED VEHICLE QUEUES**

An additional software program calculated the projected vehicle queues at the Proposed Entrance intersection during the 2029 AM and PM peak hours. The previously mentioned Synchro traffic software includes SimTraffic. The Synchro portion of the software performs macroscopic calculations for intersections, while SimTraffic handles micro-simulation and animation of vehicular traffic. SimTraffic software was utilized to estimate the projected vehicle queues at the intersections.

The 95th percentile vehicle queue is the recognized measurement in the transportation engineering profession, serving as the design standard for 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 outcomes obtained during ten one-hour traffic simulations in the software.

The 95th percentile vehicle queue lengths at the Proposed Entrance intersection are shown in Table 6 for the 2029 projected peak hour conditions. The vehicle queue worksheet results from the SimTraffic software are in Appendix I. Once again, the results for the intersection of N Campbell Station Road at Pierceson Point Lane are provided as a courtesy since this intersection was not included in the requested scope of work from Planning.

TABLE 6
VEHICLE QUEUE SUMMARY -
2029 PROJECTED PEAK HOUR TRAFFIC CONDITIONS WITH THE PROJECT

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	95th PERCENTILE VEHICLE QUEUE LENGTH (ft)	
			AM PEAK HOUR	PM PEAK HOUR
N Campbell Station Road (SB & NB) at Pierceson Point Lane (EB)	STOP Unsignalized	Northbound Left	16	32
		Eastbound Left/Right	47	35
N Campbell Station Road (SB & NB) at Proposed Entrance (WB)	STOP Unsignalized	Westbound Left/Right	50	47
		Southbound Left/Thru	29	52

Note: 95th percentile vehicle queues were calculated in SimTraffic 12 software

Table 6 shows minimal vehicle queue lengths at the Proposed Entrance intersection approaches in the 2029 AM and PM peak hours. The longest vehicle queues at the Proposed Entrance intersection are for the exiting approach, with a queue of 50 feet in the morning peak hour and 47 feet in the afternoon peak hour. Based on these results, the longest vehicle queue exiting at the Proposed Entrance intersection will be two passenger vehicles, assuming each vehicle is 25 feet in length. The 95th percentile vehicle queue lengths for entering southbound left turns are calculated to be 29 feet and 52 feet in the AM and PM peak hours, approximately one to just over two passenger cars. The vehicle queues at the intersection for The Highlands are also calculated to be short and reasonable in the projected 2029 conditions.

CONCLUSIONS & RECOMMENDATIONS

The following is an overview of recommendations to minimize the transportation impacts of the N Campbell Station Road Subdivision on the adjacent transportation system while attempting to achieve an acceptable traffic flow and safety level.

1 **N Campbell Station Road at Proposed Entrance**: A single exit lane for the N Campbell Station Road Subdivision, allowing both left and right turn movements at N Campbell Station Road, will be sufficient according to the calculations. The delays associated with these exiting vehicle movements are projected to be minimal in the projected 2029 conditions.

1a) Future landscaping, existing vegetation, or proposed signage must not impact the intersection sight distances looking from the Proposed Entrance to the north and south on N Campbell Station Road.

1b) Based on a posted speed limit of 30 mph on N Campbell Station Road, the required intersection sight distance is 300 feet for exiting left and right-turning vehicles. The existing sight distances from N Campbell Station Road at the Proposed Entrance location were visually estimated to be adequate in both directions, but require further confirmation. Sight distance to the north and south from the Proposed Entrance location is currently difficult to accurately estimate due to vegetation along the development property's road frontage on the east side of N Campbell Station Road. The vegetation on the east side of N Campbell Station Road will need to be removed during construction and will require ongoing maintenance and control in the future. The site designer must ensure that the required intersection sight distances are accounted for and provided in the design plans for the Proposed Entrance.

1c) It is recommended that a Stop Sign (R1-1) be posted and a 24" white stop bar be applied to the Proposed Entrance approach at N Campbell Station Road. The stop bar should be applied a minimum of 4 feet away from the edge of N Campbell Station Road and placed at the desired stopping point that maximizes the sight distance.

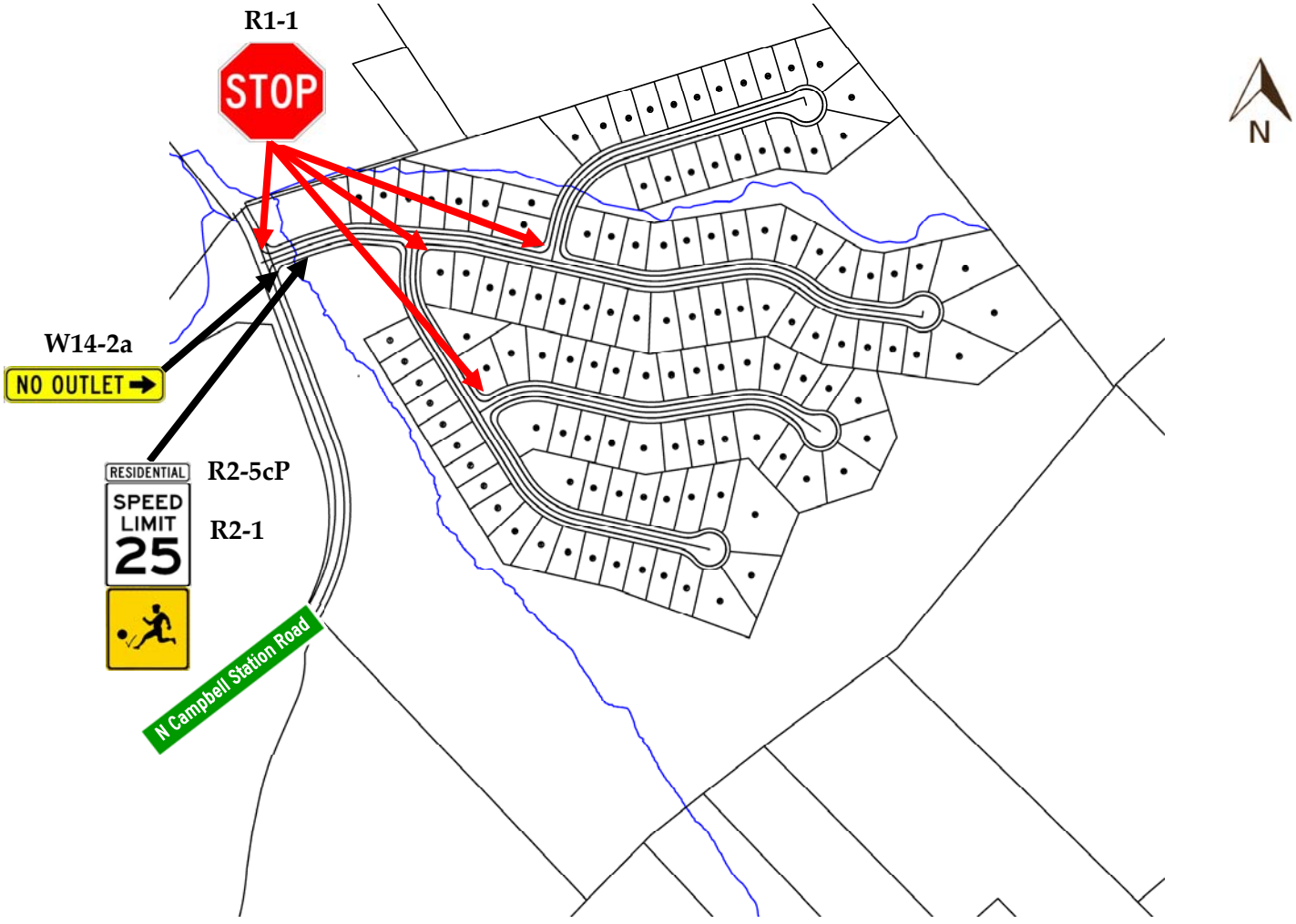
1d) The curb radius returns at the Proposed Entrance on N Campbell Station Road are recommended to be greater than the minimum to help facilitate entering right turns and increase the speed at which these vehicles can be removed from the northbound thru

movements on N Campbell Station Road. A larger radius will also help facilitate exiting right turns onto northbound N Campbell Station Road. This recommendation is offered due to the steep grade of N Campbell Station Road, which descends from south to north and likely contributes to higher vehicle speeds, requiring greater braking distances.

2 **N Campbell Station Road Subdivision Internal Roads:** The site layout plan shows four new streets, as shown in Figure 3.

2a) A 25-mph Speed Limit Sign (R2-1) with additional plaque signage, as shown in the report, is recommended to be posted near the beginning of the Proposed Entrance road off N Campbell Station Road. It is also recommended that a "No Outlet" Sign (W14-2a) be posted at the front of the subdivision. This sign can be posted above or below the street name sign.

2b) Stop Signs (R1-1) with 24" white stop bars and other traffic signage are recommended to be installed at the roadway t-intersections, as shown in the image below.



Internal Traffic Sign Locations

2c) Sight distances at the new internal intersections must not be impacted by new signage, parked cars, or future landscaping. The civil site designer should ensure that appropriate internal sight distances are met.

2d) If directed by the local post office, the site designer should include a parking area and a centralized mail delivery center within the development for the subdivision residents.

2e) All drainage grates and covers for the residential development must be pedestrian and bicycle-safe.

2f) All road and intersection elements should be designed in accordance with the American Association of State Highway and Transportation Officials (AASHTO) and Knox County specifications and guidelines to ensure proper transportation operations.

3

Other Transportation Issue: A warning curve sign near the development property is missing on N Campbell Station Road for southbound traffic. This sign location is just south of the existing entrance to the sanitary pump station for The Highlands Subdivision and on the west side of N Campbell Station Road. The post for this sign remains, but the sign itself has gone missing at some point. According to Google Street View from November 2023, this sign was a Turn Sign (W1-1r). This sign needs to be reinstalled by Knox County in advance of the sharp horizontal curve on N Campbell Station Road for southbound traffic. In addition, the County should consider including an additional warning curve sign on N Campbell Station Road in advance of the same sharp horizontal curve in the opposite direction for northbound travel.

W1-1r

View of West Side of N Campbell Station Road - South of Sanitary Pump Station Driveway Entrance (Looking South)

APPENDIX A

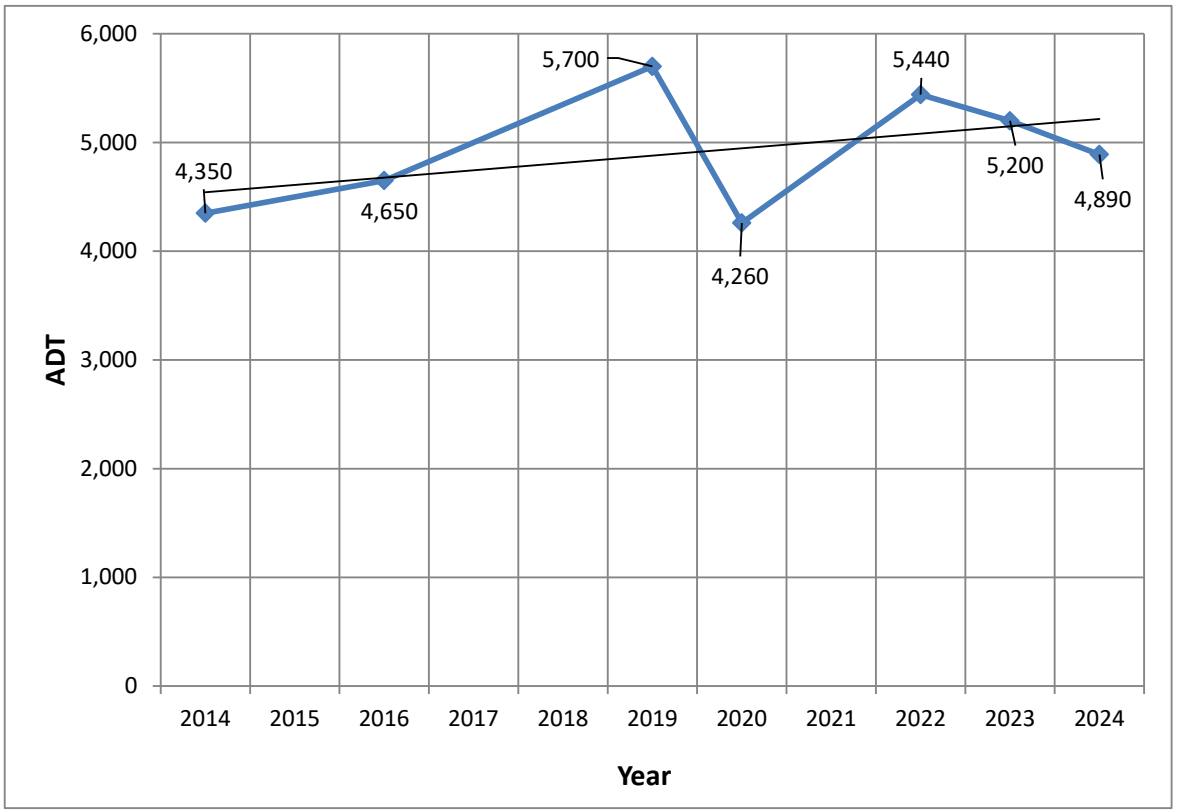
HISTORICAL TRAFFIC COUNT DATA

Historical Traffic Counts

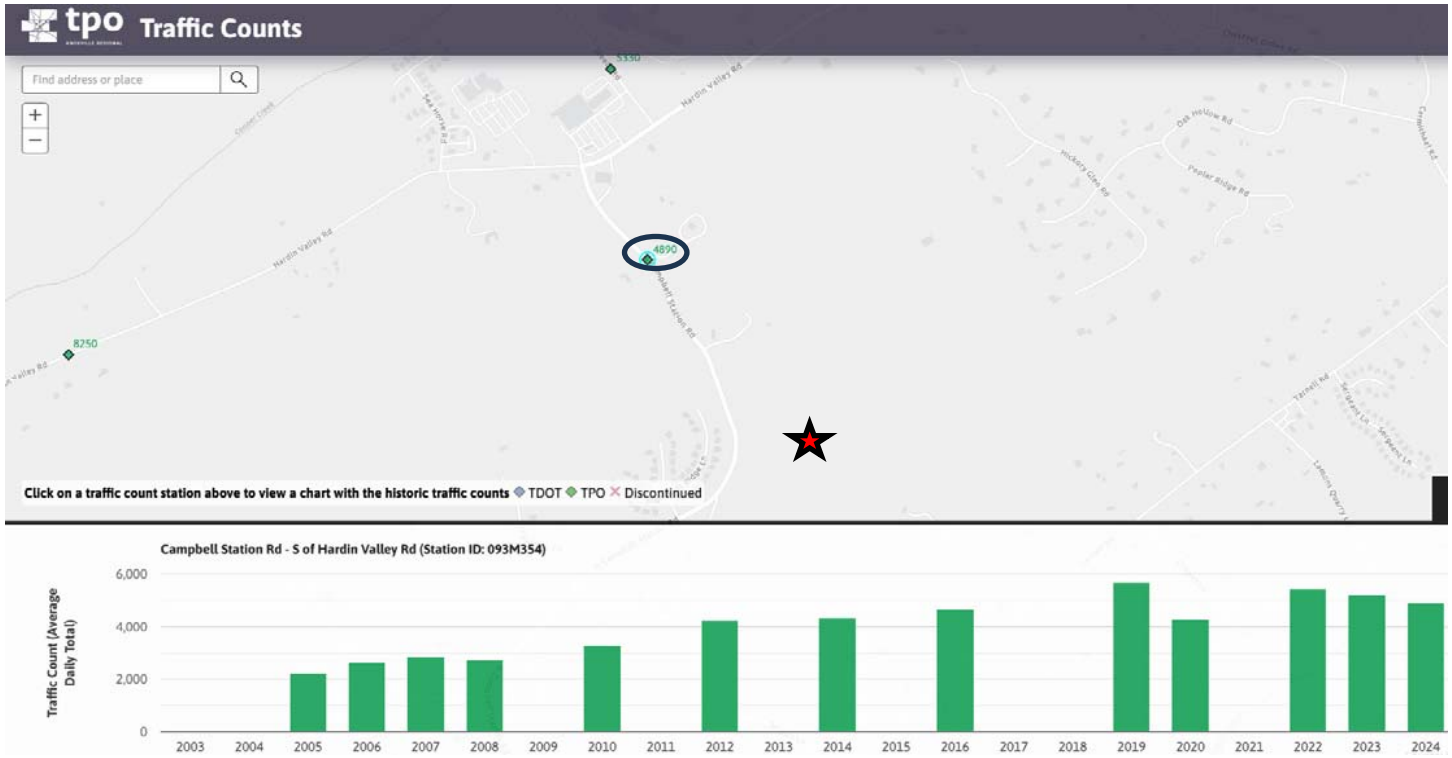
Organization: Knoxville Regional TPO
Station ID #: 093M354
Location: N Campbell Station Road, south of Hardin Valley Road

YEAR	ADT
2014	4,350
2015	-
2016	4,650
2017	-
2018	-
2019	5,700
2020	4,260
2021	-
2022	5,440
2023	5,200
2024	4,890

Trendline



2014 - 2024 Growth Rate = 12.4%
Average Annual Growth Rate = 1.2%

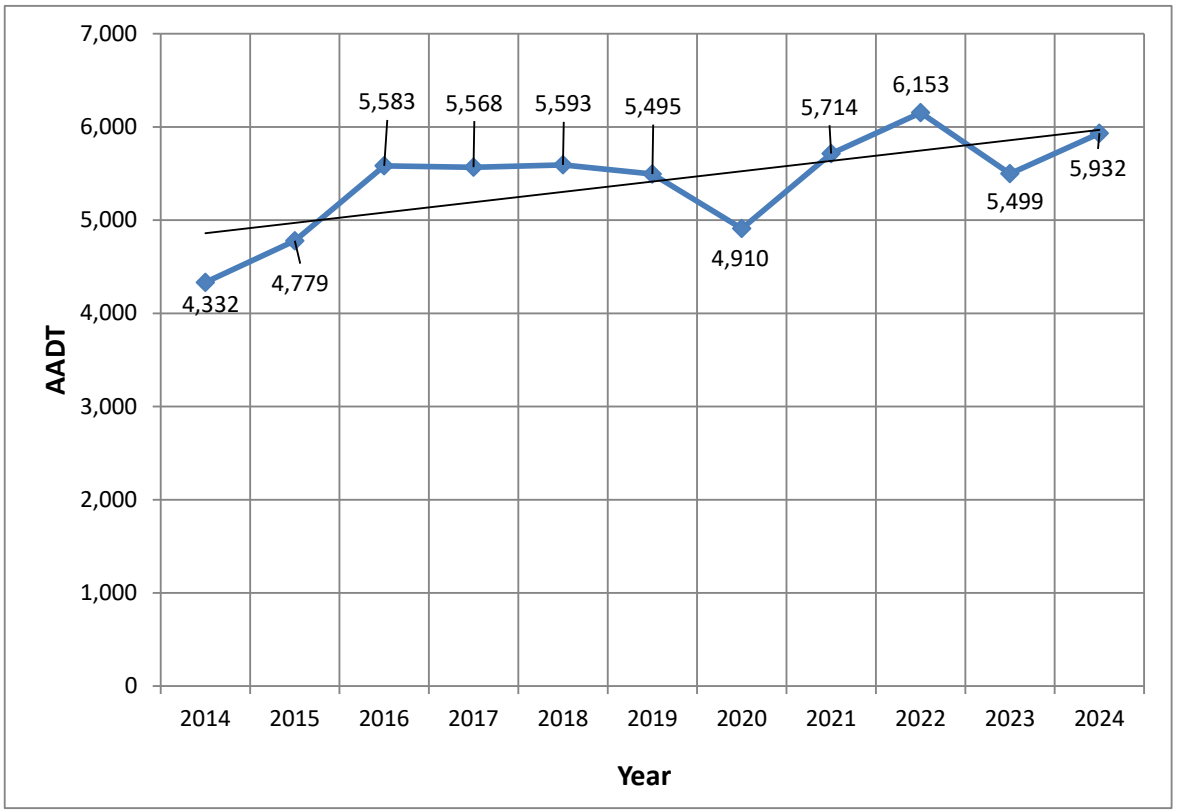

tpo
Traffic Counts
Find address or place
5330
4890
8250
Click on a traffic count station above to view a chart with the historic traffic counts
TDOT
TPO
Discontinued
Campbell Station Rd - S of Hardin Valley Rd (Station ID: 093M354)
Traffic Count (Average Daily Total)
6,000
4,000
2,000
0
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024

Historical Traffic Counts

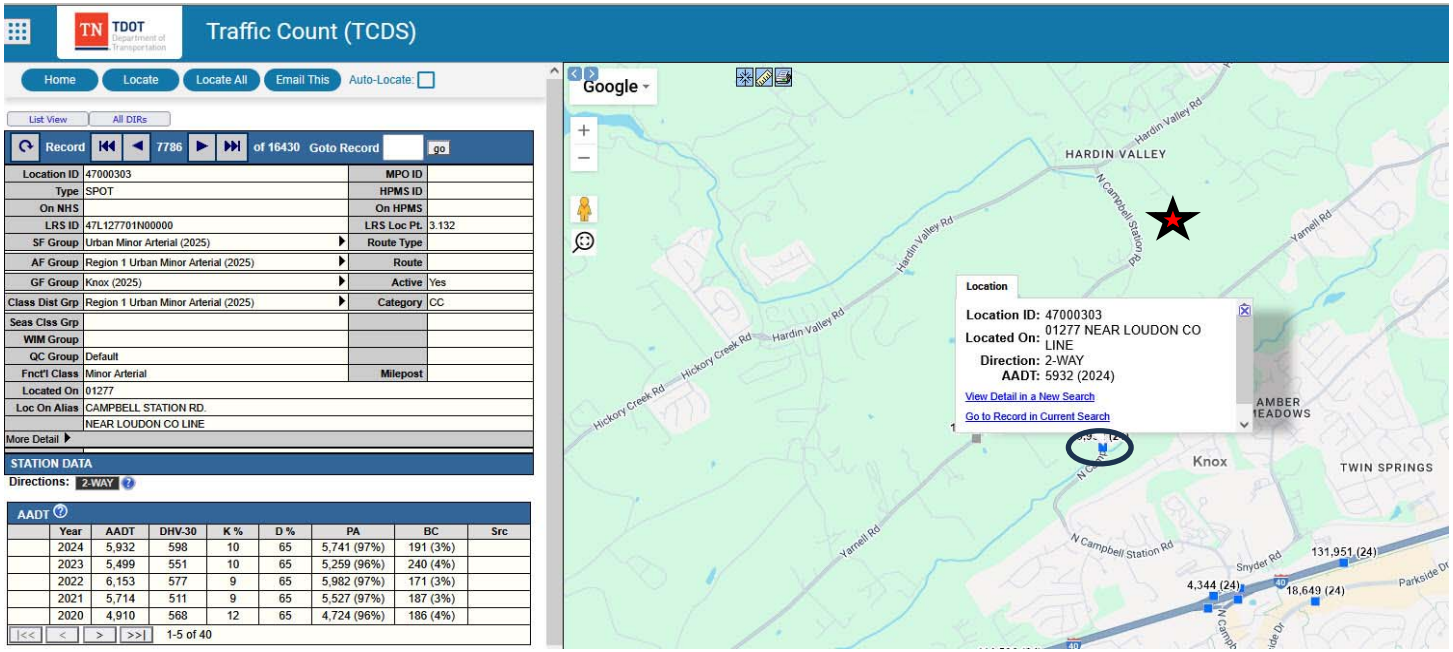
Organization: TDOT
Station ID #: 47000303
Location: N Campbell Station Road, south of Yarnell Road

YEAR	AADT
2014	4,332
2015	4,779
2016	5,583
2017	5,568
2018	5,593
2019	5,495
2020	4,910
2021	5,714
2022	6,153
2023	5,499
2024	5,932

Trendline



2014 - 2024 Growth Rate = 36.9%
Average Annual Growth Rate = 3.2%


TDOT
Traffic Count (TCDS)
Home
Locate
Locate All
Email This
Auto-Locate:
List View
All DIRs
Record
7786
of 16430
Goto Record
go
Location ID 47000303
Type SPOT
On NHS
LRS ID 47L127701N00000
SF Group Urban Minor Arterial (2025)
AF Group Region 1 Urban Minor Arterial (2025)
GF Group Knox (2025)
Class Dist Grp Region 1 Urban Minor Arterial (2025)
Seas Clss Grp
WIM Group
QC Group Default
Fnct'l Class Minor Arterial
Located On 01277
Loc On Alias CAMPBELL STATION RD.
NEAR LOUDON CO LINE
More Detail
MPO ID
HPMS ID
On HPMS
LRS Loc Pt. 3.132
Route Type
Route
Active Yes
Category CC
Milepost
STATION DATA
Directions: 2-WAY
AADT
Year AADT DHV-30 K % D % PA BC Src
2024 5,932 598 10 65 5,741 (97%) 191 (3%)
2023 5,499 551 10 65 5,259 (96%) 240 (4%)
2022 6,153 577 9 65 5,982 (97%) 171 (3%)
2021 5,714 511 9 65 5,527 (97%) 187 (3%)
2020 4,910 568 12 65 4,724 (96%) 186 (4%)
1-5 of 40
Google
HARDIN VALLEY
Hardin Valley Rd
N Campbell Station Rd
Yarnell Rd
Hickory Creek Rd
Location
Location ID: 47000303
Located On: 01277 NEAR LOUDON CO LINE
Direction: 2-WAY
AADT: 5932 (2024)
View Detail in a New Search
Go to Record in Current Search
Knox
TWIN SPRINGS
Snyder Rd
131,951 (24)
4,344 (24)
18,649 (24)

APPENDIX B

KNOXVILLE AREA TRANSIT (KAT) MAP AND INFORMATION

Route 16 - Middlebrook / Cedar Bluff
WEEKDAY

Going away from downtown					*Going toward downtown*					
Knoxville Station Bay C	**State Office Building**	**Middlebrook Pk WB and Lake Brook Blvd**	**Walmart**	**Parkwest Medical Center**	**Windsor Square on Market Place Blvd**	**Parkwest Medical Center**	**Walmart**	**Middlebrook Pk EB and Dowell Springs**	**State Office Building**	**Knoxville Station Bay C**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
			Transfer to Rt. 11				*Transfer to Rt. 11*			
					5:40 AM	5:48 AM	6:15 AM	6:25 AM	6:35 AM	7:05 AM
					6:40 AM	6:48 AM	7:15 AM	7:25 AM	7:35 AM	8:05 AM
6:15 AM	6:30 AM	6:48 AM	7:15 AM	7:30 AM	7:40 AM	7:48 AM	8:15 AM	8:25 AM	8:35 AM	9:05 AM
7:15 AM	7:30 AM	7:48 AM	8:15 AM	8:30 AM	8:40 AM	8:48 AM	9:15 AM	9:25 AM	9:35 AM	10:05 AM
8:15 AM	8:30 AM	8:48 AM	9:15 AM	9:30 AM	9:40 AM	9:48 AM	10:15 AM	10:25 AM	10:35 AM	11:05 AM
9:15 AM	9:30 AM	9:48 AM	10:15 AM	10:30 AM	10:40 AM	10:48 AM	11:15 AM	11:25 AM	11:35 AM	**12:05 PM**
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Route 16 - Middlebrook / Cedar Bluff
Saturday

Going away from downtown					*Going toward downtown*					
Knoxville Station Bay C	**State Office Building**	**Middlebrook Pk WB and Lake Brook Blvd**	**Walmart**	**Parkwest Medical Center**	**Windsor Square on Market Place Blvd**	**Parkwest Medical Center**	**Walmart**	**Middlebrook Pk EB and Dowell Springs**	**State Office Bldg.**	**Knoxville Station Bay C**
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					7:40 AM	7:48 AM	8:15 AM	8:25 AM	8:35 AM	9:05 AM
7:15 AM	7:30 AM	7:48 AM	8:15 AM	8:30 AM	8:40 AM	8:48 AM	9:15 AM	9:25 AM	9:35 AM	10:05 AM
8:15 AM	8:30 AM	8:48 AM	9:15 AM	9:30 AM	9:40 AM	9:48 AM	10:15 AM	10:25 AM	10:35 AM	11:05 AM
9:15 AM	9:30 AM	9:48 AM	10:15 AM	10:30 AM	10:40 AM	10:48 AM	11:15 AM	11:25 AM	11:35 AM	**12:05 PM**
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Route 16 - Middlebrook / Cedar Bluff
Sunday

Going away from downtown					*Going toward downtown*					
Knoxville Station Bay C	**State Office Building**	**Middlebrook Pk WB and Lake Brook Blvd**	**Walmart**	**Parkwest Medical Center**	**Windsor Square on Market Place Blvd**	**Parkwest Medical Center**	**Walmart**	**Middlebrook Pk EB and Dowell Springs**	**State Office Bldg.**	**Knoxville Station Bay C**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
			Transfer to Rt. 11				*Transfer to Rt. 11*			
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					8:40 AM	8:48 AM	9:15 AM	9:25 AM	9:35 AM	10:05 AM
8:15 AM	8:30 AM	8:48 AM	9:15 AM	9:30 AM	9:40 AM	9:48 AM	10:15 AM	10:25 AM	10:35 AM	11:05 AM
9:15 AM	9:30 AM	9:48 AM	10:15 AM	10:30 AM	10:40 AM	10:48 AM	11:15 AM	11:25 AM	11:35 AM	12:05 PM
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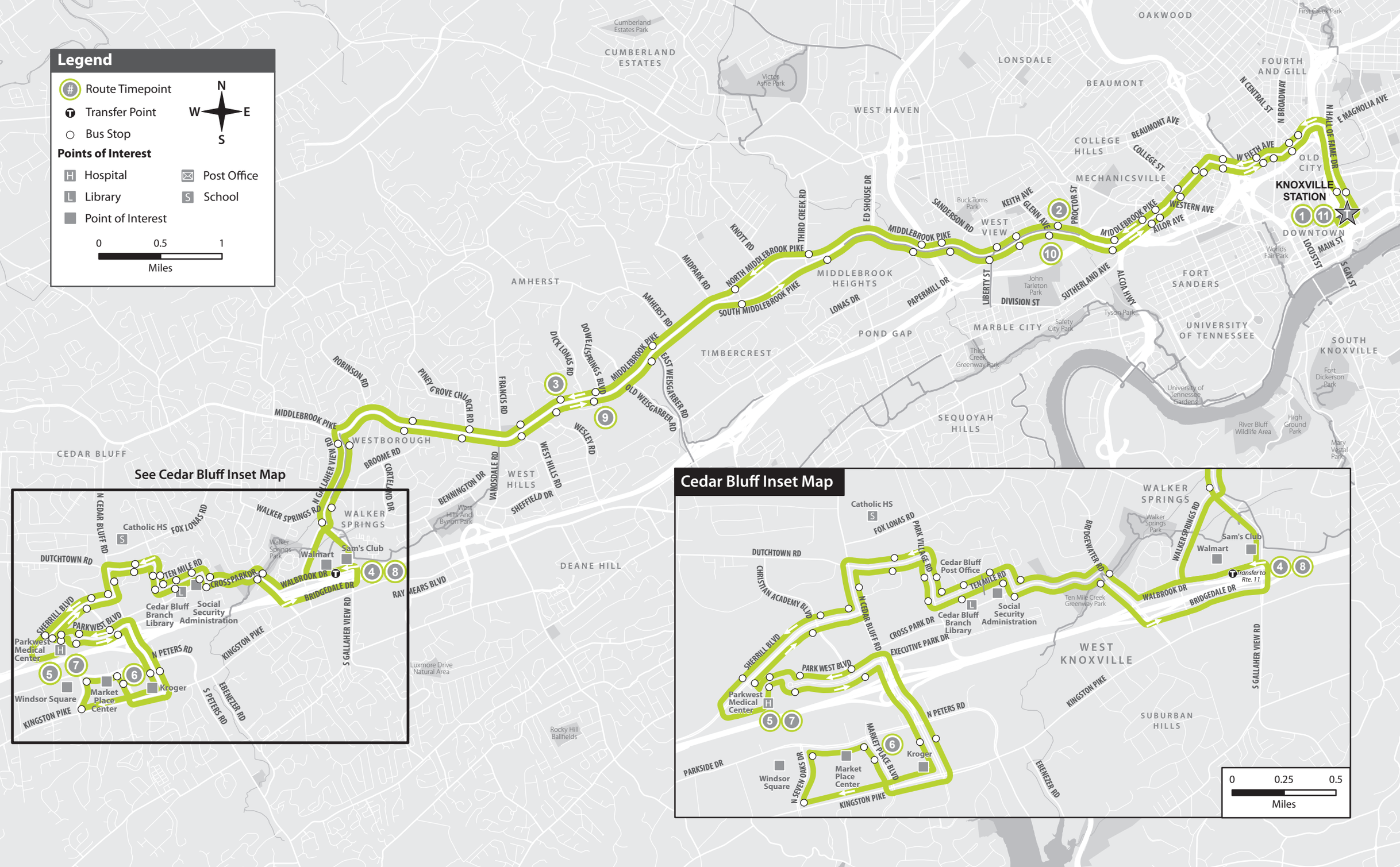
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Route Timepoint
Transfer Point
Bus Stop
Points of Interest
Hospital
Post Office
Library
School
Point of Interest
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0.5
1
Miles
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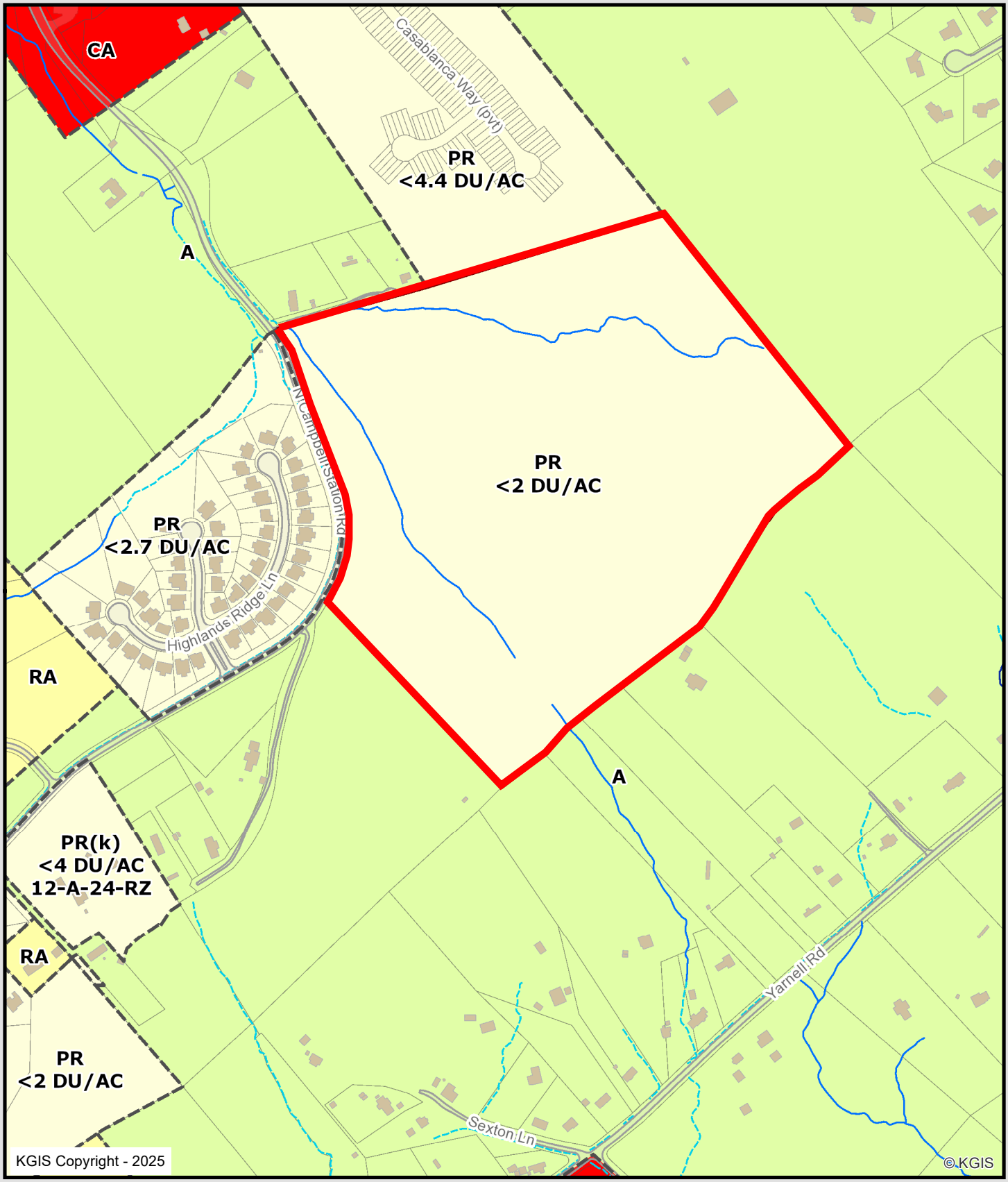
E
S
See Cedar Bluff Inset Map
Cedar Bluff Inset Map
0
0.25
0.5
Miles
CUMBERLAND ESTATES
OAKWOOD
LONSDALE
BEAUMONT
FOURTH AND GILL
WEST HAVEN
COLLEGE HILLS
MECHANICSVILLE
OLD CITY
KNOXVILLE STATION
DOWNTOWN
WEST VIEW
MIDDLEBROOK HEIGHTS
AMHERST
FORT SANDERS
MARBLE CITY
POND GAP
TIMBERCREST
UNIVERSITY OF TENNESSEE
SOUTH KNOXVILLE
SEQUOYAH HILLS
CEDAR BLUFF
WESTBOROUGH
WEST HILLS
DEANE HILL
WALKER SPRINGS
WEST KNOXVILLE
SUBURBAN HILLS
Cumberland Estates Park
Victor Ashe Park
Buck Toms Park
John Tarleton Park
Safety City Park
Tyson Park
Third Creek Greenway Park
University of Tennessee Gardens
First Creek Park
Worlds Fair Park
Fort Dickerson Park
River Bluff Wildlife Area
High Ground Park
Mary Vestal Park
West Hills Ang Byron Park
Walker Springs Park
Luxmore Drive Natural Area
Rocky Hill Ballfields
Ten Mile Creek Greenway Park
N CENTRAL ST
N BROADWAY
E MAGNOLIA AVE
N HALL OF FAME DR
BEAUMONT AVE
COLLEGE ST
W FIFTH AVE
WESTERN AVE
KEITH AVE
GLENN AVE
SANDERSON RD
PROCTOR ST
MIDDLEBROOK PIKE
AYLOR AVE
LIBERTY ST
DIVISION ST
SUTHERLAND AVE
ALCOA HWY
S GAY ST
LOCUST ST
MAIN ST
KNOTT RD
THIRD CREEK RD
ED SHOUSE DR
NORTH MIDDLEBROOK PIKE
SOUTH MIDDLEBROOK PIKE
MIDPARK RD
AMHERST RD
LONAS DR
PAPERMILL DR
DOWELL SPRINGS BLVD
DICK LONAS RD
EAST WEISGARBER RD
OLD WEISGARBER RD
WESLEY RD
WEST HILLS RD
SHEFFIELD DR
VANOSDALE RD
BENNINGTON DR
FRANCIS RD
PINEY GROVE CHURCH RD
ROBINSON RD
BROOME RD
CORTELAND DR
N GALLAHER VIEW RD
WALKER SPRINGS RD
RAY MEARS BLVD
S GALLAHER VIEW RD
EBENEZER RD
S PETERS RD
KINGSTON PIKE
N PETERS RD
CROSSPARK DR
WALBROOK DR
BRIDGEDALE DR
TEN MILE RD
FOX LONAS RD
N CEDAR BLUFF RD
DUTCHTOWN RD
SHERRILL BLVD
PARKWEST BLVD
CHRISTIAN ACADEMY BLVD
PARK VILLAGE RD
CROSS PARK DR
EXECUTIVE PARK DR
BRIDGEWATER RD
WALKERSPRINGS RD
MARKET PLACE BLVD
N SEVEN OAKS DR
PARKSIDE DR
Catholic HS
Parkwest Medical Center
Cedar Bluff Branch Library
Social Security Administration
Cedar Bluff Post Office
Walmart
Sam's Club
Kroger
Windsor Square
Market Place Center
Transfer to Rte. 11

APPENDIX C

ZONING MAP



Zoning Map

9.15.25

Knoxville - Knox County - KUB Geographic Information System

Printed: 9/15/2025 at 10:40:18 AM

0 250 500 1,000

ft

APPENDIX D

MANUAL TRAFFIC COUNT DATA

TRAFFIC COUNT DATA

Major Street: N Campbell Station Road (SB & NB)
Minor Street: Pierceson Point Lane (EB)
Traffic Control: Stop Sign on Minor Street

9/10/2025 (Wednesday)
Mostly Sunny and Mild
Conducted by: Ajax Engineering

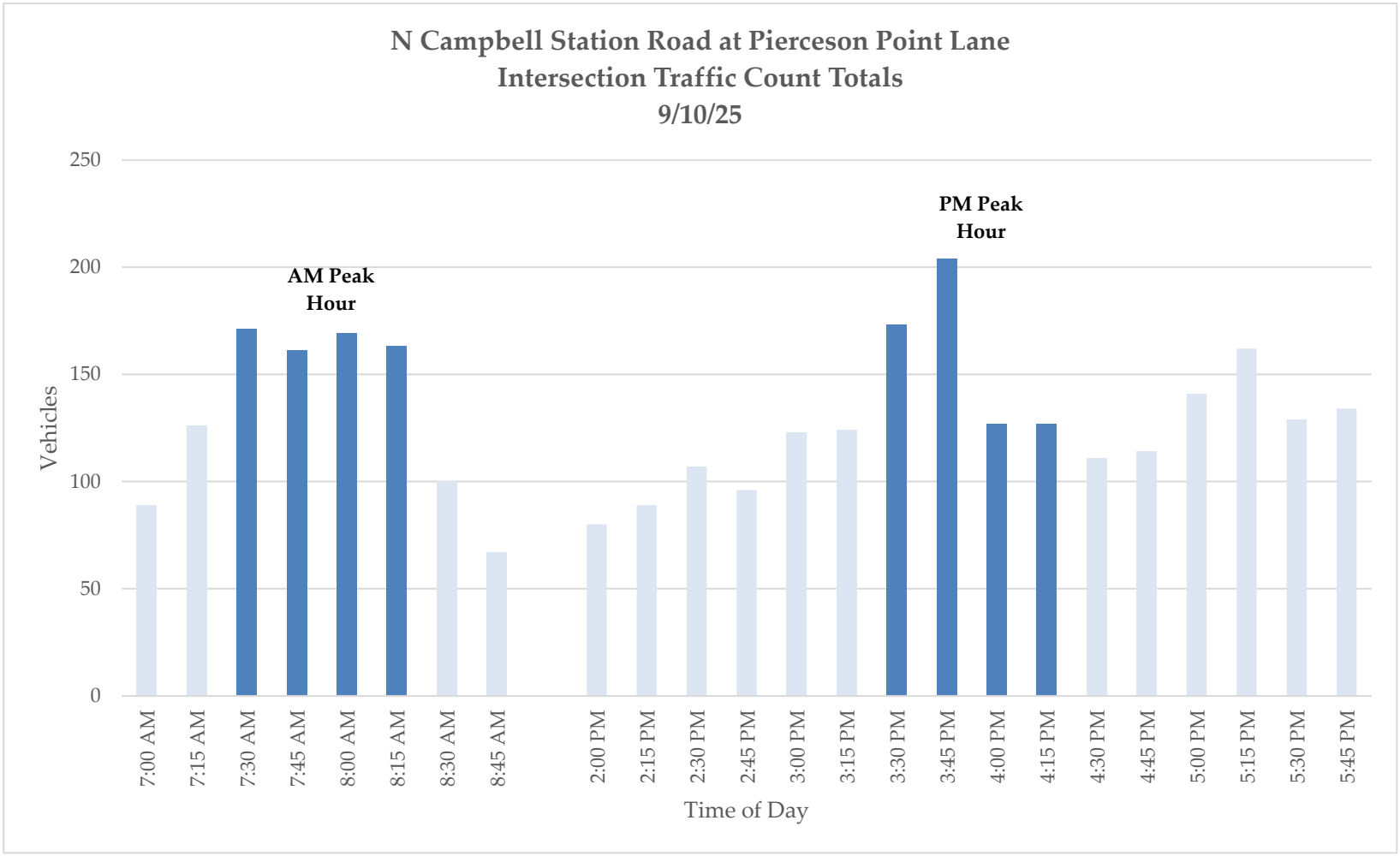
	N Campbell Station Road		N Campbell Station Road		Pierceson Point Lane			
TIME	SOUTHBOUND		NORTHBOUND		EASTBOUND		VEHICLE	PEAK
BEGIN	THRU	RT	LT	THRU	LT	RT	TOTAL	HOUR
7:00 AM	22	0	0	58	5	4	89	
7:15 AM	58	2	0	58	2	6	126	
7:30 AM	96	1	0	62	5	7	171	**7:30 AM - 8:30 AM**
7:45 AM	91	2	1	65	0	2	161	
8:00 AM	62	1	2	95	3	6	169	
8:15 AM	87	2	2	66	4	2	163	
8:30 AM	67	2	5	21	1	4	100	
8:45 AM	41	1	1	22	0	2	67	
TOTAL	524	11	11	447	20	33	1046	
2:00 PM	33	0	2	40	2	3	80	
2:15 PM	32	2	1	52	1	1	89	
2:30 PM	50	2	2	48	1	4	107	
2:45 PM	43	1	1	51	0	0	96	
3:00 PM	61	1	3	56	0	2	123	
3:15 PM	55	1	7	53	4	4	124	
3:30 PM	96	4	4	67	1	1	173	**3:30 PM - 4:30 PM**
3:45 PM	145	3	0	54	1	1	204	
4:00 PM	68	3	5	45	2	4	127	
4:15 PM	66	4	4	50	2	1	127	
4:30 PM	55	0	6	44	3	3	111	
4:45 PM	51	3	2	57	0	1	114	
5:00 PM	67	4	7	53	4	6	141	
5:15 PM	73	3	4	79	2	1	162	
5:30 PM	60	4	2	62	0	1	129	
5:45 PM	51	3	6	65	5	4	134	
TOTAL	1006	38	56	876	28	37	2041	

2025 AM Peak Hour **7:30 AM - 8:30 AM**

	N Campbell Station Road		N Campbell Station Road		Pierceson Point Lane	
TIME	SOUTHBOUND		NORTHBOUND		EASTBOUND	
BEGIN	THRU	RT	LT	THRU	LT	RT
7:30 AM	96	1	0	62	5	7
7:45 AM	91	2	1	65	0	2
8:00 AM	62	1	2	95	3	6
8:15 AM	87	2	2	66	4	2
TOTAL	**336**	**6**	**5**	**288**	**12**	**17**
TRUCK %	**2.0%**	**14.3%**	**0.0%**	**1.6%**	**0.0%**	**7.1%**
PHF $_{mvmt}$	**0.88**	**0.75**	**0.63**	**0.76**	**0.60**	**0.61**
PHF $_{app}$	**0.88**		**0.76**		**0.60**	
PHF $_{int}$	**0.97**					

2025 PM Peak Hour **3:30 PM - 4:30 PM**

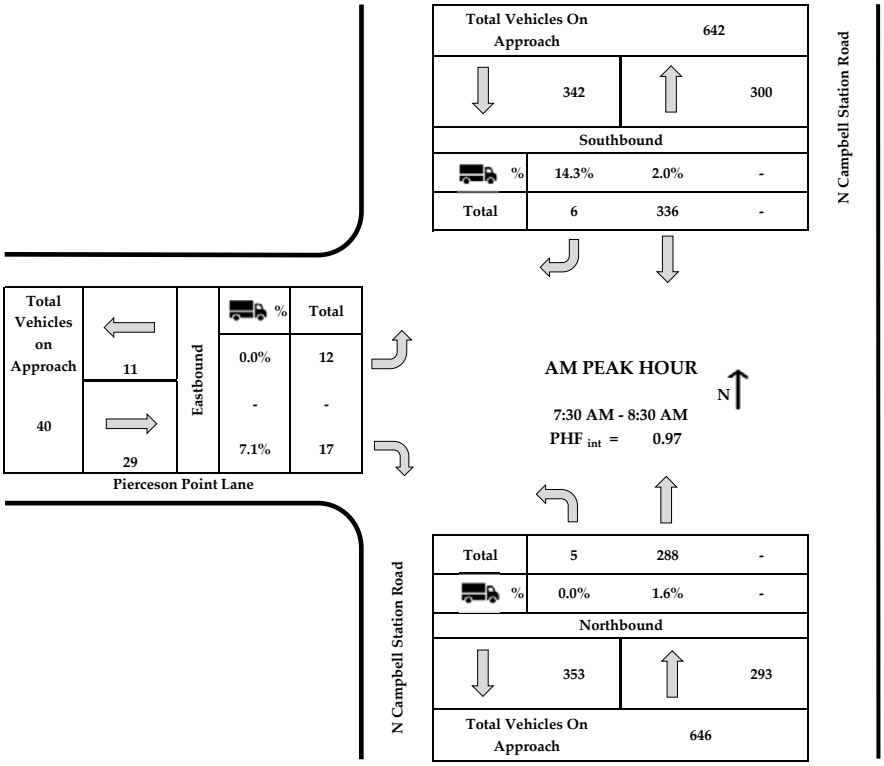
	N Campbell Station Road		N Campbell Station Road		Pierceson Point Lane	
TIME	SOUTHBOUND		NORTHBOUND		EASTBOUND	
BEGIN	THRU	RT	LT	THRU	LT	RT
3:30 PM	96	4	4	67	1	1
3:45 PM	145	3	0	54	1	1
4:00 PM	68	3	5	45	2	4
4:15 PM	66	4	4	50	2	1
TOTAL	**375**	**14**	**13**	**216**	**6**	**7**
TRUCK %	**2.4%**	**0.0%**	**0.0%**	**3.7%**	**0.0%**	**0.0%**
PHF $_{mvmt}$	**0.65**	**0.88**	**0.65**	**0.81**	**0.75**	**0.44**
PHF $_{app}$	**0.66**		**0.81**		**0.54**	
PHF $_{int}$	**0.77**					

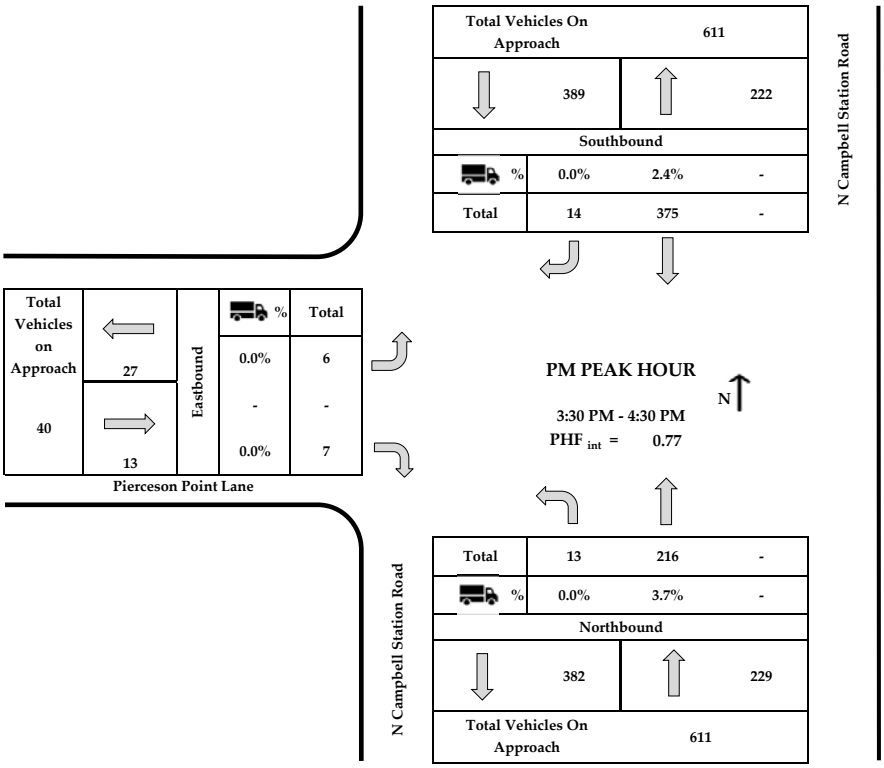

N Campbell Station Road at Pierceson Point Lane
Intersection Traffic Count Totals
9/10/25
250
200
150
100
50
0
Vehicles
AM Peak Hour
PM Peak Hour
7:00 AM
7:15 AM
7:30 AM
7:45 AM
8:00 AM
8:15 AM
8:30 AM
8:45 AM
2:00 PM
2:15 PM
2:30 PM
2:45 PM
3:00 PM
3:15 PM
3:30 PM
3:45 PM
4:00 PM
4:15 PM
4:30 PM
4:45 PM
5:00 PM
5:15 PM
5:30 PM
5:45 PM
Time of Day

PEAK HOUR DATA

Major Street: N Campbell Station Road (SB & NB)
Minor Street: Pierceson Point Lane (EB)
Traffic Control: Stop Sign on Minor Street

9/10/2025 (Wednesday)
Mostly Sunny and Mild
Conducted by: Ajax Engineering





APPENDIX E

CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 12)

EXISTING CONDITIONS

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	17	5	288	336	6
Future Vol, veh/h	12	17	5	288	336	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-5	-	-	-2	2	-
Peak Hour Factor	60	60	76	76	88	88
Heavy Vehicles, %	0	7	0	2	2	14
Mvmt Flow	20	28	7	379	382	7

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	777	385	389	0	-	0
Stage 1	385	-	-	-	-	-
Stage 2	392	-	-	-	-	-
Critical Hdwy	5.4	5.77	4.1	-	-	-
Critical Hdwy Stg 1	4.4	-	-	-	-	-
Critical Hdwy Stg 2	4.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.363	2.2	-	-	-
Pot Cap-1 Maneuver	457	687	1181	-	-	-
Stage 1	770	-	-	-	-	-
Stage 2	766	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	454	687	1181	-	-	-
Mov Cap-2 Maneuver	454	-	-	-	-	-
Stage 1	765	-	-	-	-	-
Stage 2	766	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	11.95	0.14	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	31	-	567	-	-
HCM Lane V/C Ratio	0.006	-	0.085	-	-
HCM Ctrl Dly (s/v)	8.1	0	11.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	7	13	216	375	14
Future Vol, veh/h	6	7	13	216	375	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-5	-	-	-2	2	-
Peak Hour Factor	54	54	81	81	66	66
Heavy Vehicles, %	0	0	0	4	2	0
Mvmt Flow	11	13	16	267	568	21

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	878	579	589	0	-	0
Stage 1	579	-	-	-	-	-
Stage 2	299	-	-	-	-	-
Critical Hdwy	5.4	5.7	4.1	-	-	-
Critical Hdwy Stg 1	4.4	-	-	-	-	-
Critical Hdwy Stg 2	4.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	410	562	996	-	-	-
Stage 1	663	-	-	-	-	-
Stage 2	823	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	402	562	996	-	-	-
Mov Cap-2 Maneuver	402	-	-	-	-	-
Stage 1	650	-	-	-	-	-
Stage 2	823	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	12.98	0.49	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	102	-	475	-	-
HCM Lane V/C Ratio	0.016	-	0.051	-	-
HCM Ctrl Dly (s/v)	8.7	0	13	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

PROJECTED CONDITIONS WITH THE PROJECT

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	17	5	345	425	6
Future Vol, veh/h	12	17	5	345	425	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-5	-	-	-2	2	-
Peak Hour Factor	60	60	76	76	88	88
Heavy Vehicles, %	0	7	0	2	2	14
Mvmt Flow	20	28	7	454	483	7

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	953	486	490	0	-	0
Stage 1	486	-	-	-	-	-
Stage 2	467	-	-	-	-	-
Critical Hdwy	5.4	5.77	4.1	-	-	-
Critical Hdwy Stg 1	4.4	-	-	-	-	-
Critical Hdwy Stg 2	4.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.363	2.2	-	-	-
Pot Cap-1 Maneuver	378	611	1084	-	-	-
Stage 1	712	-	-	-	-	-
Stage 2	723	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	374	611	1084	-	-	-
Mov Cap-2 Maneuver	374	-	-	-	-	-
Stage 1	707	-	-	-	-	-
Stage 2	723	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	13.25	0.12	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	26	-	484	-	-
HCM Lane V/C Ratio	0.006	-	0.1	-	-
HCM Ctrl Dly (s/v)	8.3	0	13.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	35	28	346	11	13	396
Future Vol, veh/h	35	28	346	11	13	396
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	10	-	-	-10
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	2	0	0	2
Mvmt Flow	39	31	384	12	14	440

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	859	391	0	0	397	0
Stage 1	391	-	-	-	-	-
Stage 2	469	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	329	662	-	-	1173	-
Stage 1	688	-	-	-	-	-
Stage 2	634	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	324	662	-	-	1173	-
Mov Cap-2 Maneuver	324	-	-	-	-	-
Stage 1	688	-	-	-	-	-
Stage 2	624	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	15.3	0	0.26
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	419	57	-
HCM Lane V/C Ratio	-	-	0.167	0.012	-
HCM Ctrl Dly (s/v)	-	-	15.3	8.1	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	7	13	283	459	14
Future Vol, veh/h	6	7	13	283	459	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-5	-	-	-2	2	-
Peak Hour Factor	54	54	81	81	66	66
Heavy Vehicles, %	0	0	0	4	2	0
Mvmt Flow	11	13	16	349	695	21

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1088	706	717	0	-	0
Stage 1	706	-	-	-	-	-
Stage 2	381	-	-	-	-	-
Critical Hdwy	5.4	5.7	4.1	-	-	-
Critical Hdwy Stg 1	4.4	-	-	-	-	-
Critical Hdwy Stg 2	4.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	326	484	893	-	-	-
Stage 1	600	-	-	-	-	-
Stage 2	772	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	319	484	893	-	-	-
Mov Cap-2 Maneuver	319	-	-	-	-	-
Stage 1	586	-	-	-	-	-
Stage 2	772	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	14.82	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	79	-	391	-	-
HCM Lane V/C Ratio	0.018	-	0.062	-	-
HCM Ctrl Dly (s/v)	9.1	0	14.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	20	257	32	40	449
Future Vol, veh/h	24	20	257	32	40	449
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	10	-	-	-10
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	2	0	0	2
Mvmt Flow	27	22	286	36	44	499

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	891	303	0	0	321	0
Stage 1	303	-	-	-	-	-
Stage 2	588	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	315	741	-	-	1250	-
Stage 1	754	-	-	-	-	-
Stage 2	559	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	300	741	-	-	1250	-
Mov Cap-2 Maneuver	300	-	-	-	-	-
Stage 1	754	-	-	-	-	-
Stage 2	532	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	14.93	0	0.65
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	411	147	-
HCM Lane V/C Ratio	-	-	0.119	0.036	-
HCM Ctrl Dly (s/v)	-	-	14.9	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

APPENDIX F

ITE TRIP GENERATION DATA

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 215), and higher than those for senior adult housing—single-family (Land Use 251). (Source 1008)

Additional Data

The sites were surveyed in the 1990s, the 2000s, the 2010s, and the 2020s in Alabama, Arizona, British Columbia (CAN), California, Delaware, Illinois, Kentucky, Massachusetts, Minnesota, Montana, New Jersey, New York, North Carolina, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Vermont, and West Virginia.

Source Numbers

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, 1204, 1221, 1225, 1236, 1251, 1265, 1267

Single-Family Detached Housing
(210)

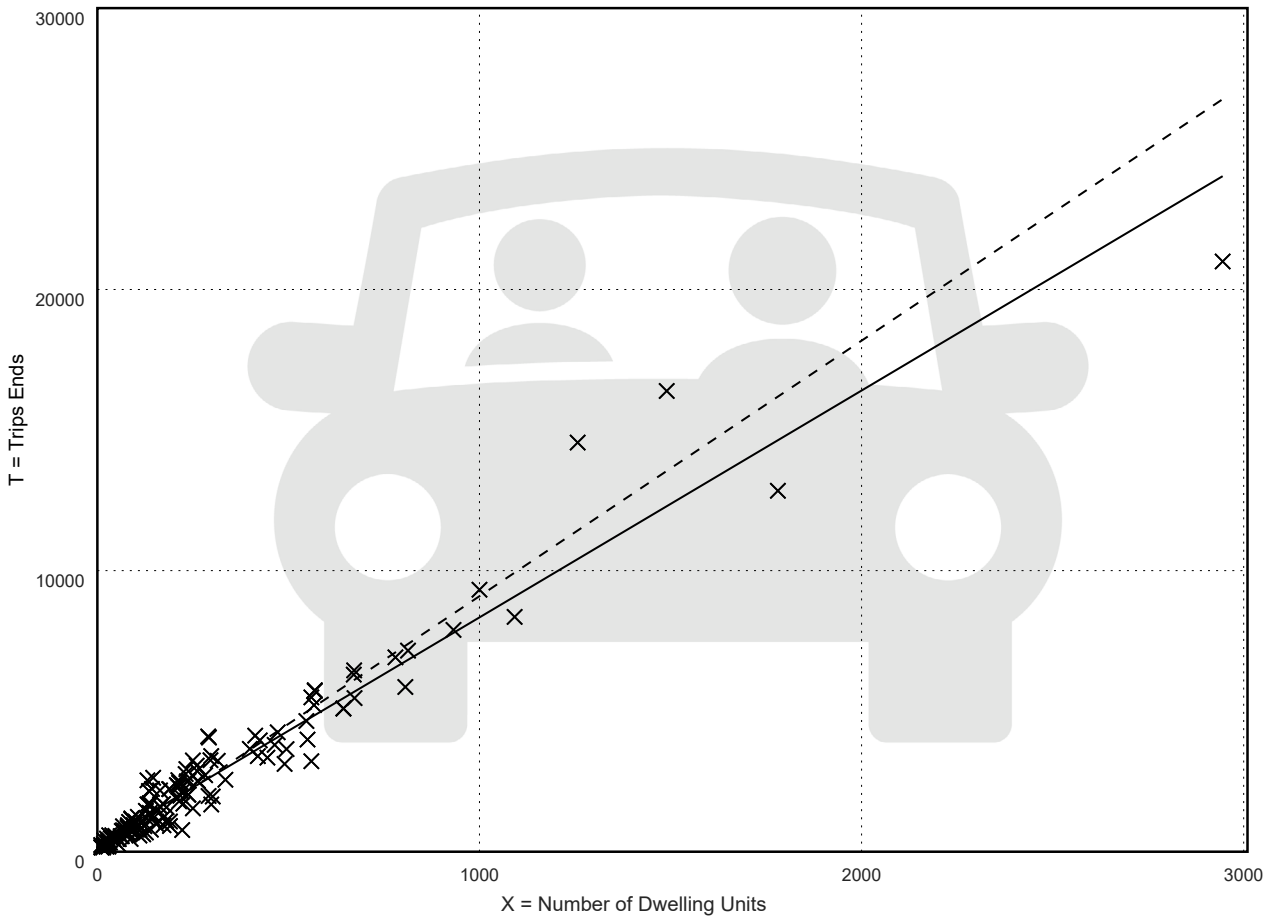
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 155
Avg. Num. of Dwelling Units: 261
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.09	3.47 - 23.80	2.29

Data Plot and Equation



Fitted Curve Equation: T = 8.07(X) + 265.45

R^2= 0.94

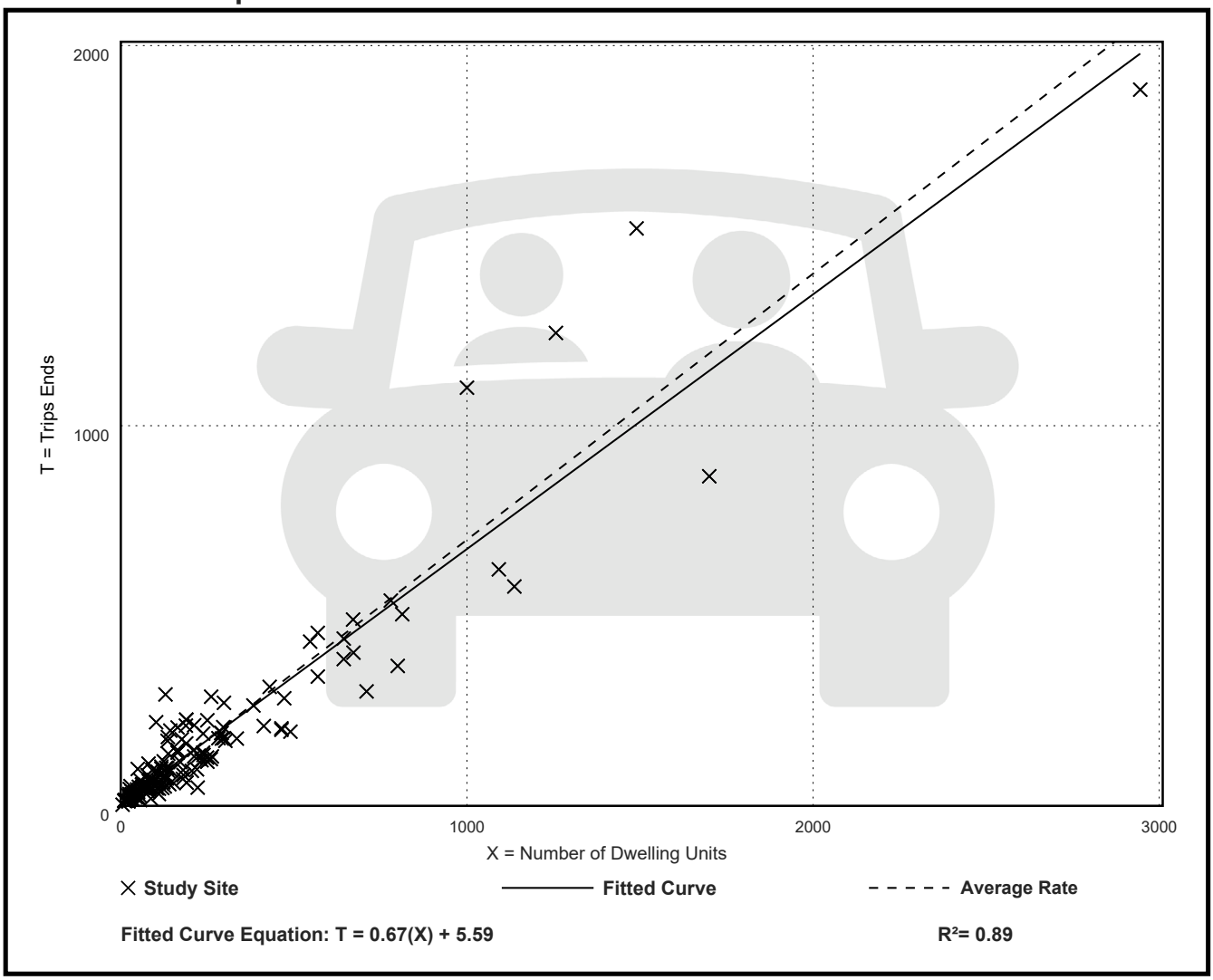
Single-Family Detached Housing
(210)

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:	153
Avg. Num. of Dwelling Units:	239
Directional Distribution:	27% entering, 73% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.22 - 2.27	0.26

Data Plot and Equation



Fitted Curve Equation: T = 0.67(X) + 5.59

R^2= 0.89

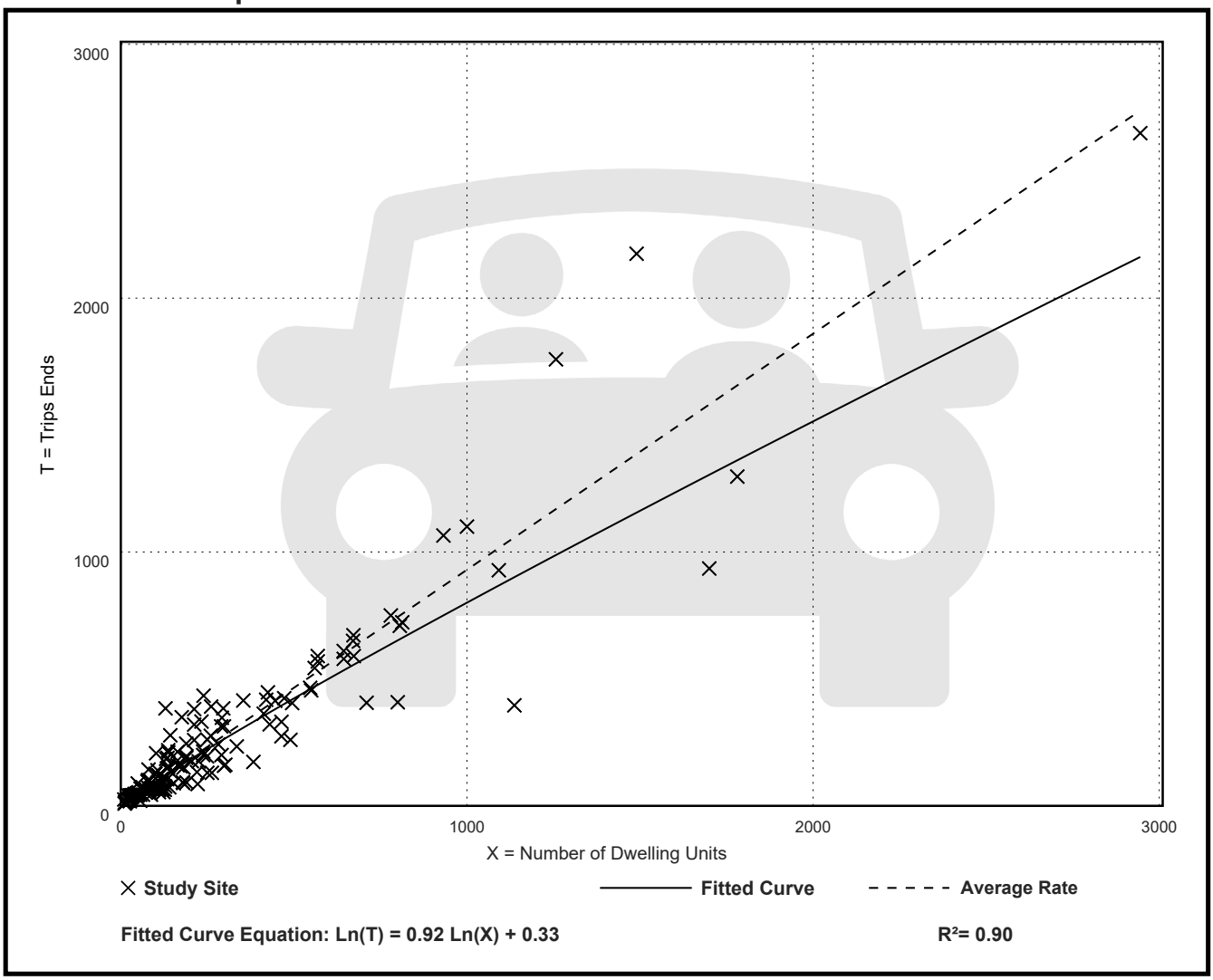
Single-Family Detached Housing
(210)

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:	166
Avg. Num. of Dwelling Units:	266
Directional Distribution:	62% entering, 38% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.93	0.35 - 2.98	0.33

Data Plot and Equation



TRIP GENERATION FOR N CAMPBELL STATION ROAD SUBDIVISION

122 Single-Family Detached Houses

ITE LAND USE CODE	LAND USE DESCRIPTION	# OF 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	122	1,250	27%	73%		62%	38%	
				24	63	87	72	44	116
Total New Volume Site Trips			**1,250**	**24**	**63**	**87**	**72**	**44**	**116**

ITE Trip Generation Manual, 12th Edition

Trips calculated by using Fitted Curve Equations

TRIP GENERATION FOR N CAMPBELL STATION ROAD SUBDIVISION

122 Single-Family Detached Houses

122 Residential Houses = X

Weekday:

Fitted Curve Equation: T = 8.07(X) + 265.45

T = 984.54 + 265.45
T = 1249.99
T = 1,250 trips

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: T = 0.67(X) + 5.59

T = 81.74 + 5.59
T = 87.33
T = 87 trips

Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 0.33

Ln(T) = 0.92 * 4.80 + 0.33
Ln(T) = 4.75
T = 116 trips

APPENDIX G

2022 CENSUS BUREAU DATA

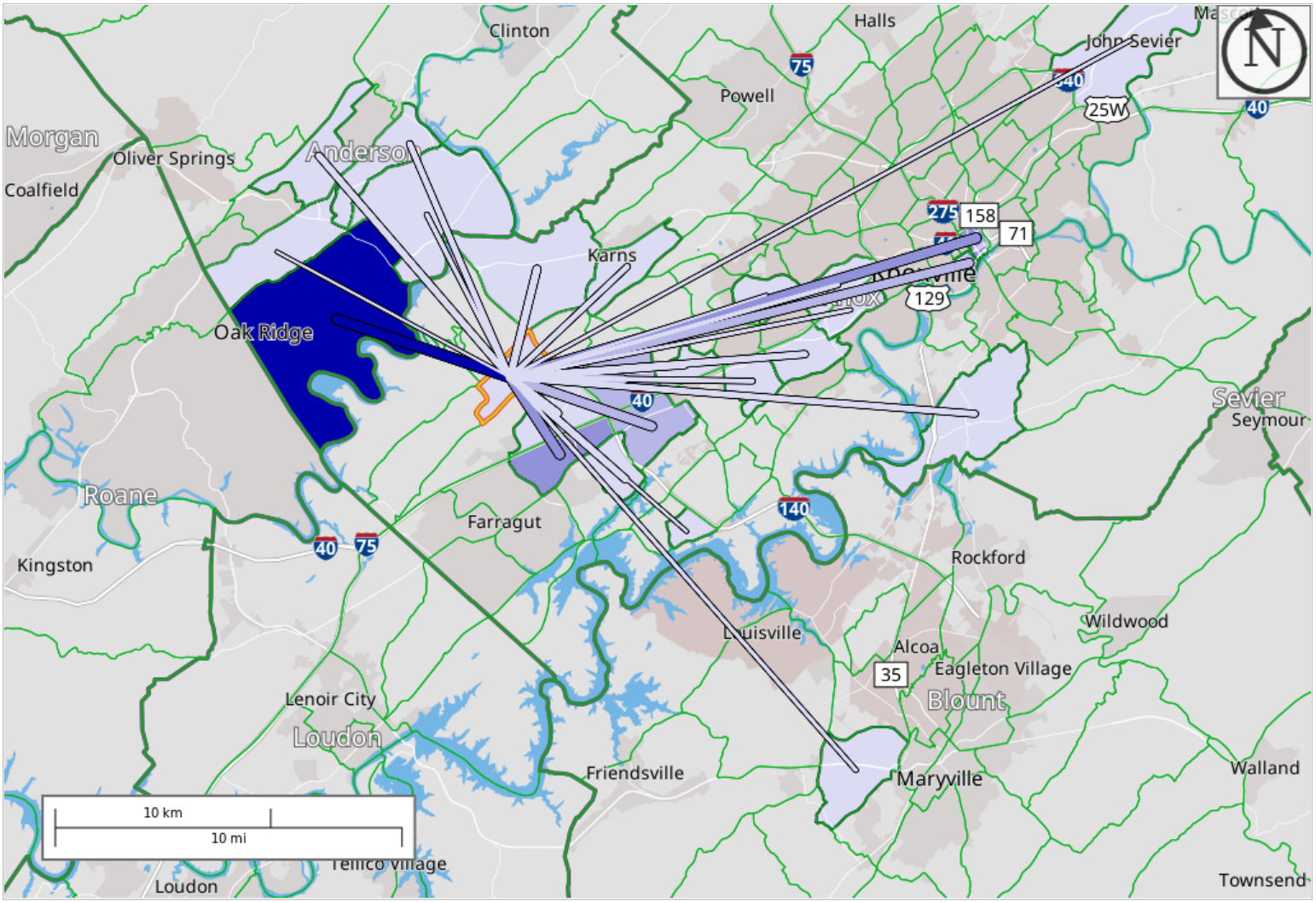
Destination Analysis

Workers: *Living in 59.10 (Knox, TN)*
Showing: *Employment locations grouped by Census Tracts*

Created by the U.S. Census Bureau's OnTheMap `https://onthemap.ces.census.gov` on 09/17/2025

Counts of All Jobs from Home Selection Area to Work Census Tracts in 2022

All Workers



Map Legend

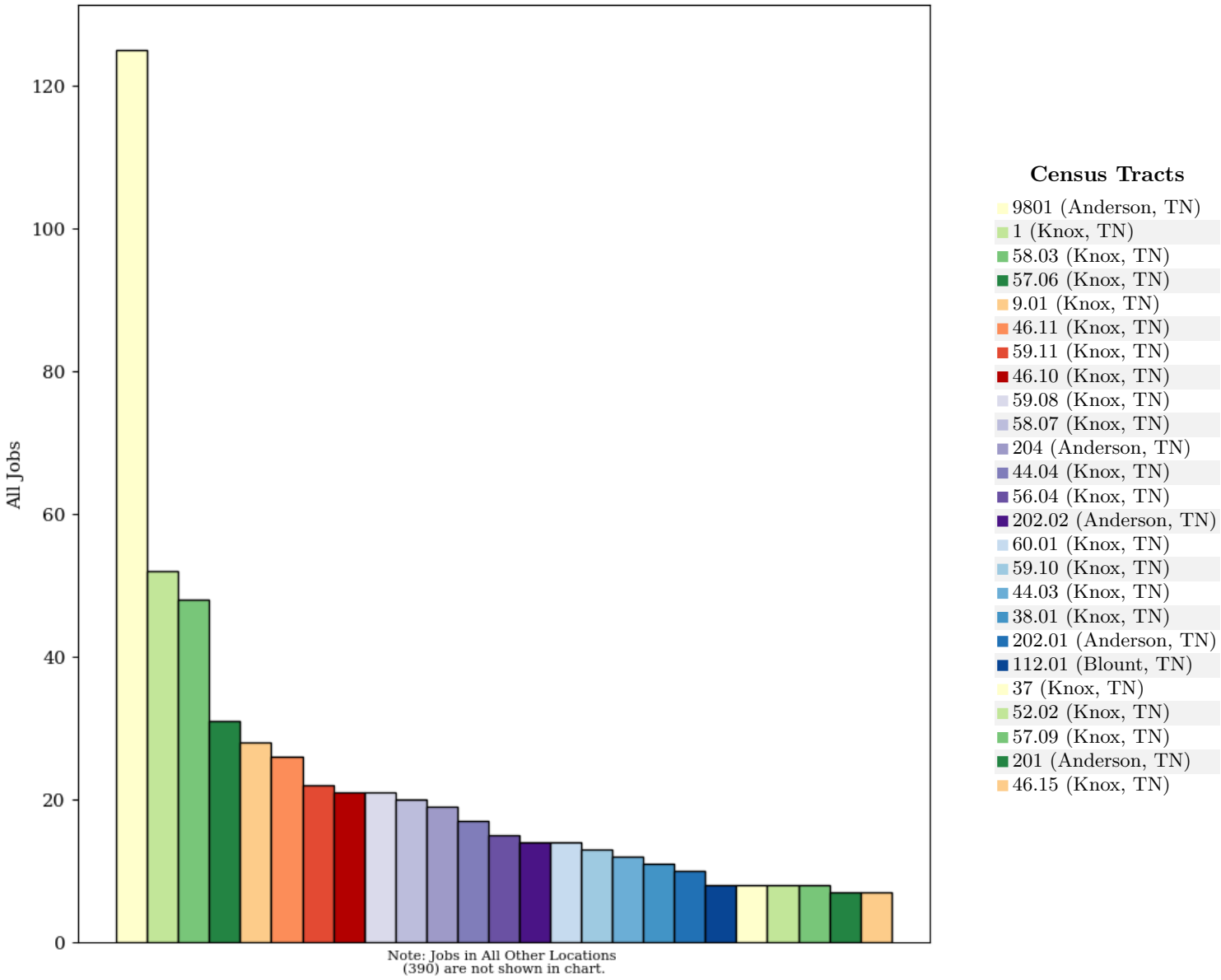
Job Count
- 109 - 125
- 92 - 108
- 75 - 91
- 58 - 74
- 41 - 57
- 24 - 40
- 7 - 23

Selection Areas
- Home Area

Job Count
- 109 - 125
- 92 - 108
- 75 - 91
- 58 - 74
- 41 - 57
- 24 - 40
- 7 - 23

All Jobs from Home Selection Area to Work Census Tracts in 2022

All Workers



All Jobs from Home Selection Area to Work Census Tracts in 2022

All Workers

Census Tracts as Work Destination Area	2022 Count	2022 Share
All Census Tracts	955	100.0%
9801 (Anderson, TN)	125	13.1%
1 (Knox, TN)	52	5.4%
58.03 (Knox, TN)	48	5.0%
57.06 (Knox, TN)	31	3.2%
9.01 (Knox, TN)	28	2.9%
46.11 (Knox, TN)	26	2.7%
59.11 (Knox, TN)	22	2.3%
46.10 (Knox, TN)	21	2.2%
59.08 (Knox, TN)	21	2.2%
58.07 (Knox, TN)	20	2.1%

Census Tracts as Work Destination Area	2022 Count	2022 Share
204 (Anderson, TN)	19	2.0%
44.04 (Knox, TN)	17	1.8%
56.04 (Knox, TN)	15	1.6%
202.02 (Anderson, TN)	14	1.5%
60.01 (Knox, TN)	14	1.5%
59.10 (Knox, TN)	13	1.4%
44.03 (Knox, TN)	12	1.3%
38.01 (Knox, TN)	11	1.2%
202.01 (Anderson, TN)	10	1.0%
112.01 (Blount, TN)	8	0.8%
37 (Knox, TN)	8	0.8%
52.02 (Knox, TN)	8	0.8%
57.09 (Knox, TN)	8	0.8%
201 (Anderson, TN)	7	0.7%
46.15 (Knox, TN)	7	0.7%
All Other Locations	390	40.8%

Additional Information

Analysis Settings

Analysis Type	Destination
Destination Type	Census Tracts
Selection area as	Home
Year(s)	2022
Job Type	All Jobs
Selection Area	59.10 (Knox, TN) from Census Tracts
Selected Census Blocks	22
Analysis Generation Date	09/17/2025 08:33 - OnTheMap 6.25.2
Code Revision	bd5bc0a714230c9c2b909d905c8753cb532970e8
LODES Data Vintage	20241022_1605

Data Sources

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2nd Quarter of 2002-2022).

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

KNOX COUNTY TURN LANE VOLUME THRESHOLD WORKSHEETS

TABLE 4A

LEFT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

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

396

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149 150 - 199	300 245	235 200	185 160	145 130	120 110	100 90
200 - 249 250 - 299	205 175	170 150	140 125	115 105	100 90	80 70
300 - 349 350 - 399	155 135	135 120	110 100	95 85	80 70	65 60
400 - 449 450 - 499	120 105			75 70	65 60	55 50
500 - 549 550 - 599	95 85			65 60	55 50	50 45
600 - 649 650 - 699	75 70			55 50	45 40	40 35
700 - 749 750 or More	65 60			45 40	35 35	30 30

346 + 11 = 357

N Campbell Station Road at Proposed Entrance

2029 Projected AM SB Left Turns = 13

Left Turn Lane NOT Warranted

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149 150 - 199	100 90	80 75	70 65	60 55	55 50	50 45
200 - 249 250 - 299	80 70	72 65	460 55	55 50	50 45	45 40
300 - 349 350 - 399	65 60	60 55	50 50	50 45	45 40	40 40
400 - 449 450 - 499	55 50	50 45	45 45	45 40	40 35	35 35
500 - 549 550 - 599	50 45	45 40	40 40	40 35	35 35	35 35
600 - 649 650 - 699	40 35	35 35	35 35	35 30	35 30	30 30
700 - 749 750 or More	30 30	30 30	30 30	30 30	30 30	30 30

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

TABLE 4B
RIGHT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

346

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

N Campbell Station Road at Proposed Entrance

2029 Projected AM NB Right Turns = 11

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						Yes
50 - 99					Yes	Yes
100 - 149				Yes	Yes	Yes
150 - 199			Yes	Yes	Yes	Yes
200 - 249		Yes	Yes	Yes	Yes	Yes
250 - 299	Yes	Yes	Yes	Yes	Yes	Yes
300 - 349	Yes	Yes	Yes	Yes	Yes	Yes
350 - 399	Yes	Yes	Yes	Yes	Yes	Yes
400 - 449	Yes	Yes	Yes	Yes	Yes	Yes
450 - 499	Yes	Yes	Yes	Yes	Yes	Yes
500 - 549	Yes	Yes	Yes	Yes	Yes	Yes
550 - 599	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.

TABLE 4A

LEFT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

(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	300	235	185	145	120	100
150 - 199	245	200	160	130	110	90
200 - 249	205	170	140	115	100	80
250 - 299	175	150	125	105	90	70
300 - 349	155	135	110	95	80	65
350 - 399	135	120	100	85	70	60
400 - 449	120	105	90	75	65	55
450 - 499	105	90	80	70	60	50
500 - 549	95	80	70	65	55	50
550 - 599	85	70	65	60	50	45
600 - 649	75	65	60	55	45	40
650 - 699	70	60	55	50	40	35
700 - 749	65	55	50	45	35	30
750 or More	60	50	45	40	35	30

449

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149	100	80	70	60	55	50
150 - 199	90	75	65	55	50	45
200 - 249	80	72	460	55	50	45
250 - 299	70	65	55	50	45	40
300 - 349	65	60	50	50	45	40
350 - 399	60	55	50	45	40	40
400 - 449	55			45	40	35
450 - 499	50			40	35	35
500 - 549	50			40	35	35
550 - 599	45			35	35	35
600 - 649	40			35	35	30
650 - 699	35			30	30	30
700 - 749	30			30	30	30
750 or More	30	30	30	30	30	30

257 + 32 = 289

N Campbell Station Road at Proposed Entrance

2029 Projected PM SB Left Turns = 40

Left Turn Lane NOT Warranted

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

TABLE 4B
RIGHT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

257

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25						
32 → 25 - 49						
50 - 99						
100 - 149						
150 - 199						
200 - 249						
250 - 299						Yes
300 - 349					Yes	Yes
350 - 399				Yes	Yes	Yes
400 - 449				Yes	Yes	Yes
450 - 499			Yes	Yes	Yes	Yes
500 - 549		Yes	Yes	Yes	Yes	Yes
550 - 599		Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

N Campbell Station Road at Proposed Entrance

2029 Projected PM NB Right Turns = 32

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						Yes
50 - 99					Yes	Yes
100 - 149				Yes	Yes	Yes
150 - 199			Yes	Yes	Yes	Yes
200 - 249		Yes	Yes	Yes	Yes	Yes
250 - 299	Yes	Yes	Yes	Yes	Yes	Yes
300 - 349	Yes	Yes	Yes	Yes	Yes	Yes
350 - 399	Yes	Yes	Yes	Yes	Yes	Yes
400 - 449	Yes	Yes	Yes	Yes	Yes	Yes
450 - 499	Yes	Yes	Yes	Yes	Yes	Yes
500 - 549	Yes	Yes	Yes	Yes	Yes	Yes
550 - 599	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 I

VEHICLE QUEUE WORKSHEETS (SIMTRAFFIC 12)

Intersection: 4: N Campbell Station Road & Pierceson Point Lane

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	51	31
Average Queue (ft)	20	2
95th Queue (ft)	47	16
Link Distance (ft)	456	188
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: N Campbell Station Road & Proposed Entrance

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	54	58
Average Queue (ft)	29	6
95th Queue (ft)	50	29
Link Distance (ft)	251	188
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: N Campbell Station Road & Pierceson Point Lane

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	37	61
Average Queue (ft)	11	6
95th Queue (ft)	35	32
Link Distance (ft)	456	188
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: N Campbell Station Road & Proposed Entrance

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	52	84
Average Queue (ft)	24	13
95th Queue (ft)	47	52
Link Distance (ft)	302	158
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

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ajaxengineering@gmail.com

AJAX ENGINEERING
CIVIL ENGINEERING / TRAFFIC ENGINEERING