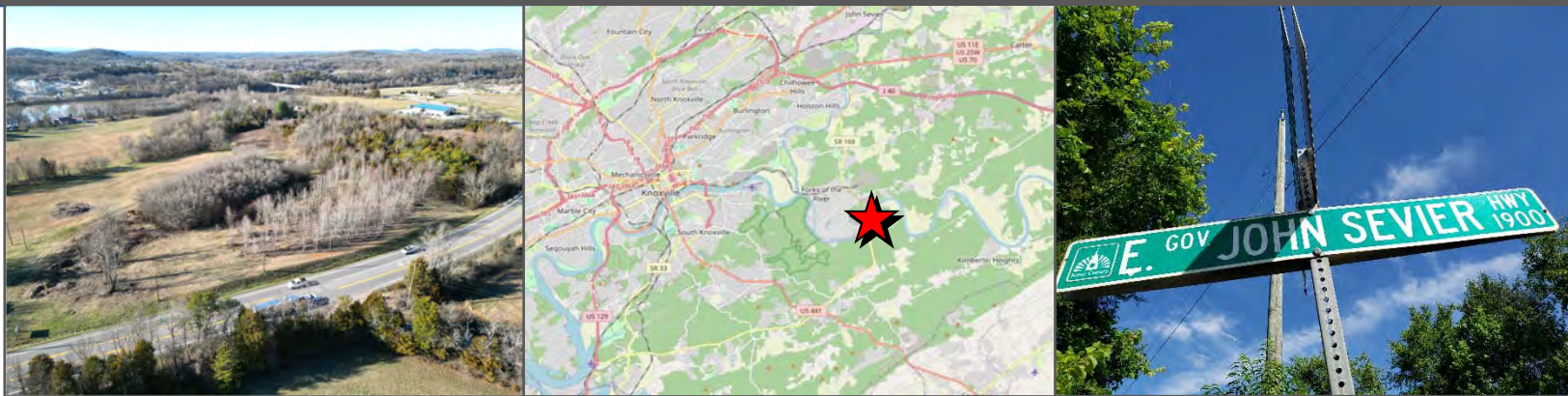


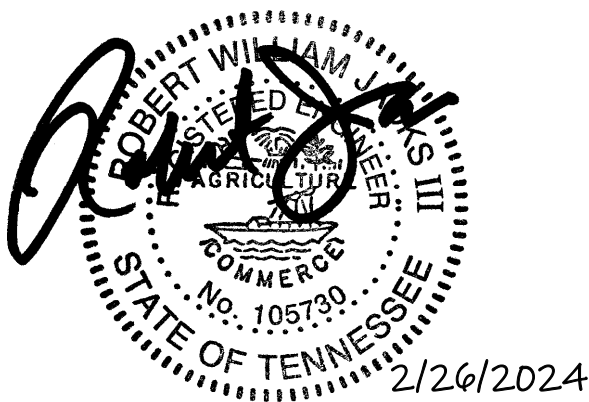


Transportation Impact Study Heartland Development Subdivision Knox County, Tennessee



February 2024

Prepared for:
Heartland Development
307 Blue Peacock Way
Seymour, TN 37865



4-SE-24-C / 4-G-24-DP
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EXECUTIVE SUMMARY

Preface:

Heartland Development proposes a residential development at E Governor John Sevier Highway across from French Road in Southeast Knox County, TN. The proposed development will include a maximum of 151 single-family detached houses on 35.8 +/- acres and is referenced in this study as the “Heartland Development Subdivision” since an official name has not been chosen. The development will be built in a single phase and is anticipated to be fully built and occupied by 2027. The development proposes a single entrance on E Governor John Sevier Highway at the existing unsignalized t-intersection with French Road.

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

Study Results:

The findings of this study include the following:

- The Heartland Development Subdivision, with a maximum of 151 single-family houses, is estimated to generate 1,474 trips at full build-out and occupancy on an average weekday. Of these daily trips, 108 are estimated to occur during the AM peak hour and 146 in the PM peak hour in 2027.
- The projected 2027 level of service calculations for the intersection of E Governor John Sevier Highway at French Road and the Proposed Entrance resulted in reasonable LOS and vehicle delays for the existing approaches. However, the constructed approach leg (entrance) for the development at the intersection will experience high vehicle delays in the eastbound left/thru lane during peak periods. Overall, however, these exiting left-turning vehicles will experience minimal queue lengths, with a calculated 95th percentile vehicle queue of 49 feet, or about two passenger vehicles, in the 2027 PM peak hour.
- Based on Tennessee Department of Transportation standards, the projected 2027 volumes at the intersection of E Governor John Sevier Highway at French Road and the Proposed Entrance will warrant an exclusive southbound right-turn lane

on E Governor John Sevier Highway for motorists entering the development from the north.

Recommendations:

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

- At the intersection of E Governor John Sevier Highway at French Road, the current site plan for the development shows the eastbound exiting left/thru lane for the development with a storage length of 70 feet. It is recommended that this lane be increased to 75 feet to potentially and fully store three passenger vehicles.
- The exiting lanes for the development at E Governor John Sevier Highway should be marked on the pavement with the appropriate white turn arrows, and yellow transverse cross-hatching markings should be applied in advance of the proposed raised median on the entrance road.
- It is recommended that the center two-way left-turn lane (TWLTL) pavement markings on E Governor John Sevier Highway be modified to reflect an exclusive northbound left-turn lane at the Proposed Entrance. The existing pavement markings in the TWLTL should be re-stripped to accommodate a dedicated minimum storage length of 50 feet for northbound left turns, and a white left-turn arrow should be applied to the pavement.
- A southbound right-turn lane on E Governor John Sevier Highway is recommended to be constructed at the Proposed Entrance with 215 feet of storage and a taper length of 130 feet (approximately 10:1). The right-turn lane should include the appropriate right-turn arrow pavement markings as shown in the Tennessee Department of Transportation (TDOT) standard drawing T-M-4. The designer must coordinate with TDOT to design and construct this southbound right-turn lane.
- It is recommended that a Stop Sign (R1-1) be installed, and a 24" white stop bar be applied to the Proposed Entrance approach at E Governor John Sevier Highway. The stop bar should be applied a minimum of 4 feet away from the edge of E

Governor John Sevier Highway and placed at the desired stopping point that maximizes the sight distance.

- Based on a posted speed limit of 45-mph on E Governor John Sevier Highway, the required intersection sight distance is 530 feet for exiting turning vehicles from the Proposed Entrance. Sight distances at the Proposed Entrance approach must not be impacted by future landscaping, signage, or vegetation. The site designer must ensure that the intersection sight distances are accounted for and provided in the design plans. A visual inspection determined that these sight distances are available to the south on E Governor John Sevier Highway. The sight distance to the north appears adequate for the stopping sight distance but does not appear to meet the required intersection sight distance. It is recommended that a registered land surveyor measure the available sight distance to the north at the Proposed Entrance location on E Governor John Sevier Highway and determine if vegetation or cut slopes could be removed to achieve the required sight distance.
- Due to the reduced sight distance to the north, it is recommended that an advance intersection warning sign be installed on E Governor John Sevier Highway for southbound motorists. This warning signage should be a Cross Road Intersection (W2-1) sign. The sign should be installed on a single post for the southbound lane on E Governor John Sevier Highway, preferably 500 feet north of the intersection with the Proposed Entrance and French Road. This placement location would be just before the beginning of the recommended southbound right-turn taper and lane on E Governor John Sevier Highway.
- The existing advance intersection warning sign for northbound traffic on E Governor John Sevier Highway will need to be replaced with a Cross Road Intersection (W2-1) sign to reflect the addition of the Proposed Entrance approach at the intersection. This sign is approximately 850 feet south of the existing intersection and is currently posted with a Side Road Intersection (W2-2R) sign.
- The developer should consider installing a single overhead roadway light to delineate the Proposed Entrance at E Governor John Sevier Highway for travel at night or in low-light conditions. This lighting would be ideally placed adjacent to the Proposed Entrance driveway and off E Governor John Sevier Highway and would fully illuminate the intersection.
- The construction of the Proposed Entrance on E Governor John Sevier Highway will require a TDOT Highway Entrance Permit. The developer will need to apply for this permit and coordinate with TDOT regarding their specific requirements for this entrance.

- A 25-mph Speed Limit (R2-1) sign is recommended to be posted near the beginning of the development entrance off E Governor John Sevier Highway. It is 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.
- Dual end-of-roadway object markers (OM4-1) should be installed at the end of the subdivision stub-out road if constructed as shown in the concept plan. An additional sign should be posted at the stub-out road to follow Knoxville-Knox County Subdivision Regulations. This sign is for notification of a possible future street connection. It should state, “NOTICE – This road will be extended with future development – for more info. contact Knox Co. Engineering & Public Works (865) 215-5800”.
- Stop Signs (R1-1) with 24” white stop bars and other traffic signage are recommended to be installed at the internal road locations, as shown in the report. Yield Signs (R1-2) with Roundabout Plaque Signs (R6-5P) are appropriate to be installed at the traffic circle/mini-roundabout if the internal sight distances are met. The approaches to the traffic circle/mini-roundabout should also be marked with white Yield markings (row of solid white triangles across the driving lane) on the pavement.
- Sight distance at the new internal intersections must not be impacted by new signage, parked cars, or future landscaping. With a speed limit of 25-mph in the development, the internal intersection sight distance is 250 feet. The required stopping sight distance is 155 feet for a level road grade. The site designer should ensure that internal sight distance lengths are met and account for different proposed road grades.
- The longest internal roadway will have two bulb-outs along its length that will accommodate access to several proposed lots in the corners of the development property. Construction of these bulb-outs will create larger areas of pavement without traffic control. At a minimum, it is recommended that a white dashed pavement line be applied to the outside edge of the roadway adjacent to the bulb-out. Another potential traffic control that should be considered includes a striped delineated island.
- 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 grade and intersection elements should be designed to AASHTO, TDOT, and Knox County specifications and guidelines to ensure proper transportation operations.
- * • The northbound lane of E Governor John Sevier Highway has a Reduced Speed Limit Ahead (W3-5) sign posted to the south of French Road that indicates an upcoming reduction of the speed limit from 50-mph to 45-mph. However, a 45-mph Speed Limit (R2-1) sign is not posted to the north of this sign, designating the start of the 45-mph speed zone. Since this is located on a state route, TDOT should install a 45-mph Speed Limit (R2-1) sign where the 45-mph speed zone officially begins on the highway.
- * • TDOT should consider installing a Two-Way Left Turn Only (R3-9b) sign for southbound traffic on E Governor John Sevier Highway. It would be appropriate for this sign to be installed just south of the bridge crossing the French Broad River, where the center TWLTL begins.
- * • Knox County is recommended to install a 30-mph Speed Limit (R2-1) sign on French Road off E Governor John Sevier Highway for motorists traveling east on French Road due to the lack of a speed limit sign in this direction.

DESCRIPTION OF EXISTING CONDITIONS

▪ STUDY AREA:

The proposed location of this new residential development is shown on a map in Figure 1. This proposed development will be located on E Governor John Sevier Highway across from French Road in Southeast Knox County, TN. The development site is east and adjacent to the French Broad River and is just under three miles south of the intersection of E Governor John Sevier Highway and Strawberry Plains Pike. The development will have a single entrance tie to E Governor John Sevier Highway at French Road.

As Knoxville/Knox County Planning requested, transportation impacts associated with the proposed development were analyzed at the unsignalized intersection of E Governor John Sevier Highway at French Road, where the Proposed Entrance will tie into and create a 4-way intersection.



The proposed development property is in a quasi-rural area that is slowly being transformed into an area that is more suburbanized due to increased development. A large veterans cemetery was constructed just north of the proposed development site on E Governor John Sevier Highway and adjacent to the French Broad River. The East Tennessee State Veterans Cemetery was established in 2011 and has a capacity of 28,000 plots. Governor John Sevier Highway has become more attractive to developers and residents over the past few years due to the dwindling availability of developable and affordable property in other parts of Knox County and due to its proximity to other major roads.

The development property has 1,300 feet of road frontage on the west side of E Governor John Sevier Highway. The proposed development site is currently undeveloped, nearly split between

open areas used for farm production and areas covered with forest. A single farm storage building is located on the far northwestern part of the development property near the French Broad River. The development property will consist of two existing parcels.

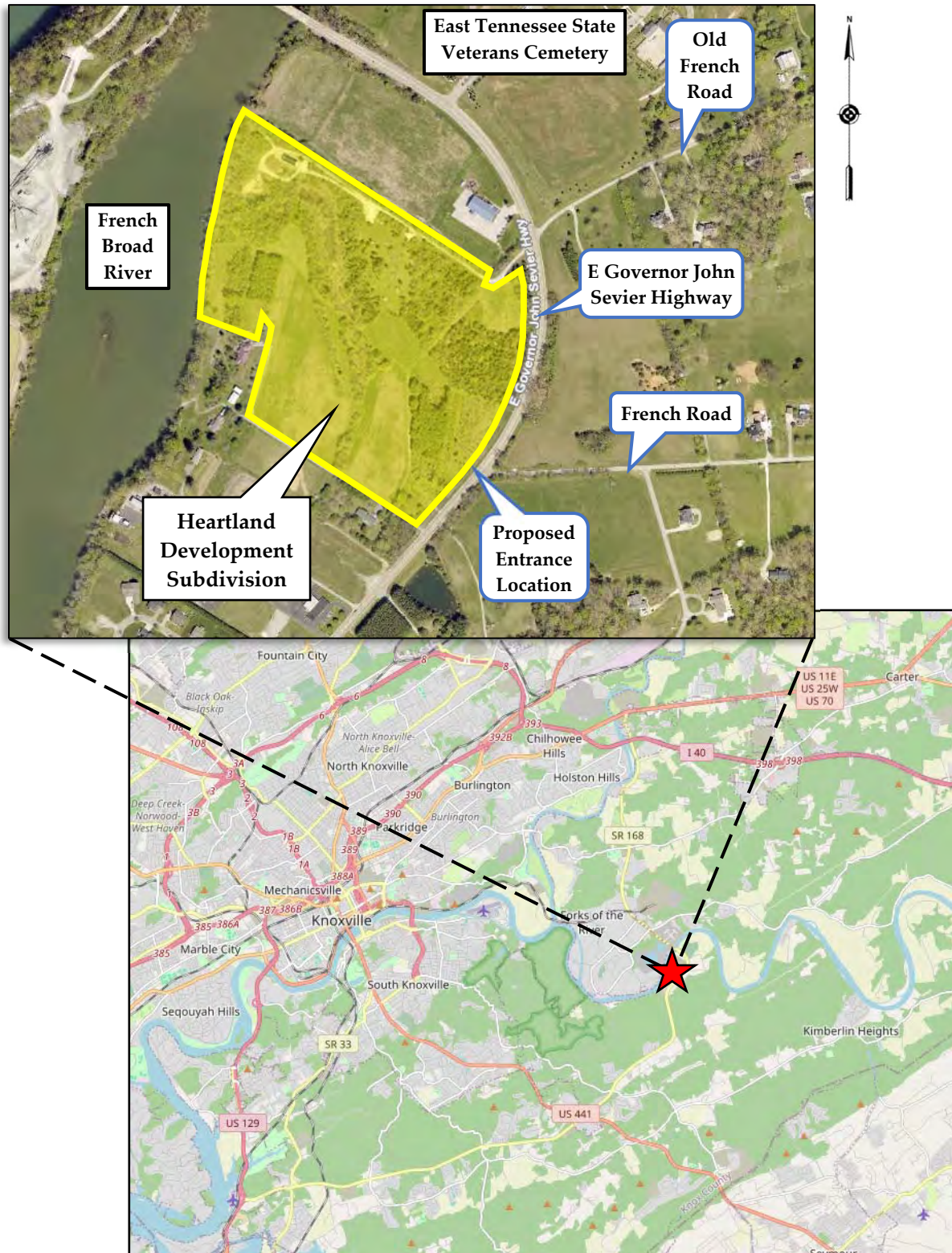


Figure 1
Location Map

▪ **EXISTING ROADWAYS:**

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

TABLE 1
STUDY CORRIDOR CHARACTERISTICS

NAME	CLASSIFICATION ¹	SPEED LIMIT	LANES	ROAD WIDTH ²	TRANSIT ³	PEDESTRIAN FACILITIES	BICYCLE FACILITIES
East Governor John Sevier Highway (SR 168)	Major Arterial	45 mph	3 (with TWLTL)	46 feet	None	No sidewalks along roadway	No bike lanes
French Road	Local Street	30 mph	2 undivided	17 feet	None	No sidewalks along roadway	No bike lanes

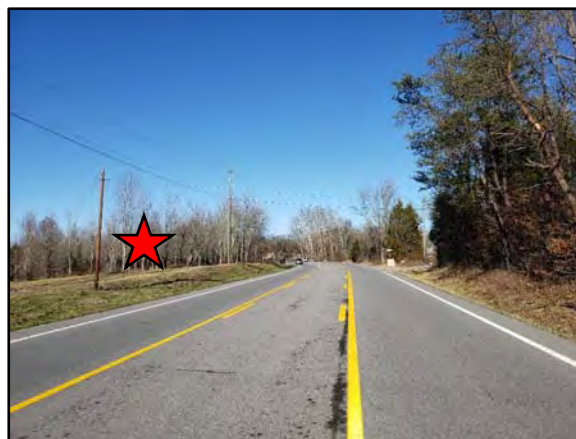
¹ 2018 Major Road Plan by Knoxville/Knox County Planning

² From edges of pavement or face of curbs

³ According to Knoxville Area Transit (KAT) System Map

Governor John Sevier Highway (State Route 168) is classified as a Major Arterial and traverses in a general north-south direction in the study area. W Governor John Sevier Highway begins at the interchange with Alcoa Highway (US 129/SR 115) on its southwest end. On its northeast end, E Governor John Sevier Highway terminates at the intersection with Asheville Highway (US 11E/US 25/US 70/SR 9), totaling 18.1 miles. The delineation of the East/West designation of Governor John Sevier Highway occurs at the overpass intersection with Chapman Highway, 3.8 miles to the southwest of the development site.

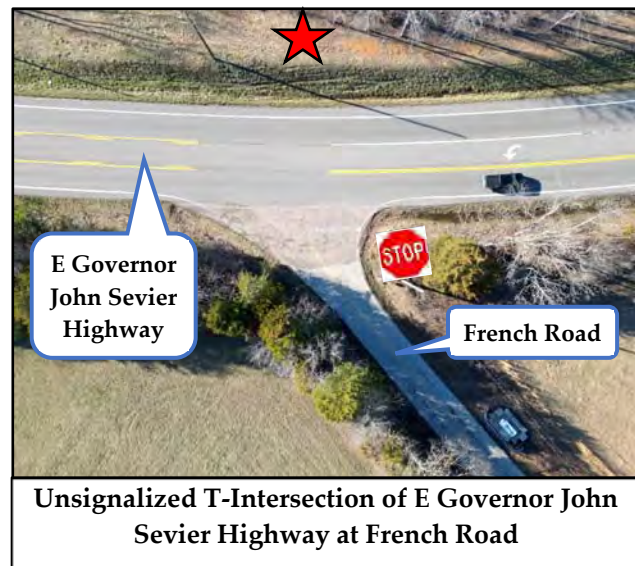
E Governor John Sevier Highway at the development site currently consists of a 3-lane pavement section that includes a continuous center two-way left-turn turn lane (TWLTL). The lanes are 12 feet wide with 4-foot paved shoulders outside the white edge lines. The pavement surface is approximately 46 feet in total width. Grass side slopes are located immediately outside of the paved shoulders. At the project site, utility streetlights are not provided on E Governor John Sevier Highway, and the speed limit is posted at 45-mph. The posted speed limit is increased to 50-mph near the development's southern edge at the highway. The center TWLTL for the



**E Governor John Sevier Highway at
Development Site Property
(Looking Northeast)**

southbound approach of E Governor John Sevier Highway has a designated storage length of 110 feet for vehicles turning onto French Road.

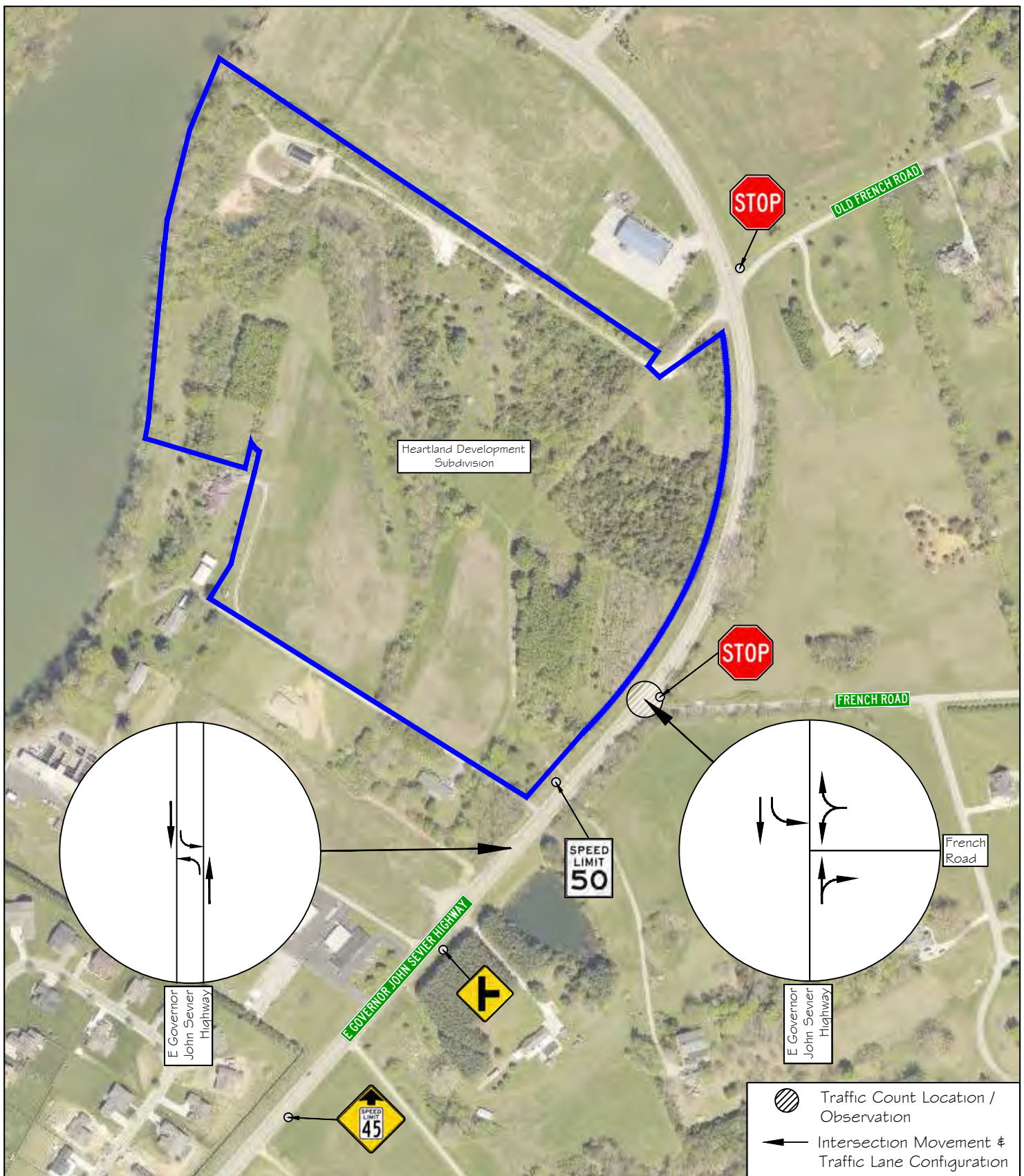
French Road is classified as a Local Street with a total length of 1.8 miles. This road traverses between E Governor John Sevier Highway on its north side and Hopewell Road on its south side. Near E Governor John Sevier Highway, French Road has a pavement width of 17 feet with a painted double yellow centerline and white edge lines with a straight alignment. Off E Governor John Sevier Highway, French Road has an east-west alignment until it intersects Old French Road. Past Old French Road, French Road has a more north-south



alignment, and further to the south, the roadway becomes windier and slightly narrower and is not delineated by any painted pavement markings. The posted speed limit is 30-mph; however, it is only posted for northbound/westbound travel on French Road towards E Governor John Sevier Highway. The northbound/westbound direction of travel on French Road has two 30-mph speed limit signs posted, while southbound/eastbound travel does not have any posted speed limit signs.

French Road provides access to residential houses, farm properties, and undeveloped properties in a more rural part of Knox County. At the intersection of French Road at E Governor John Sevier Highway, the horizontal alignment of French Road makes a slight turn to line up perpendicularly with the highway. A Stop Sign (R1-1) at E Governor John Sevier Highway controls the French Road approach.

Figure 2 shows the existing lane configurations of the intersection examined in the study, the traffic count location for the study, and the current traffic road signage in the study area. The road signage shown in Figure 2 only includes warning and regulatory signage near the development site and adjacent to the studied intersection. The pages following Figure 2 give a further overview of the site study area with photographs.



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

NOT TO SCALE

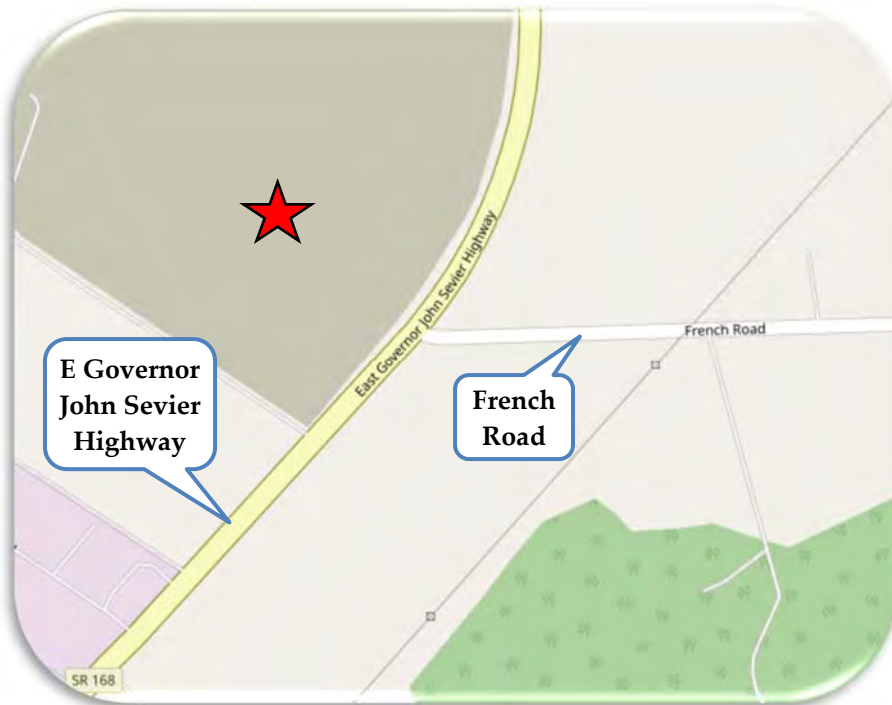


FIGURE 2

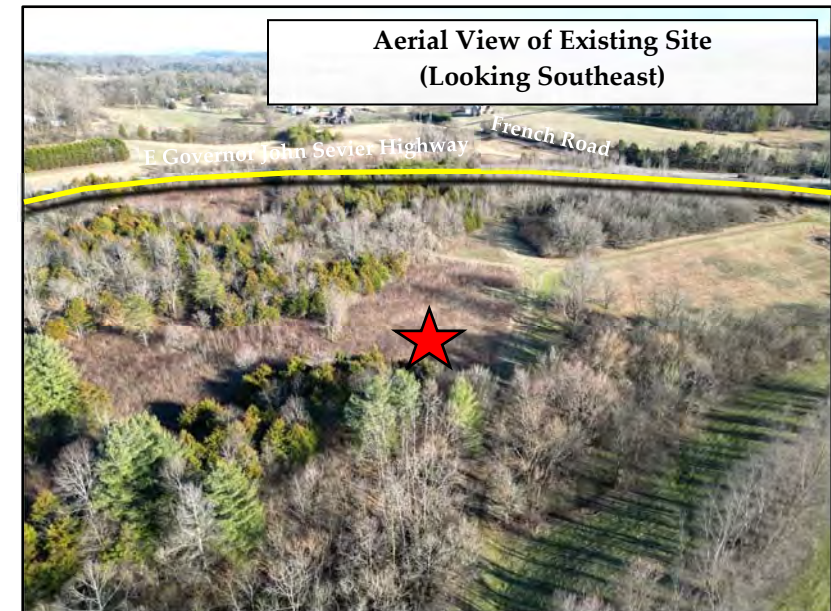
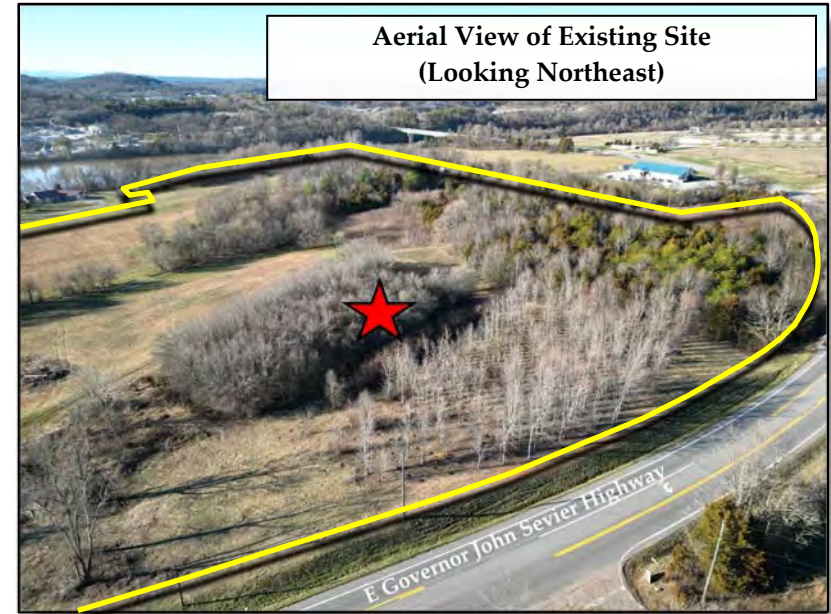
Heartland Development Subdivision

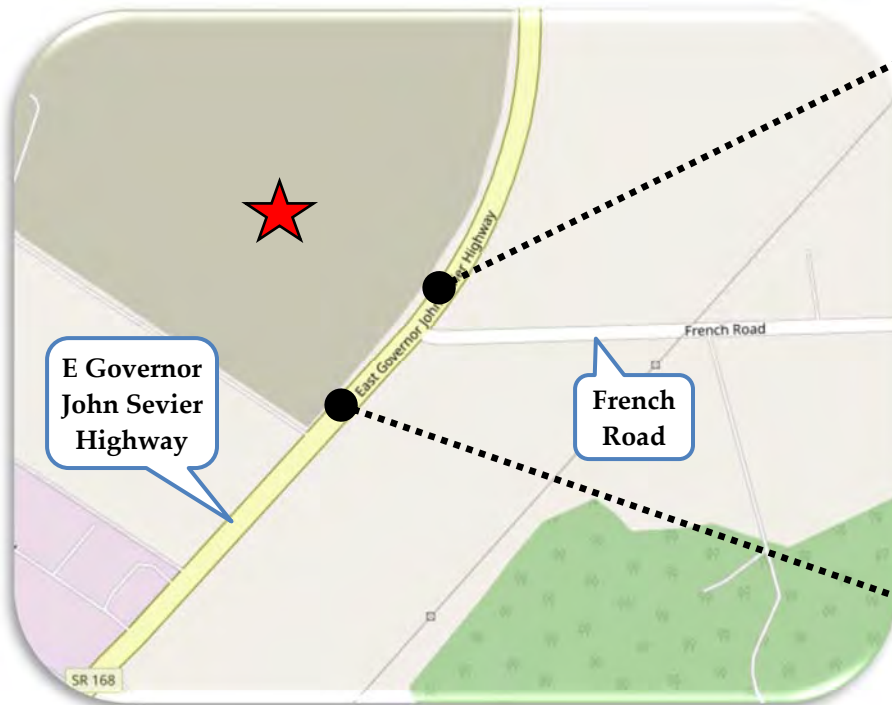
Traffic Count Location, Traffic Signage & Existing Lane Configurations

PHOTO EXHIBITS

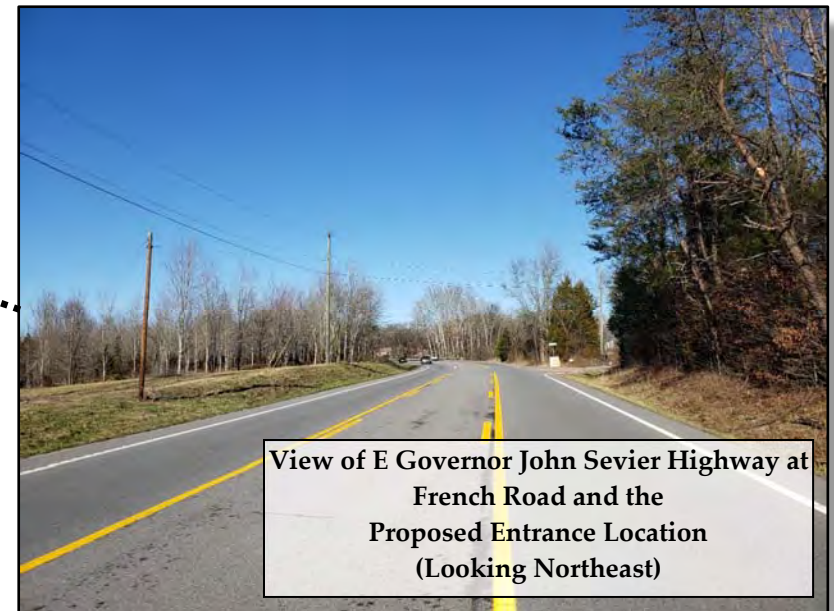
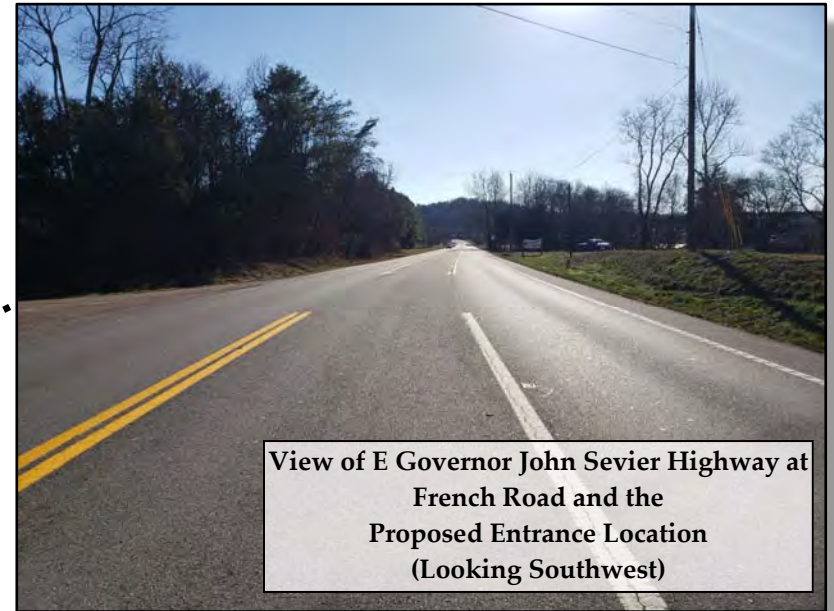


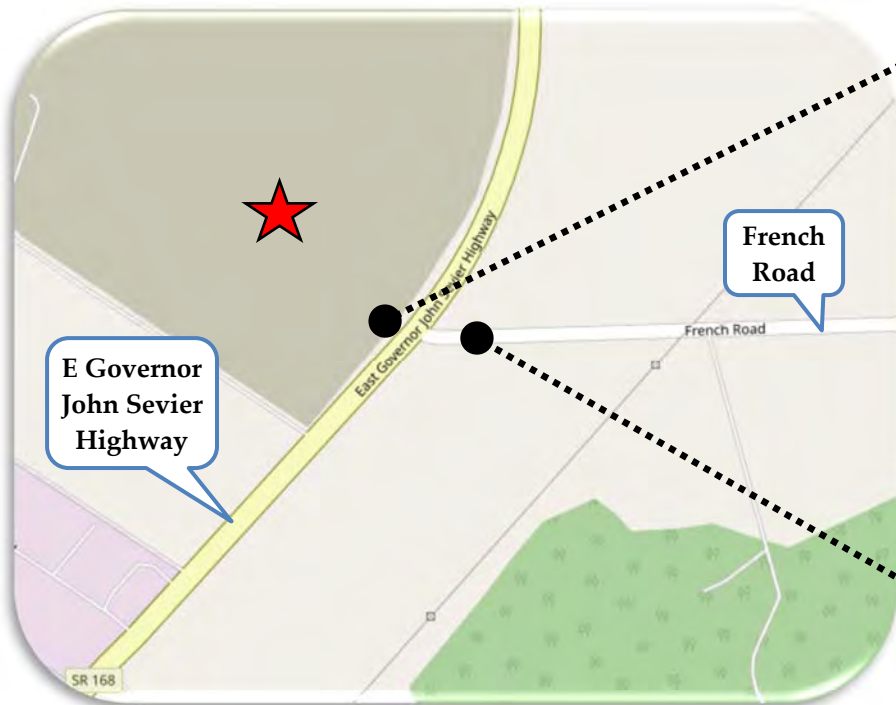
E Governor John Sevier Highway at French Road and the Proposed Development Site



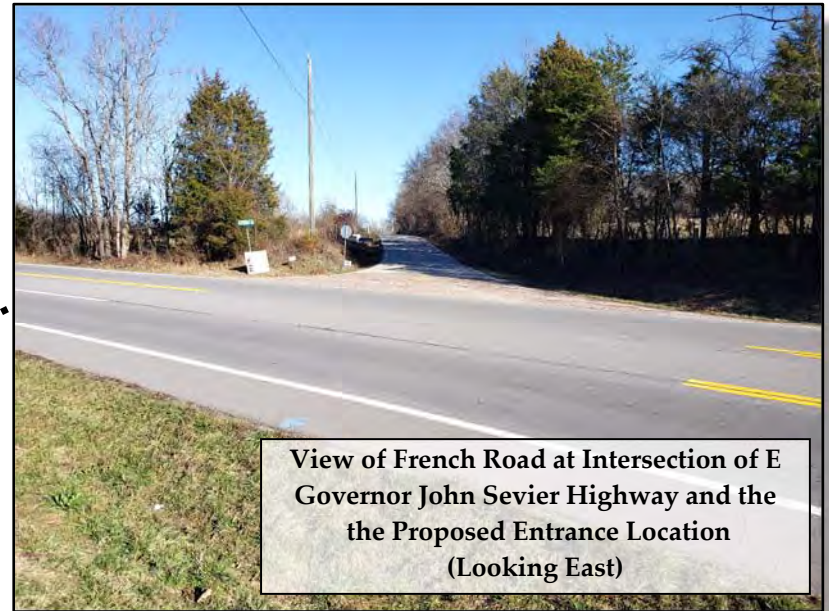


E Governor John Sevier Highway at French Road and the Proposed Development Site





E Governor John Sevier Highway at French Road and the Proposed Development Site



View of French Road at Intersection of E Governor John Sevier Highway and the Proposed Entrance Location (Looking East)



View of French Road at Intersection of E Governor John Sevier Highway and the Proposed Entrance Location (Looking West)

▪ **EXISTING TRANSPORTATION VOLUMES PER MODE:**

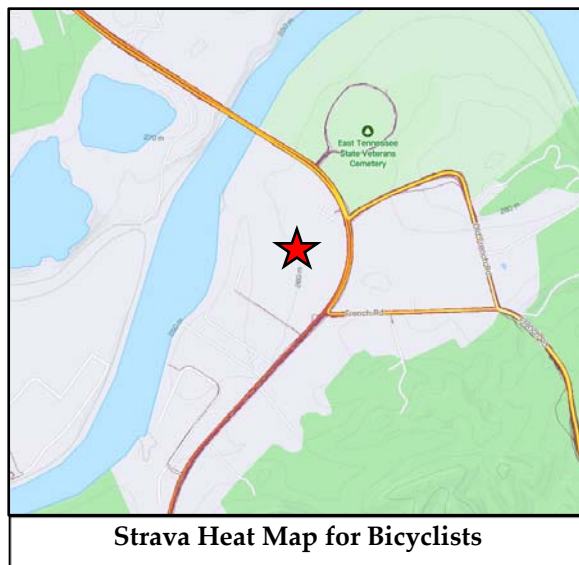
One annual vehicular traffic count location exists near the study area, and the Tennessee Department of Transportation (TDOT) conducts this count. The count location data is the following and can be viewed with further details in Appendix A:

- Existing vehicular roadway traffic:

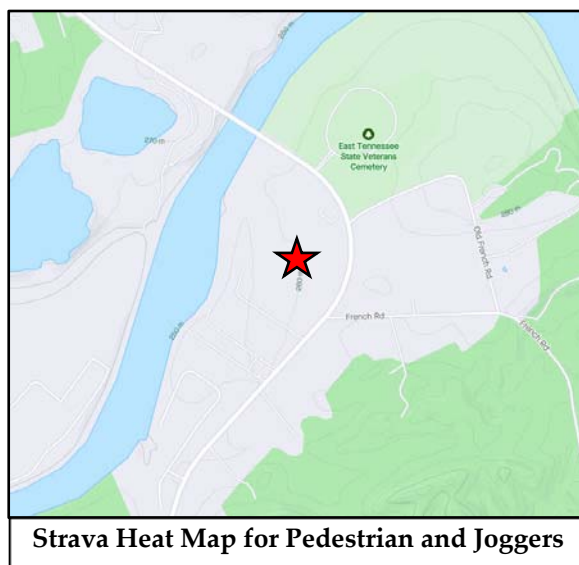
The TDOT reported an Average Daily Traffic (ADT) on E Governor John Sevier Highway, just north of the development site, at 12,062 vehicles per day in 2023. From 2013 to 2023, this count station has indicated a 1.9% average annual traffic growth rate.

- Existing bicycle and pedestrian volumes:

The average daily pedestrian and bicycle traffic is unknown along the studied roadways. Due to the lack of facilities, it is assumed that few pedestrians and bicyclists use the roads in the study area. No pedestrians or bicyclists were observed during the 6-hour traffic count for this project at the intersection of E Governor John Sevier Highway at French Road.



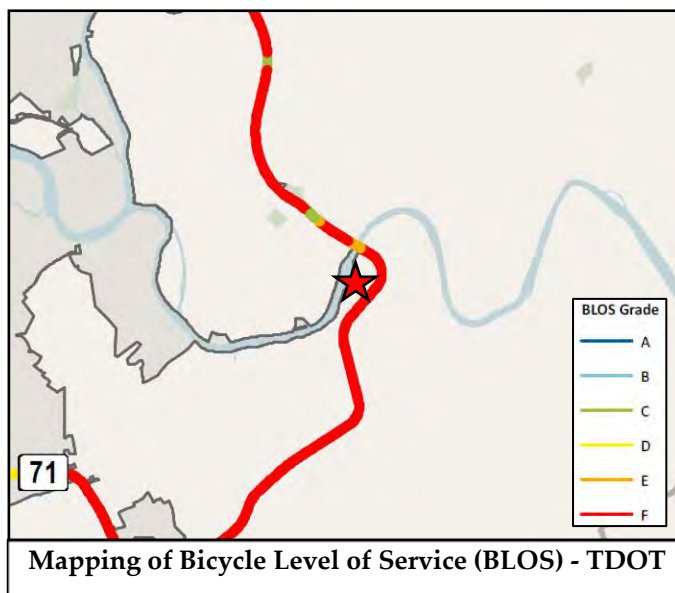
An online website, strava.com, provides “heat” maps detailing routes taken by pedestrians, joggers, and bicyclists. The provided heat maps show the last two years of data, are updated monthly, and are gathered from individuals allowing their smart devices to track and compile their routes (millions of users). The activities in the maps are shown on the roads with color intensities with lighter colors signifying higher activity. Some bicycle traffic is recorded on the E



Governor John Sevier Highway and French Road sections adjacent to the development site. The Strava heat map data shows no pedestrian traffic along E Governor John Sevier Highway or French Road.

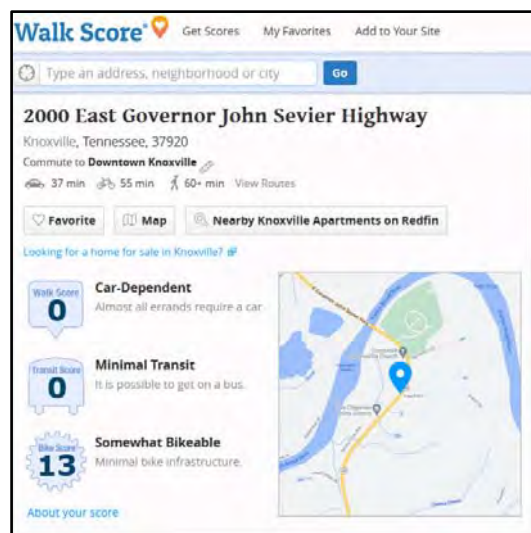
▪ **PEDESTRIAN AND BICYCLE FACILITIES:**

Bicycle facilities (lanes) are not available within the project site study area. Sidewalks are not provided either. Even though bicycle facilities are not provided on E Governor John Sevier Highway, TDOT has published mapping illustrating the Bicycle Level of Service (BLOS) for state routes in Knox County. BLOS is a nationally used measure of bicyclist comfort based on a roadway's geometry and traffic conditions. BLOS A designates the route as most suitable for bicyclists and BLOS F as the least suitable. The BLOS mapping for E Governor John Sevier Highway (SR 168) in the study area at the development site shows a BLOS grade of F.



▪ **WALK SCORE:**

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

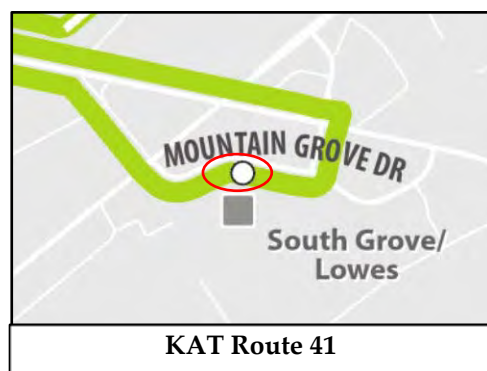


Appendix B shows maps and other information for the Walk, Bike, and Transit Score at the approximate development property address (2000 E Governor John Sevier Highway). The project site location is graded with a Walk Score of 0. This Walk Score indicates that almost all errands currently require a vehicle for travel at the development property. The Walk Score is graded at zero due to the lack of sidewalks and nearby amenities. The site is graded with a Bike Score of 13, which means there is minimal bike infrastructure, but it is somewhat bikeable. The site is given a Transit Score of 0 since no public transportation locations are near the development site.

▪ **TRANSIT SERVICES:**

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

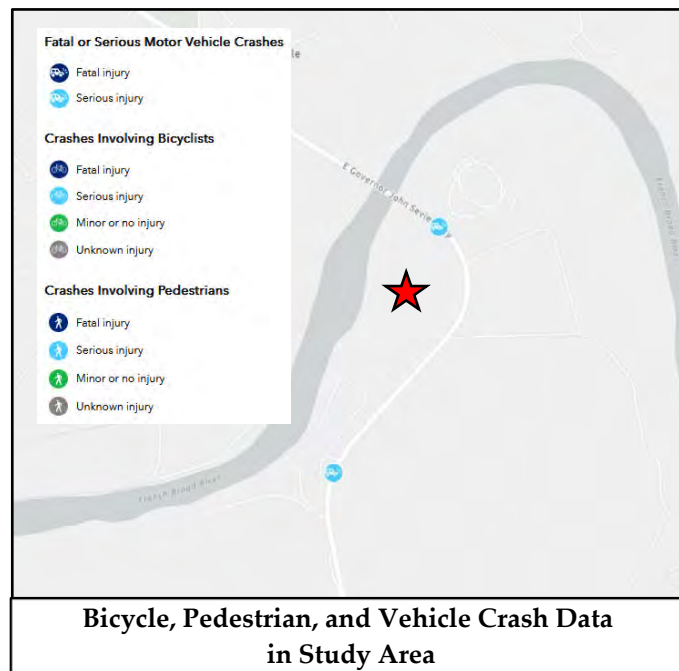
The closest public transit bus stop to the development site is 3.9 miles away to the southwest by roadway. The bus stop is on Mountain Grove Drive near Chapman Highway in front of the Lowe's Home Improvement Center and on Route 41, "Chapman Highway". It operates on weekdays and weekends; this route map is also included in Appendix C. KAT had to reduce its service schedule due to workforce shortages. These



changes took place on August 29th, 2022, and the reduced schedule for this route is also included in Appendix C. However, according to news reports, KAT plans to increase services on some routes on Sundays and evenings starting April 8, 2024. Other transit services in the area include the East Tennessee Human Resource Agency (ETHRA) and the Community Action Committee (CAC), which provides transportation services when requested.

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

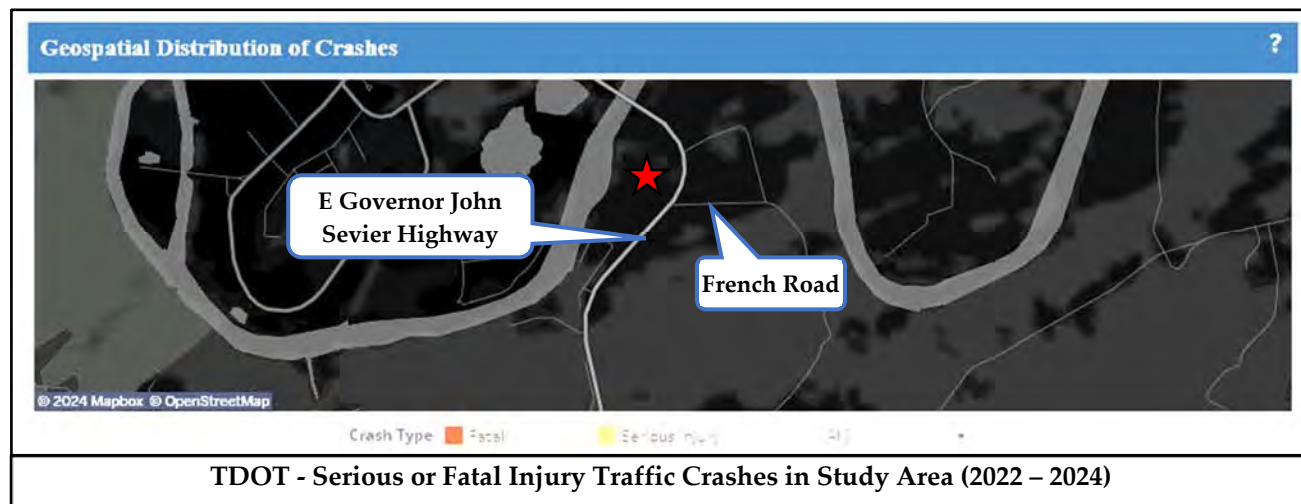
■ **CRASH DATA:**



The Knoxville Transportation Planning Organization (TPO) provides a website that lists bicycle, pedestrian, and vehicle severe or fatal crashes from October 2016 to September 2021. According to the data, none of these incidents occurred near the development site or at the studied intersection in the past couple of years. The closest incidents occurred north and south of the proposed development site on E Governor John Sevier Highway. The two closest crashes involved suspected DUI incidents. The one to the north near the Veteran's Cemetery occurred on

August 3rd, 2021, involved a single vehicle and resulted in a serious injury. The other incident occurred to the south near Stonesilo Way on August 12th, 2018. This crash also involved a single vehicle and resulted in a serious injury.

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



PROJECT DESCRIPTION

▪ LOCATION AND SITE PLAN:

The proposed plan layout with a maximum of 151 single-family detached houses on 35.8 +/- acres is designed by LJA Engineering and is shown in Figure 3. The development property will be a re-subdivision of two parcels in Knox County. As shown in the figure, four new streets will be constructed for the residential development. The longest internal roadway that circles the property will have two “bulb-outs” along its length that will accommodate access to several proposed lots in the corners of the development property. This long internal roadway will terminate at a stub-out at the edge of the northern boundary for potential future development; however, no specific developments are known or planned. The other end of this long internal roadway will end at a cul-de-sac and will intersect the main entrance road at a traffic circle/mini-roundabout at a y-intersection.

The subdivision will have one entrance on E Governor John Sevier Highway and will tie into the existing unsignalized t-intersection with French Road. Constructing the entrance will transform the existing intersection into a 4-way configuration.



**View of Front (East Side) of Development Property at
Intersection of E Governor John Sevier Highway
at French Road**

The 35.8-acre residential development will incorporate a large common area on the east side of the development along the French Broad River. The minimum size of the single-family detached house lots will be a tenth of an acre (4,500 ft²), with a few lots a quarter of an acre in size. Each house will have a garage and driveway. Besides a common river access point for future residents, no other subdivision amenities are being proposed. Sidewalks are not proposed for this development.

The schedule for the completion of this new residential development depends on economic

factors and construction timelines. This project is also contingent on permitting, design, and other regulatory approvals. The area's real estate market is still experiencing large amounts of activity and growth due to population growth and other factors. This study assumed that the total construction build-out of the development and full occupancy would occur within the next three years (2027).

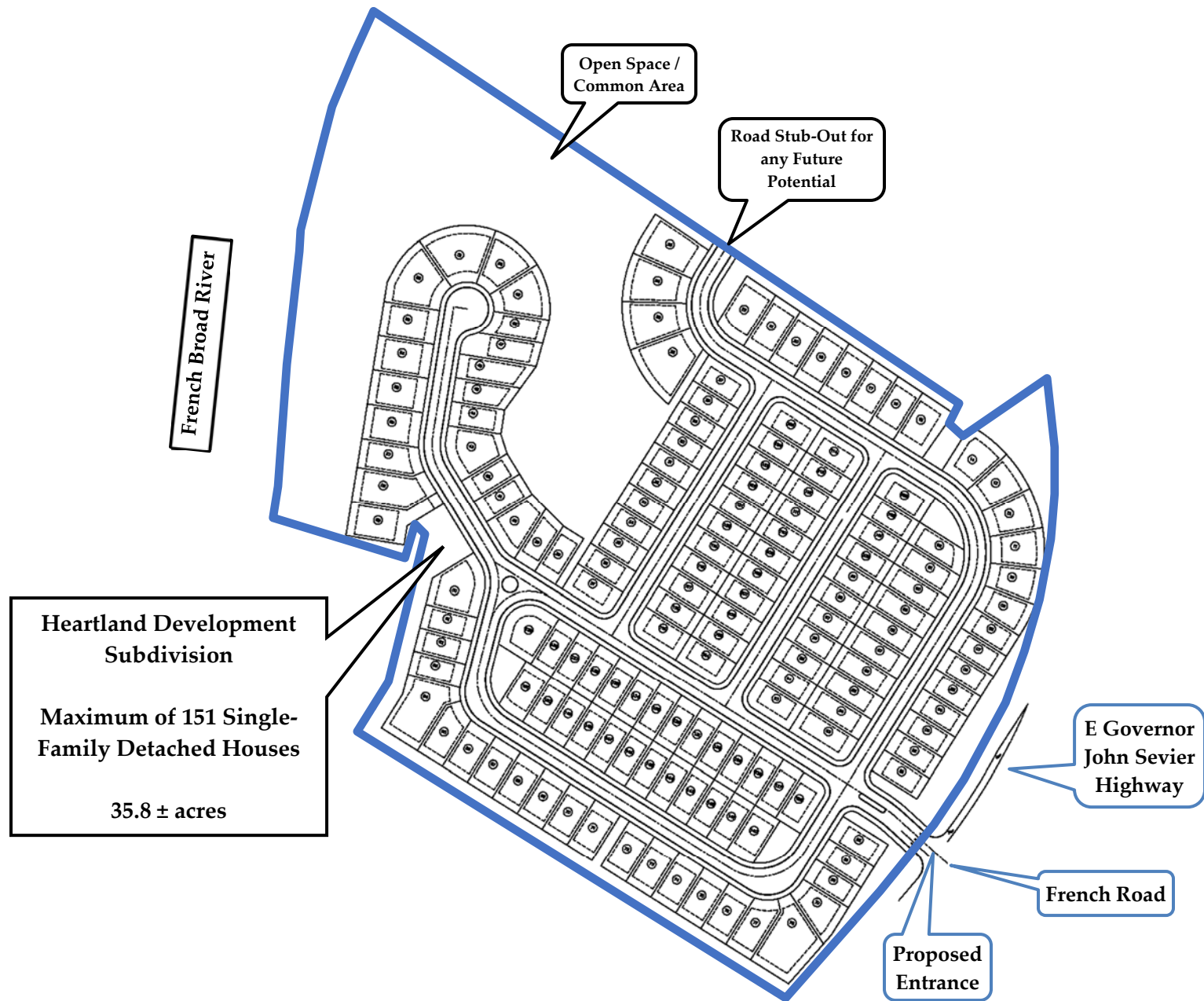


Figure 3
Proposed Plan Layout
Heartland Development Subdivision

Not to Scale

■ **PROPOSED USES AND ZONING REQUIREMENTS:**

The two parcels comprising the Heartland Development Subdivision property were rezoned to Planned Residential (PR) in 2022. The southern parcel was approved with a density of up to 4.5 units per acre. The northern parcel was approved with a density of up to 3.9 units per acre. The Planned Residential (PR) zone in Knox County allows for various land uses primarily within the residential realm. Uses permitted in this zone include single-family dwellings, duplexes, and multi-dwelling structures and developments. The most recent published online KGIS zoning map is provided in Appendix D. The existing adjacent surrounding zoning and land uses are the following:

- A single large parcel is located directly to the development property's north side and zoned as Agricultural (A). Crosswalk Community Church occupies this parcel, with most of the property being an open-maintained field.
- E Governor John Sevier Highway binds the development property to the east. A few large parcels across the highway to the east are mostly undeveloped except for a few standalone single-family detached houses. The large parcels across the highway are zoned as Agricultural (A).
- The adjacent properties to the south and southwest are occupied by single-family detached houses and are zoned as Agricultural (A). These parcels have access to the highway via a joint permanent easement.
- The French Broad River binds the development on the west side, and the river is zoned as Floodway (F).



▪ **ON-SITE CIRCULATION:**

The total length of the four new streets within the development will be 5,087 feet (0.96 miles), designed and constructed to the Knox County, TN specifications. The development will have asphalt paved internal roadways and 6" concrete curbs. The lane widths internally will be 13 feet each for a total 26-foot pavement width. The Proposed Entrance is shown in the design with a width of 39 feet with two exiting lanes and one entering lane. The two exiting lanes are shown as one for left/thru movements and one for right turns. The left/thru lane in the design plan has a vehicle storage length of 70 feet. The street right-of-way within the development will be 50 feet. Sidewalks are not proposed along the internal roads. Knox County will maintain the streets in the development after construction, and these will be dedicated public roads.

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

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

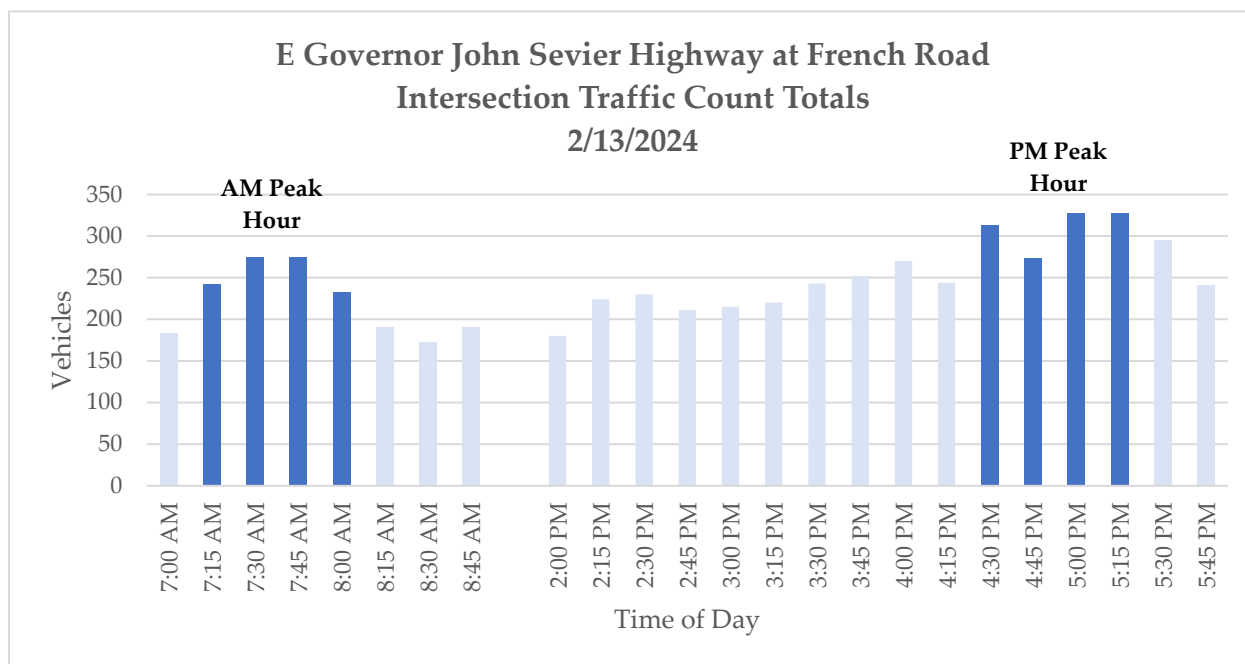
ANALYSIS OF EXISTING AND PROJECTED CONDITIONS

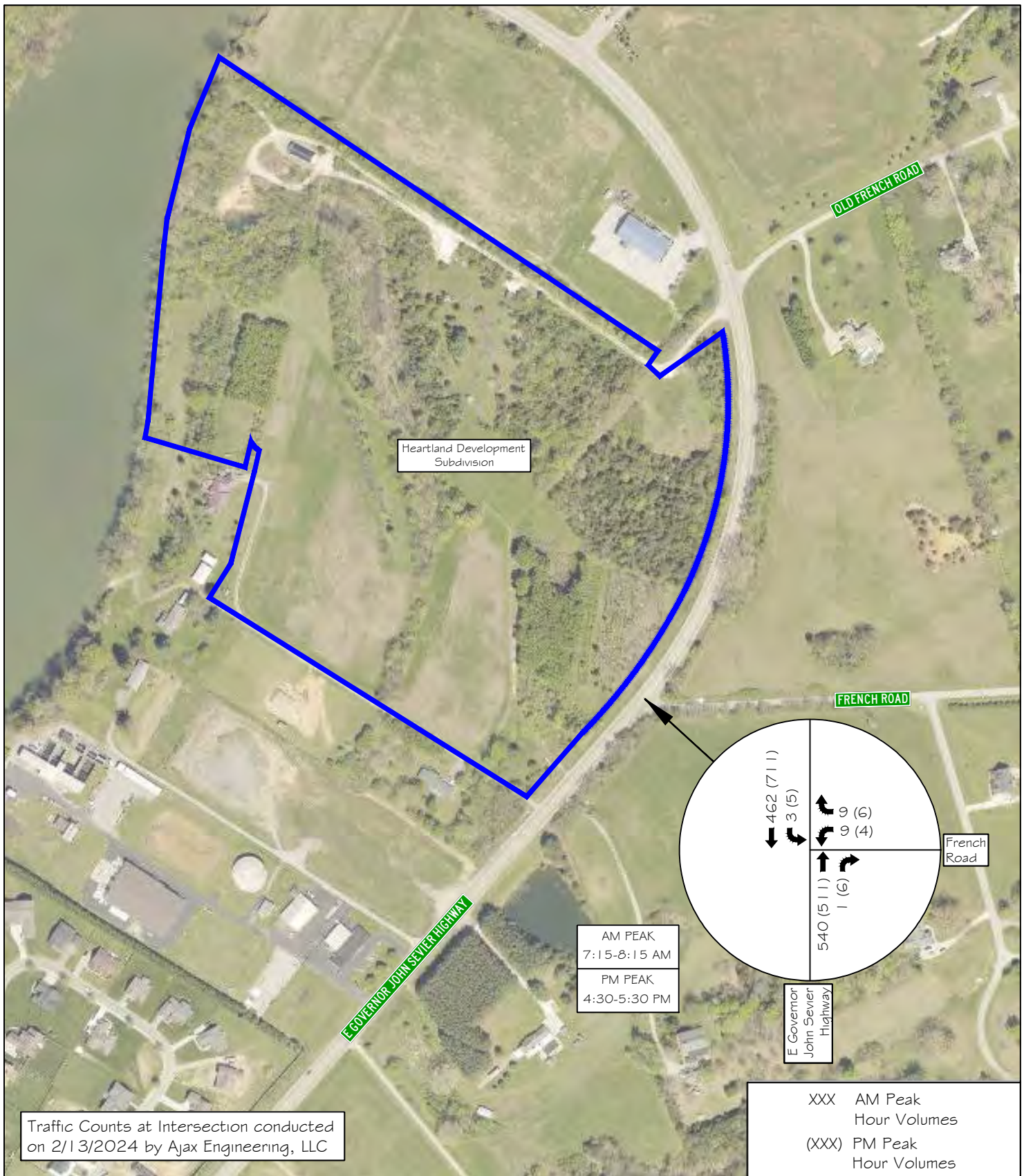
▪ EXISTING TRAFFIC CONDITIONS:

This study conducted a 6-hour traffic count at the unsignalized t-intersection of E Governor John Sevier Highway at French Road on Tuesday, February 13th, 2024. The manual traffic counts were conducted to tabulate the morning and afternoon peak period volumes and travel directions near the proposed development site. Based on the traffic volumes collected, the AM and PM peak hours were observed at 7:15 – 8:15 am and 4:30 – 5:30 pm at the intersection. Local county public schools were in session when the traffic counts were conducted.

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

- No bicyclists or pedestrians were observed during the traffic counts at the intersection.
- Most of the observed traffic was passenger vehicles. However, the traffic stream included a moderate number of semi-tractor-trailers. Other large and heavy vehicles included dump trucks, school buses, construction vehicles, and trash collection trucks.
- Some motorists on French Road turning left towards the south on E Governor John Sevier Highway used the center TWLTL as a merging lane to enter the southbound traffic stream.





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FIGURE 4

Heartland Development Subdivision

2024 Peak Hour Traffic Volumes -
EXISTING TRAFFIC CONDITIONS

Capacity analyses were undertaken to determine the Level of Service (LOS) for the existing 2024 traffic volumes shown in Figure 4 at the studied intersection. The capacity analyses were calculated following the Highway Capacity Manual (HCM) methods and Synchro Traffic Software (Version 11).

Methodology:

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



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

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

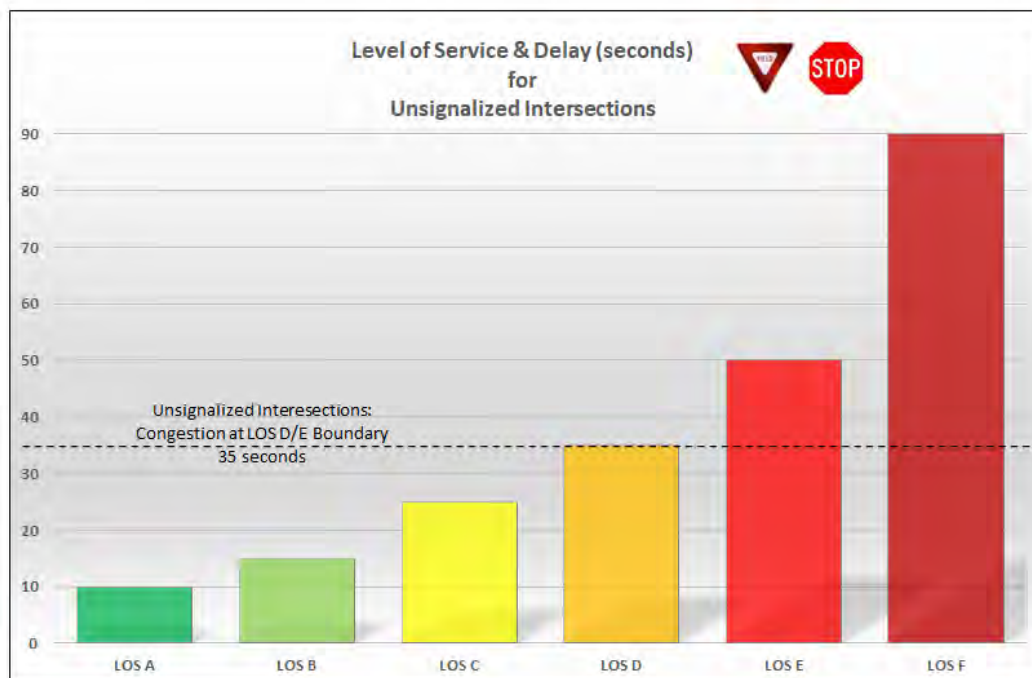
the delay for each minor approach and major street left-turn movements. Table 2 lists the level of service criteria for unsignalized intersections. The analysis results of unsignalized intersections using the HCM methodologies are conservative due to the more significant vehicle gap parameters used in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

TABLE 2
LEVEL OF SERVICE AND DELAY FOR UNSIGNALIZED INTERSECTIONS



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


Source: Highway Capacity Manual, 6th Edition



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

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

TABLE 3
2024 INTERSECTION CAPACITY ANALYSIS RESULTS -
EXISTING TRAFFIC CONDITIONS

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
E Governor John Sevier Highway (SB & NB) at French Road (WB)		Westbound Left/Right	B	13.2	0.052	B	12.7	0.049
		Southbound Left	A	8.8	0.004	A	8.5	0.011

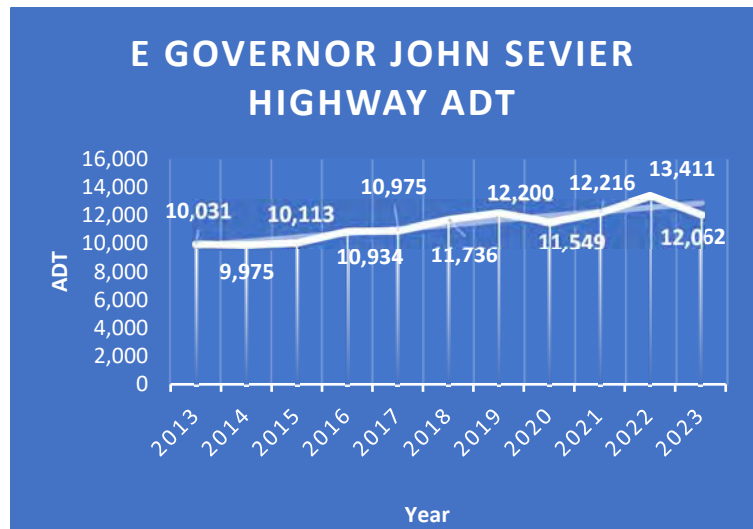
Note: All analyses were calculated in Synchro 11 software and reported using 6th Edition intersection methodology

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

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


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

Vehicular traffic on E Governor John Sevier Highway in the study area has shown low annual growth over the past ten years (1.9%), according to the TDOT traffic count station and as shown in Appendix A. For this study, a slightly higher annual growth rate of 2.0% was used to calculate future growth on the studied roadways up to 2027 to account for potential traffic growth in the study area and provide a conservative analysis.



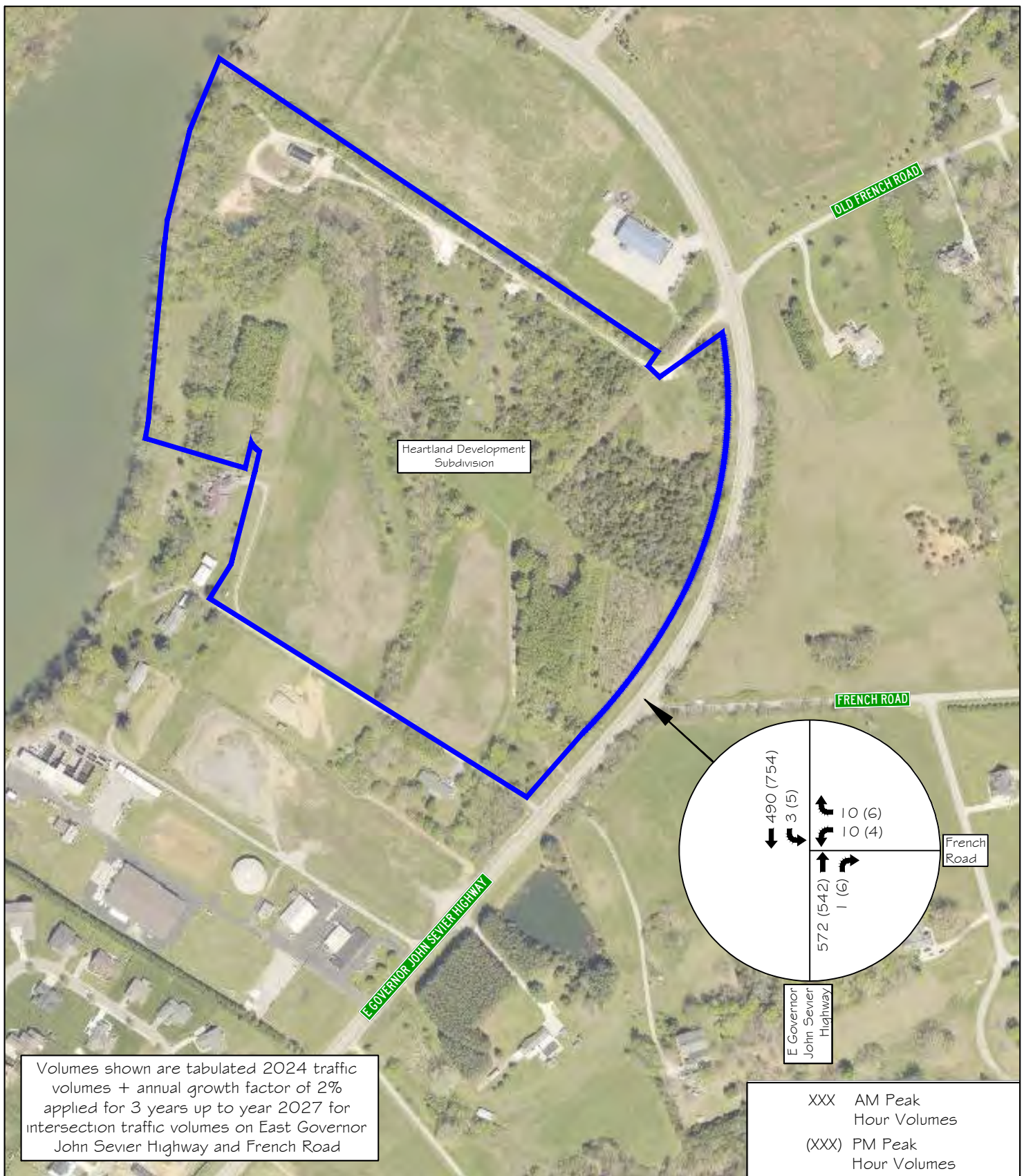
A growth rate of 2% was applied to the intersection approach volumes obtained from the traffic count to calculate the future intersection volumes in 2027 without the projected development traffic. Capacity analyses were undertaken to determine the projected LOS in 2027 without the project at the intersection. The results are shown in Table 4, and Appendix F includes the capacity analysis worksheets. The results in Table 4 are similar but slightly increased compared to the 2024 results shown in Table 3. Figure 5 shows the projected 2027 traffic volumes without the project at the intersection during the AM and PM peak hours.

TABLE 4
2027 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS WITHOUT THE PROJECT

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
E Governor John Sevier Highway (SB & NB) at French Road (WB)	 Unsignalized	Westbound Left/Right	B	13.7	0.060	B	13.1	0.051
		Southbound Left	A	9.0	0.004	A	8.6	0.012

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

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



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FIGURE 5

Heartland Development Subdivision

2027 Peak Hour Traffic Volumes -
PROJECTED TRAFFIC CONDITIONS
WITHOUT THE PROJECT

▪ **TRIP GENERATION:**

A generated trip is a single or one-direction vehicle movement entering or exiting the study site. The estimated amount of traffic the proposed 151 (maximum) single-family detached houses will generate was calculated based on rates and equations provided by the Trip Generation Manual, 11th Edition, an Institute of Transportation Engineers (ITE) publication. The Trip Generation Manual is the traditional and most popular resource for determining trip generation rates when transportation impact studies are produced. The data and calculations from ITE for the proposed land use are shown in Appendix G. A summary of this information is presented in the following table:



TABLE 5
TRIP GENERATION FOR HEARTLAND DEVELOPMENT SUBDIVISION
Maximum of 151 Single-Family Detached Houses

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	151 Houses	1,474	25%	75%		63%	37%	
				27	81	108	92	54	146
Total New Volume Site Trips			1,474	27	81	108	92	54	146

ITE Trip Generation Manual, 11th Edition

Trips calculated by using Fitted Curve Equation

For the proposed residential development, with a maximum of 151 single-family detached houses, it is estimated that 27 vehicles will enter and 81 will exit, for a total of 108 generated trips during the AM peak hour in the year 2027. Similarly, it is estimated that 92 vehicles will enter and 54 will exit, for a total of 146 generated trips during the PM peak hour in the year 2027. The calculated trips generated for an average weekday are estimated to be 1,474 vehicles for the proposed development. No vehicle trip reductions were included in the calculations or analysis.

▪ **TRIP DISTRIBUTION AND ASSIGNMENT:**

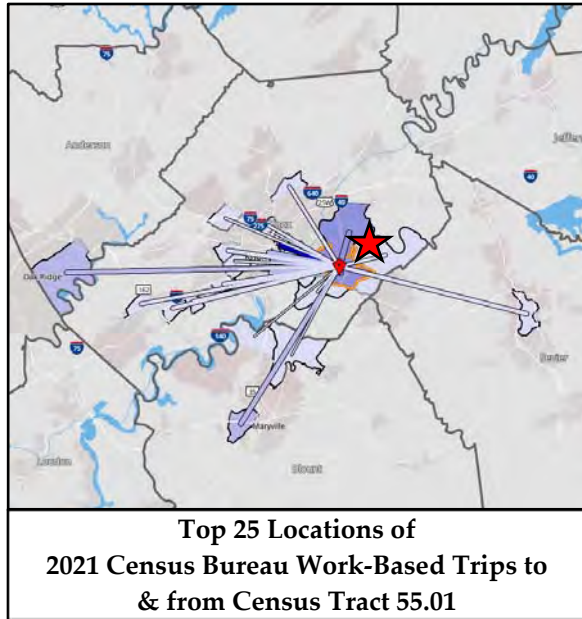
The projected trip distribution and assignment for the Heartland Development Subdivision are based on several sources and engineering judgment. The first source is based on the existing traffic count volumes and the observed travel directions collected at the E Governor John Sevier Highway intersection adjacent to the proposed development site at French Road.

During the traffic count, the observed direction of thru travel on E Governor John Sevier Highway was roughly 45% / 55% in the AM peak hour, with 45% heading southbound and 55% heading northbound. The travel split in the PM peak hour was near 60% / 40% southbound and northbound.

A supplementary traffic count was also conducted on February 13th, 2024, at the intersection of E Governor John Sevier Highway at Stonesilo Way. Stonesilo Way provides the singular road access to the highway for Serenity River Subdivision, which currently has 44 single-family detached houses. This brief count tabulated the entering and exiting volumes to and from the adjacent subdivision during the AM and PM peak hours identified at the intersection at French Road (7:15 – 8:15 am / 4:30 – 5:30 pm). The observed entering and exiting splits on Stonesilo Way are projected to be a good analog for the future residents of the Heartland Development Subdivision since this road serves a similar residential land use as proposed for the development site. The entering and exiting percentages during the observed AM and PM peak hours to and from Stonesilo Way were the following:

**Observed Entering and Exiting Vehicle Distribution
at Stonesilo Way on E Governor John Sevier Highway**

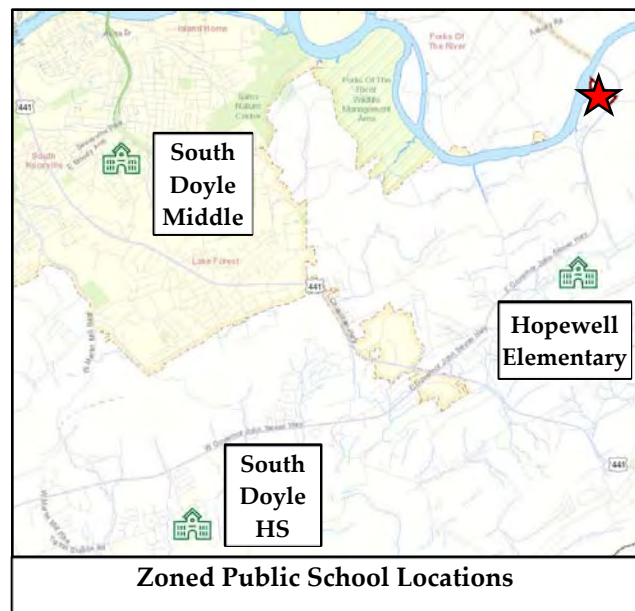
AM PEAK HOUR	
ENTER FROM NORTH	29%
ENTER FROM SOUTH	71%
EXIT TO NORTH	21%
EXIT TO SOUTH	79%
PM PEAK HOUR	
ENTER FROM NORTH	60%
ENTER FROM SOUTH	40%
EXIT TO NORTH	33%
EXIT TO SOUTH	67%



The second source for determining the projected trip distribution is based on work-related trips in the local area. Work-based trips will be a significant impetus for generated trips by the development, and these trips are more likely to travel to and from the north, northwest, west, and southwest. This assertion is based on data from the United States Bureau website for Census Tract 55.01, where the development property is located. Based on 2021 (latest available) census data and as shown in Appendix H, most work-based trips in the surrounding area correspond to the Forks of the River Industrial Park, downtown Knoxville, the University of Tennessee, West Knoxville, Alcoa, Maryville, and Sevierville.

In addition to employment centers, some generated traffic will travel to and from public and private schools. Schools will be another impetus for external trip-making. The school zone boundary for Carter Middle and High School and South Doyle Middle and High School is designated along the French Broad River. The development property is currently zoned for New Hopewell Elementary, South Doyle Middle, and South Doyle High School.

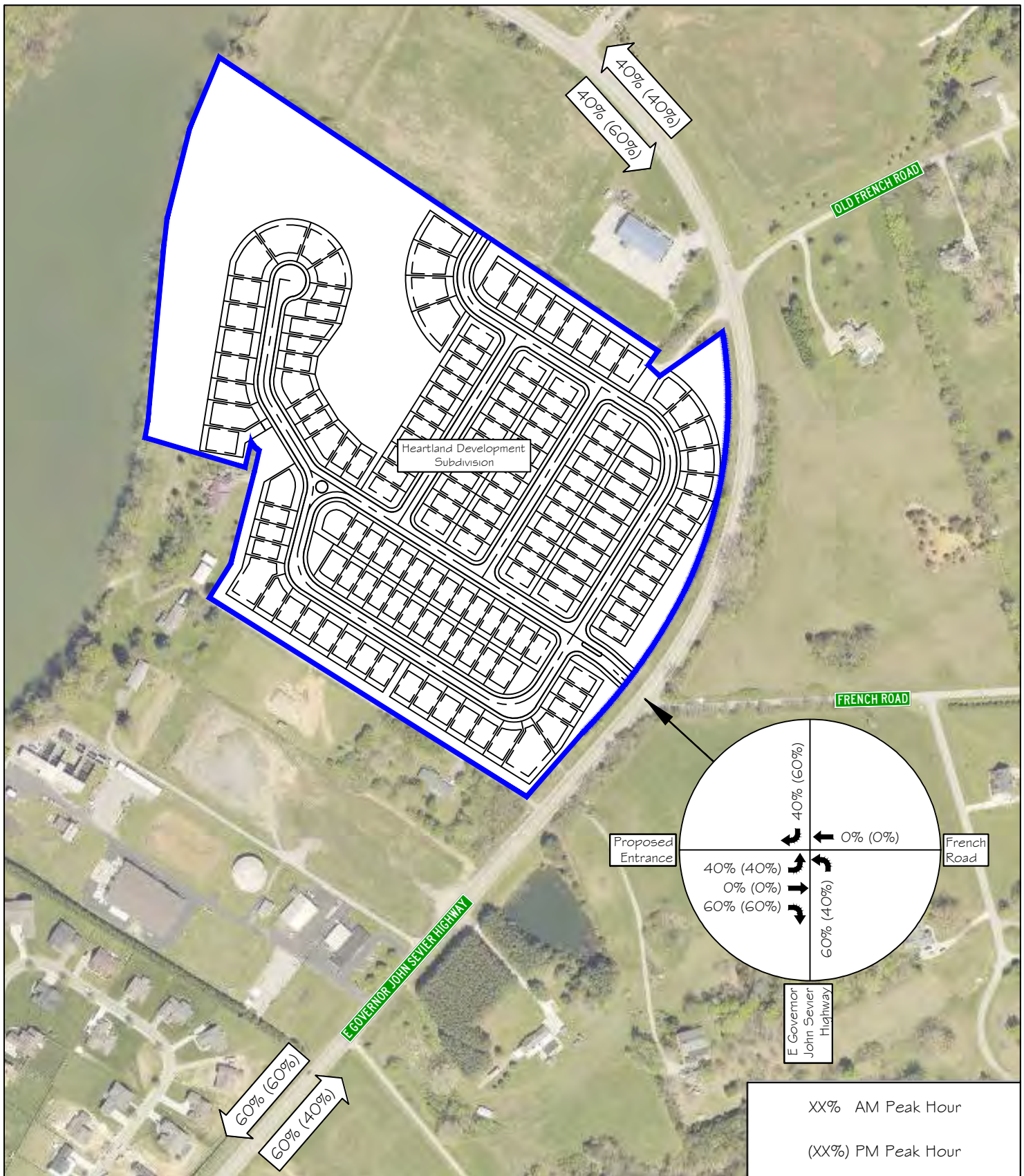
New Hopewell Elementary is 2.1 miles away by roadway to the south of the development site via E Governor John Sevier Highway. South Doyle Middle is 8.6 miles away by roadway to the west, closer to downtown Knoxville. The shortest and quickest route to this school will be via E Governor John Sevier Highway to the south and then Chapman Highway back to the north. South Doyle High School is located 7.1 miles southwest of the development site via East and West Governor John Sevier Highway. All these schools will generate traffic from the subdivision to the south on E Governor John Sevier Highway in the morning.



The Knox County Schools Transportation Department has developed Parental Responsibility Zones (PRZ) to determine whether students are offered transportation services to and from school. The PRZ is defined as being 1.5 miles for grades 6 – 12 and 1.0 miles for grades K – 5 from where the students' parcel is accessed to the point where the buses unload at the school. This development will be outside the PRZ for all the zoned schools, and all school-age children attending public schools in the development will be able to utilize this service if desired.

Based on these factors, data, and engineering judgment, Figure 6 shows the projected distribution of traffic entering and exiting the proposed development at the studied intersection. The percentages shown in the figure only pertain to the trips generated by the proposed dwellings in the development calculated from the ITE trip rates.

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



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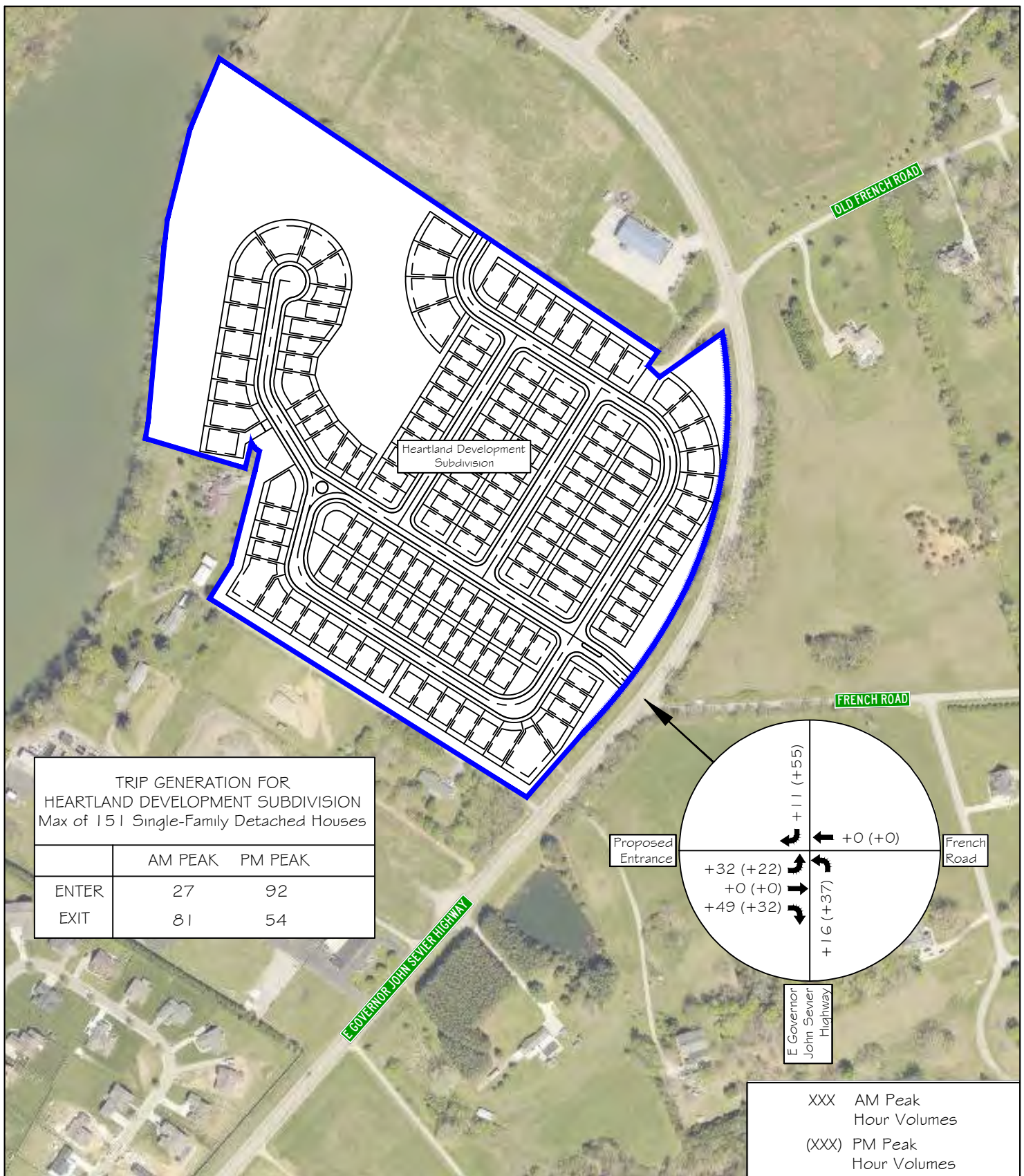
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FIGURE 6

Heartland Development Subdivision

Directional Distribution of Generated Traffic during AM and PM Peak Hour



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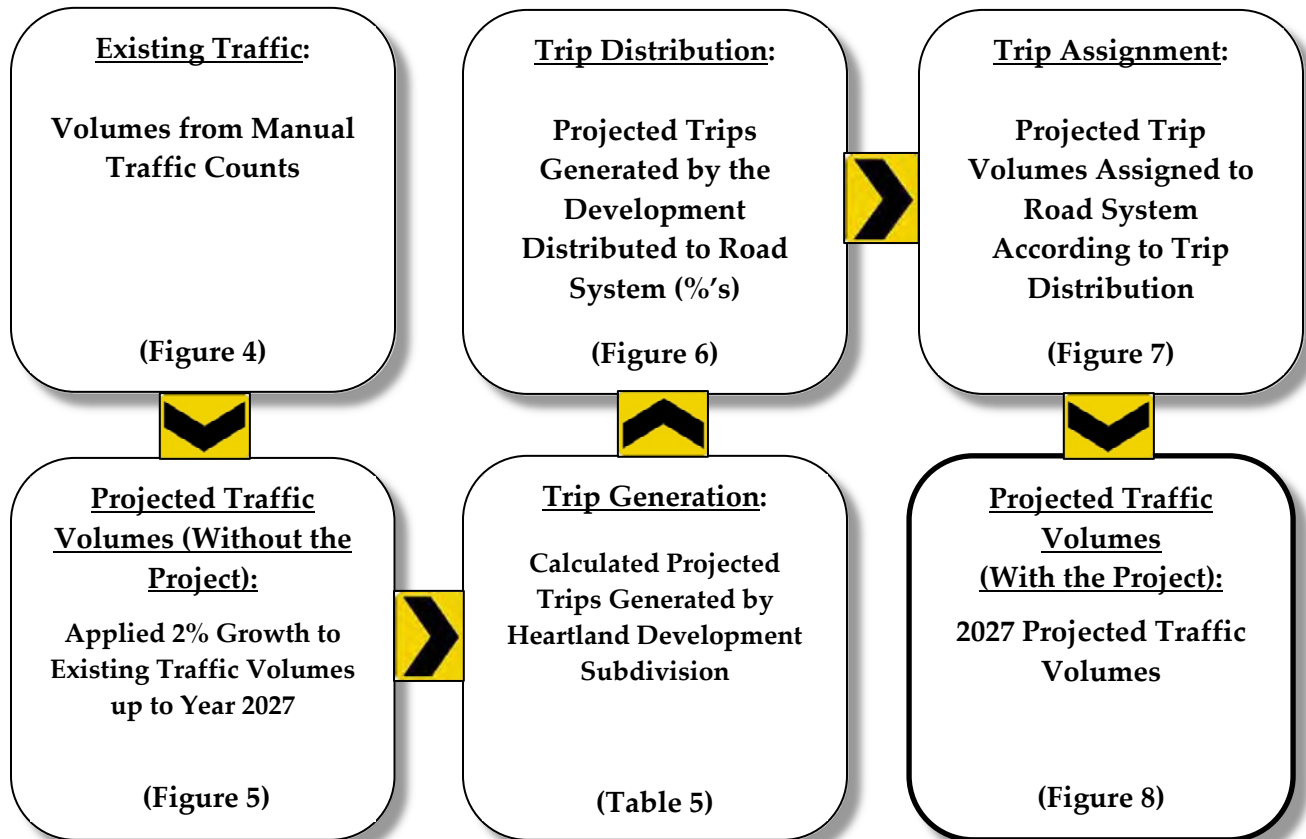
FIGURE 7

Heartland Development Subdivision

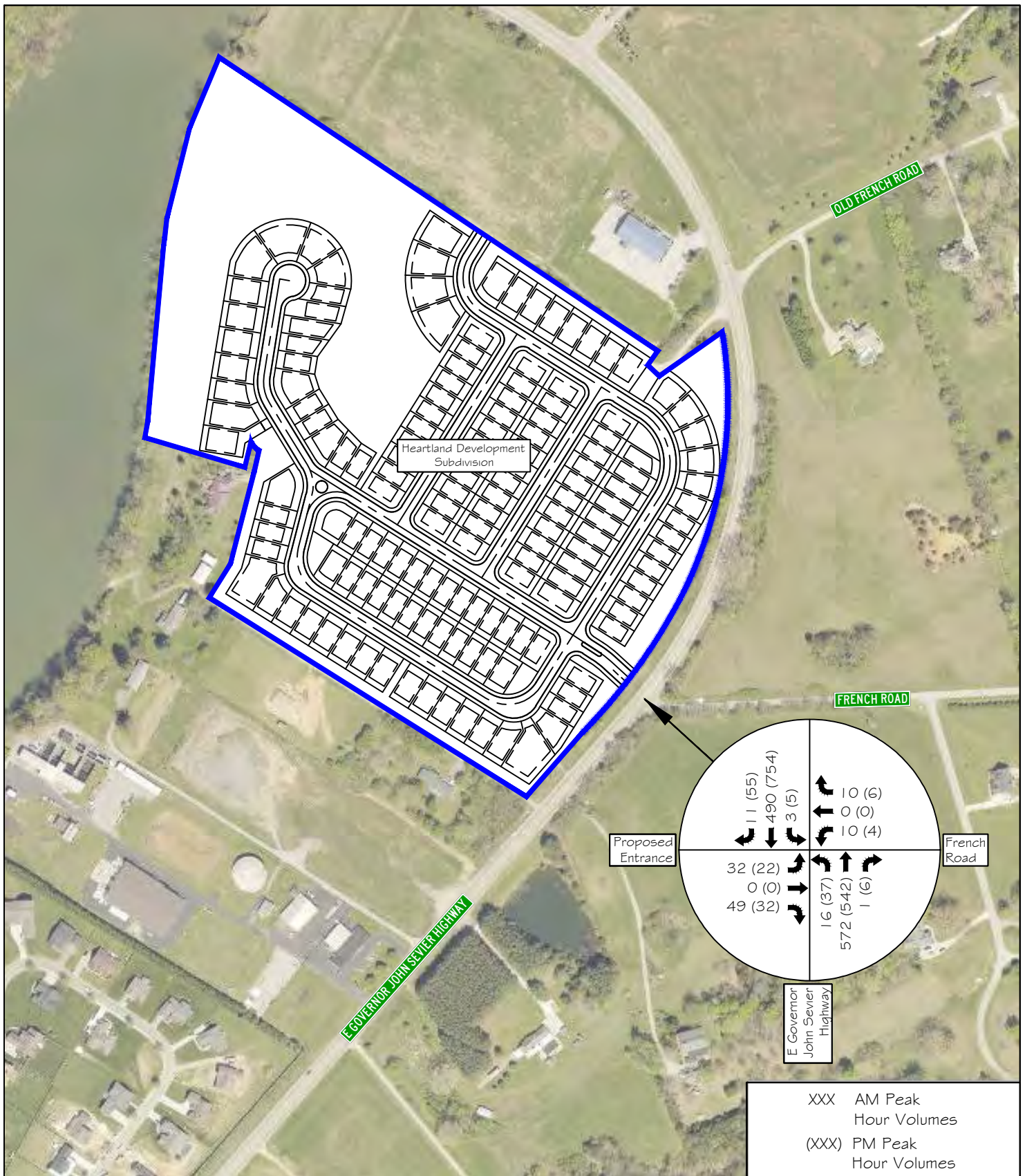
Traffic Assignment of Generated Traffic during AM and PM Peak Hour

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

Overall, several additive steps were taken to estimate the total projected traffic volumes at the studied intersection when the Heartland Development Subdivision is constructed and occupied in 2027. The steps are illustrated below for clarity and review:



The calculated peak hour traffic (Table 5) generated by the Heartland Development Subdivision was added to the 2027 horizon year traffic (Figure 5) by following the predicted trip distributions and assignments (Figures 6 and 7). This procedure was completed to obtain the total projected traffic volumes when the proposed development is fully built and occupied in 2027. Figure 8 shows the projected 2027 AM and PM peak hours with the generated development traffic at the studied intersection.



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FIGURE 8

Heartland Development Subdivision

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

Capacity analyses were conducted to determine the projected LOS at the studied intersection with the development traffic in 2027. The results indicated minimal degradation between the existing and projected conditions with the project in 2027 for the existing approaches at the intersection. However, the Proposed Entrance exiting left/thru lane is projected to operate at LOS E and F in the 2027 AM and PM peak hours, respectively. The Proposed Entrance exiting right-turn lane is projected to operate at LOS B in the AM peak hour and LOS C in the PM peak hour in 2027. These results can be seen in Table 6, and Appendix F includes the worksheets for these capacity analyses. Note: These results include a proposed southbound exclusive right-turn lane on E Governor John Sevier Highway, as documented in the following section of the report in the Evaluation of Turn Lane Thresholds.

TABLE 6
2027 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
E Governor John Sevier Highway (SB & NB) at French Road (WB) and Proposed Entrance (EB)	 Unsignalized	Northbound Left	A	8.5	0.017	A	9.9	0.053
		Eastbound Approach	C	22.3		D	32.1	
		Eastbound Left/Thru	E	37.7	0.245	F	56.3	0.260
		Eastbound Right	B	12.0	0.095	C	15.5	0.094
		Westbound Left/Thru/Right	C	20.8	0.105	C	21.3	0.097
		Southbound Left	A	9.0	0.004	A	8.6	0.012

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

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

A summary of the E Governor John Sevier Highway at French Road intersection capacity analysis results is presented in Table 7. This table provides a side-by-side summary and comparison of the intersection for the 2024 existing conditions, projected conditions in 2027 without the project, and the projected conditions in 2027 with the project. The summary does not show the Proposed Entrance approach since it only exists in the projected 2027 conditions.

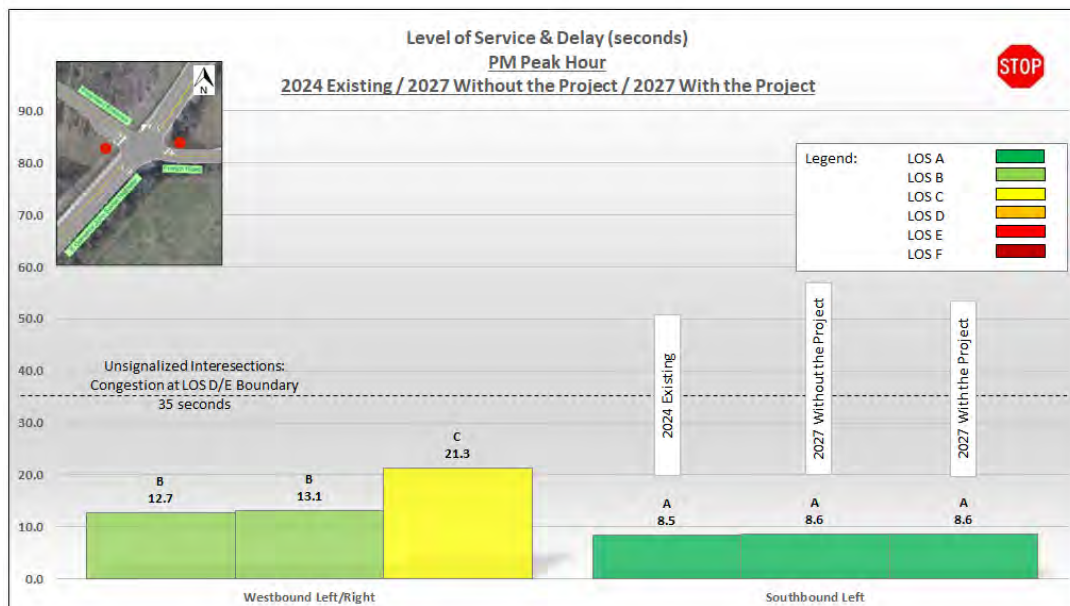
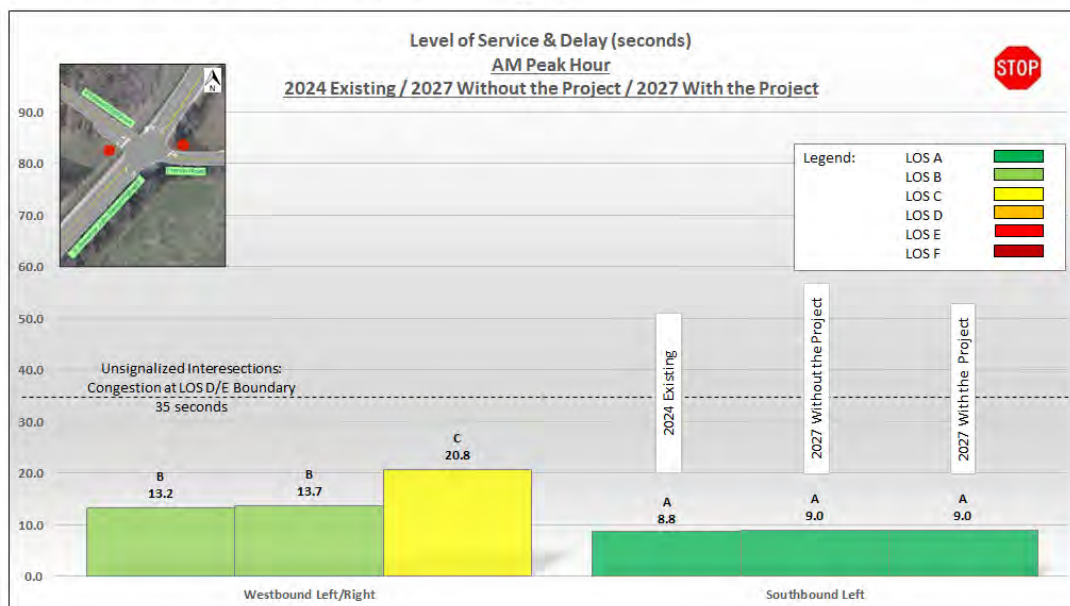
TABLE 7
INTERSECTION CAPACITY ANALYSIS SUMMARY
E GOVERNOR JOHN SEVIER HIGHWAY AT FRENCH ROAD



LOCATION / PEAK HOUR MOVEMENT	2024 EXISTING			2027 WITHOUT THE PROJECT			2027 WITH THE PROJECT		
	LOS ^a	Delay ^b	v/c ^c	LOS ^a	Delay ^b	v/c ^c	LOS ^a	Delay ^b	v/c ^c
AM Peak									
Westbound Left/Right	B	13.2	0.052	B	13.7	0.060	C	20.8	0.105
Southbound Left	A	8.8	0.004	A	9.0	0.004	A	9.0	0.004
PM Peak									
Westbound Left/Right	B	12.7	0.049	B	13.1	0.051	C	21.3	0.097
Southbound Left	A	8.5	0.011	A	8.6	0.012	A	8.6	0.012

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

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



▪ **POTENTIAL TRANSPORTATION SAFETY ISSUES:**

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

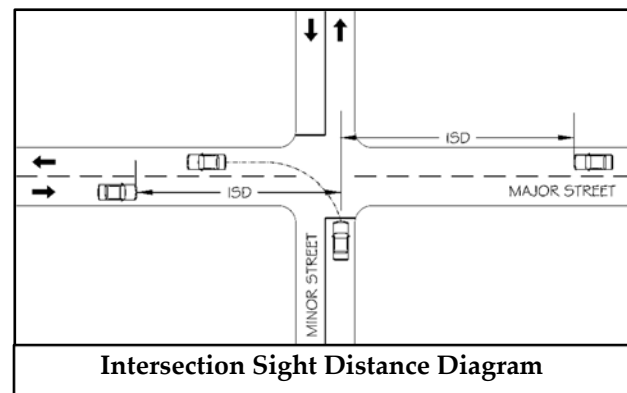
○ **EVALUATION OF SIGHT DISTANCE**

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

Methodology:

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

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

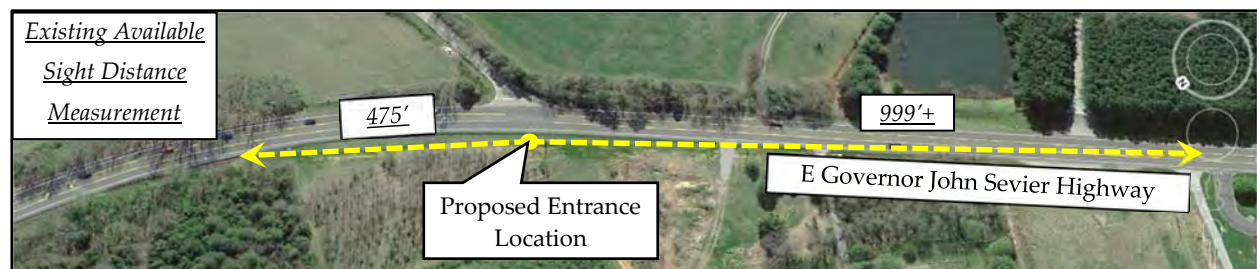


Three traffic maneuvers are available for vehicles stopped on a minor street at a 4-way intersection: (1) left-turn, (2) right-turn, (3) or a crossing maneuver across the major street. For turns from the minor street, ISD is needed to allow a stopped motorist to turn onto a major street without being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

With a posted speed limit of 45-mph on E Governor John Sevier Highway at the Proposed Entrance, the ISD is 530 feet calculated based on AASHTO's (American Association of State Highway Transportation Officials) guidance and TDOT's standards. This distance is required for a motorist to make safely a left turn from the Proposed Entrance at E Governor John Sevier Highway. The ISD for exiting right turns is 465 feet. E Governor John Sevier Highway has a 1.2% road grade downhill from the north to the south at the Proposed Entrance location at French Road. Based on the posted speed limit of 45-mph on E Governor John Sevier Highway and the existing road grades, the SSD is calculated to be 370 feet to the north and 355 feet to the south.

Visual observations of the sight distances at the Proposed Entrance location on E Governor John Sevier Highway were undertaken. Using a Nikon Laser Rangefinder at the Proposed Entrance location at French Road, the available sight distance was visually estimated to be 999'+ feet (limit of the rangefinder) to the south and 475 feet to the north. Based on visual observation, the sight distances from the Proposed Entrance will be adequate to the south but less than optimum to the north.

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



View of Sight Distance on E Governor John Sevier Highway at Proposed Entrance and French Road (Looking North)



View of Sight Distance on E Governor John Sevier Highway at Proposed Entrance and French Road (Looking South)

○ **EVALUATION OF TURN LANE THRESHOLDS**

An evaluation of the need for separate turn lanes on E Governor John Sevier Highway at the Proposed Entrance in the projected 2027 conditions was conducted. The evaluation did not include left turn-entering movements at the Proposed Entrance since an existing TWLTL is already provided in the center of the highway.

The criteria used for this turn lane evaluation were based on TDOT's "Highway System Access Manual". This design policy relates vehicle volume thresholds based on prevailing speeds for two-lane and four-lane roadways. The projected volumes were evaluated based on the posted speed limit of 45 mph on E Governor John Sevier Highway at the Proposed Entrance.

According to TDOT's guidelines, a separate southbound right-turn lane on E Governor John Sevier Highway is warranted at the Proposed Entrance based on the projected 2027 PM peak hour traffic volumes. The worksheets for these evaluations are provided in Appendix I.

○ **PROJECTED VEHICLE QUEUES**

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

The 95th percentile vehicle queue is the recognized measurement in the traffic engineering profession as the design standard used when considering vehicle queue lengths. A 95th percentile vehicle queue length means 95% certainty that the vehicle queue will not extend beyond that point. The calculated vehicle queue results were based on averaging the outcome obtained during ten traffic simulations. The 95th percentile vehicle queue lengths at the studied intersection for the 2027 projected conditions are shown in Table 8. The vehicle queue worksheet results from the SimTraffic software are in Appendix J. These results include the proposed southbound exclusive right-turn lane on E Governor John Sevier Highway.

TABLE 8
TURN LANE STORAGE & VEHICLE QUEUE SUMMARY -
2027 PROJECTED PEAK HOUR TRAFFIC WITH THE PROJECT

INTERSECTION	APPROACH/ MOVEMENT	STORAGE LENGTH (ft)	ADEQUATE LENGTH?	SIMTRAFFIC 95 th PERCENTILE QUEUE LENGTH (ft)	
				AM PEAK HOUR	PM PEAK HOUR
East Governor John Sevier Highway (NB & SB) at French Road (WB) / Proposed Entrance (EB)	Eastbound Left/Thru	70	Yes	46	49
	Eastbound Right	n/a	n/a	42	44
	Westbound Left/Thru/Right	n/a	n/a	38	28
	Northbound Left	TWLTL	n/a	17	28
	Southbound Left	110 *	Yes	8	10

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

* 110 feet of left turn storage designated by painted pavement markings (additional storage provided in TWLTL)

Table 8 shows that all the existing and proposed turn lane storage lengths will be adequate in the projected 2027 conditions.

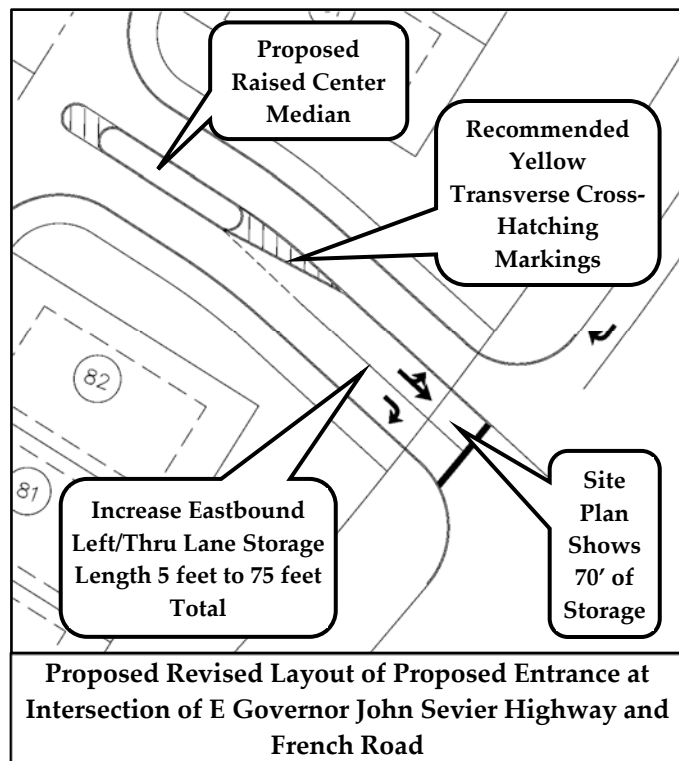
CONCLUSIONS & RECOMMENDATIONS

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



E Governor John Sevier Highway at French Road / Proposed Entrance: The projected 2027 level of service calculations for the intersection of E Governor John Sevier Highway at French Road and the Proposed Entrance resulted in reasonable LOS and vehicle delays for the existing approaches. However, the constructed approach leg (entrance) for the development at the intersection will experience high vehicle delays in the eastbound left/thru lane during peak periods. Overall, however, these exiting left-turning vehicles will experience minimal queue lengths, with a calculated 95th percentile vehicle queue of 49 feet, or about two passenger vehicles, in the 2027 PM peak hour.

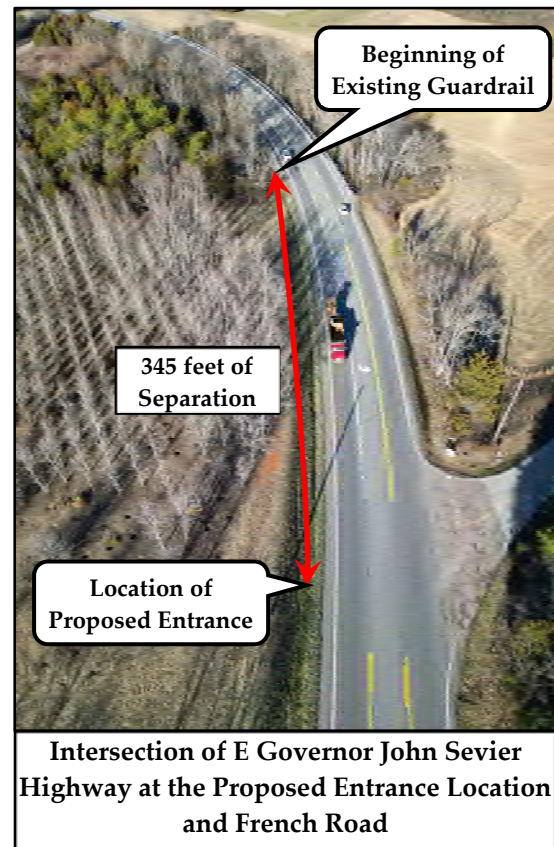
- 1a) The proposed exiting lanes at this intersection are currently shown in the site plan with separate left/thru and right-turn lanes. The site plan shows the exiting eastbound left/thru lane with a storage length of 70 feet. It is recommended that this lane have a minimum storage length of 75 feet, allowing the storage of three passenger vehicles. The exiting lanes should be marked on the pavement with the appropriate white turn arrows, and yellow transverse cross-hatching markings should be applied in advance of the proposed raised median on the entrance road.



- 1b) For left turn entering traffic, the existing center TWLTL on E Governor John Sevier Highway will provide the necessary vehicle storage and be adequate in the projected conditions. The longest northbound left-turn queue entering the development is

projected to be 28 feet in 2027. It is recommended that the center TWLTL pavement markings on E Governor John Sevier Highway be modified to reflect an exclusive northbound left-turn lane at the Proposed Entrance. The existing pavement markings in the TWLTL should be re-striped to accommodate a dedicated minimum storage length of 50 feet for northbound left turns at the intersection and include a white left-turn arrow applied to the pavement.

- 1c) Based on the projected 2027 volumes, a separate southbound right-turn lane on E Governor John Sevier Highway is warranted and recommended for vehicles entering the development at the Proposed Entrance. However, existing roadway features will constrain the potential length of the southbound right-turn lane on E Governor John Sevier Highway. The existing guardrail on the west side of E Governor John Sevier Highway was installed to protect motorists from the steep side slopes on the highway and begins approximately 345 feet from the closest proposed road edge of the Proposed Entrance.

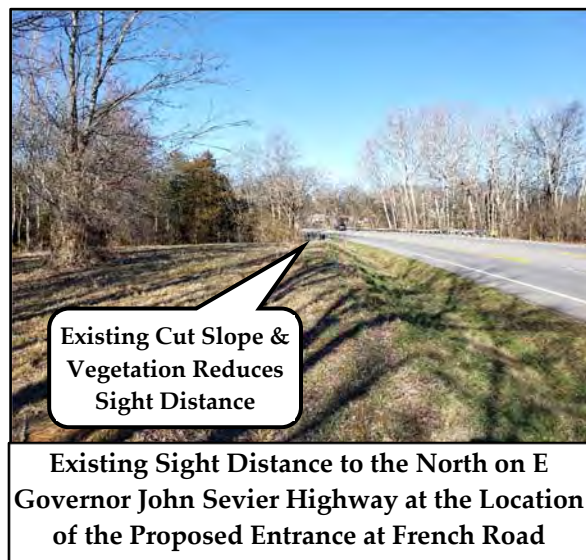


Typically, the length of a turn lane would be determined by calculating the stopping sight distance based on the observed operating speed. The stopping sight distance for this approach is calculated to be 370 feet for southbound vehicles to decelerate and stop from a posted speed limit of 45-mph. However, this recommended length is based on vehicles coming to a complete stop, and the right-turning vehicles coming off E Governor John Sevier Highway at the Proposed Entrance will not completely stop but will be closer to 10 to 15-mph when turning. Due to the existing limiting roadway features and because the turn lane will be constructed on the inside of a horizontal curve on E Governor John Sevier Highway, a relatively short taper length is recommended. The southbound right-turn lane is recommended to be constructed at the Proposed Entrance with 215 feet of storage and a taper length of 130 feet (approximately 10:1).

The right-turn lane should include the appropriate right-turn arrow pavement markings as shown in TDOT standard drawing T-M-4. The designer must coordinate with TDOT to design and construct this southbound right-turn lane.

- 1d) It is recommended that a Stop Sign (R1-1) be installed, and a 24" white stop bar be applied to the Proposed Entrance approach at E Governor John Sevier Highway. The stop bar should be applied a minimum of 4 feet away from the edge of E Governor John Sevier Highway and placed at the desired stopping point that maximizes the sight distance.
- 1e) Sight distances at the Proposed Entrance approach must not be impacted by future landscaping, signage, or vegetation. The site designer must ensure that the intersection sight distances are accounted for and provided in the design plans. Based on a posted speed limit of 45-mph on E Governor John Sevier Highway, the required ISD is 530 feet. A visual inspection determined that these sight distances are available to the south. The sight distance to the north appears adequate for the stopping sight distance but does not appear to meet the required intersection sight distance. It is recommended that a registered land surveyor measure the available sight distance to the north at the Proposed Entrance location on E Governor John Sevier Highway and determine if vegetation or cut slopes could be removed to achieve the required sight distance.

Some sight distance to the north could be gained by reducing the existing cut slope and vegetation on the west side of E Governor John Sevier Highway to the north of the Proposed Entrance location. The cut slope and vegetation are believed to be within the TDOT right-of-way. Any earth grading or vegetation removal to increase the sight distance will require permitting and permission from TDOT.



- 1f) Due to the reduced sight distance to the north, it is recommended that an advance intersection warning sign be installed on E Governor John Sevier Highway for southbound motorists. The sign should be a Cross Road Intersection (W2-1) sign. This signage should be installed on a single post for the southbound lane on E Governor John Sevier Highway, preferably 500 feet north of the intersection with the Proposed Entrance and French Road. This placement location would be just before the beginning of the recommended southbound right-turn taper and lane on E Governor John Sevier Highway.



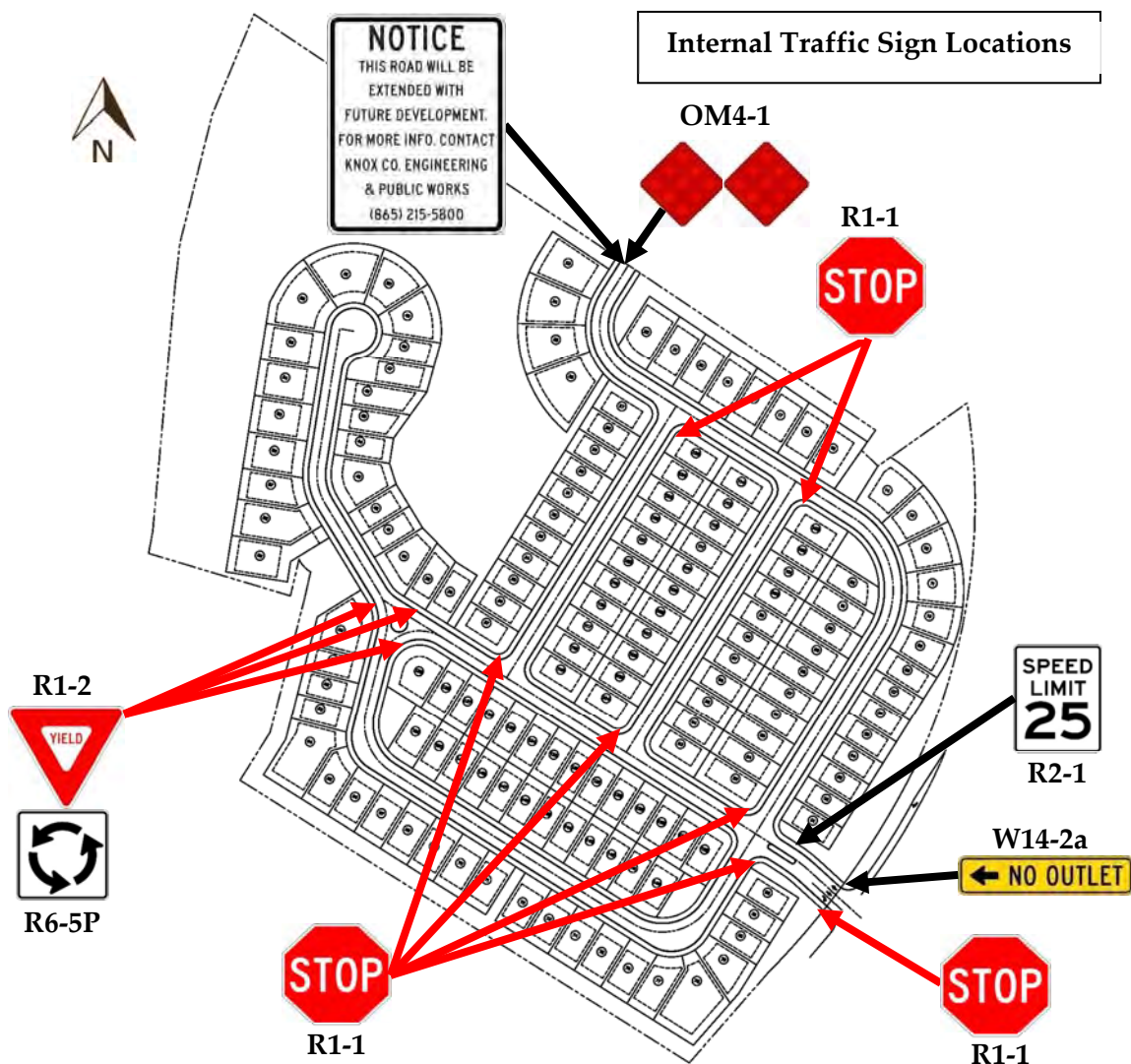
**Cross Road
Intersection
(W2-1)**

- 1g) Likewise, the existing advance intersection warning sign for northbound traffic on E Governor John Sevier Highway will need to be replaced with a Cross Road Intersection (W2-1) sign to reflect the addition of the Proposed Entrance approach at the intersection. This sign is approximately 850 feet south of the existing intersection and is currently posted with a Side Road Intersection (W2-2R) sign.
- 1h) Due to the isolated nature of this entrance on E Governor John Sevier Highway, it is recommended that intersection street lighting be provided. The developer should consider installing a single overhead roadway light to delineate the Proposed Entrance at E Governor John Sevier Highway for travel at night or in low-light conditions. This lighting would be ideally placed adjacent to the Proposed Entrance driveway and off E Governor John Sevier Highway and would fully illuminate the intersection.
- 1i) The construction of the Proposed Entrance on E Governor John Sevier Highway will require a TDOT Highway Entrance Permit. The developer will need to apply for this permit and coordinate with TDOT regarding their specific requirements for this entrance.



Heartland Development Subdivision Internal Roads: The layout plan shows one entrance on E Governor John Sevier Highway constructed for the development, as shown in Figure 3 and below.

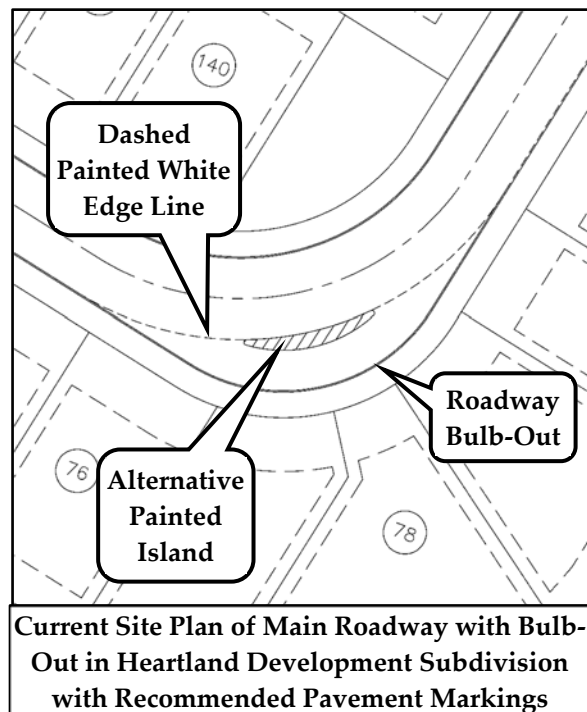
- 2a) A 25-mph Speed Limit (R2-1) sign is recommended to be posted near the beginning of the development entrance off E Governor John Sevier Highway. It is also recommended that a “No Outlet” Sign (W14-2a) be posted at the front of the subdivision. This sign can be posted above or below the street name sign.
- 2b) Dual end-of-roadway object markers (OM4-1) should be installed at the end of the subdivision stub-out road if constructed as shown in the concept plan. An additional sign should be posted at the stub-out road to follow Knoxville-Knox County Subdivision Regulations. This sign is for notification of a possible future street connection and is shown in the image below.



Stop Signs (R1-1) with 24" white stop bars and other traffic signage are recommended to be installed at the internal road locations, as shown in the report. Yield Signs (R1-2) with Roundabout Plaque Signs (R6-5P) are appropriate to be installed at the traffic circle/mini-roundabout if the internal sight distances are met. The approaches to the traffic circle/mini-roundabout should also be marked with white Yield markings (row of solid white triangles across the driving lane) on the pavement. See Figure 2B-24 in the Manual of Uniform Traffic Control Devices, 11th Edition for further guidance. Details regarding the specifics of this y-intersection should be discussed during the detailed design phase with Knox County Engineering.

- 2c) Sight distance at the new internal intersections must not be impacted by new signage, parked cars, or future landscaping. With a speed limit of 25-mph in the development, the internal intersection sight distance is 250 feet. The required stopping sight distance is 155 feet for a level road grade. The site designer should ensure that internal sight distance lengths are met and account for different proposed road grades.

- 2d) The longest internal roadway will have two bulb-outs along its length that will accommodate access to several proposed lots in the corners of the development property. Construction of these bulb-outs will create larger areas of pavement without traffic control. At a minimum, it is recommended that a white dashed pavement line be applied to the outside edge of the roadway adjacent to the bulb-out. Another potential traffic control that should be considered includes a striped delineated island. Details regarding potential traffic controls at these bulb-outs should be discussed in the detailed design phase with Knox County Engineering.



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

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

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



Other Transportation Recommendations: Other transportation-related considerations include the following:

- 3a) The northbound lane of E Governor John Sevier Highway has a Reduced Speed Limit Ahead (W3-5) sign posted to the south of French Road that indicates an upcoming reduction of the speed limit from 50-mph to 45-mph. However, a 45-mph Speed Limit (R2-1) sign is not posted to the north of this sign, designating the start of the 45-mph speed zone. According to the Manual of Uniform Traffic Control Devices (MUTCD) in Section 2C.38, it states that “if used, Reduced Speed Limit Ahead signs shall be followed by a Speed Limit (R2-1) sign installed at the beginning of the zone where the speed limit applies.” Since this is located on a state route, TDOT should install a 45-mph Speed Limit (R2-1) sign where the 45-mph speed zone officially begins on the highway.
- 3b) TDOT should consider installing a Two-Way Left Turn Only (R3-9b) sign for southbound traffic on E Governor John Sevier Highway. It would be appropriate to install this sign just south of the bridge crossing the French Broad River, where the TWLTL begins. It is recommended that this sign be installed to notify and remind motorists of the purpose of the TWLTL and that the center lane should not be used for passing other vehicles.
- 3c) Knox County is recommended to install a 30-mph Speed Limit (R2-1) sign on French Road off E Governor John Sevier Highway for motorists traveling east on French Road due to the lack of a speed limit sign in this direction.



**Two-Way Left
Turn Only
(R3-9b)**

APPENDIX A

HISTORICAL TRAFFIC COUNT DATA

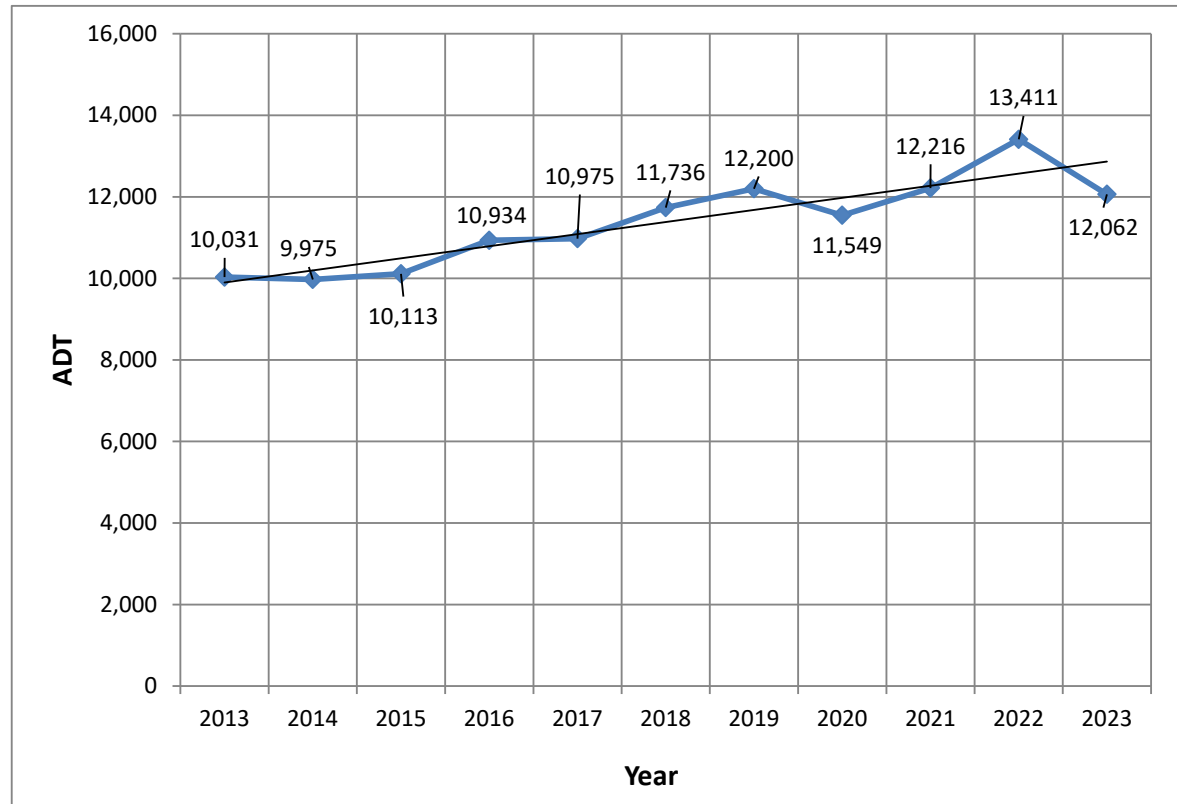
Historical Traffic Counts

Organization: TDOT

Station ID #: 47000168

Location: East Governor John Sevier Highway, north of Old French Road

YEAR	AADT	
2013	10,031	Trendline ↓
2014	9,975	
2015	10,113	
2016	10,934	
2017	10,975	
2018	11,736	
2019	12,200	
2020	11,549	
2021	12,216	
2022	13,411	
2023	12,062	



2013 - 2023 Growth Rate = 20.2%

Average Annual Growth Rate = 1.9%

TN

TDOT

Department of Transportation

MS2

Traffic Count Database System (TCDS)

Home

Login

Locate

Locate All

Email This

Auto-Locate OFF

List View

All DIRs

Record

7453

of 15934

Goto Record

go

Location ID	47000168	MPO ID	
Type	SPOT	HPMS ID	
On NHS		On HPMS	
LRS ID	47SR168001	LRS Loc Pt.	10.811
SF Group	Urban Minor Arterial	Route Type	
AF Group	Region 1 Urban Minor Arterial	Route	
GF Group	Knox	Active	Yes
Class Dist Grp	Region 1 Urban Minor Arterial	Category	CC
Seas Class Grp			
WIM Group			
QC Group	Default		
Funct'l Class	Minor Arterial	Milepost	
Located On	SR168		
Loc On Alias	W. GOV. JOHN SEVIER HWY. E. OF FRENCH BROAD RIVER		

More Details

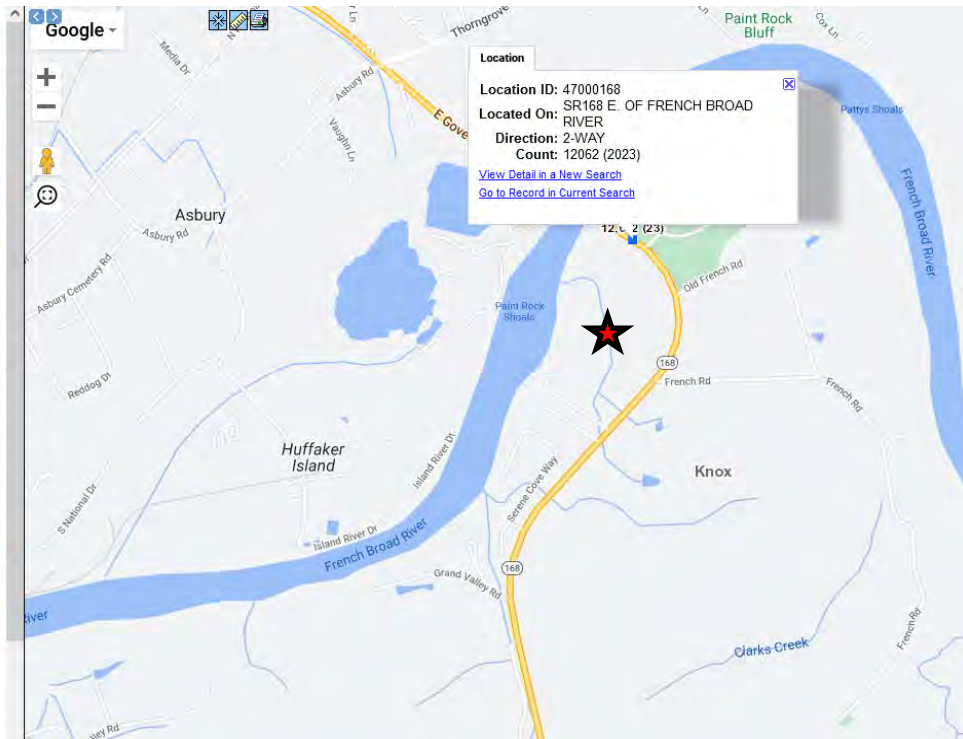
STATION DATA

Directions: 2-WAY

AADT	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2023	12,062	1,180	10	65	11,533 (96%)	529 (4%)	
	2022	13,411	1,152	9	65	13,037 (97%)	374 (3%)	
	2021	12,216	1,102	9	65	11,815 (97%)	401 (3%)	
	2020	11,549	1,168	10	65	11,110 (96%)	439 (4%)	
	2019	12,200		12	65			

<< < > >>

1-5 of 39




APPENDIX B

WALK SCORE


WALKSCORE




(from walkscore.com)


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

2000 East Governor John Sevier Highway

Knoxville, Tennessee, 37920

Commute to **Downtown Knoxville** 

 37 min  55 min  60+ min [View Routes](#)

[Looking for a home for sale in Knoxville?](#) 

Walk Score

0

Car-Dependent
Almost all errands require a car.

Transit Score

0

Minimal Transit
It is possible to get on a bus.

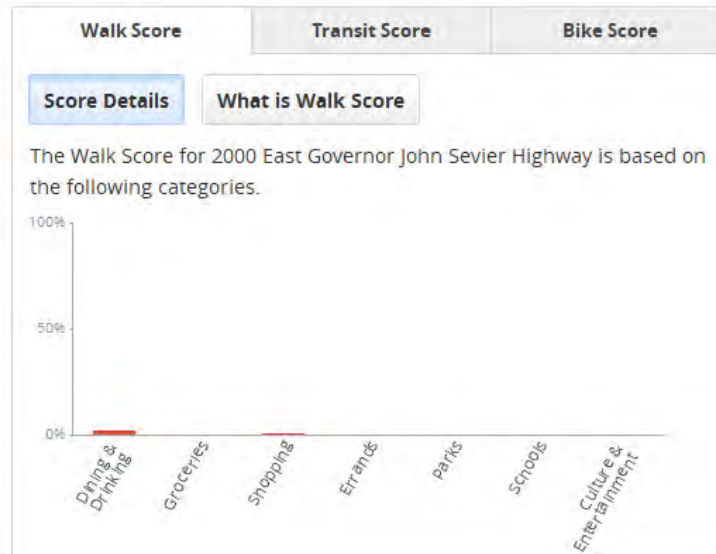
Bike Score

13

Somewhat Bikeable
Minimal bike infrastructure.

[About your score](#)
[Add scores to your site](#)

Scores for 2000 East Governor John Sevier Highway ✕



Scores for 2000 East Governor John Sevier Highway ✕



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

Scores for 2000 East Governor John Sevier Highway ✕

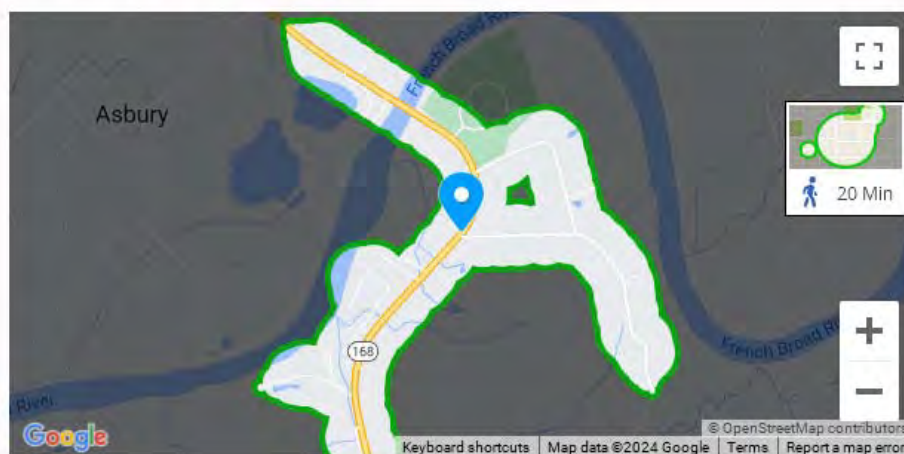


Walk Score	Transit Score	Bike Score
Bike Score measures whether an area is good for biking based on bike lanes and trails, hills, road connectivity, and destinations.		
90-100	Biker's Paradise	Daily errands can be accomplished on a bike
70-89	Very Bikeable	Biking is convenient for most trips
50-69	Bikeable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

Travel Time Map

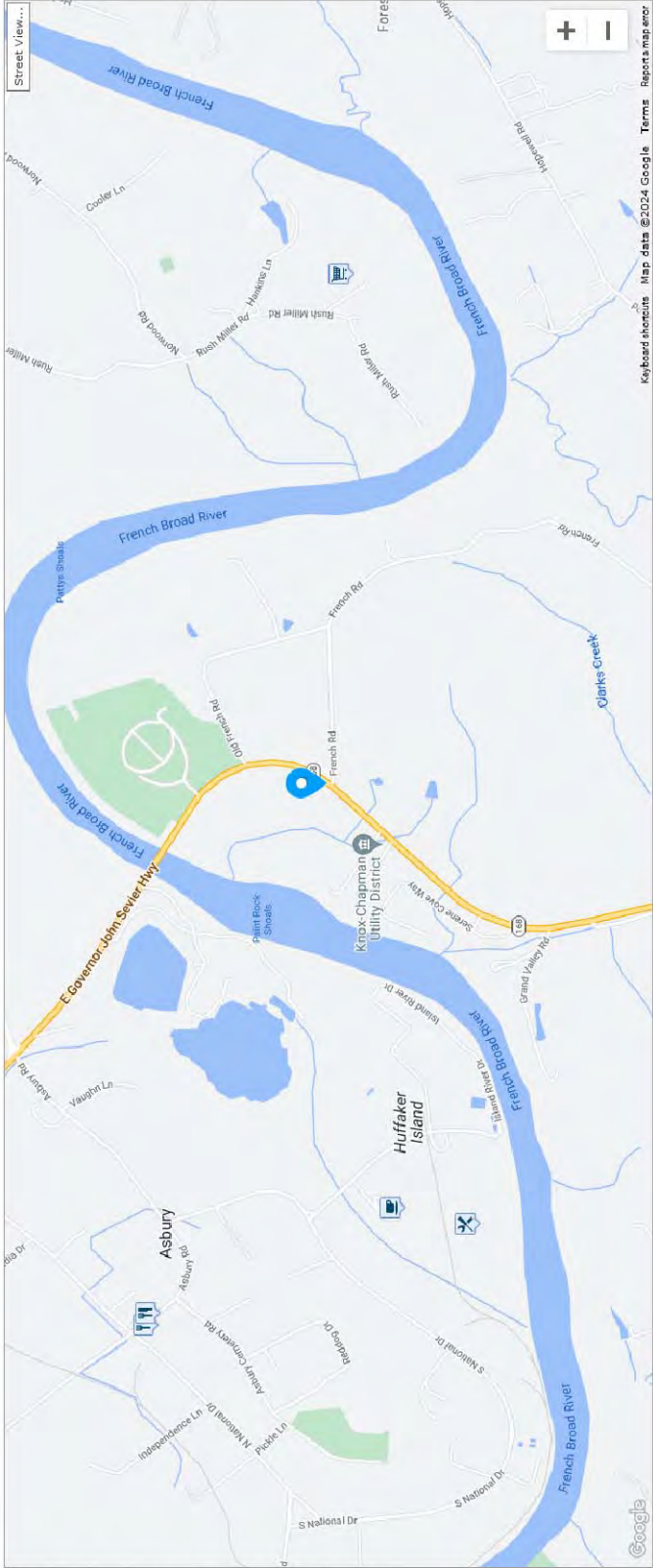
[Add to your site](#)

Explore how far you can travel by car, bus, bike and foot from 2000 East Governor John Sevier Highway.



What's Nearby

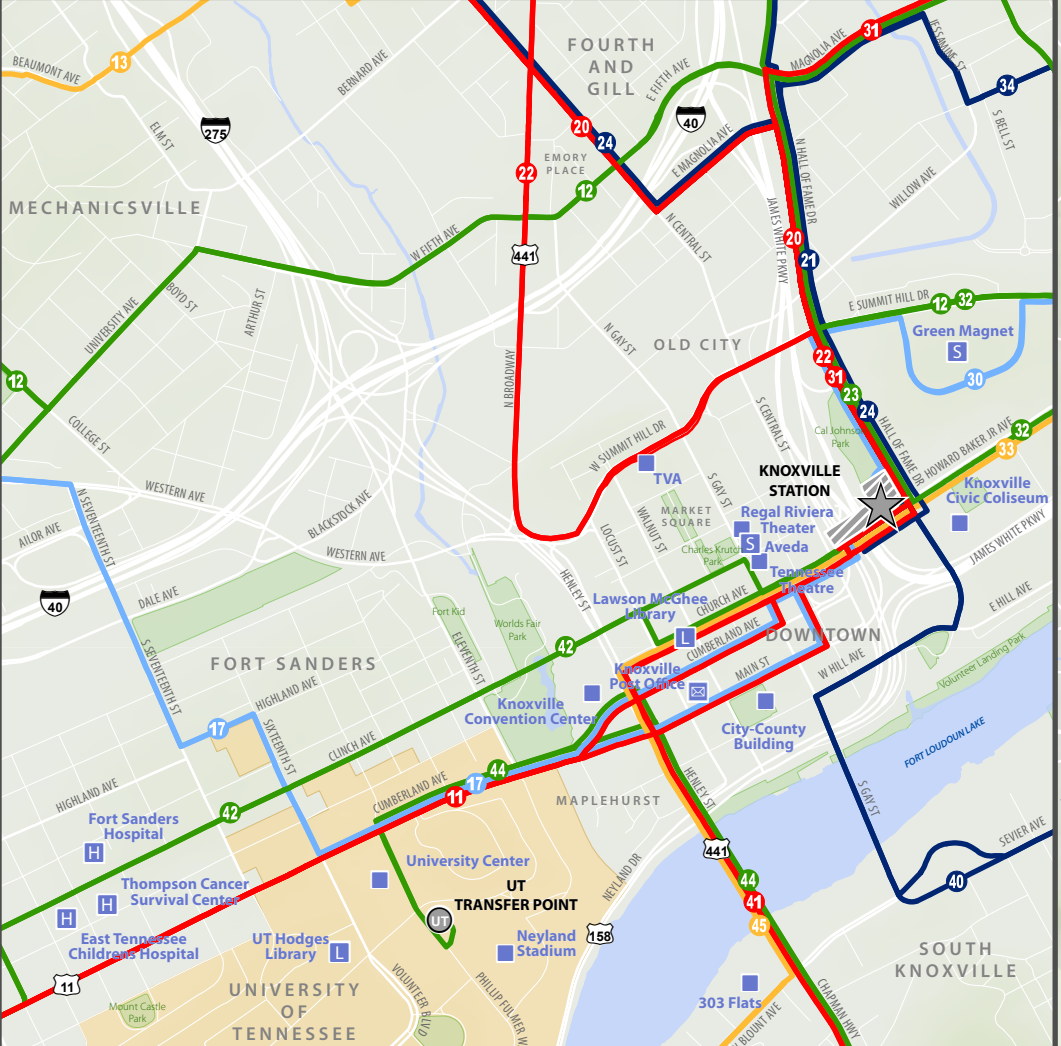
- Restaurants:**
Cruze Farm Pizza Barn 1.3mi
- Coffee:**
Green Mountain Coffee Roast... 1mi
- Bars:**
Ozzy's 4.5mi
- Groceries:**
Rivendale Nursery 1.2mi
- Parks:**
Eastern State Wildlife Manage... 2.7mi
- Schools:**
New Hopewell Elementary Sc... 1.7mi
- Shopping:**
Pilot Flying J 1.3mi
- Entertainment:**
Redbox 3.4mi
- Errands:**
House Hasson Hardware Co. 4.1mi
- Search Nearby:**



APPENDIX C

KNOXVILLE AREA TRANSIT MAP AND INFORMATION

Knoxville City Center



Legend

Transfer Point

Lift Service Area Boundary

Points of Interest

Hospital

School

Library

Point of Interest

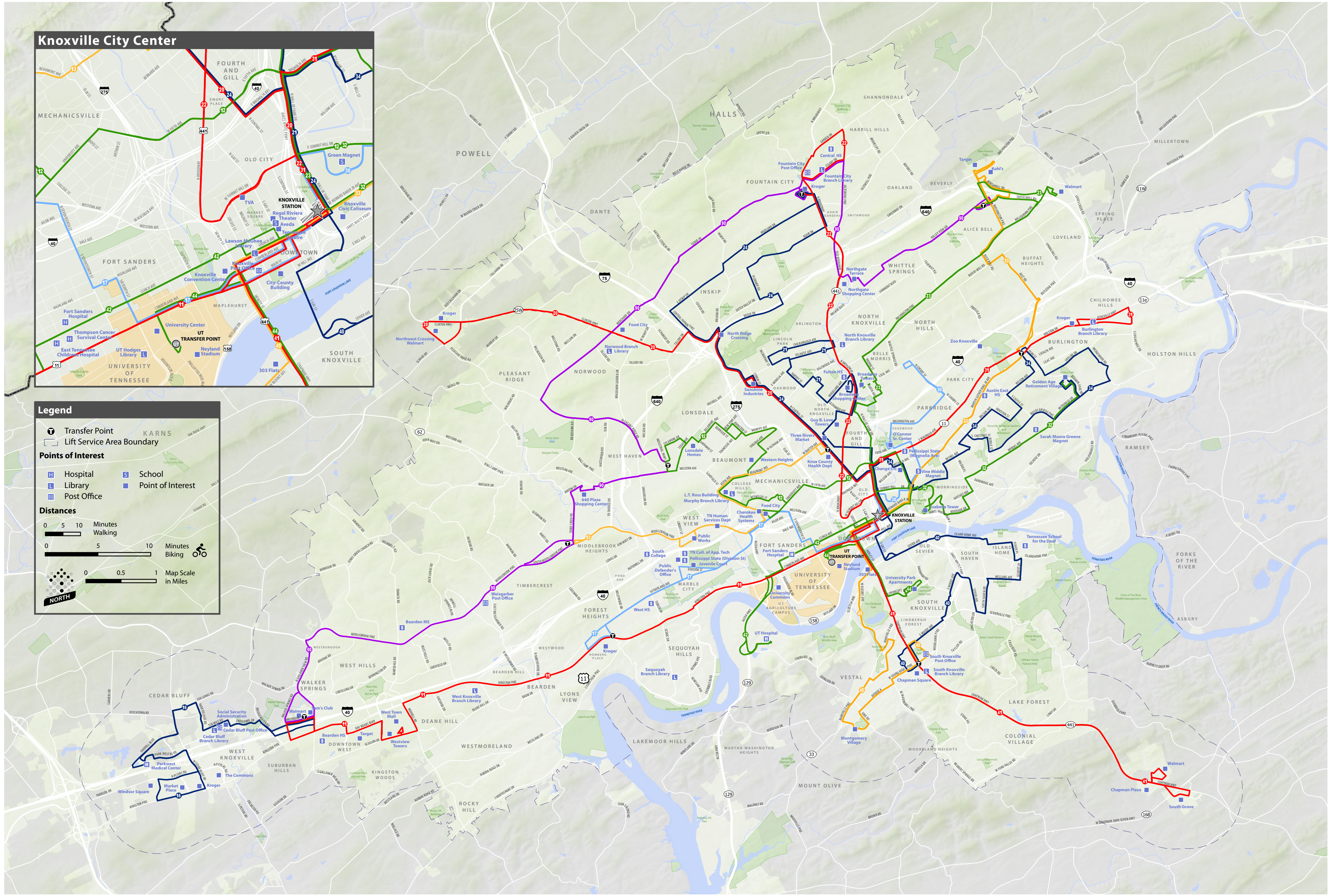
Post Office

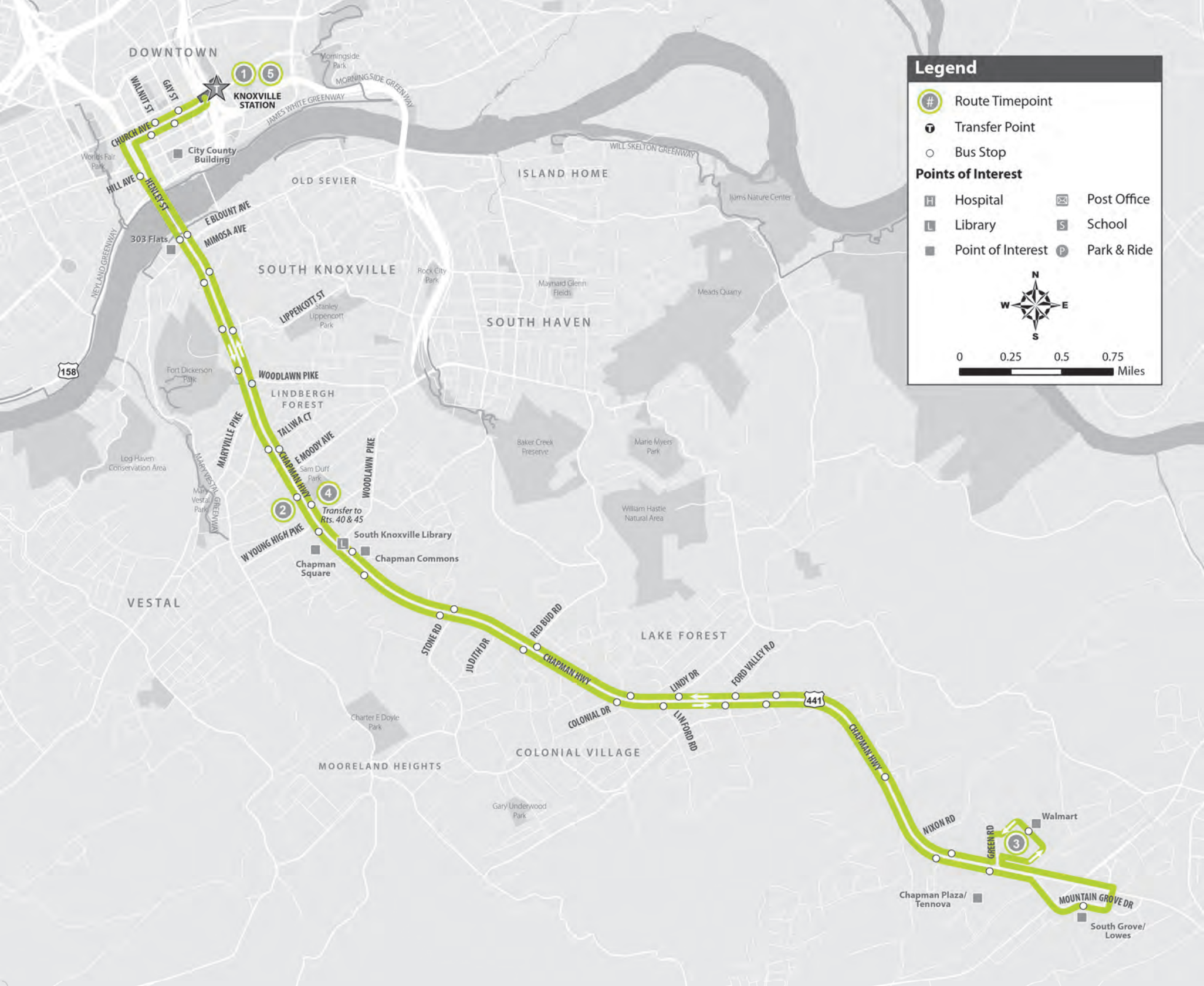
Distances

0 5 10 Minutes Walking

0 5 10 Minutes Biking

0 0.5 1 Map Scale in Miles





Legend

- # Route Timepoint
- T Transfer Point
- Bus Stop
- Points of Interest**
 - H Hospital
 - L Library
 - Point of Interest
 - Post Office
 - S School
 - P Park & Ride



0 0.25 0.5 0.75 Miles

Route 41 - Chapman Highway: Weekdays

Going away from downtown		Going toward downtown		
Knoxville Station Bay P	Chapman Hwy past Moody	Walmart	Chapman Hwy past Young High Pike	Knoxville Station Bay P
1	2	3	4	5
		5:41 AM	5:50 AM	6:10 AM
6:15 AM	6:26 AM	6:41 AM	6:50 AM	7:10 AM
6:45 AM	6:56 AM	7:11 AM	7:20 AM	7:40 AM
7:15 AM	7:26 AM	7:41 AM	7:50 AM	8:10 AM
7:45 AM	7:56 AM	8:11 AM	8:20 AM	8:40 AM
8:15 AM	8:26 AM	8:41 AM	8:50 AM	9:10 AM
8:45 AM	8:56 AM	9:11 AM	9:20 AM	9:40 AM
9:15 AM	9:26 AM	9:41 AM	9:50 AM	10:10 AM
9:45 AM	9:56 AM	10:11 AM	10:20 AM	10:40 AM
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10:45 AM	10:56 AM	11:11 AM	11:20 AM	11:40 AM
11:15 AM	11:26 AM	11:41 AM	11:50 AM	12:10 PM
11:45 AM	11:56 AM	12:11 PM	12:20 PM	12:40 PM
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12:45 PM	12:56 PM	1:11 PM	1:20 PM	1:40 PM
1:15 PM	1:26 PM	1:41 PM	1:50 PM	2:10 PM
1:45 PM	1:56 PM	2:11 PM	2:20 PM	2:40 PM
2:15 PM	2:26 PM	2:41 PM	2:50 PM	3:10 PM
2:45 PM	2:56 PM	3:11 PM	3:20 PM	3:40 PM
3:15 PM	3:26 PM	3:41 PM	3:50 PM	4:10 PM
3:45 PM	3:56 PM	4:11 PM	4:20 PM	4:40 PM
4:15 PM	4:26 PM	4:41 PM	4:50 PM	5:10 PM
4:45 PM	4:56 PM	5:11 PM	5:20 PM	5:40 PM
5:15 PM	5:26 PM	5:41 PM	5:50 PM	6:10 PM
5:45 PM	5:56 PM	6:11 PM	6:20 PM	6:40 PM
6:15 PM	6:26 PM	6:41 PM	6:50 PM	7:10 PM
6:45 PM	6:56 PM	7:11 PM	7:20 PM	7:40 PM
7:15 PM	7:26 PM	7:41 PM	7:50 PM	8:10 PM
7:45 PM	7:56 PM	8:11 PM	8:20 PM	8:40 PM
8:15 PM	8:26 PM	8:41 PM	8:50 PM	9:10 PM
8:45 PM	8:56 PM	9:11 PM	9:20 PM	9:40 PM
9:15 PM	9:26 PM	9:41 PM	9:50 PM	10:10 PM
9:45 PM	9:56 PM	10:11 PM	10:20 PM	10:40 PM
10:15 PM	10:26 PM	10:41 PM	10:50 PM	11:10 PM
11:15 PM	11:26 PM	11:41 PM	11:50 PM	

Route 41 - Chapman Highway: SATURDAYS

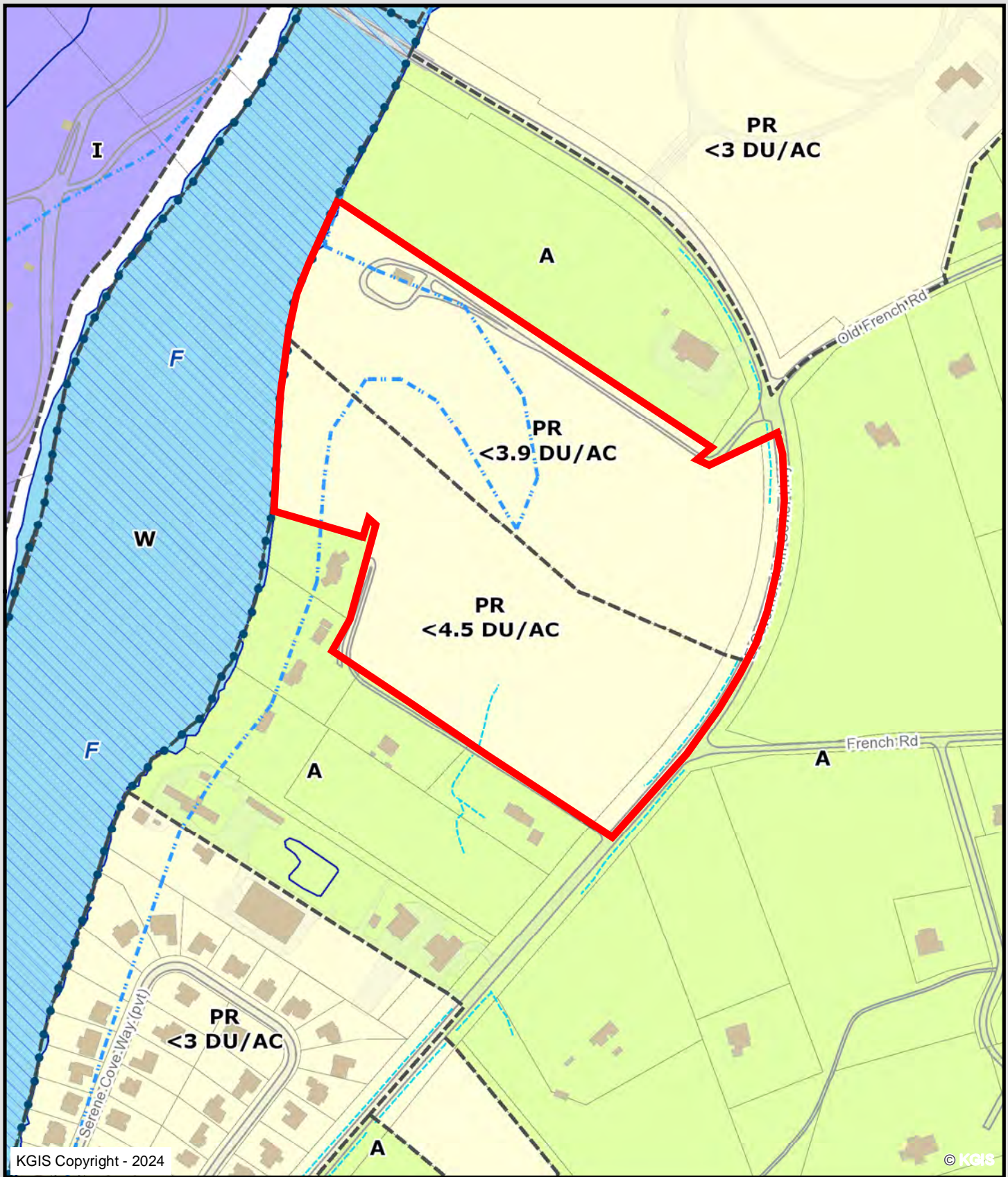
Going away from downtown		Going toward downtown		
Knoxville Station Bay P	Chapman Hwy past Moody	Walmart	Chapman Hwy past Young High Pike	Knoxville Station Bay P
1	2	3	4	5
7:15 AM	7:26 AM	7:41 AM	7:50 AM	8:10 AM
7:45 AM	7:56 AM	8:11 AM	8:20 AM	8:40 AM
8:15 AM	8:26 AM	8:41 AM	8:50 AM	9:10 AM
8:45 AM	8:56 AM	9:11 AM	9:20 AM	9:40 AM
9:15 AM	9:26 AM	9:41 AM	9:50 AM	10:10 AM
9:45 AM	9:56 AM	10:11 AM	10:20 AM	10:40 AM
10:15 AM	10:26 AM	10:41 AM	10:50 AM	11:10 AM
10:45 AM	10:56 AM	11:11 AM	11:20 AM	11:40 AM
11:15 AM	11:26 AM	11:41 AM	11:50 AM	12:10 PM
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3:45 PM	3:56 PM	4:11 PM	4:20 PM	4:40 PM
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4:45 PM	4:56 PM	5:11 PM	5:20 PM	5:40 PM
5:15 PM	5:26 PM	5:41 PM	5:50 PM	6:10 PM
5:45 PM	5:56 PM	6:11 PM	6:20 PM	6:40 PM
6:15 PM	6:26 PM	6:41 PM	6:50 PM	7:10 PM
6:45 PM	6:56 PM	7:11 PM	7:20 PM	7:40 PM
7:15 PM	7:26 PM	7:41 PM	7:50 PM	8:10 PM
7:45 PM	7:56 PM	8:11 PM	8:20 PM	8:40 PM
8:15 PM	8:26 PM	8:41 PM	8:50 PM	9:10 PM
8:45 PM	8:56 PM	9:11 PM	9:20 PM	9:40 PM
9:15 PM	9:26 PM	9:41 PM	9:50 PM	10:10 PM
9:45 PM	9:56 PM	10:11 PM	10:20 PM	10:40 PM
10:15 PM	10:26 PM	10:41 PM	10:50 PM	11:10 PM
10:45 PM	10:56 PM	11:11 PM	11:20 PM	11:40 PM
11:15 PM	11:26 PM	11:41 PM	11:50 PM	12:10 AM

Route 41 - Chapman Highway: SUNDAYS

Going away from downtown		Going toward downtown		
Knoxville Station Bay P	Chapman Hwy past Moody	Walmart	Chapman Hwy past Young High Pike	Knoxville Station Bay P
1	2	3	4	5
8:15 AM	8:26 AM	8:41 AM	8:50 AM	9:10 AM
9:15 AM	9:26 AM	9:41 AM	9:50 AM	10:10 AM
10:15 AM	10:26 AM	10:41 AM	10:50 AM	11:10 AM
11:15 AM	11:26 AM	11:41 AM	11:50 AM	12:10 PM
12:15 PM	12:26 PM	12:41 PM	12:50 PM	1:10 PM
1:15 PM	1:26 PM	1:41 PM	1:50 PM	2:10 PM
2:15 PM	2:26 PM	2:41 PM	2:50 PM	3:10 PM
3:15 PM	3:26 PM	3:41 PM	3:50 PM	4:10 PM
4:15 PM	4:26 PM	4:41 PM	4:50 PM	5:10 PM
5:15 PM	5:26 PM	5:41 PM		

APPENDIX D

ZONING MAP



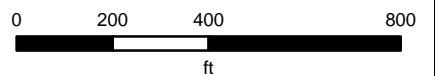
Zoning Map

(as of 2.18.24)

Knoxville - Knox County - KUB Geographic Information System



Printed: 2/18/2024 at 3:31:33 PM



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APPENDIX E

MANUAL TRAFFIC COUNT DATA

TRAFFIC COUNT DATA

Major Street: E Governor John Sevier Highway (SB and NB)
 Minor Street: French Road (WB)
 Traffic Control: Stop Sign on Minor Street

2/13/2024 (Tuesday)
 Partly Cloudy and Mild
 Conducted by: Ajax Engineering

	E Governor John Sevier Highway		French Road		E Governor John Sevier Highway			
TIME	SOUTHBOUND		WESTBOUND		NORTHBOUND		VEHICLE	PEAK
BEGIN	LT	THRU	LT	RT	THRU	RT	TOTAL	HOUR
7:00 AM	0	85	1	4	93	0	183	
7:15 AM	1	116	3	3	119	0	242	7:15 AM - 8:15 AM
7:30 AM	0	109	3	1	162	0	275	
7:45 AM	1	118	2	2	152	0	275	
8:00 AM	1	119	1	3	107	1	232	
8:15 AM	0	93	2	0	95	1	191	
8:30 AM	0	84	0	1	87	0	172	
8:45 AM	0	97	0	2	91	1	191	
TOTAL	3	821	12	16	906	3	1761	
2:00 PM	1	90	4	0	84	1	180	
2:15 PM	2	100	3	1	116	2	224	
2:30 PM	1	129	1	0	98	1	230	
2:45 PM	1	114	0	0	96	0	211	
3:00 PM	2	114	2	0	97	0	215	
3:15 PM	3	126	0	0	88	3	220	
3:30 PM	1	140	1	1	98	2	243	
3:45 PM	3	133	1	0	112	3	252	
4:00 PM	1	144	0	1	124	0	270	
4:15 PM	1	138	0	1	103	1	244	
4:30 PM	1	183	0	1	126	2	313	4:30 PM - 5:30 PM
4:45 PM	0	141	2	0	130	1	274	
5:00 PM	1	193	1	1	132	0	328	
5:15 PM	3	194	1	4	123	3	328	
5:30 PM	3	138	2	1	151	0	295	
5:45 PM	0	136	1	1	101	2	241	
TOTAL	24	2213	19	12	1779	21	4068	

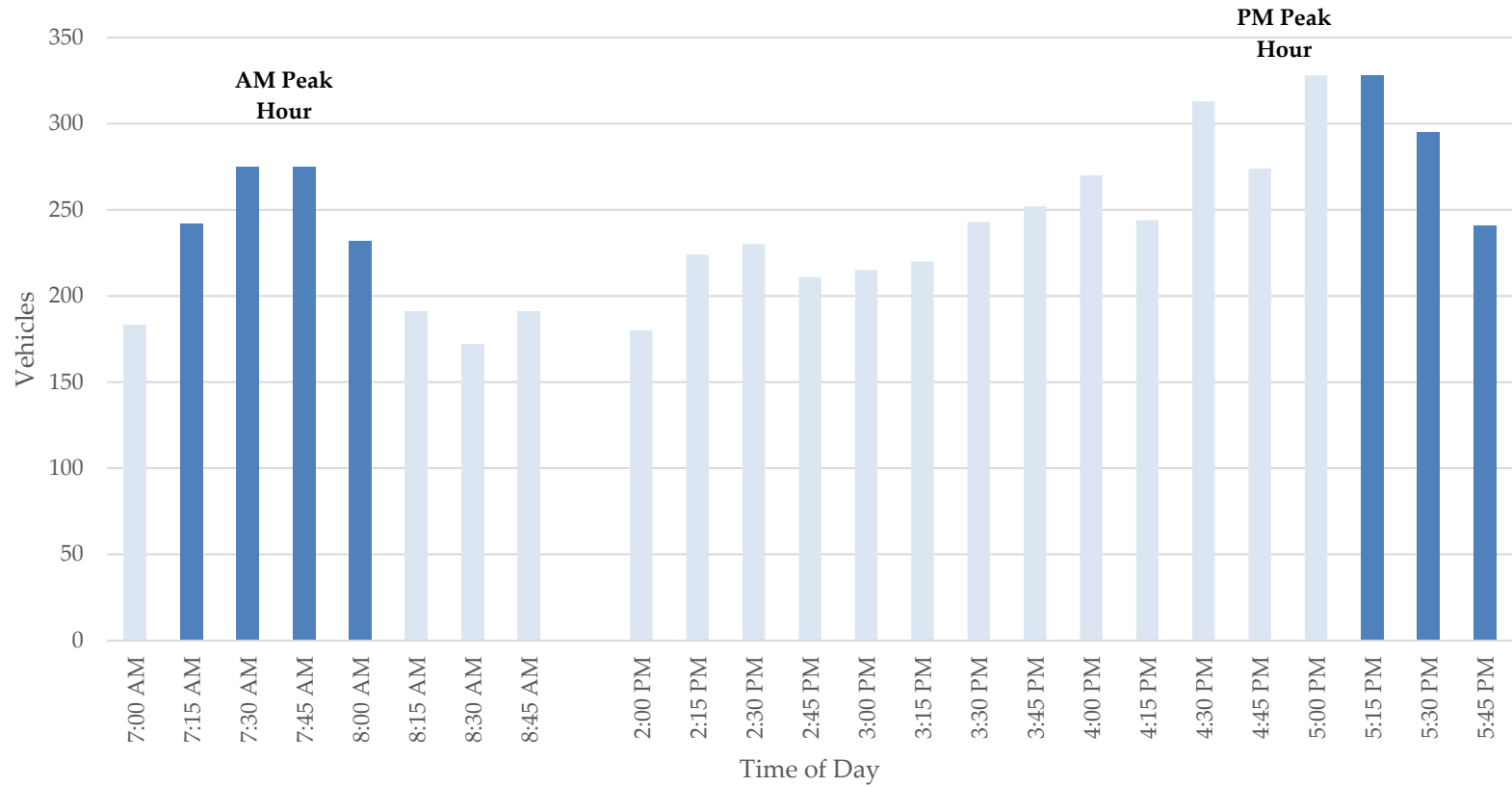
2024 AM Peak Hour 7:15 AM - 8:15 AM

	E Governor John Sevier Highway		French Road		E Governor John Sevier Highway	
TIME	SOUTHBOUND		WESTBOUND		NORTHBOUND	
BEGIN	LT	THRU	LT	RT	THRU	RT
7:15 AM	1	116	3	3	119	0
7:30 AM	0	109	3	1	162	0
7:45 AM	1	118	2	2	152	0
8:00 AM	1	119	1	3	107	1
TOTAL	3	462	9	9	540	1
PHF	0.75	0.97	0.75	0.75	0.83	0.25
TRUCK %	0.0%	9.3%	0.0%	0.0%	2.8%	0.0%

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

	E Governor John Sevier Highway		French Road		E Governor John Sevier Highway	
TIME	SOUTHBOUND		WESTBOUND		NORTHBOUND	
BEGIN	LT	THRU	LT	RT	THRU	RT
4:30 PM	1	183	0	1	126	2
4:45 PM	0	141	2	0	130	1
5:00 PM	1	193	1	1	132	0
5:15 PM	3	194	1	4	123	3
TOTAL	5	711	4	6	511	6
PHF	0.42	0.92	0.50	0.38	0.97	0.50
TRUCK %	0.0%	2.0%	0.0%	0.0%	4.9%	0.0%

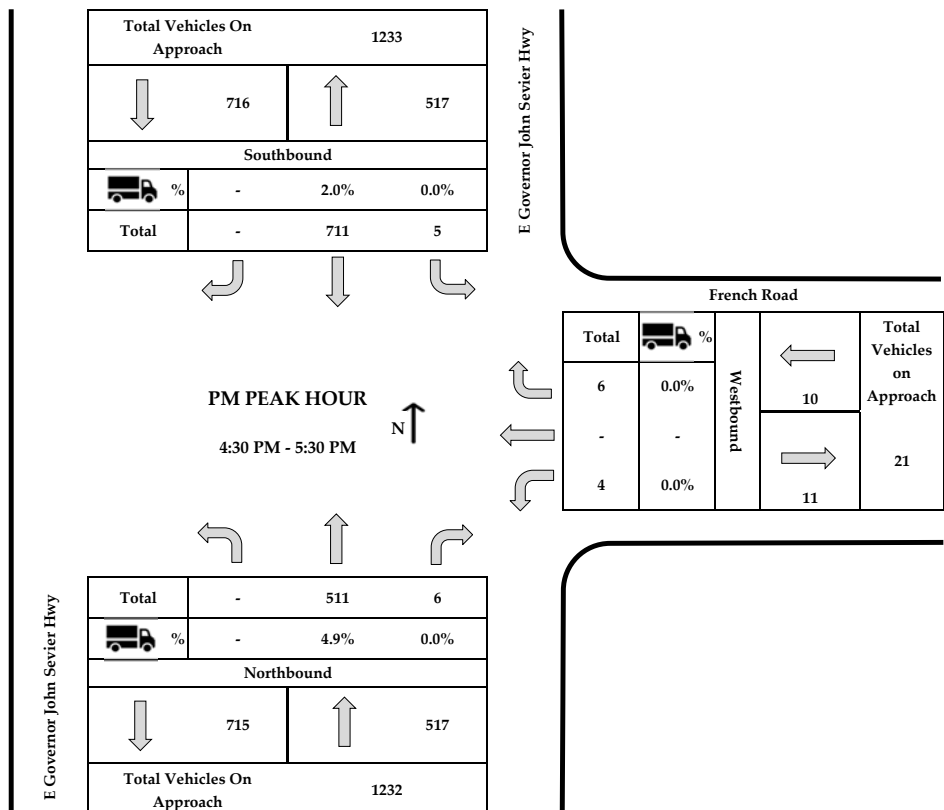
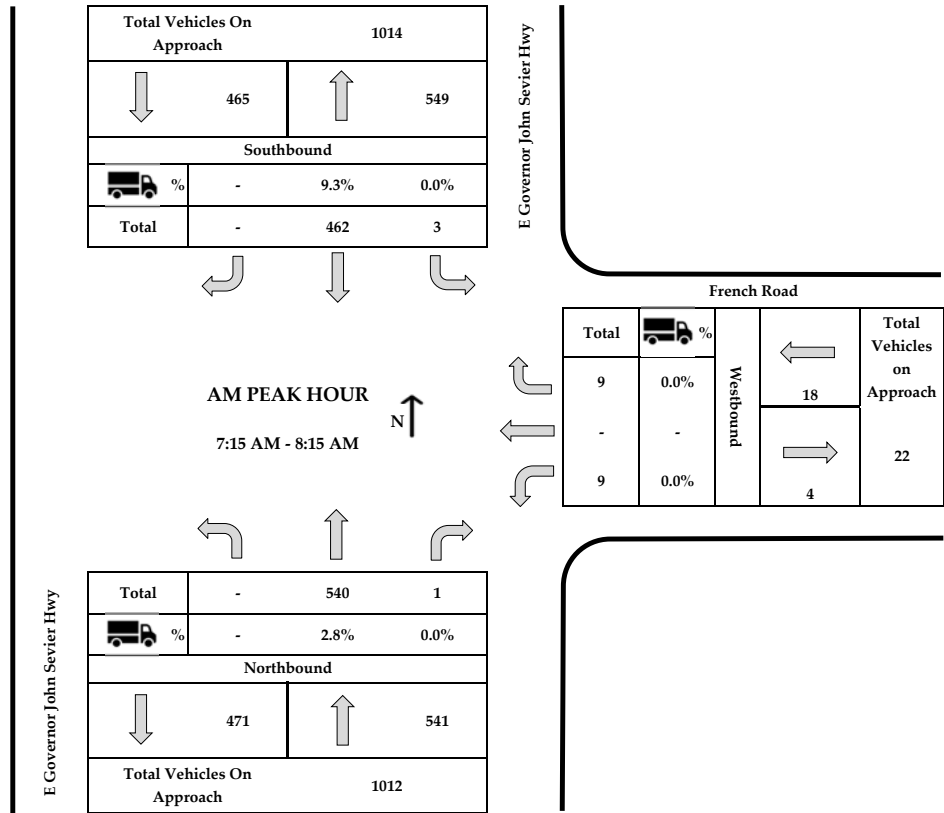
E Governor John Sevier Highway at French Road
Intersection Traffic Count Totals
2/13/2024



PEAK HOUR DATA

Major Street: E Governor John Sevier Highway (SB and NB)
 Minor Street: French Road (WB)
 Traffic Control: Stop Sign on Minor Street

2/13/2024 (Tuesday)
 Partly Cloudy and Mild
 Conducted by: Ajax Engineering



TRAFFIC COUNT DATA

Major Street: E Governor John Sevier Highway (SB and NB)
Minor Street: Stonesilo Way (EB)
Traffic Control: Stop Sign on Minor Street

2/13/2024 (Tuesday)
Partly Cloudy and Mild
Conducted by: Ajax Engineering

2024 AM Peak Hour

	E Govenor John Sevier Highway		E Govenor John Sevier Highway		Stone Silo Way	
TIME	SOUTHBOUND		NORTHBOUND		EASTBOUND	
BEGIN	THRU	RT	LT	THRU	LT	RT
7:15 AM	-	1	2	-	3	4
7:30 AM	-	0	2	-	2	7
7:45 AM	-	1	1	-	0	2
8:00 AM	-	0	0	-	0	6
TOTAL	-	2	5	-	5	19
% ENTER	-	29%	71%	-	-	-
% EXIT	-	-	-	-	21%	79%





2024 PM Peak Hour

	E Govenor John Sevier Highway		E Govenor John Sevier Highway		Stone Silo Way	
TIME	SOUTHBOUND		NORTHBOUND		EASTBOUND	
BEGIN	THRU	RT	LT	THRU	LT	RT
4:30 PM	-	2	1	-	1	1
4:45 PM	-	1	3	-	0	0
5:00 PM	-	2	1	-	0	0
5:15 PM	-	4	1	-	0	1
TOTAL	-	9	6	-	1	2
% ENTER	-	60%	40%	-	-	-
% EXIT	-	-	-	-	33%	67%

APPENDIX F

CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 11)

EXISTING CONDITIONS

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	9	540	1	3	462
Future Vol, veh/h	9	9	540	1	3	462
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	-	-	-	110	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-4	-	1	-	-	-1
Peak Hour Factor	75	75	83	25	75	97
Heavy Vehicles, %	0	0	3	0	0	9
Mvmt Flow	12	12	651	4	4	476





Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1137	653	0	0	655
Stage 1	653	-	-	-	-
Stage 2	484	-	-	-	-
Critical Hdwy	5.6	5.8	-	-	4.1
Critical Hdwy Stg 1	4.6	-	-	-	-
Critical Hdwy Stg 2	4.6	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2
Pot Cap-1 Maneuver	290	506	-	-	942
Stage 1	603	-	-	-	-
Stage 2	695	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	289	506	-	-	942
Mov Cap-2 Maneuver	425	-	-	-	-
Stage 1	603	-	-	-	-
Stage 2	692	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.2	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	462	942
HCM Lane V/C Ratio	-	-	0.052	0.004
HCM Control Delay (s)	-	-	13.2	8.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0

Intersection

Int Delay, s/veh 0.3





Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	6	511	6	5	711
Future Vol, veh/h	4	6	511	6	5	711
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	-	-	-	110	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-4	-	1	-	-	-1
Peak Hour Factor	50	38	97	50	42	92
Heavy Vehicles, %	0	0	5	0	0	2
Mvmt Flow	8	16	527	12	12	773

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1330	533	0
Stage 1	533	-	-
Stage 2	797	-	-
Critical Hdwy	5.6	5.8	-
Critical Hdwy Stg 1	4.6	-	-
Critical Hdwy Stg 2	4.6	-	-
Follow-up Hdwy	3.5	3.3	-
Pot Cap-1 Maneuver	232	584	-
Stage 1	667	-	-
Stage 2	534	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	229	584	-
Mov Cap-2 Maneuver	371	-	-
Stage 1	667	-	-
Stage 2	528	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.7	0	0.1
HCM LOS	B		





Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	489	1040
HCM Lane V/C Ratio	-	-	0.049	0.011
HCM Control Delay (s)	-	-	12.7	8.5
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0

PROJECTED CONDITIONS WITHOUT THE PROJECT

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	10	572	1	3	490
Future Vol, veh/h	10	10	572	1	3	490
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	-	-	-	110	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-4	-	1	-	-	-1
Peak Hour Factor	75	75	83	25	75	97
Heavy Vehicles, %	0	0	3	0	0	9
Mvmt Flow	13	13	689	4	4	505
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1204	691	0	0	693	0
Stage 1	691	-	-	-	-	-
Stage 2	513	-	-	-	-	-
Critical Hdwy	5.6	5.8	-	-	4.1	-
Critical Hdwy Stg 1	4.6	-	-	-	-	-
Critical Hdwy Stg 2	4.6	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	268	484	-	-	912	-
Stage 1	584	-	-	-	-	-
Stage 2	678	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	267	484	-	-	912	-
Mov Cap-2 Maneuver	407	-	-	-	-	-
Stage 1	584	-	-	-	-	-
Stage 2	675	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	13.7	0	0.1			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	442	912	-	
HCM Lane V/C Ratio	-	-	0.06	0.004	-	
HCM Control Delay (s)	-	-	13.7	9	-	
HCM Lane LOS	-	-	B	A	-	
HCM 95th %tile Q(veh)	-	-	0.2	0	-	

Intersection

Int Delay, s/veh 0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	6	542	6	5	754
Future Vol, veh/h	4	6	542	6	5	754
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	-	-	-	110	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	-4	-	1	-	-	-1
Peak Hour Factor	50	38	97	50	42	92
Heavy Vehicles, %	0	0	5	0	0	2
Mvmt Flow	8	16	559	12	12	820

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1409	565	0
Stage 1	565	-	-
Stage 2	844	-	-
Critical Hdwy	5.6	5.8	-
Critical Hdwy Stg 1	4.6	-	-
Critical Hdwy Stg 2	4.6	-	-
Follow-up Hdwy	3.5	3.3	-
Pot Cap-1 Maneuver	211	562	-
Stage 1	649	-	-
Stage 2	513	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	208	562	-
Mov Cap-2 Maneuver	353	-	-
Stage 1	649	-	-
Stage 2	507	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.1	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	469	1012
HCM Lane V/C Ratio	-	-	0.051	0.012
HCM Control Delay (s)	-	-	13.1	8.6
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0

PROJECTED CONDITIONS WITH THE PROJECT

Intersection

Int Delay, s/veh 2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↱	↱		↱		↱	↱		↱	↱	↱
Traffic Vol, veh/h	32	0	49	10	0	10	16	572	1	3	490	11
Future Vol, veh/h	32	0	49	10	0	10	16	572	1	3	490	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	70	-	0	-	-	-	100	-	-	110	-	215
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	-4	-	-	1	-	-	-1	-
Peak Hour Factor	90	90	90	75	90	75	90	83	25	75	97	90
Heavy Vehicles, %	0	0	0	0	0	0	0	3	0	0	9	0
Mvmt Flow	36	0	54	13	0	13	18	689	4	4	505	12

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1247	1242	505	1273	1252	691	517	0	0	693	0	0
Stage 1	513	513	-	727	727	-	-	-	-	-	-	-
Stage 2	734	729	-	546	525	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	6.3	5.7	5.8	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	5.3	4.7	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	5.3	4.7	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	152	176	571	193	230	484	1059	-	-	912	-	-
Stage 1	548	539	-	492	508	-	-	-	-	-	-	-
Stage 2	415	431	-	593	599	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	145	172	571	172	225	484	1059	-	-	912	-	-
Mov Cap-2 Maneuver	145	172	-	172	225	-	-	-	-	-	-	-
Stage 1	539	537	-	484	499	-	-	-	-	-	-	-
Stage 2	397	424	-	534	597	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	22.2	20.8	0.2	0.1
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1059	-	-	145	571	254	912	-	-
HCM Lane V/C Ratio	0.017	-	-	0.245	0.095	0.105	0.004	-	-
HCM Control Delay (s)	8.5	-	-	37.7	12	20.8	9	-	-
HCM Lane LOS	A	-	-	E	B	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.9	0.3	0.3	0	-	-

Intersection

Int Delay, s/veh 1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰		↰	↱		↰	↱	↱
Traffic Vol, veh/h	22	0	32	4	0	6	37	542	6	5	754	55
Future Vol, veh/h	22	0	32	4	0	6	37	542	6	5	754	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	70	-	0	-	-	-	100	-	-	110	-	215
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	-4	-	-	1	-	-	-1	-
Peak Hour Factor	90	90	90	50	90	38	90	97	50	42	92	90
Heavy Vehicles, %	0	0	0	0	0	0	0	5	0	0	2	0
Mvmt Flow	24	0	36	8	0	16	41	559	12	12	820	61

Major/Minor	Minor2		Minor1		Major1		Major2		Major2		Major2	
Conflicting Flow All	1499	1497	820	1540	1552	565	881	0	0	571	0	0
Stage 1	844	844	-	647	647	-	-	-	-	-	-	-
Stage 2	655	653	-	893	905	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	6.3	5.7	5.8	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	5.3	4.7	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	5.3	4.7	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	102	124	378	134	162	562	776	-	-	1012	-	-
Stage 1	361	382	-	535	542	-	-	-	-	-	-	-
Stage 2	458	467	-	413	438	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	94	116	378	116	152	562	776	-	-	1012	-	-
Mov Cap-2 Maneuver	94	116	-	116	152	-	-	-	-	-	-	-
Stage 1	342	377	-	507	513	-	-	-	-	-	-	-
Stage 2	422	442	-	370	433	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	32.1		21.3		0.7		0.1	
HCM LOS	D		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	776	-	-	94	378	245	1012	-	-
HCM Lane V/C Ratio	0.053	-	-	0.26	0.094	0.097	0.012	-	-
HCM Control Delay (s)	9.9	-	-	56.3	15.5	21.3	8.6	-	-
HCM Lane LOS	A	-	-	F	C	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.9	0.3	0.3	0	-	-

APPENDIX G

ITE TRIP GENERATION RATES

Land Use: 210

Single-Family Detached Housing

Description

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

Specialized Land Use

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

Additional Data

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

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

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

Source Numbers

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

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 174

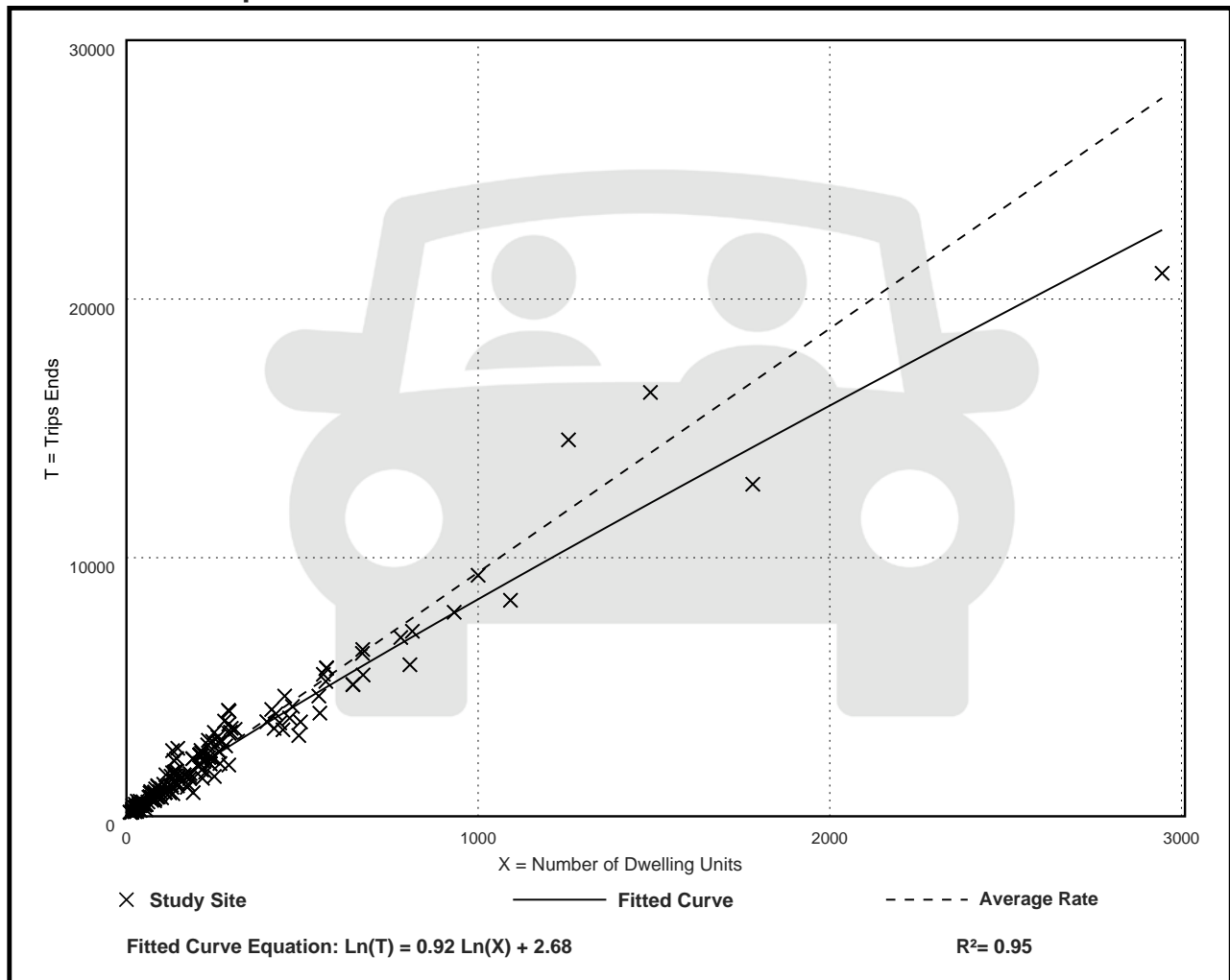
Avg. Num. of Dwelling Units: 246

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 192

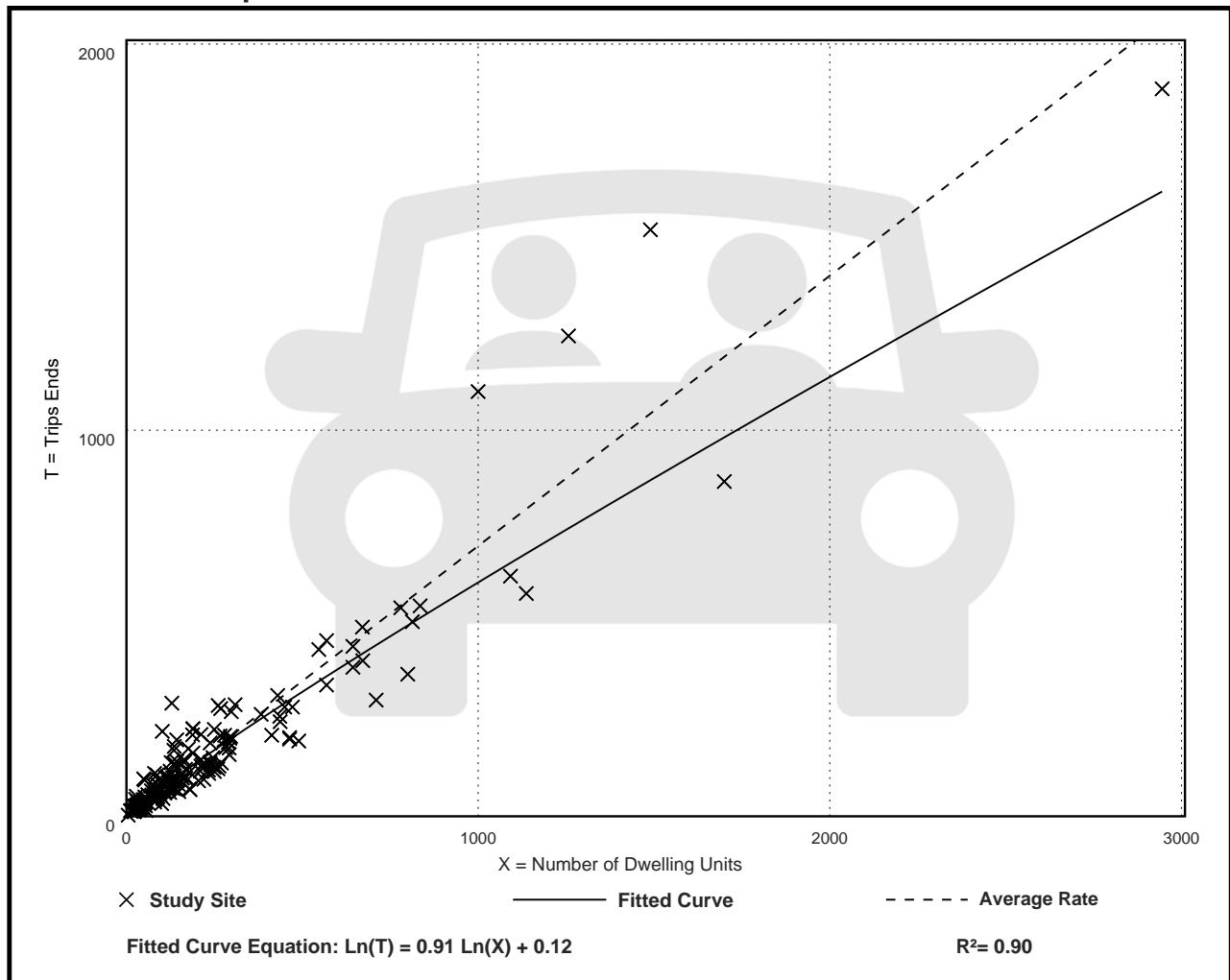
Avg. Num. of Dwelling Units: 226

Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 208

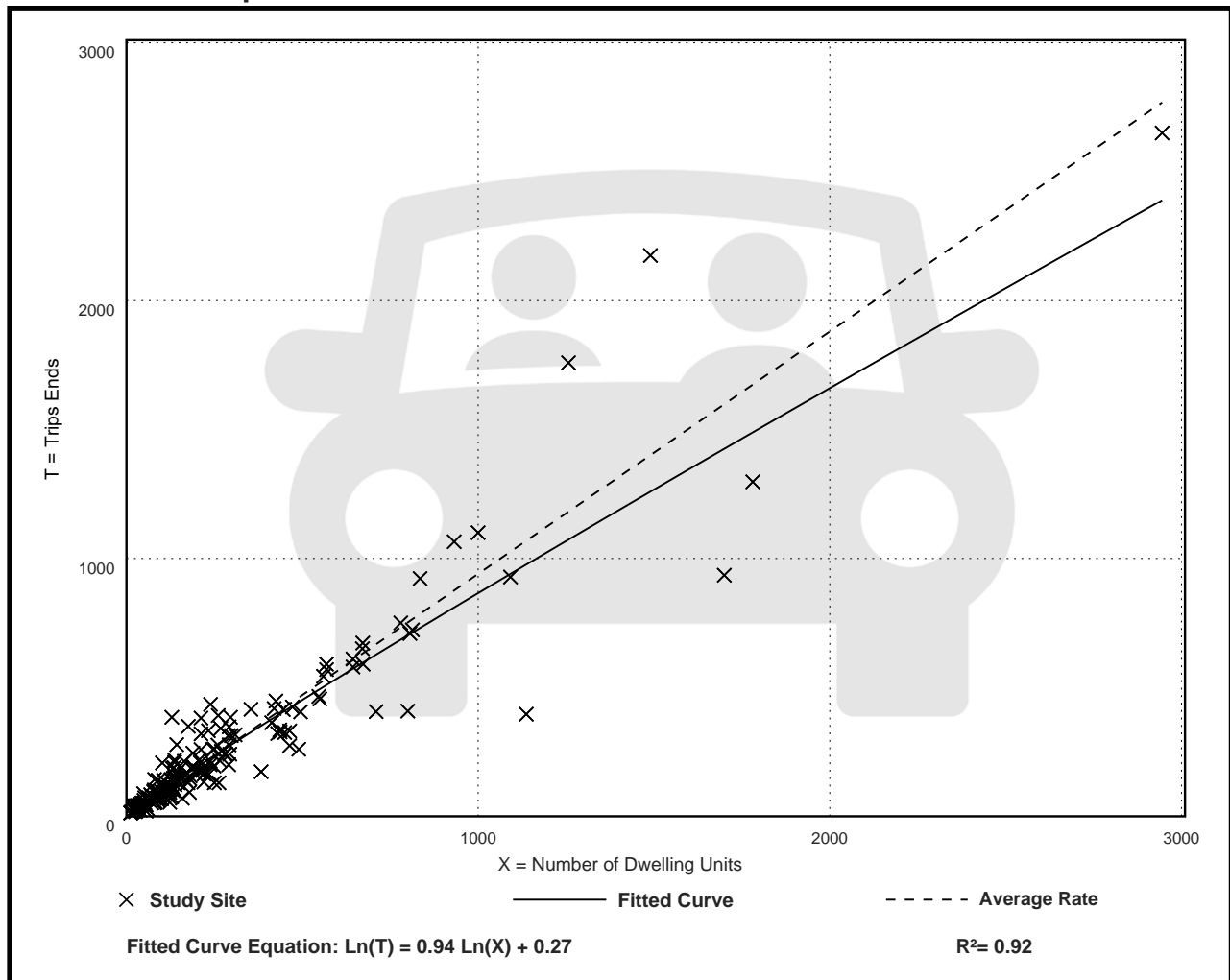
Avg. Num. of Dwelling Units: 248

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



TRIP GENERATION FOR HEARTLAND DEVELOPMENT SUBDIVISION
Maximum of 151 Single-Family Detached Houses

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	151 Houses	1,474	25%	75%		63%	37%	
				27	81	108	92	54	146
Total New Volume Site Trips			1,474	27	81	108	92	54	146

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

TRIP GENERATION FOR HEARTLAND DEVELOPMENT SUBDIVISION

Maximum of 151 Single-Family Detached Houses

151 Residential Houses = X

Weekday:

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

$$\ln(T) = 0.92 * 5.02 + 2.68$$

$$\ln(T) = 7.30$$

$$T = \underline{\underline{1,474 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 7 and 9 am:

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

$$T = 0.91 * 5 + 0.12$$

$$\ln(T) = 4.69$$

$$T = \underline{\underline{108 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 4 and 6 pm:

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

$$\ln(T) = 0.94 * 5.02 + 0.27$$

$$\ln(T) = 4.99$$

$$T = \underline{\underline{146 \text{ trips}}}$$

APPENDIX H

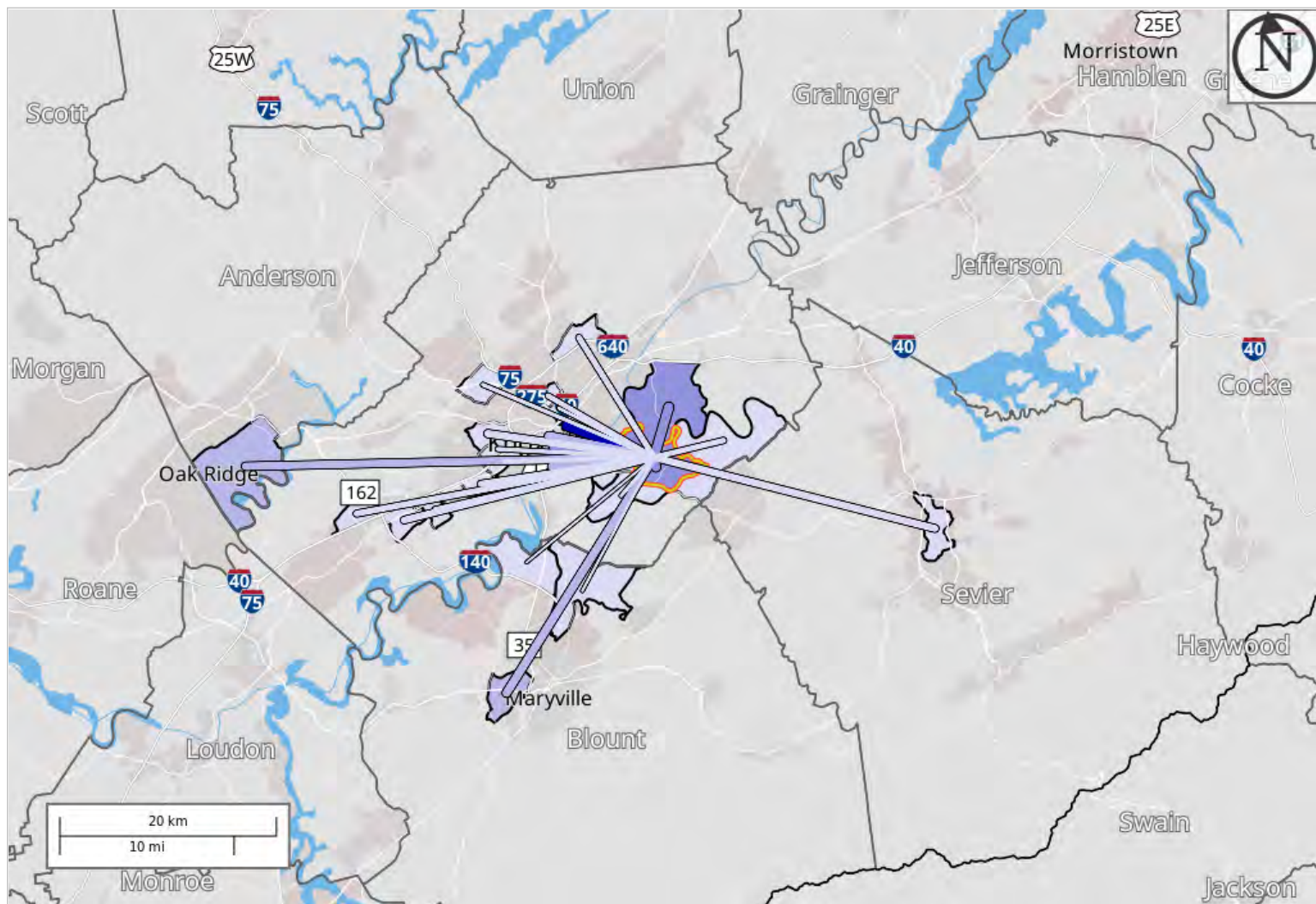
2021 CENSUS BUREAU DATA

Work Destination Report - Home Selection Area to Work Census Tracts All Jobs for All Workers in 2021

Created by the U.S. Census Bureau's OnTheMap <https://onthemap.ces.census.gov> on 02/17/2024

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

All Workers



Map Legend

Job Count

- 87 - 99
- 74 - 86
- 62 - 73
- 49 - 61
- 37 - 48
- 24 - 36
- 11 - 23

Selection Areas

- ▭ Home Area

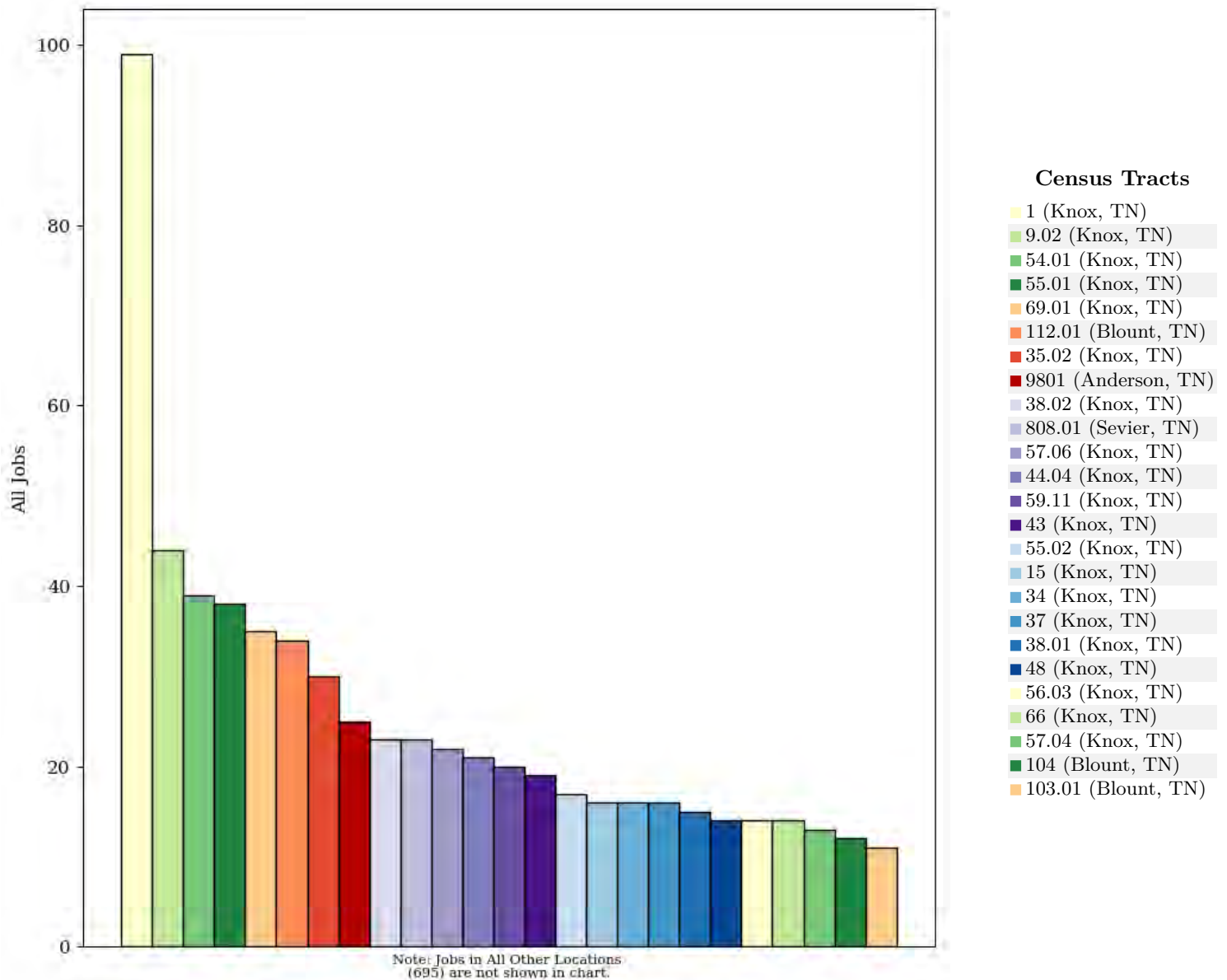
Job Count

- ▭ 87 - 99
- ▭ 74 - 86
- ▭ 62 - 73
- ▭ 49 - 61
- ▭ 37 - 48
- ▭ 24 - 36
- ▭ 11 - 23



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

All Workers



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

All Workers

Census Tracts as Work Destination Area	2021	
	Count	Share
All Census Tracts	1,325	100.0\%
1 (Knox, TN)	99	7.5\%
9.02 (Knox, TN)	44	3.3\%
54.01 (Knox, TN)	39	2.9\%
55.01 (Knox, TN)	38	2.9\%
69.01 (Knox, TN)	35	2.6\%
112.01 (Blount, TN)	34	2.6\%
35.02 (Knox, TN)	30	2.3\%
9801 (Anderson, TN)	25	1.9\%
38.02 (Knox, TN)	23	1.7\%
808.01 (Sevier, TN)	23	1.7\%

Census Tracts as Work Destination Area	2021	
	Count	Share
57.06 (Knox, TN)	22	1.7\%
44.04 (Knox, TN)	21	1.6\%
59.11 (Knox, TN)	20	1.5\%
43 (Knox, TN)	19	1.4\%
55.02 (Knox, TN)	17	1.3\%
15 (Knox, TN)	16	1.2\%
34 (Knox, TN)	16	1.2\%
37 (Knox, TN)	16	1.2\%
38.01 (Knox, TN)	15	1.1\%
48 (Knox, TN)	14	1.1\%
56.03 (Knox, TN)	14	1.1\%
66 (Knox, TN)	14	1.1\%
57.04 (Knox, TN)	13	1.0\%
104 (Blount, TN)	12	0.9\%
103.01 (Blount, TN)	11	0.8\%
All Other Locations	695	52.5\%

Additional Information

Analysis Settings

Analysis Type	Destination
Destination Type	Census Tracts
Selection area as	Home
Year(s)	2021
Job Type	All Jobs
Selection Area	55.01 (Knox, TN) from Census Tracts
Selected Census Blocks	64
Analysis Generation Date	02/17/2024 15:29 - OnTheMap 6.23.4
Code Revision	b83319a02a70b14bc14ccfe9d9a4e81022acdb73
LODES Data Vintage	20231016_1512

Data Sources

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

Notes

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

APPENDIX I

TDOT TURN LANE VOLUME THRESHOLD WORKSHEETS

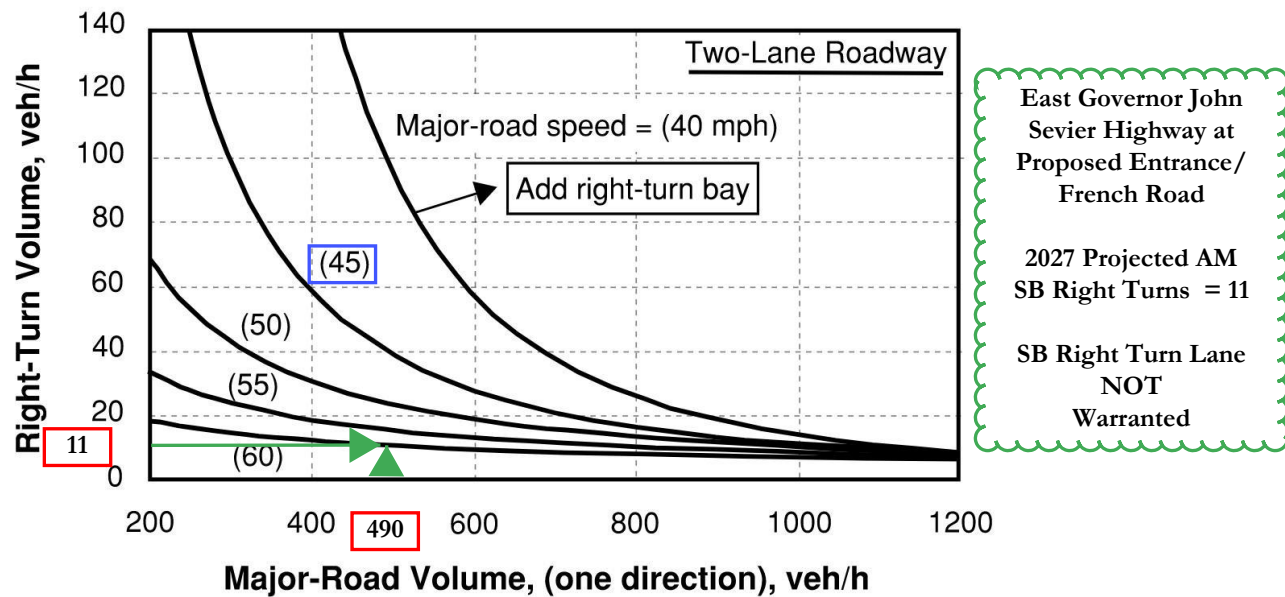


Figure 3-18: Right-Turn Lane Warrant along Two-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)²⁴

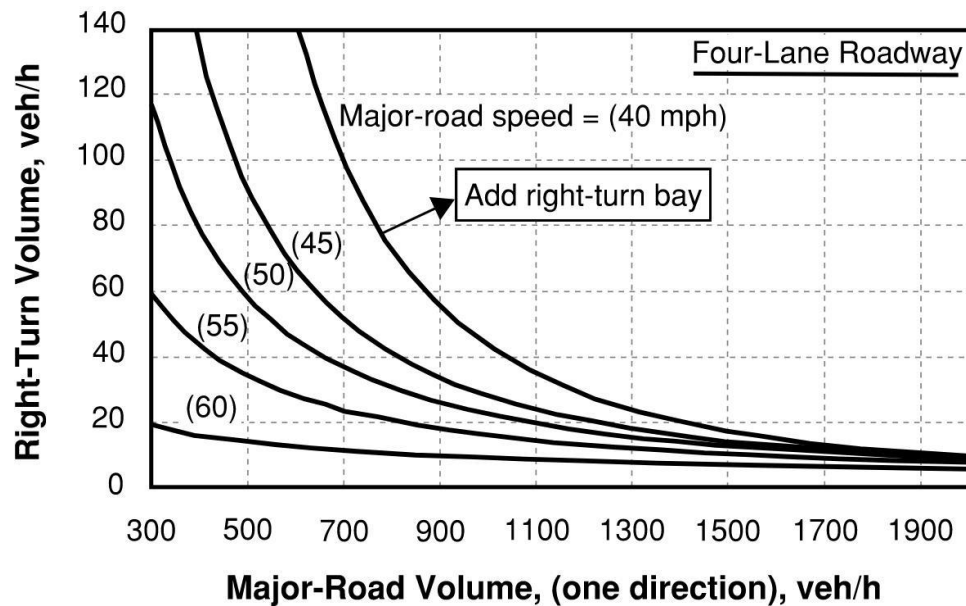


Figure 3-19: Right-Turn Lane Warrant along Four-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)²⁵

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

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

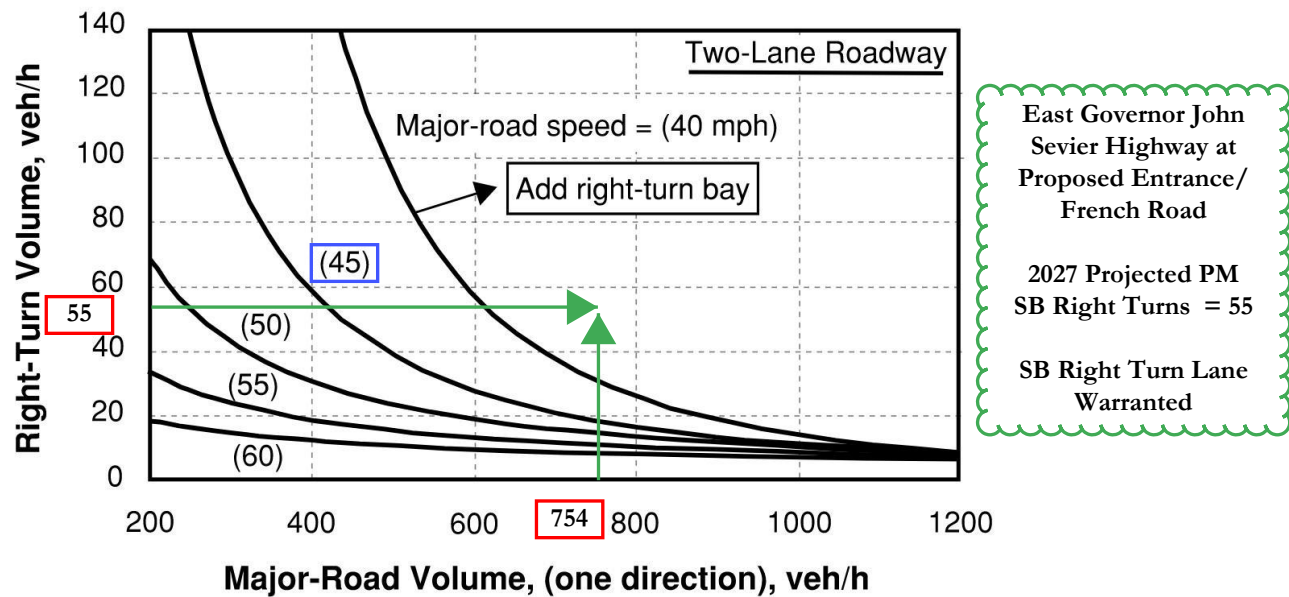


Figure 3-18: Right-Turn Lane Warrant along Two-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)²⁴

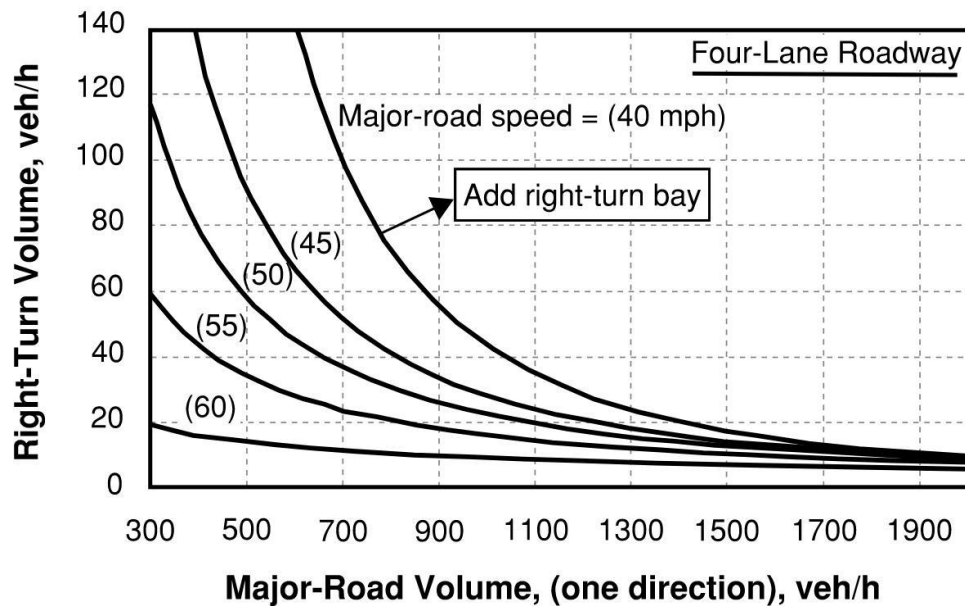


Figure 3-19: Right-Turn Lane Warrant along Four-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)²⁵

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

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

APPENDIX J

SIMTRAFFIC VEHICLE QUEUE WORKSHEETS

Intersection: 4: E Governor John Sevier Highway & Proposed Entrance/French Road

Movement	EB	EB	WB	NB	SB
Directions Served	LT	R	LTR	L	L
Maximum Queue (ft)	53	52	41	24	16
Average Queue (ft)	20	21	13	4	1
95th Queue (ft)	46	42	38	17	8
Link Distance (ft)		136	701		
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	70			100	110
Storage Blk Time (%)	0	0			
Queuing Penalty (veh)	0	0			

Network Summary

Network wide Queuing Penalty: 0

Intersection: 4: E Governor John Sevier Highway & Proposed Entrance/French Road

Movement	EB	EB	WB	NB	SB
Directions Served	LT	R	LTR	L	L
Maximum Queue (ft)	56	61	34	36	21
Average Queue (ft)	18	19	8	10	1
95th Queue (ft)	49	44	28	28	10
Link Distance (ft)		136	701		
Upstream Blk Time (%)		0			
Queuing Penalty (veh)		0			
Storage Bay Dist (ft)	70			100	110
Storage Blk Time (%)	2	0			
Queuing Penalty (veh)	1	0			

Network Summary

Network wide Queuing Penalty: 1

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