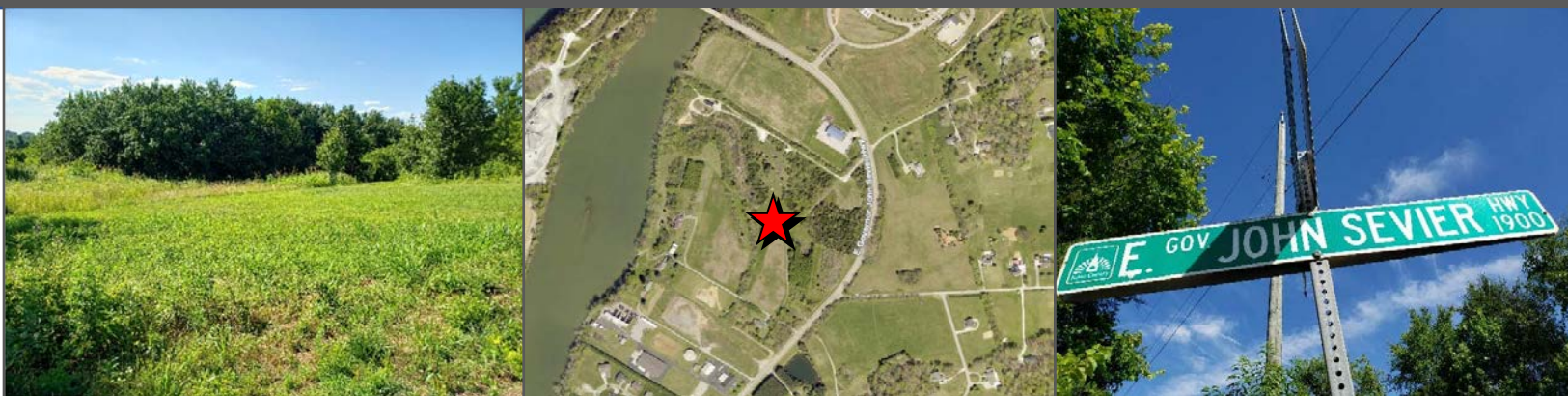


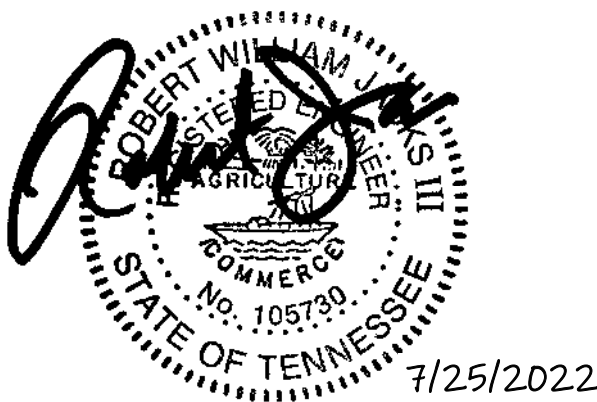


# Transportation Impact Study Price – Toole Subdivision Knox County, Tennessee



July 2022

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## EXECUTIVE SUMMARY

### **Preface:**

A developer is proposing to construct a residential development at East Governor John Sevier Highway across from French Road in Southeast Knox County, TN. The proposed development will include 140 single-family detached houses on 35.8 +/- acres and is referenced in this study as the “Price – Toole Subdivision” since an official name has not been decided. The development will be built in a single phase and is anticipated to be fully built and occupied by 2028. The development proposes a single entrance on East Governor John Sevier Highway at the existing 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 Price – Toole Subdivision development, with a total of 140 single-family houses, is estimated to generate 1,376 trips at full build-out and occupancy on an average weekday. Of these daily trips, 101 are estimated to occur during the AM peak hour and 136 in the PM peak hour in 2028.
- The intersection of East Governor John Sevier Highway at French Road, with the addition of the Proposed Entrance approach, is expected to operate with reasonable vehicle delays and queues in the projected AM and PM peak hours. Overall, the intersection will operate acceptably in 2028 with respect to vehicle capacity with the addition of the proposed new entrance approach.
- The projected volumes at the intersection of East Governor John Sevier Highway at French Road and the Proposed Entrance warrant an exclusive southbound right-turn lane for residents and motorists entering the development.

### **Recommendations:**

The following recommendations are offered based on the study analyses. The recommendations are offered 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 the recommendations are discussed at the end of the report.

- The current site plan for the development shows the eastbound exiting right-turn lane with a storage length of 40 feet. Based on the calculations presented in the study, it is recommended that this right-turn lane have a minimum storage length of 75 feet with a minimum taper length of 25 feet.
- The exiting lanes of the development at East Governor John Sevier Highway should be marked on the pavement with the appropriate white lane arrows.
- It is recommended that the center two-way left-turn lane (TWLTL) pavement markings on East 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.
- A southbound right-turn lane on East 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 East Governor John Sevier Highway. The stop bar should be applied a minimum of 4 feet away from the edge of East Governor John Sevier Highway and placed at the desired stopping point that maximizes the sight distance.
- Sight distances at the Proposed Entrance approach must not be impacted by future landscaping, signage, or vegetation. The site designer must ensure that the intersection and stopping sight distances are accounted for and provided in the design plans. A visual inspection determined that these sight distances are available to the south. The sight distance to the north appears to be adequate for

the required stopping sight distance but does not appear to meet the desirable 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 East Governor John Sevier Highway.

- Due to the limited sight distance to the north, it is recommended that an advance intersection warning sign be installed on East 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 East 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 lane taper on East Governor John Sevier Highway.
- The existing advance intersection warning sign for northbound traffic on East 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 existing sign is approximately 850 feet south of the existing intersection and is currently posted with a Side Road Intersection (W2-2R) sign.
- Intersection street lighting is recommended to be provided at the Proposed Entrance to improve visibility and conspicuity.
- The construction of the Proposed Entrance on East 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.
- The current site plan shows a southbound acceleration lane at the Proposed Entrance for exiting vehicles. This lane is recommended to be eliminated from the site plan since the proposed length would provide minimal assistance for vehicle acceleration and is not expected to be particularly beneficial.
- A 25-mph Speed Limit (R2-1) sign is recommended to be posted near the beginning of the development entrance off East 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.
- Stop Signs (R1-1) with 24” white stop bars are recommended to be installed at the internal intersections, as shown in the report.
- 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 280 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.

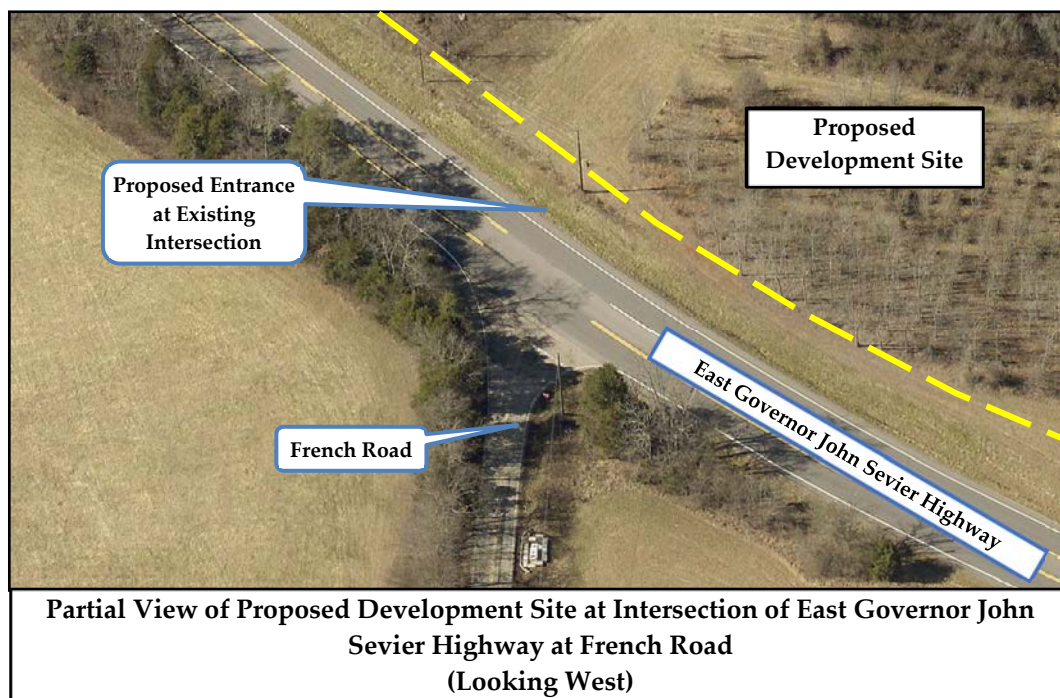
- The longest internal roadway will have two bulb-outs along its length that will accommodate access to several proposed lots in the corners of the development property. Construction of these bulb-outs will create large areas of pavement without traffic control. At a minimum, it is recommended that a white dashed pavement line be applied to the outside edge of the roadway adjacent to the bulb-out. Other potential traffic controls that should be considered include a stripped island or a raised delineated island. Details regarding potential traffic controls at these bulb-outs should be discussed in the detailed design phase with Knox County Engineering.
- 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 East 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 East Governor John Sevier Highway. This sign would be appropriate 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 East Governor John Sevier Highway for motorists traveling east on French Road.

## 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 East 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 East Governor John Sevier Highway and Strawberry Plains Pike. The development will have a single entrance tie to East Governor John Sevier Highway at French Road.

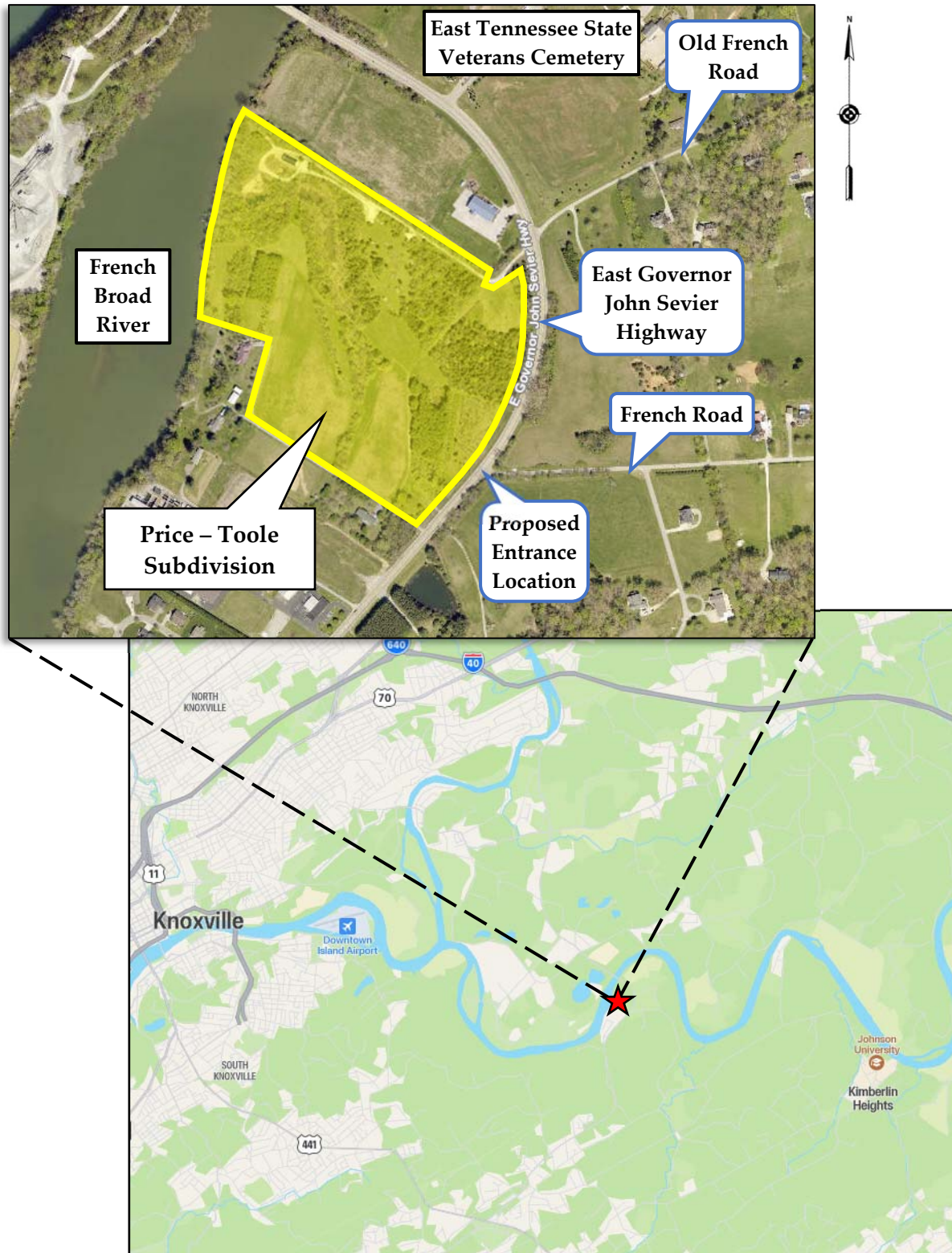
As Knoxville/Knox County Planning requested, transportation impacts associated with the proposed development were analyzed at the unsignalized intersection of East Governor John Sevier Highway at French Road, where the Proposed Entrance will tie into and create a 4-way intersection.



The proposed development property is in a quasi-rural area that is slowly being transformed into an area more suburbanized due to increased development. Recently, a large veterans cemetery was established just north of the development site on East 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 4,475 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 East Governor John Sevier Highway. The proposed development site is currently undeveloped, with it 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: the Price property and the Toole property.



**Figure 1**  
**Location Map**



▪ **EXISTING ROADWAYS:**

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

**TABLE 1**  
**STUDY CORRIDOR CHARACTERISTICS**

NAME	CLASSIFICATION <sup>1</sup>	SPEED LIMIT	LANES	ROAD WIDTH <sup>2</sup>	TRANSIT <sup>3</sup>	PEDESTRIAN FACILITIES	BICYCLE FACILITIES
East Governor John Sevier Highway (SR 168)	Major Arterial	45 mph	3 (with TWLTL)	44 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

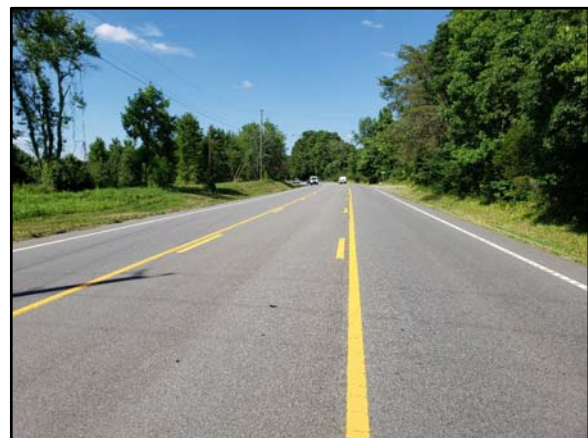
<sup>1</sup> 2018 Major Road Plan by Knoxville/Knox County Planning

<sup>2</sup> From edges of pavement or face of curbs

<sup>3</sup> 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. West Governor John Sevier Highway begins at the interchange with Alcoa Highway (US 129/SR 115) on its southwest end. On its northeast end, East Governor John Sevier Highway terminates at the intersection with Asheville Highway (US 11E/US 25/US 70/SR 9) with a total length of 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.

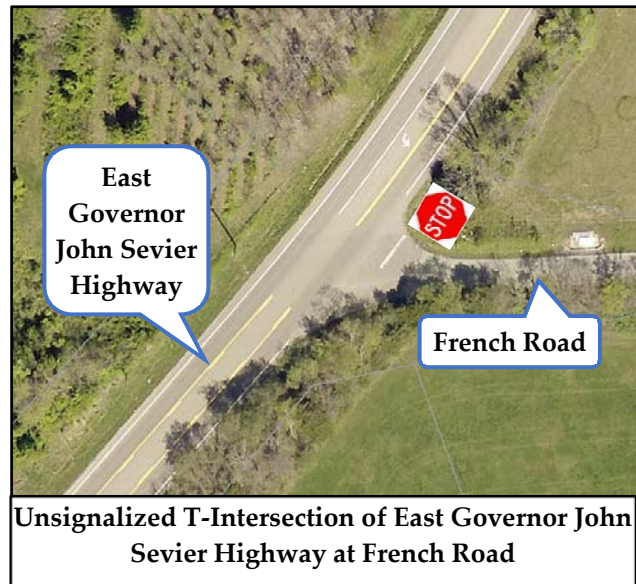
East Governor John Sevier Highway at the development site currently consists of a 3-lane pavement section that includes a continuous center TWLTL. The lanes are 12 feet wide with 4-foot paved shoulders outside the white edge lines. The pavement surface is approximately 46 feet in total width. Grass side slopes are located immediately outside of the paved shoulders. At the project site, utility streetlights are not provided on East 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.



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

**French Road** is a Local Street with a total length of 1.8 miles. This road traverses between East Governor John Sevier Highway on its north side to Hopewell Road on its south side. Near East 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. 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

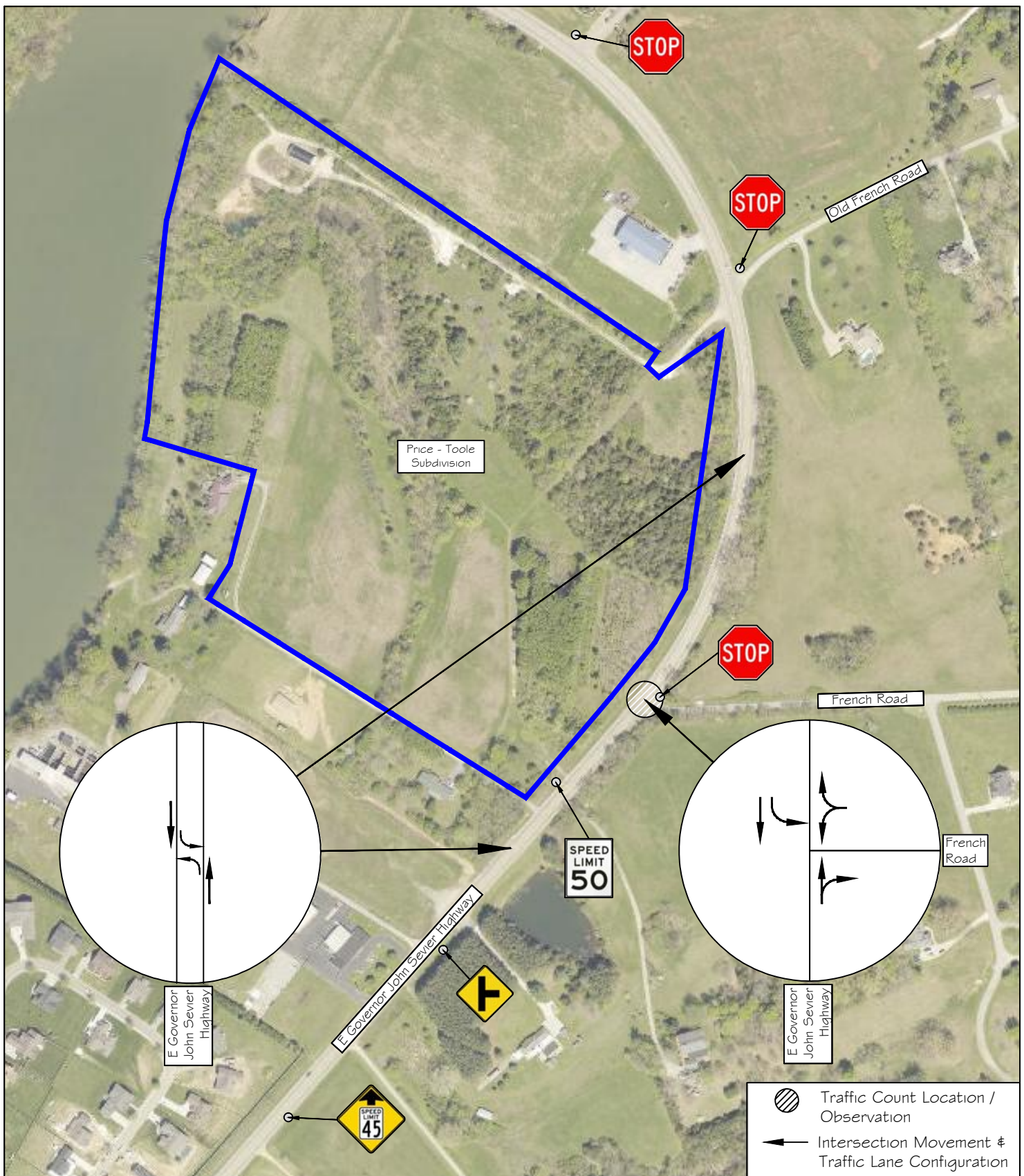
south, the roadway becomes windier and slightly narrower and is not delineated by any painted pavement markings. The posted speed limit is 30-mph; however, it is only posted for northbound/westbound travel on French Road towards East Governor John Sevier Highway. The northbound/westbound direction of 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 East Governor John Sevier Highway, the horizontal alignment of French Road makes a slight turn to line up perpendicularly with the highway. The French Road approach is controlled by a Stop Sign (R1-1) at East Governor John Sevier Highway.

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.





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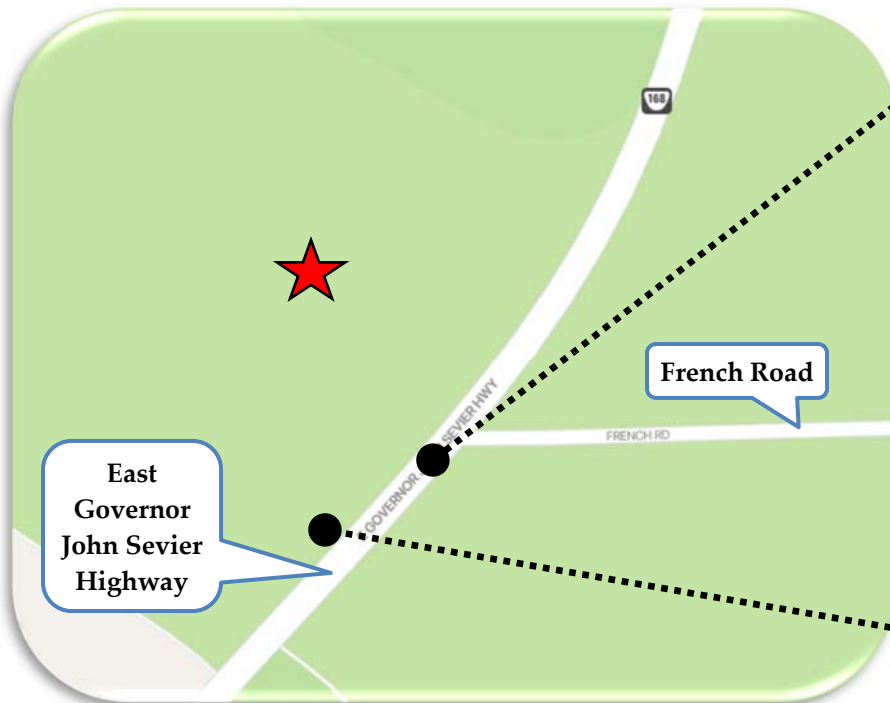


FIGURE 2

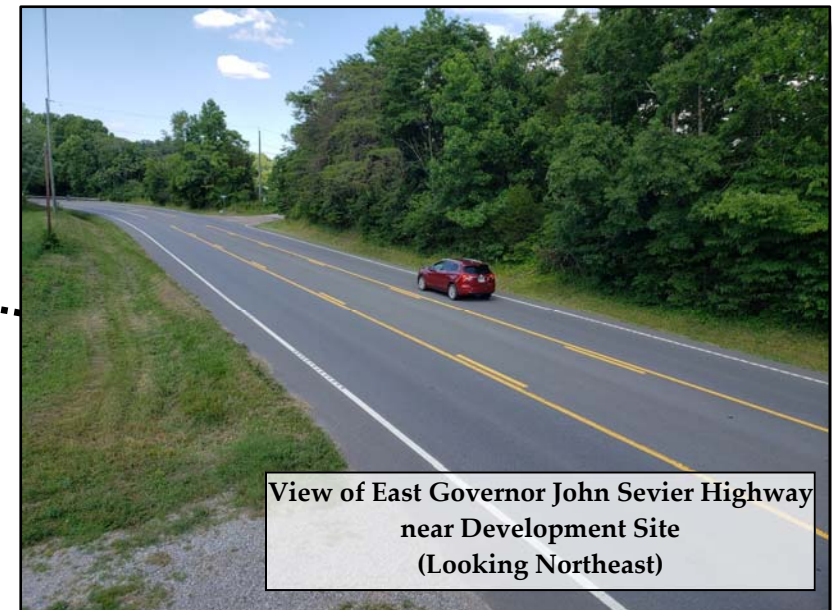
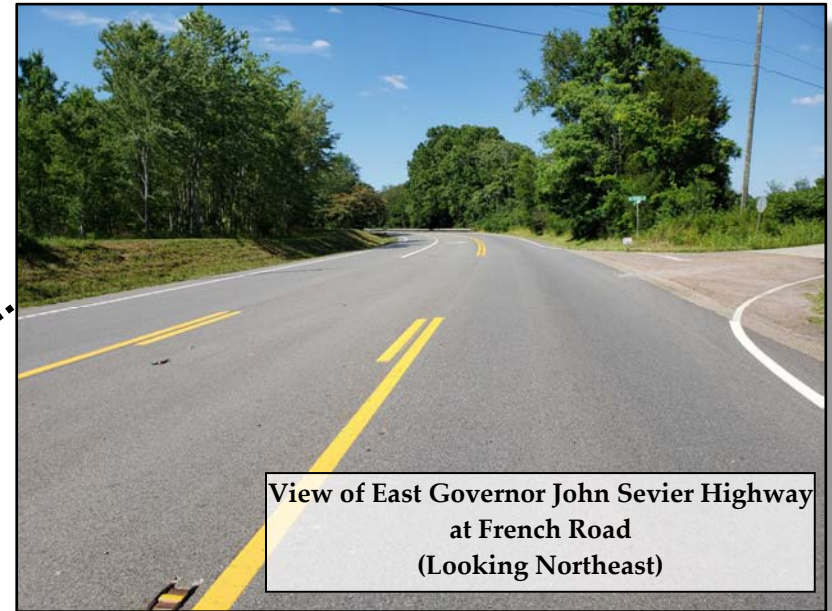
Price - Toole Subdivision

Traffic Count Location, Traffic Signage & Existing Lane Configurations

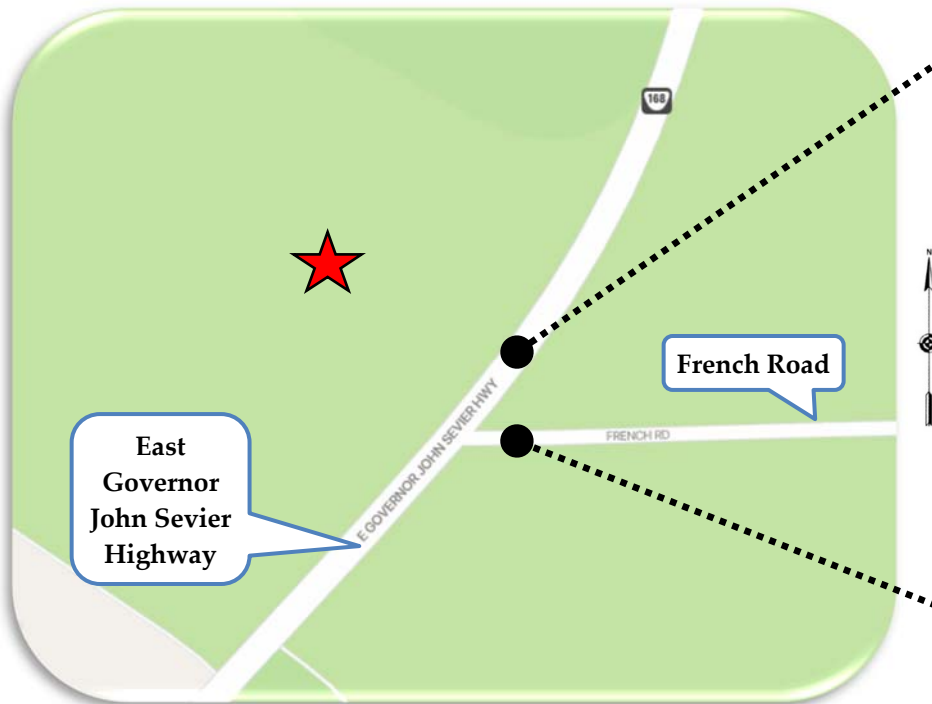
## PHOTO EXHIBITS



Intersection of East Governor John Sevier Highway at  
French Road

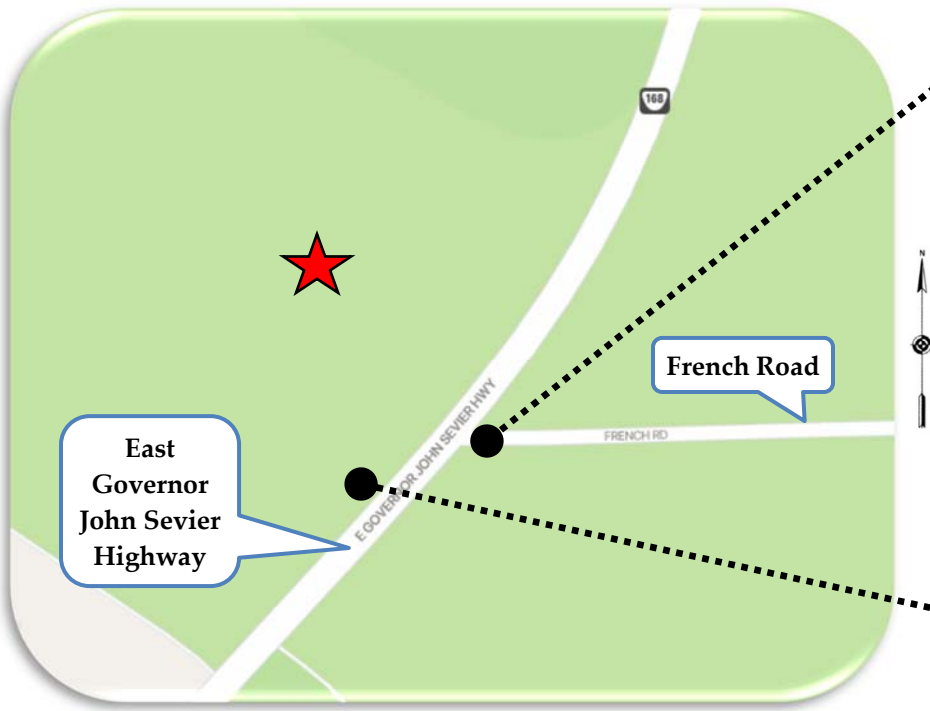




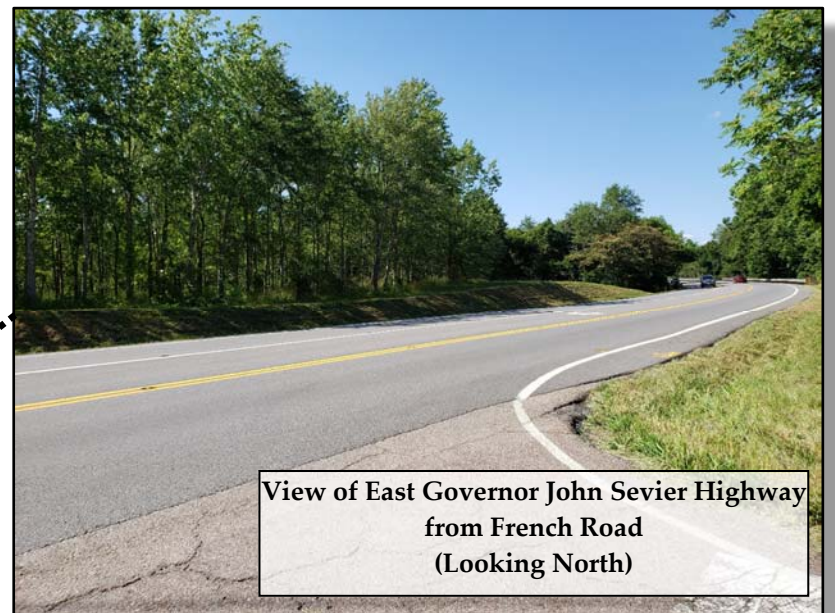


**Intersection of East Governor John Sevier Highway at French Road**





**Intersection of East Governor John Sevier Highway at French Road**



**View of East Governor John Sevier Highway from French Road (Looking North)**



**View of Proposed Development Site at East Governor John Sevier Highway (Looking Northwest)**

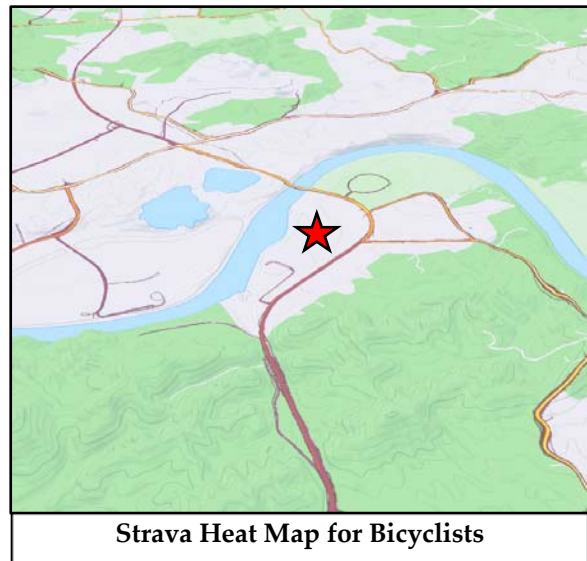


▪ **EXISTING TRANSPORTATION VOLUMES PER MODE:**

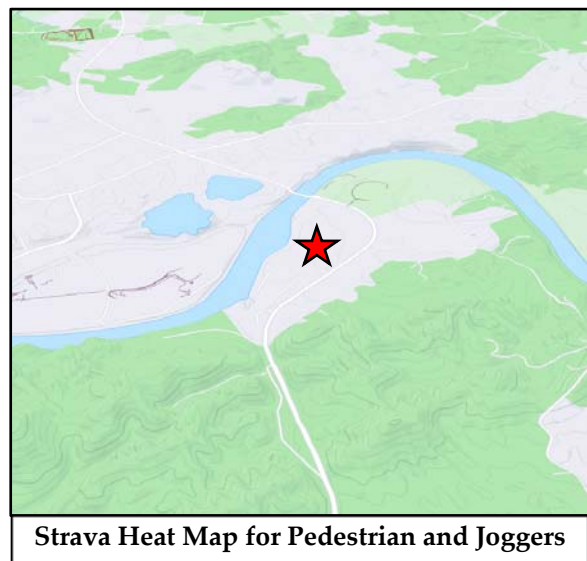
One annual vehicular traffic count location exists nearby the study area, and the Tennessee Department of Transportation conducts this count. The count location data is the following and can be viewed with further details in Appendix A:

- Existing vehicular roadway traffic:  
The TDOT reported an Average Daily Traffic (ADT) on East Governor John Sevier Highway, just north of the development site, at 12,216 vehicles per day in 2021. From 2011 to 2021, this count station has indicated a 0.8% 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 there is a minimal number of pedestrians and bicyclists on these roads in the study area. During the traffic counts for this project at East Governor John Sevier Highway at French Road, no pedestrians or bicyclists were observed over 6 hours.



An online website, [strava.com](https://www.strava.com), provides "heat" maps detailing exercise routes taken by pedestrians, joggers, and bicyclists. The provided heat maps show the last two years of data, are updated monthly, and are gathered from individuals allowing their smart devices to track and compile their routes (millions of users). The activities in the maps are shown on the roads with color intensities with lighter colors signifying



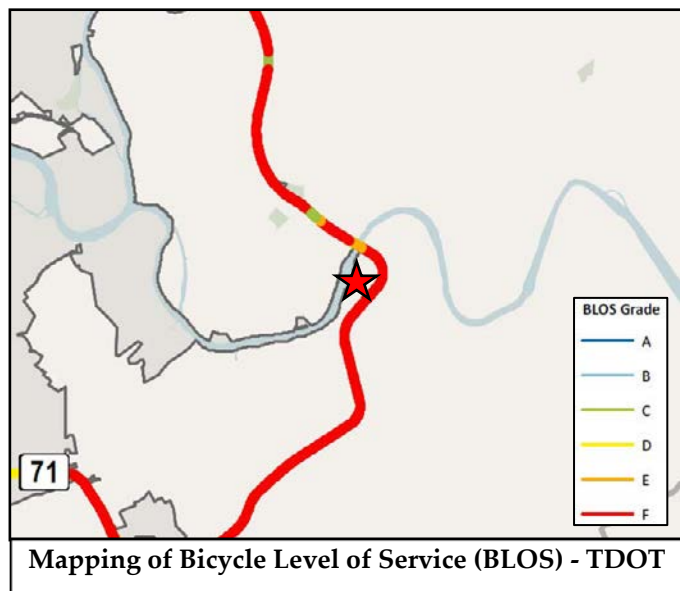
higher activity. The Strava heat map data shows no pedestrian traffic along East Governor John Sevier Highway or French Road. Some bicycle traffic is recorded on the East Governor John Sevier Highway and French Road sections adjacent to the development site.

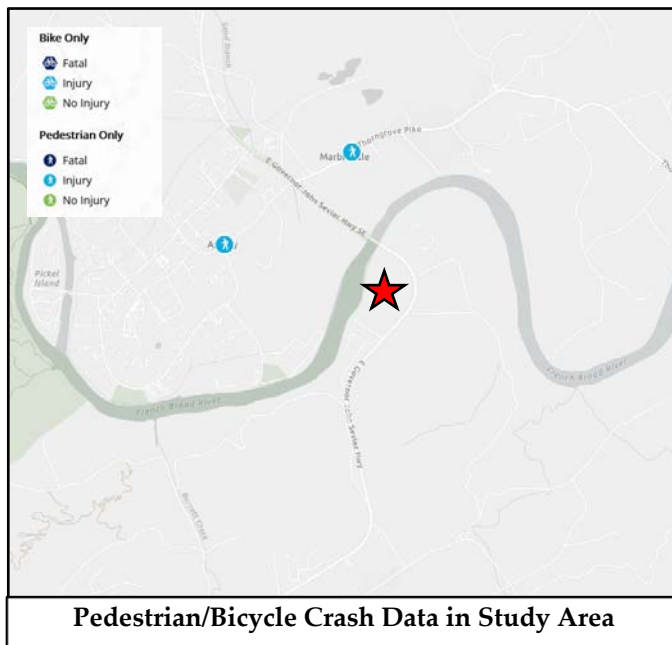
▪ **ON-STREET PARKING:**

On-street parking was not observed during the site review and is not allowed on any studied roadways adjacent to the project site.

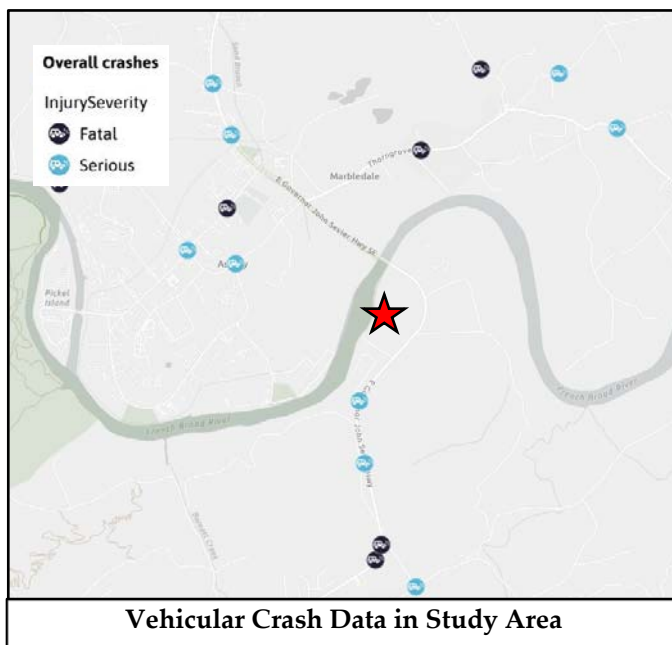
▪ **PEDESTRIAN AND BICYCLE FACILITIES:**

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 East 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 East Governor John Sevier Highway (SR 168) in the study area at the development site shows F grades.





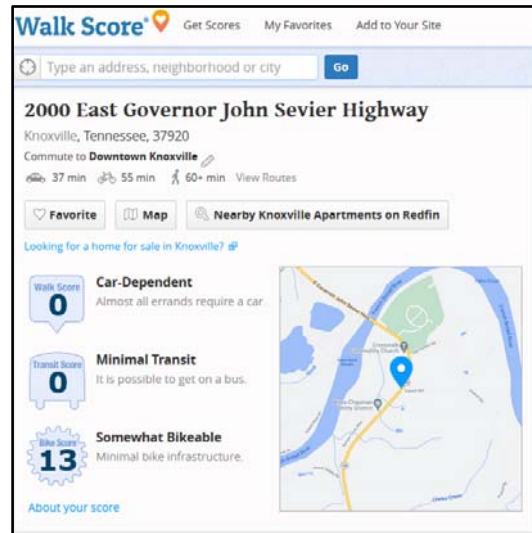
The Knoxville TPO provided a 2020 update to bicycle and pedestrian crash data for Knox County, Blount County, and other surrounding counties. According to the data, none of these incidents occurred near the development site or at the studied intersection in the past couple of years. The closest incidents occurred on Thorngrove Pike and Asbury Road north of the development site and across the river. The incident on Thorngrove Pike involved a pedestrian crossing mid-block, but not in a crosswalk. The other incident occurred on Asbury Road and was listed as a lack of sidewalks contributing to the crash.



The Knoxville TPO also provides data related to “Life-Altering Traffic Crashes”. This data lists “the location of 2,326 traffic crashes in the Knoxville region that resulted in a fatality or serious injury between January 2016 and June 2019.” Several “Serious” and “Fatal” crashes are shown on this TPO mapping in the surrounding area. These crashes occurred along East Governor John Sevier Highway and north of the development site, but none are adjacent to the site. The closest fatal crashes to the development site occurred on East Governor John Sevier Highway to the south, 1.3 miles away.

▪ **WALK SCORE:**

A private company offers an online website at [walkscore.com](http://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 Score, Bike Score, and Transit Score at the approximate development property address (2000 East 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 the lack of 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 in the study area. 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 located on Mountain Grove Drive near Chapman Highway in front of the Lowe’s Home Improvement Center and is on Route 41, “Chapman Highway”. It operates on weekdays and weekends; this route map is also included in Appendix C. Other transit services in the area include the East Tennessee Human Resource Agency (ETHRA) and the Community Action Committee (CAC), which provides transportation services when requested.

## PROJECT DESCRIPTION

### ▪ LOCATION AND SITE PLAN:

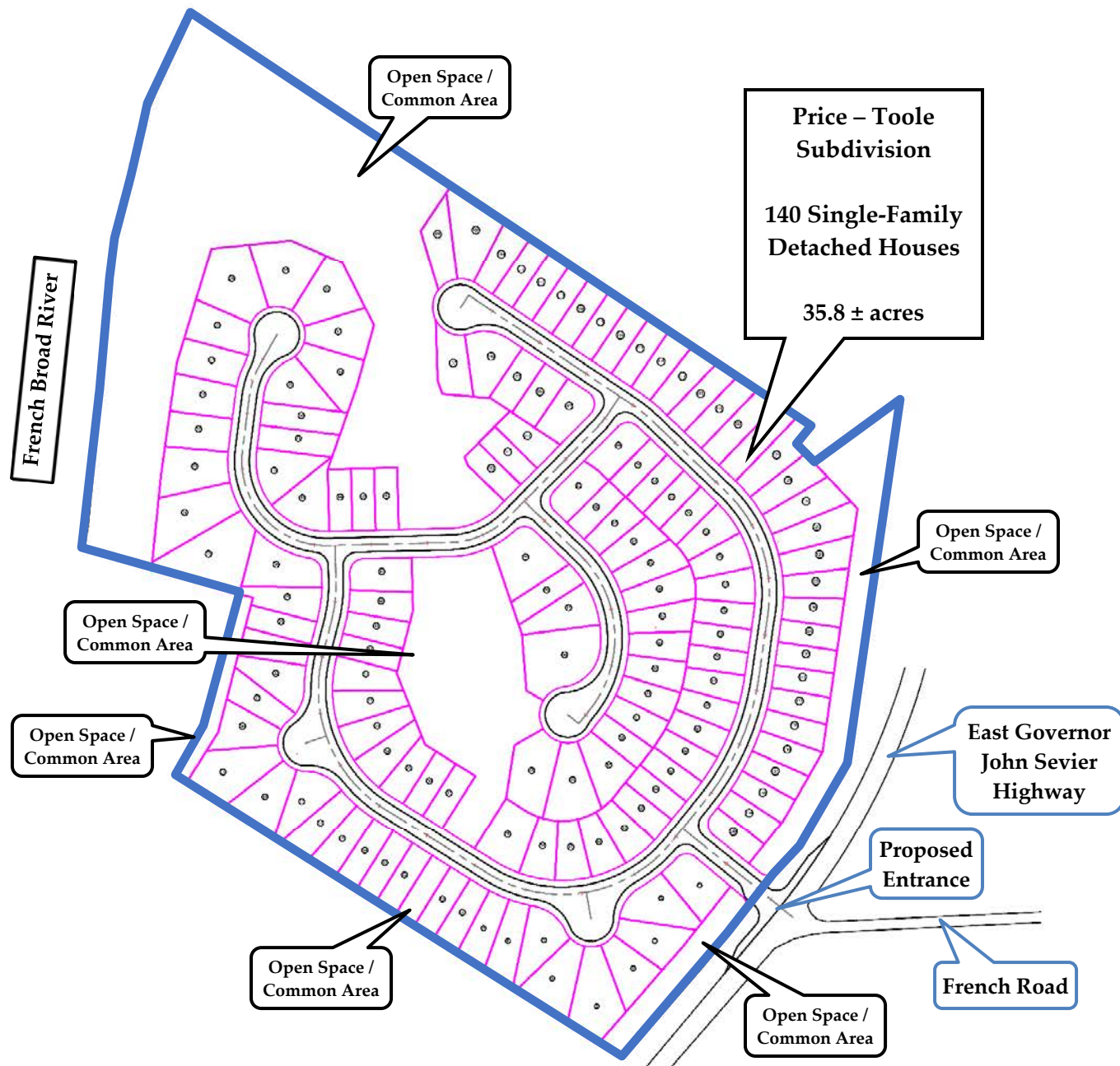
The proposed plan layout with 140 single-family detached houses on 35.8 +/- acres is designed by Rackley Engineering and is shown in Figure 3. The development property will be a re-subdivision of two parcels located within Knox County. As shown in the figure, four new streets will be constructed for the residential development. The total length of the new streets will be 4,139 feet (0.78 miles). 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. All the internal roadways will end in cul-de-sacs except for the entrance road at East Governor John Sevier Highway.

The subdivision will have one entrance on East 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.

The 35.8-acre residential development will incorporate six large common areas, with a sizable majority in the center of the property and along the French Broad River. Two common areas will be provided at the front of the development site and along East Governor John Sevier Highway. A total of 10.85 acres of the property will be designated as common areas. These common areas will entail a third of the entire development site acreage. The minimum size of the single-family detached house lots will be a tenth of an acre, with a few lots nearly a third of an acre in size. Each house will have a garage and driveway. Sidewalks are not proposed for this development.

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





**Figure 3**  
**Proposed Plan Layout**  
**Price - Toole Subdivision**

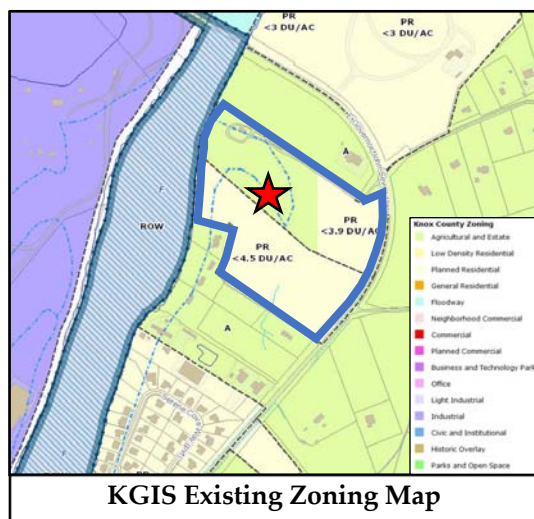
Not to Scale



■ **PROPOSED USES AND ZONING REQUIREMENTS:**

The two parcels comprising the Price-Toole Subdivision development property were zoned as Agricultural (A) within Knox County, TN. The development property was recently requested and approved to be rezoned to the Planned Residential (PR) zone. The southern parcel, the Price property, was approved with a density of up to 4.5 units per acre. The northern parcel, the Toole property, was approved with a density of up to 3.9 units per acre. The Planned Residential (PR) zone 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.
- East 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).



▪ **DEVELOPMENT DENSITY:**

The Price-Toole Subdivision development's proposed density is based on a maximum of 140 single-family residential houses on 35.8 acres. One hundred forty houses on 35.8 acres compute to 3.9 dwelling units per acre, equal to the maximum approved for the Toole property rezoning to Planned Residential (PR).

▪ **ON-SITE CIRCULATION:**

The total length of the four new streets within the development will be 4,139 feet (0.78 miles), designed and constructed to the Knox County, TN specifications. The development will have asphalt paved internal roadways and 8" 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 figure 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 right-turn lane is shown with a storage length of 40 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. None of these vehicle types will impact roadway operations other than when they occasionally enter and exit the development. It is expected that curbside private garbage collection services will be available for this residential subdivision.

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, truck 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

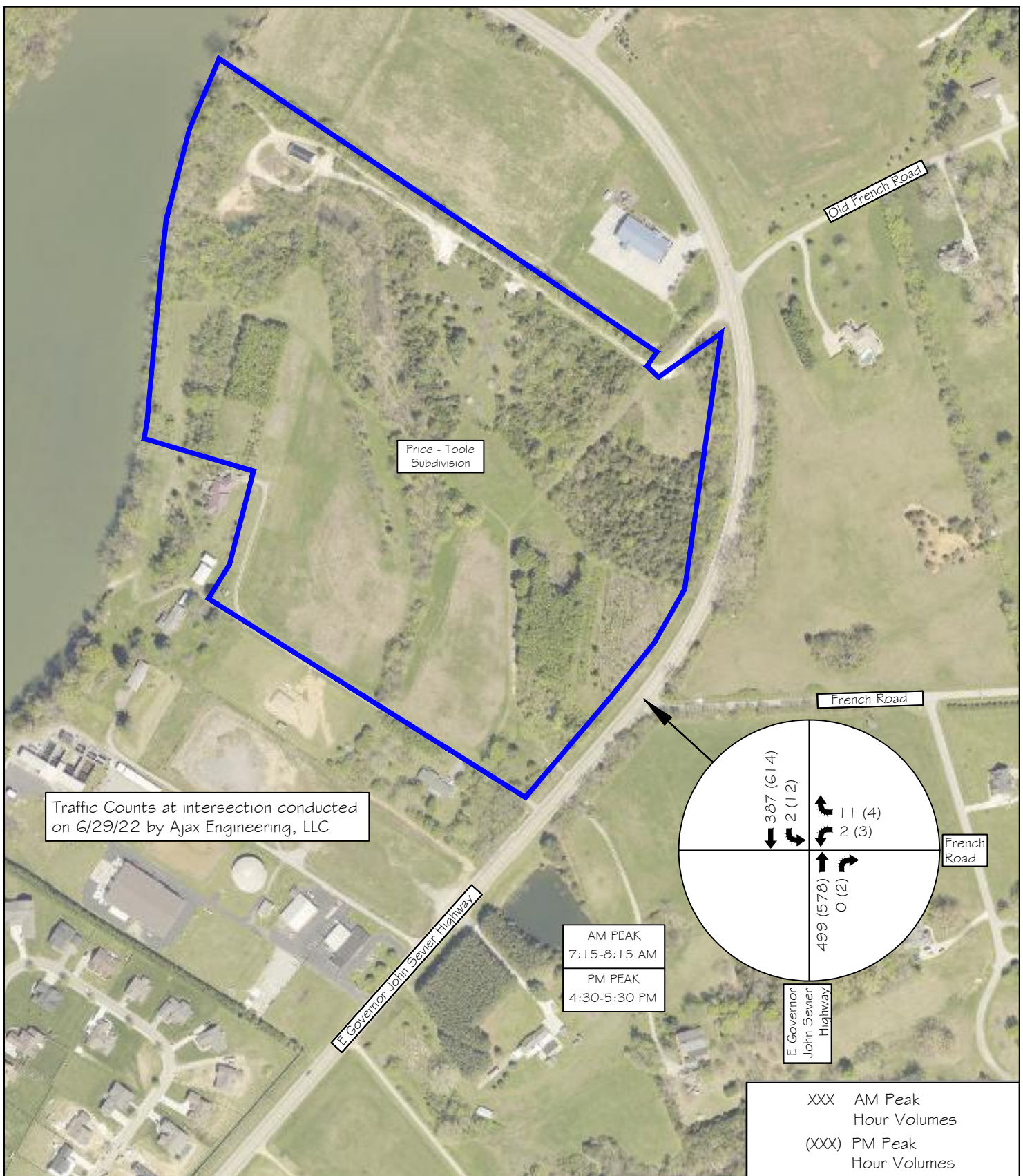
### ▪ EXISTING TRAFFIC CONDITIONS:

This study conducted a 6-hour traffic count at the unsignalized t-intersection of East Governor John Sevier Highway at French Road on Wednesday, June 29<sup>th</sup>, 2022. 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 not in session when the traffic counts were conducted. The manual tabulated traffic counts can be reviewed in Figure 4a and Appendix E.

Since the traffic counts were collected while schools were out for summer break, assumed factors were applied to the tabulated volumes to account for the missing school traffic. A factor of 15% was applied to the tabulated AM peak hour volumes, and 5% was applied to the PM peak hour volumes, and these adjusted volumes are shown in Figure 4b. These adjusted volumes were used for all the subsequent analyses in the study. The assumed factors were chosen based on a comparison with the annual TDOT traffic count station data from February 1<sup>st</sup>, 2021, referenced earlier in the report. The hourly counts from the TDOT annual count are also included in Appendix E. Applying these assumed factors to the AM and PM peak hour volumes tabulated for this study closely matched the TDOT peak hour volumes in February 2021. Typically, the AM peak hour includes both school traffic and traditional morning rush hour/work traffic since both trip types occur within the same timeframe in the morning. This phenomenon is particularly true for road locations closer to schools. In the afternoon, schools are dismissed earlier than traditional afternoon rush hour/work traffic and do not coincide at the same time. Typically, the highest PM peak hour occurs later in the day and does not include much school-related traffic. Thus, this study's tabulated PM peak hour traffic required less adjustment to account for the missing school traffic versus the counts collected in the AM peak hour. The manual tabulated traffic count observations are listed in the following:

- 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 several semi-tractor-trailers and other larger vehicles.
- One motorist heading southbound on East Governor John Sevier Highway was observed passing a tractor-trailer at French Road by traveling in the center TWLTL.





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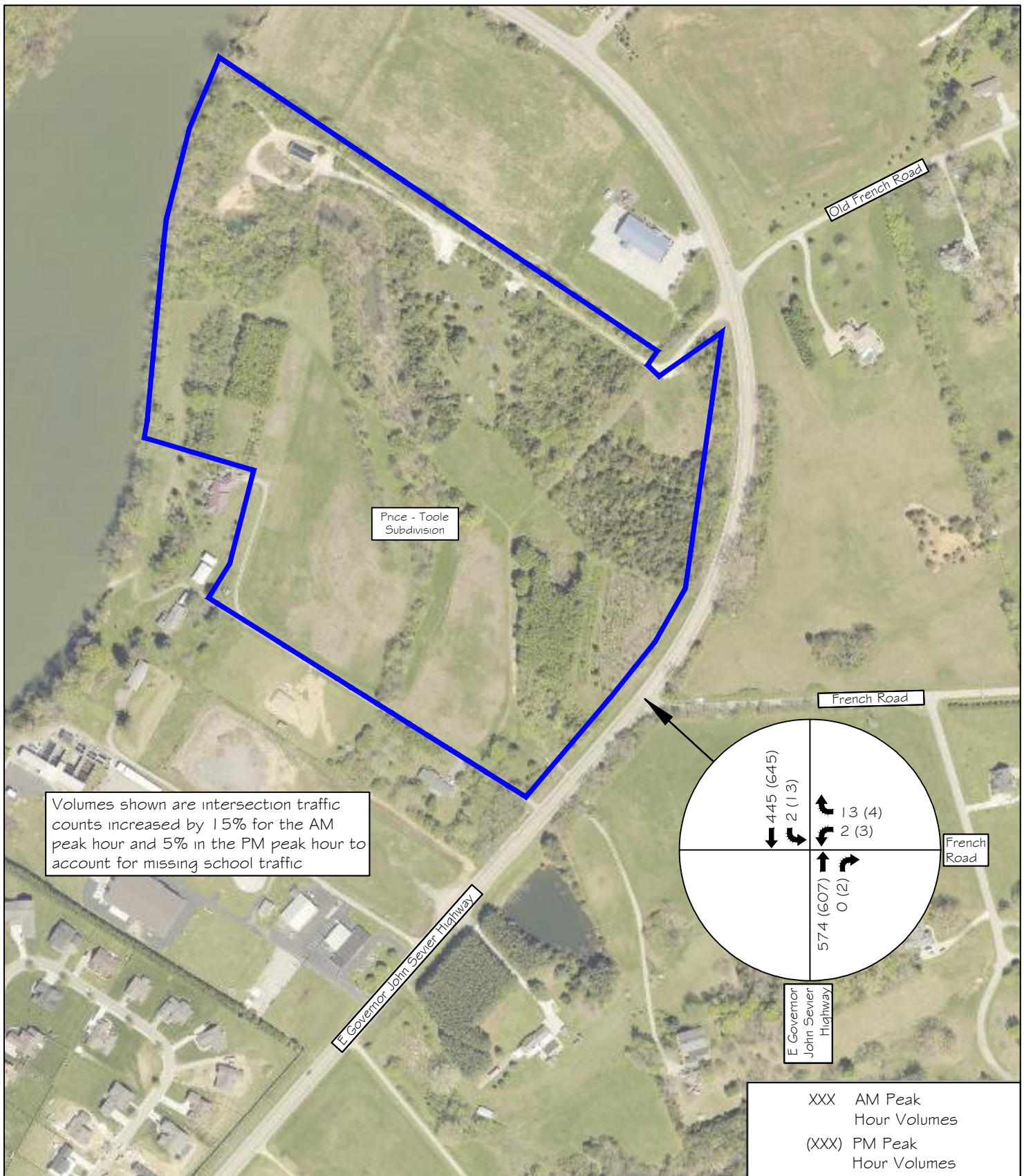


FIGURE 4a

Price - Toole Subdivision

2022 Peak Hour Traffic Volumes -  
EXISTING TRAFFIC CONDITIONS  
(Unadjusted Volumes)





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FIGURE 4b

Price - Toole Subdivision

2022 Peak Hour Traffic Volumes -  
 EXISTING TRAFFIC CONDITIONS  
 (Adjusted Volumes)

Capacity analyses were undertaken to determine the Level of Service (LOS) for the adjusted existing 2022 traffic volumes shown in Figure 4b 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, and this delay would represent 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 that includes 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.

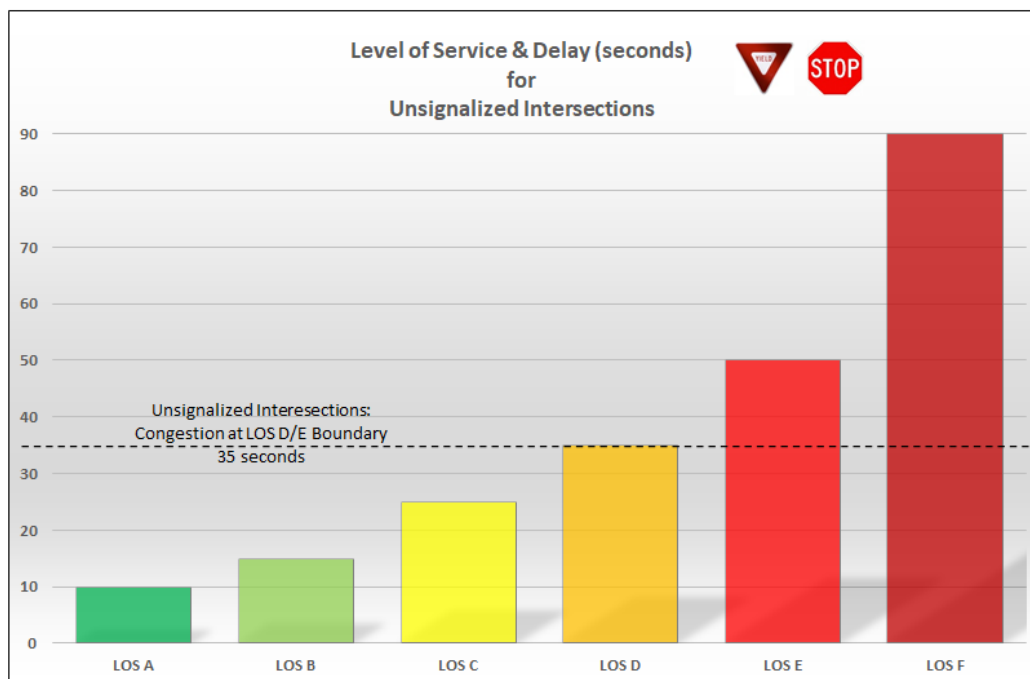
**TABLE 2**

**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 2022 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 2022 peak hour capacity analyses.

As shown in Table 3, all the existing 2022 movements are calculated to be operating with good LOS and low vehicle delays in the AM and PM peak hours.

**TABLE 3**  
**2022 INTERSECTION CAPACITY ANALYSIS RESULTS -**  
**EXISTING TRAFFIC CONDITIONS (ADJUSTED FOR SCHOOL TRAFFIC)**

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
East Governor John Sevier Highway (SB & NB) at French Road (WB)	 Unsignalized	Westbound Left/Right	B	13.4	0.061	B	13.7	0.046
		Southbound Left	A	9.1	0.005	A	8.9	0.018

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

<sup>a</sup> Level of Service

<sup>b</sup> Average Delay (sec/vehicle)

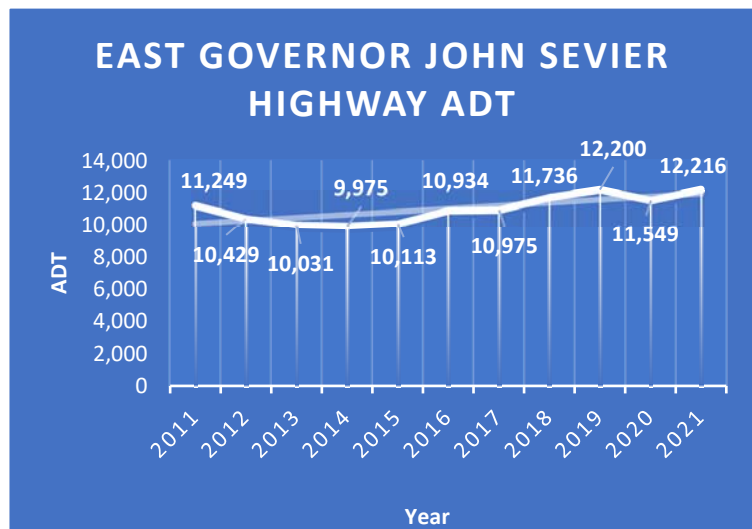
<sup>c</sup> Volume-to-Capacity Ratio



▪ **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 for this proposed development is assumed to occur by 2028.

Vehicular traffic on East Governor John Sevier Highway in the study area has shown lower annual growth over the past ten years (0.8%), according to the TDOT traffic count station and as shown in Appendix A. For this study, a higher annual growth rate of 1.0% was used to calculate future growth on the studied roadways up to 2028 to account for potential traffic growth in the study area and provide a conservative analysis.



A growth rate of 1% was applied to the school-adjusted intersection approach volumes obtained from the traffic count to calculate the future intersection volumes in 2028 without the projected development traffic. Capacity analyses were undertaken to determine the projected LOS in 2028 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 to the existing 2022 results shown in Table 3. Figure 5 shows the projected 2028 traffic volumes without the project at the intersection during the AM and PM peak hours.

**TABLE 4**  
**2028 INTERSECTION CAPACITY ANALYSIS RESULTS -**  
**PROJECTED TRAFFIC CONDITIONS (WITHOUT THE PROJECT)**

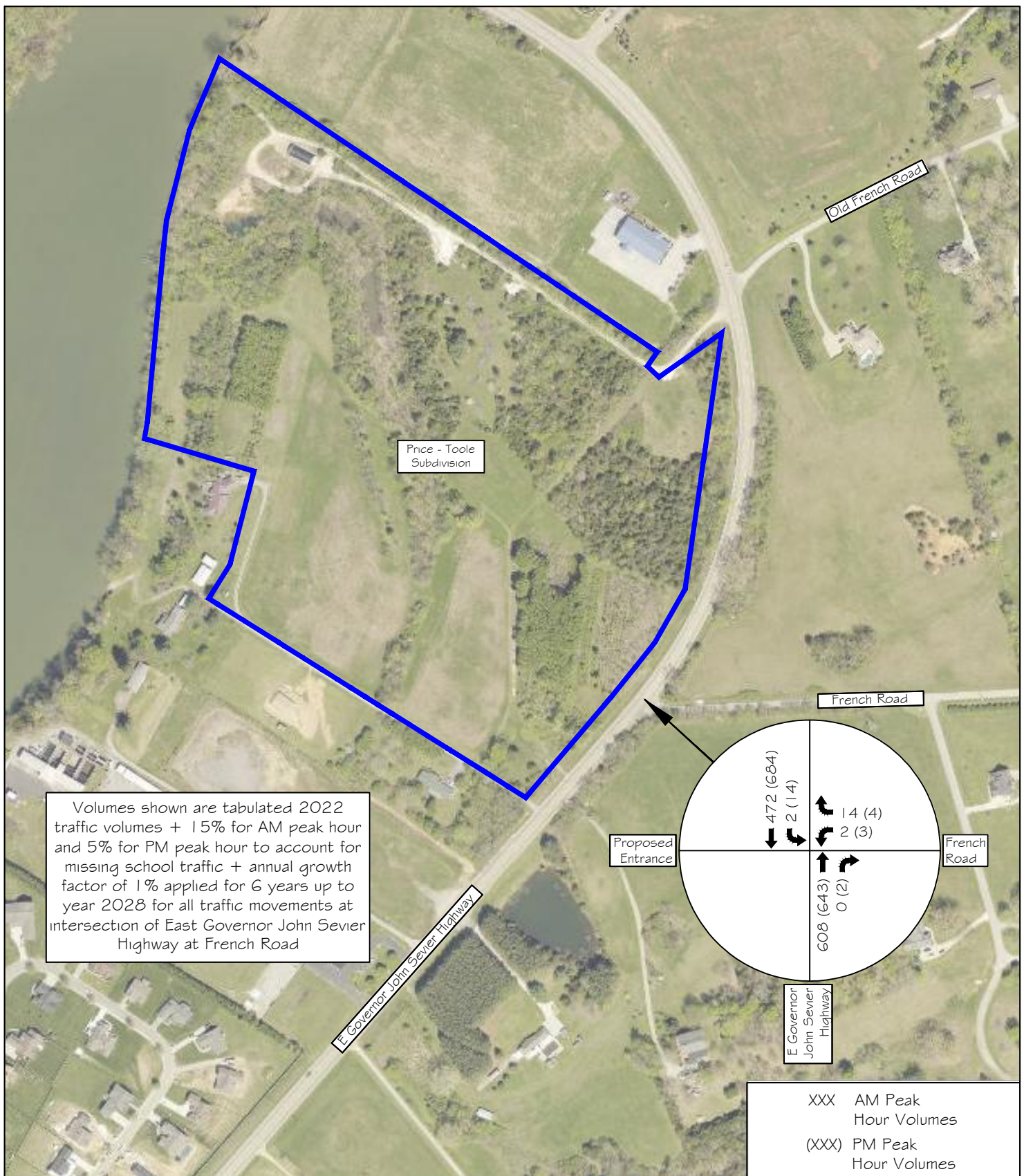
INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
East Governor John Sevier Highway (SB & NB) at French Road (WB)		Westbound Left/Right	B	13.9	0.068	B	14.2	0.048
		Southbound Left	A	9.2	0.005	A	9.0	0.021

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

<sup>a</sup> Level of Service

<sup>b</sup> Average Delay (sec/vehicle)

<sup>c</sup> Volume-to-Capacity Ratio



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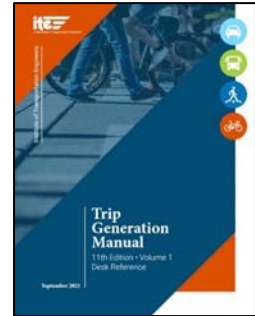
FIGURE 5

Price - Toole Subdivision

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

▪ **TRIP GENERATION:**

A generated trip is a single or one-direction vehicle movement entering or exiting the study site. The estimated amount of traffic that the 140 single-family detached houses will generate was calculated based on rates and equations provided by the Trip Generation Manual, 11th Edition, a publication of the Institute of Transportation Engineers (ITE). The Trip Generation Manual is the traditional and most popular resource for determining trip generation rates when transportation impact studies are produced. The data and calculations from ITE for the proposed land use are shown in Appendix F. A summary of this information is presented in the following table:



**TABLE 5**  
**TRIP GENERATION FOR PRICE-TOOLE SUBDIVISION**  
**140 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	140 Houses	1,376	26%	74%		63%	37%	
				26	75	101	86	50	136
Total New Volume Site Trips			1,376	26	75	101	86	50	136

ITE Trip Generation Manual, 11th Edition

Trips calculated by using Fitted Curve Equation

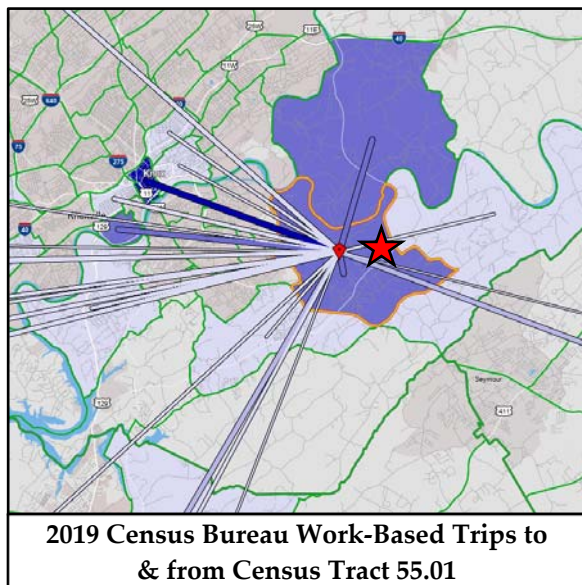
For the proposed residential development, with 140 single-family detached houses, it is estimated that 26 vehicles will enter and 75 will exit, for a total of 101 generated trips during the AM peak hour in the year 2028. Similarly, it is estimated that 86 vehicles will enter and 50 will exit, for a total of 136 generated trips during the PM peak hour in the year 2028. The calculated trips generated for an average weekday are estimated to be 1,376 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 Price-Toole Subdivision development are based on several sources and engineering judgment. The first source is based on the existing traffic count volumes and the observed travel directions collected at the East Governor John Sevier Highway intersection at French Road adjacent to the proposed development site.

During the traffic count, the observed direction of thru travel on East 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 closer to 50% / 50% northbound and southbound.



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 2019 (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, and Alcoa and Maryville.

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.

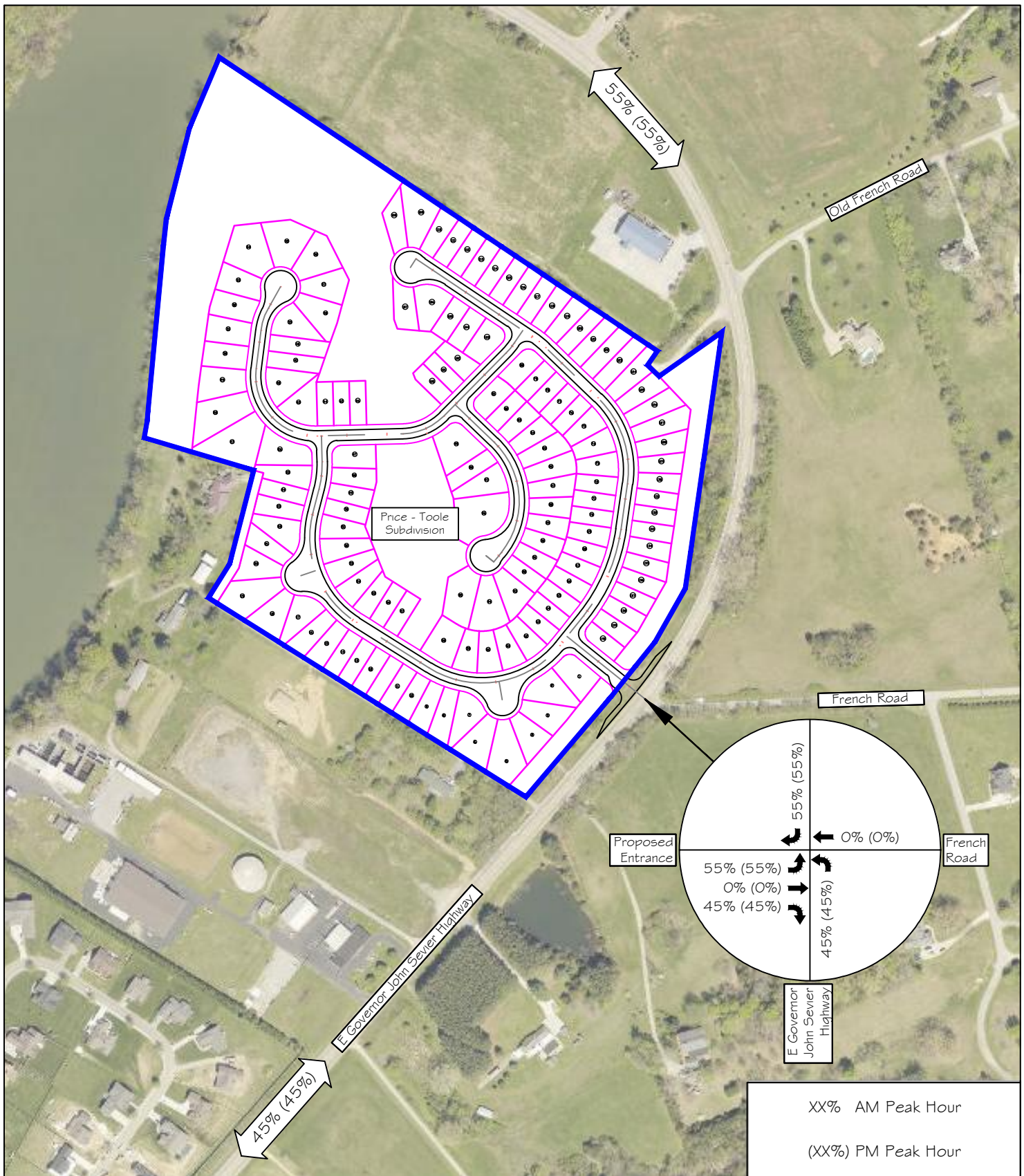
New Hopewell Elementary is 2.1 miles away by roadway to the south of the development site via East Governor John Sevier Highway. South Doyle Middle is 8.6 miles away by roadway to the

west, closer to downtown Knoxville. The shortest and quickest route to this school will be via East 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.

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

Figure 6 shows the projected distribution of traffic entering and exiting the 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. Ultimately, it was assumed that 55% of the generated trips would be to and from the north and 45% to and from the south in the AM and PM peak hours.

Figure 7 shows the traffic assignment of the computed trips generated by the development (Table 5) and is based on the assumed distribution of trips shown in Figure 6.



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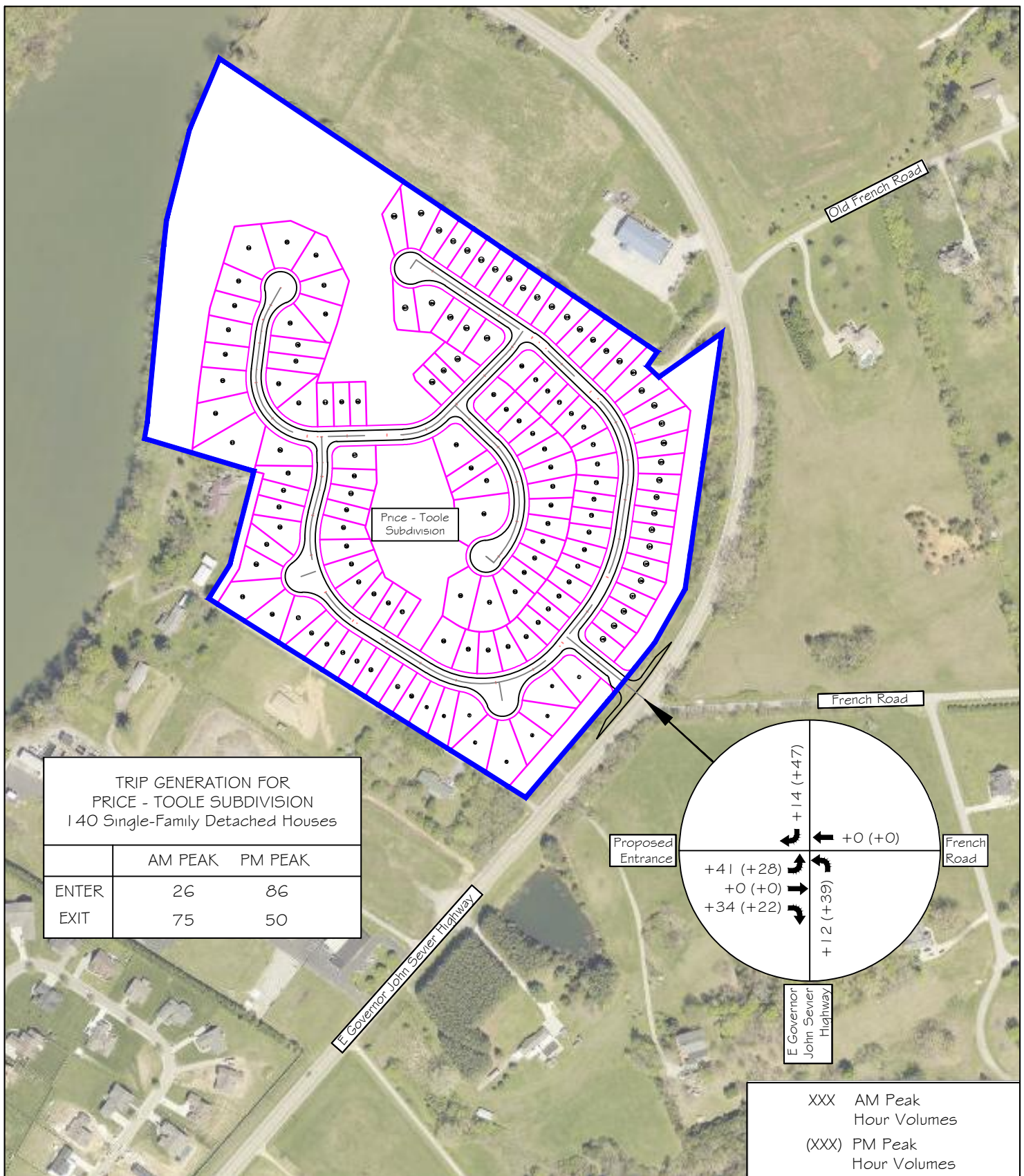


FIGURE 6

Price - Toole Subdivision

Directional Distribution of Generated  
Traffic during AM and PM Peak Hour





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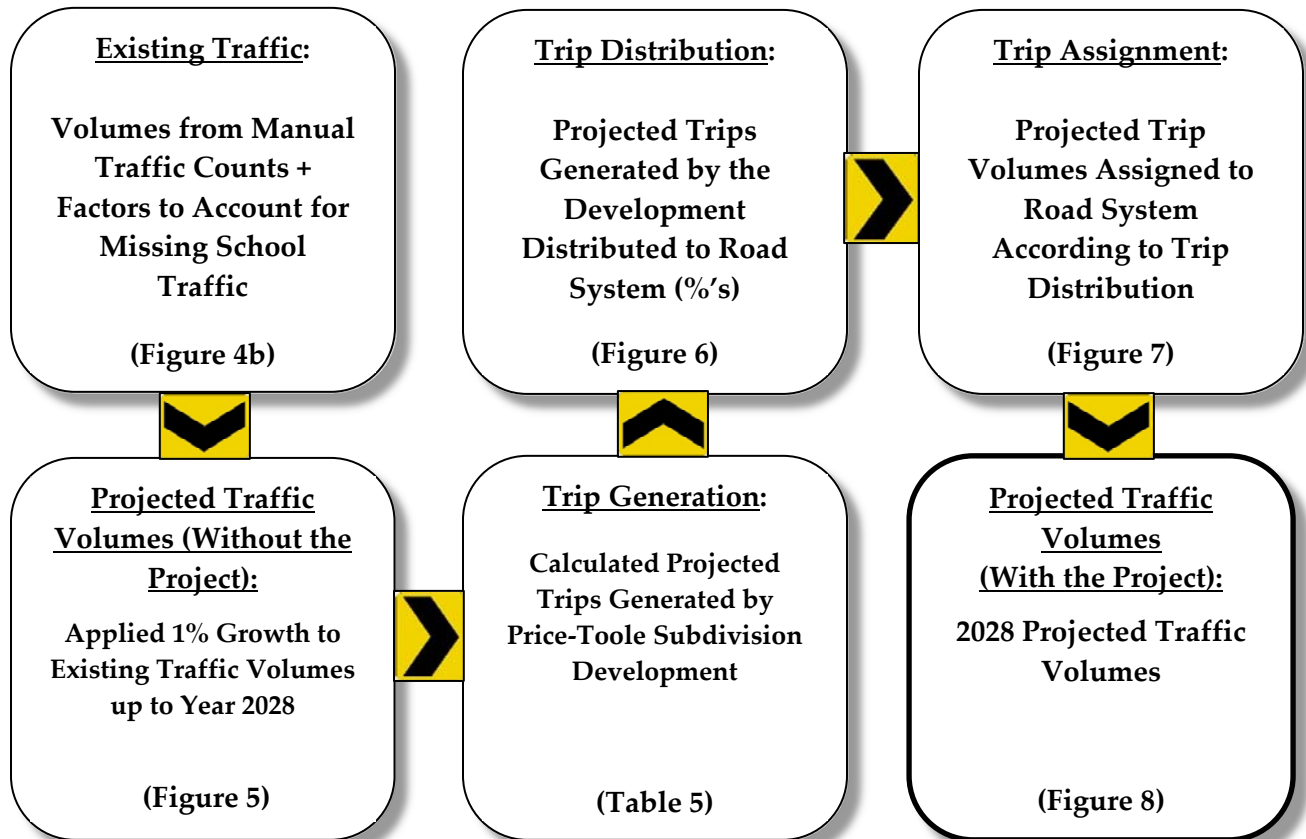
FIGURE 7

Price - Toole Subdivision

Traffic Assignment of Generated Traffic  
during AM and PM Peak Hour

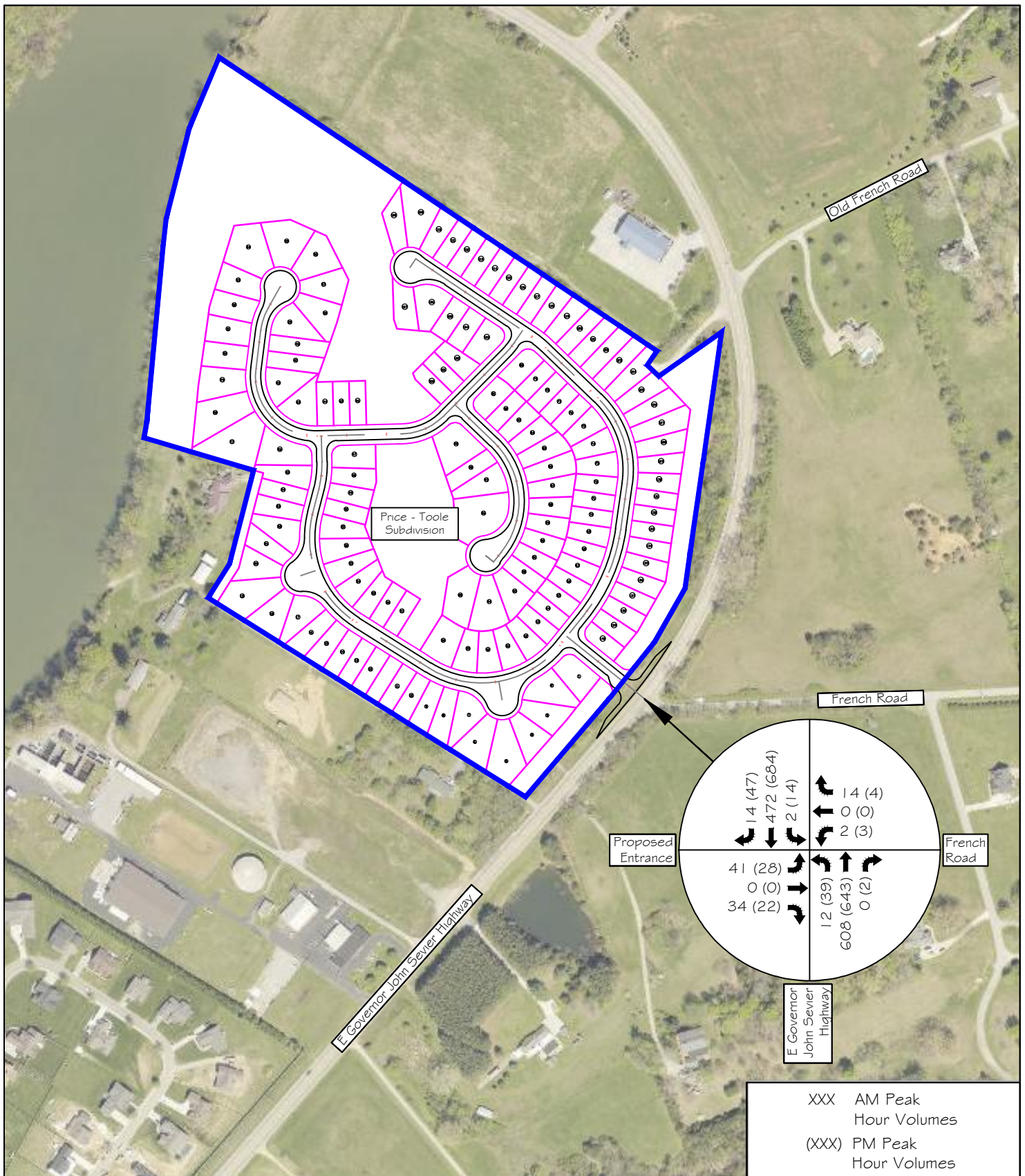
▪ **PROJECTED TRAFFIC CONDITIONS (WITH THE PROJECT):**

Overall, several additive steps were taken to estimate the total projected traffic volumes at the studied intersection when the Price-Toole Subdivision development is constructed and occupied in 2028. The steps are illustrated below for clarity and review:



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





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FIGURE 8

Price - Toole Subdivision

2028 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 2028. The results indicated minimal degradation between the existing and projected conditions with the project in 2028 for the existing approaches at the intersection. The Proposed Entrance exiting left/thru lane is projected to operate at LOS C and D in the 2028 AM and PM peak hours, respectively. The Proposed Entrance exiting right-turn lane is projected to operate at LOS B in both the AM and PM peak hours in 2028. The intersection's projected 2028 peak hour capacity resulted in very reasonable LOS and vehicle delays. These results can be seen in Table 6, and Appendix F includes the worksheets for these capacity analyses.

**TABLE 6**  
**2028 INTERSECTION CAPACITY ANALYSIS RESULTS -**  
**PROJECTED TRAFFIC CONDITIONS (WITH THE PROJECT)**

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
East Governor John Sevier Highway (SB & NB) at French Road (WB) and Proposed Entrance (EB)	 Unsignalized	Northbound Left	A	8.4	0.012	A	9.6	0.052
		Eastbound Left	C	22.7	0.183	D	26.9	0.160
		Eastbound Right	B	11.6	0.065	B	14.6	0.061
		Westbound Left/Thru/Right	B	14.3	0.071	C	16.3	0.059
		Southbound Left	A	9.2	0.005	A	9.0	0.021

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

<sup>a</sup> Level of Service

<sup>b</sup> Average Delay (sec/vehicle)

<sup>c</sup> Volume-to-Capacity Ratio

A summary of the East Governor John Sevier Highway at French Road intersection capacity analysis results are presented in Table 7. This table provides a side-by-side summary and comparison of the intersection for the 2022 existing conditions, projected conditions in the year 2028 without the project, and the projected conditions in the year 2028 with the project. The Proposed Entrance approach is not shown in the table since it only exists in the projected conditions.

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



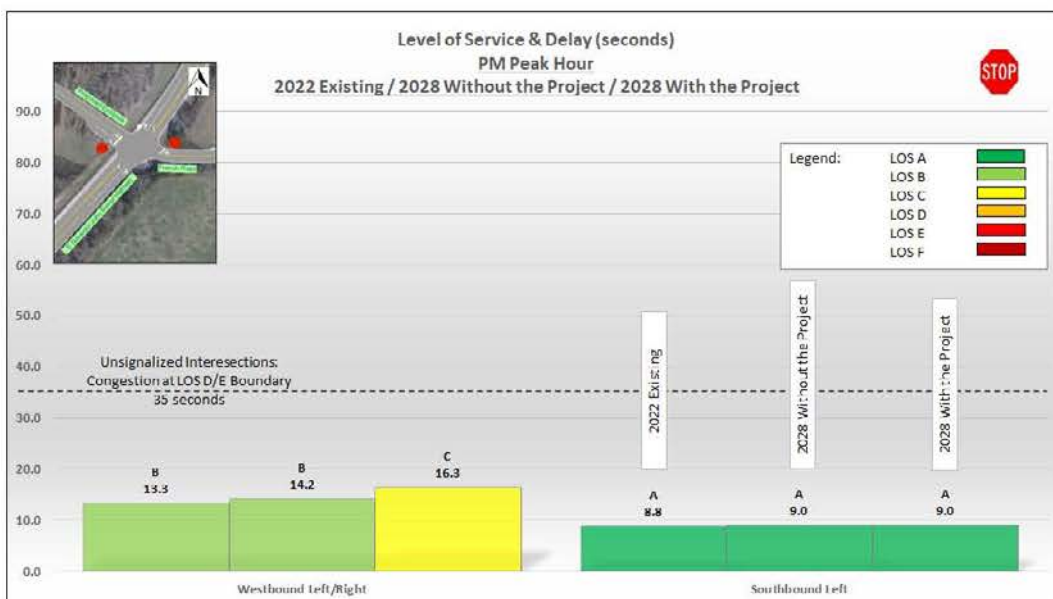
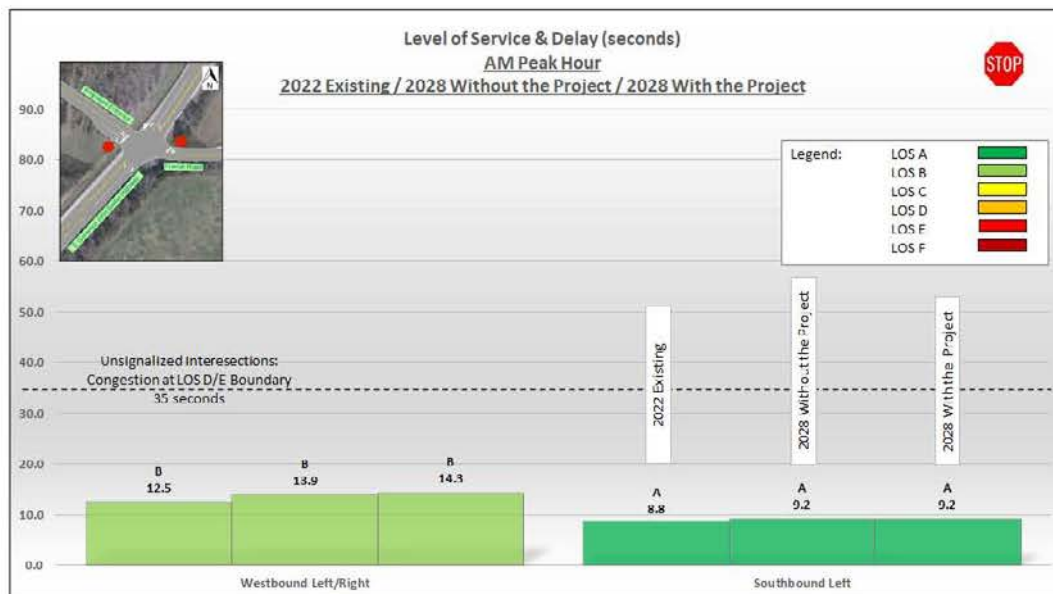
LOCATION / PEAK HOUR MOVEMENT	2022 EXISTING			2028 WITHOUT THE PROJECT			2028 WITH THE PROJECT		
	LOS <sup>a</sup>	Delay <sup>b</sup>	v/c <sup>c</sup>	LOS <sup>a</sup>	Delay <sup>b</sup>	v/c <sup>c</sup>	LOS <sup>a</sup>	Delay <sup>b</sup>	v/c <sup>c</sup>
<b>AM Peak</b>									
Westbound Left/Right	B	12.5	0.047	B	13.9	0.068	B	14.3	0.071
Southbound Left	A	8.8	0.004	A	9.2	0.005	A	9.2	0.005
<b>PM Peak</b>									
Westbound Left/Right	B	13.3	0.044	B	14.2	0.048	C	16.3	0.059
Southbound Left	A	8.8	0.017	A	9.0	0.021	A	9.0	0.021

Note: Analysis calculated in Synchro 11 software and reported with HCM 2010 methodology

<sup>a</sup> Level of Service

<sup>b</sup> Average Delay (sec/vehicle)

<sup>c</sup> 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 adjacent transportation system features are discussed in the following pages.

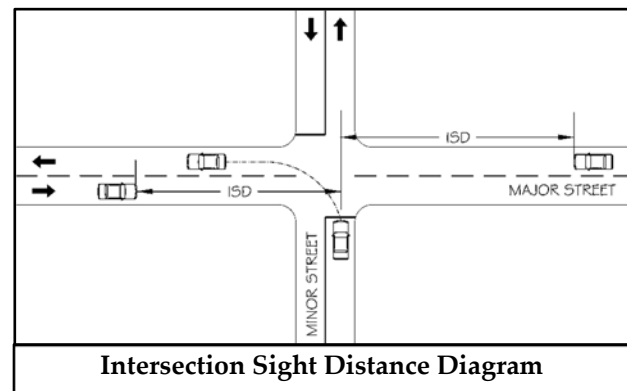
➤ **EVALUATION OF SIGHT DISTANCE**

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 considered the desirable visibility distance standard for evaluating the safety of an intersection. ISD is based on the time required to perceive, react, and complete the desired traffic maneuver once a motorist on a minor street decides to perform a traffic maneuver. Three traffic maneuvers are available for



vehicles stopped on a minor street at a 4-way intersection: (1) 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.

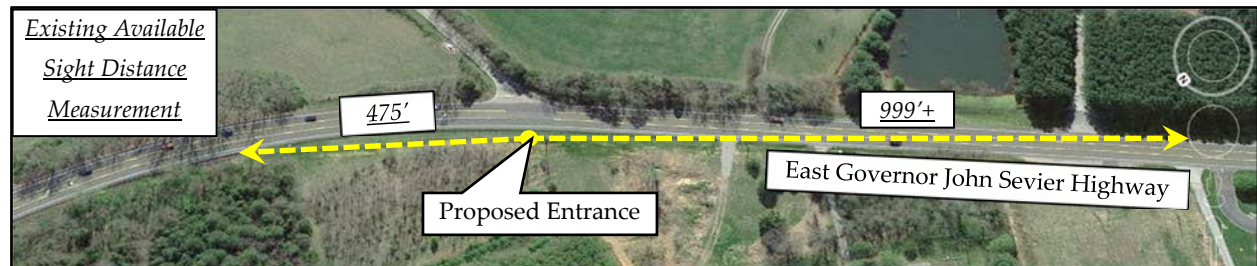


With a posted speed limit of 45-mph on East Governor John Sevier Highway at the Proposed Entrance, the ISD is 565 feet calculated based on AASHTO's (American Association of State Highway Transportation Officials) guidance.

East 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 East Governor John Sevier Highway and the existing road grades, the SSD is calculated to be 435 feet to the north and 420 feet to the south.

Visual observations of the sight distances at the Proposed Entrance location on East Governor John Sevier Highway were undertaken. Using a Nikon Laser Rangefinder at the Proposed Entrance location at French Road, the ISD 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, SSD, and the rangefinder measured sight distances.



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



View of Sight Distance on East 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 into the development in the projected 2028 conditions was conducted for the Proposed Entrance on East Governor John Sevier Highway. The evaluation did not include left-turn 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 Knox County's "Access Control and Driveway Design Policy" and TDOT's "Highway System Access Manual". These design policies relate vehicle volume thresholds based on prevailing speeds for two-lane and four-lane roadways. The projected volumes were evaluated based on speeds of 46 – 55 mph to account for slightly higher vehicle speeds due to the proximity to the 50-mph speed zone just south of the development on East Governor John Sevier Highway.

According to Knox County's and TDOT's guidelines, a separate southbound right-turn lane on East Governor John Sevier Highway is warranted at the Proposed Entrance based on the projected 2028 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 2028 projected 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 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 2028 projected conditions are shown in Table 8. The vehicle queue worksheet results from the SimTraffic software are in Appendix J.

**TABLE 8**  
**TURN LANE STORAGE & VEHICLE QUEUE SUMMARY -**  
**2028 PROJECTED PEAK HOUR TRAFFIC (WITH THE PROJECT)**

INTERSECTION	APPROACH/ MOVEMENT	STORAGE LENGTH (ft)	ADEQUATE LENGTH?	SIMTRAFFIC 95 <sup>th</sup> 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	n/a	n/a	57	63
	Eastbound Right	40	No	55	52
	Westbound Left/Thru/Right	n/a	n/a	32	24
	Northbound Left	TWLTL	n/a	20	38
	Southbound Left	110 *	Yes	6	19

Note: 95<sup>th</sup> 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 turn lane storage lengths will be adequate in the projected 2028 conditions. Based on the calculations, the proposed eastbound right-turn lane at the Proposed Entrance is the only turn lane without adequate storage capacity. The current site plan shows a vehicle storage length of 40 feet; however, the largest queue is estimated to be 55 feet in the projected 2028 AM peak hour and 52 feet in the 2028 PM peak hour. The left/thru lane will have adequate storage since the exiting lane of the development towards East Governor John Sevier Highway will directly transition to this lane.

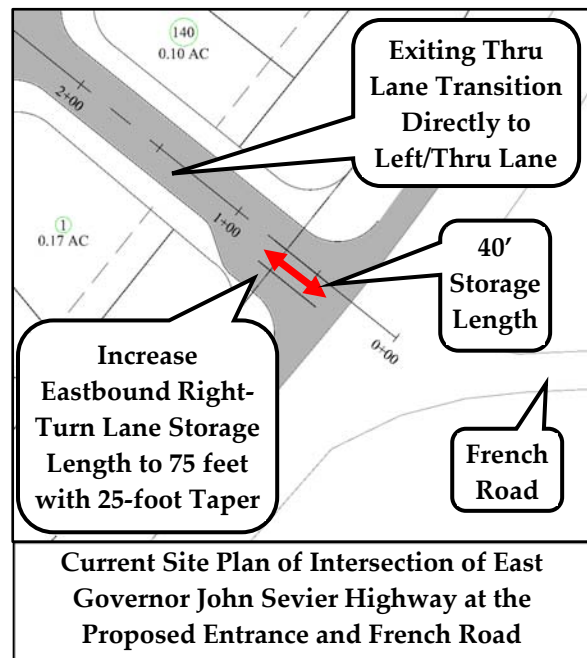
## CONCLUSIONS & RECOMMENDATIONS

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



**East Governor John Sevier Highway at French Road / Proposed Entrance:** The projected 2028 level of service calculations for the intersection of East Governor John Sevier Highway at French Road and the Proposed Entrance resulted in reasonable LOS and vehicle delays for this intersection with an additional constructed approach leg for the development.

- 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 right-turn lane with a storage length of 40 feet. Based on the calculations presented in the study, it is recommended that the eastbound right-turn lane have a minimum storage length of 75 feet and a taper length of 25 feet. The right-turn lane is recommended to be extended to 75 feet to reduce the possibility of the left/thru lane vehicle queue blocking access to the lane. While the longest calculated vehicle queue for the right-turn lane in 2028 is 55 feet, the longest vehicle queue for the left/thru lane is 63 feet. Providing a 75-foot storage lane with a 25-foot taper will allow right-turning motorists to enter the lane without being blocked by the left/thru lane vehicle queue. These exiting lanes should be marked on the pavement with the appropriate white lane arrows.

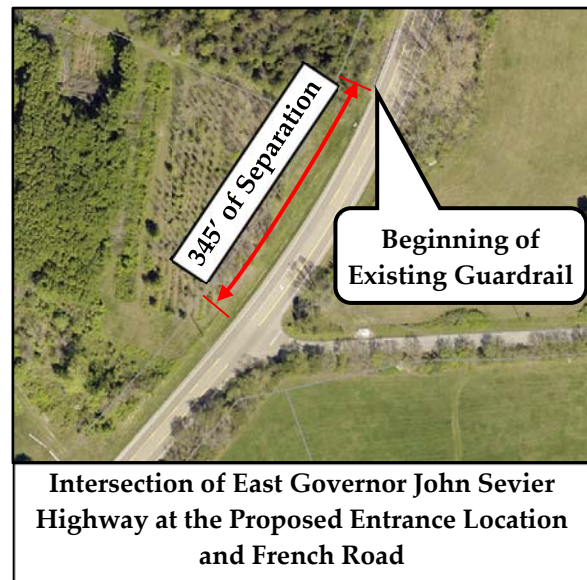


- 1b) For left-turn entering traffic, the existing center TWLTL on East Governor John Sevier Highway will provide the necessary vehicle storage and be adequate in the projected conditions. The longest northbound left-turn queue entering the development is projected to be 38 feet in 2028. It is recommended that the center TWLTL pavement



markings on East 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.

- 1c) Based on the projected 2028 volumes, a separate southbound right-turn lane on East Governor John Sevier Highway is warranted and recommended for vehicles entering the development at the Proposed Entrance. However, existing roadway features will constrain the length of the southbound right-turn lane on East Governor John Sevier Highway. The existing guardrail on the west side of East 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.

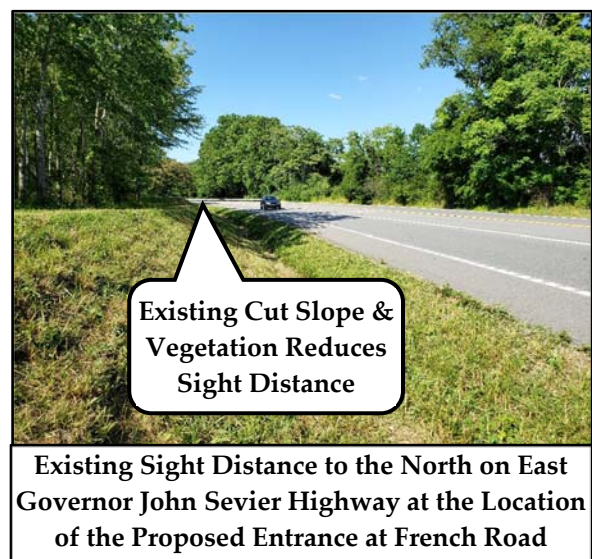


Typically, the length of a turn lane would be determined by calculating the stopping sight distance based on the observed operating speed. The stopping sight distance for this approach is calculated to be 435 feet for southbound vehicles to decelerate and stop from a posted speed limit of 45-mph. However, this recommended length is based on vehicles coming to a complete stop, and the right-turning vehicles coming off East 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 East 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 East Governor John Sevier Highway. The stop bar should be applied a minimum of 4 feet away from the edge of East 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 and stopping sight distances are accounted for and provided in the design plans. Based on a posted speed limit of 45-mph on East Governor John Sevier Highway, the desirable ISD is 565 feet looking in each direction at the entrance, and the required SSD is calculated to be 435 feet to the north and 420 feet to the south at the Proposed Entrance. A visual inspection determined that these sight distances are available to the south. The sight distance to the north appears to be adequate for the required stopping sight distance but does not appear to meet the desirable 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 East Governor John Sevier Highway.

Some sight distance to the north could be gained by reducing the existing cut slope and vegetation on the west side of East Governor John Sevier Highway to the north of the Proposed Entrance location. This 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 limited sight distance to the north, it is recommended that an advance intersection warning sign be installed on East 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 East 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 lane taper on East Governor John Sevier Highway.



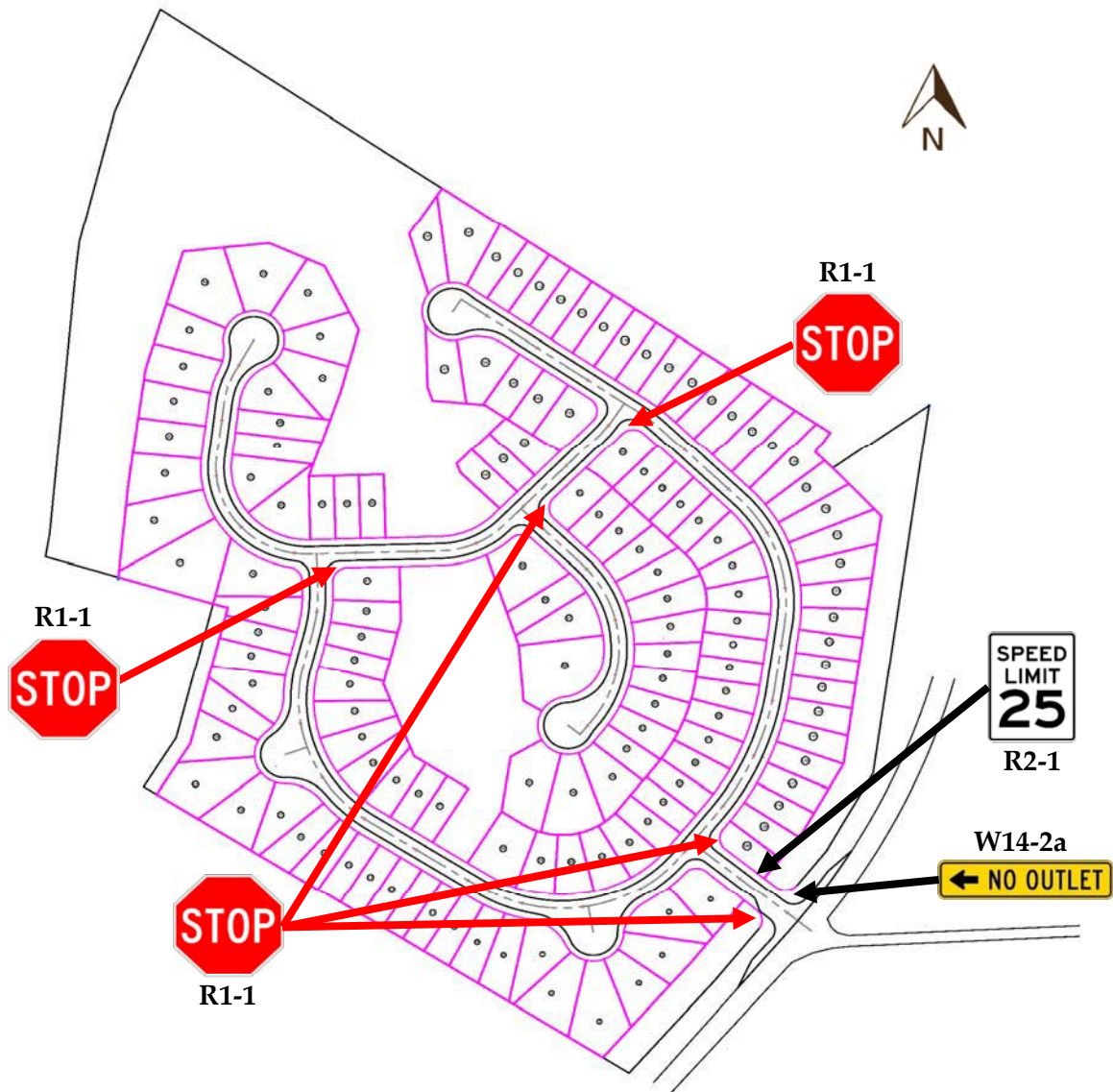
**Cross Road  
Intersection  
(W2-1)**

- 1g) Likewise, the existing advance intersection warning sign for northbound traffic on East 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 existing 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 East Governor John Sevier Highway, it is recommended that intersection street lighting be provided at this entrance. A streetlight at this intersection will allow motorists at night-time to recognize the entrance location on East Governor John Sevier Highway and correctly enter and exit the development.
- 1i) The construction of the Proposed Entrance on East 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. The current site plan shows a southbound acceleration lane at the Proposed Entrance for exiting vehicles. This lane is recommended to be eliminated from the site plan since the proposed length would provide minimal assistance for vehicle acceleration and is not expected to be particularly beneficial.



**Price-Toole Subdivision Internal Roads:** The layout plan shows one entrance on East 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 East 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.
- 2b) Stop Signs (R1-1) with 24” white stop bars and other traffic signage are recommended to be installed at the internal locations, as shown below:

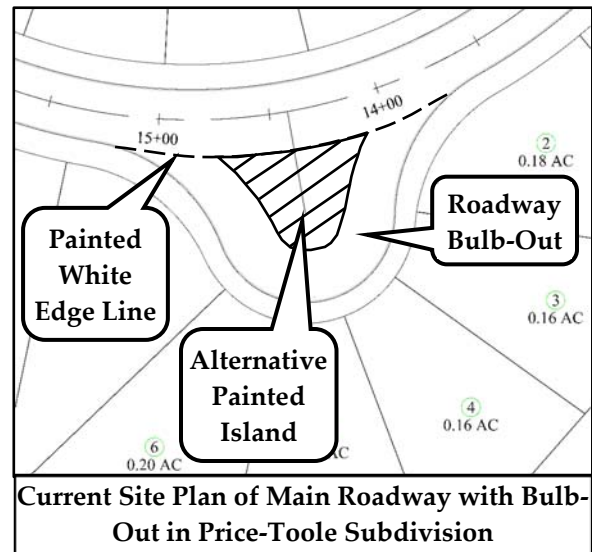


Internal Traffic Sign Locations



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 280 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 large 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. Other potential traffic controls that should be considered include a striped island or a raised delineated island.



**Current Site Plan of Main Roadway with Bulb-Out in Price-Toole Subdivision**

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 centralized mail delivery center with a parking area within the development. The site plan does not show a general location, and a specific plan with a parking area should be designed and provided if required by the USPS.

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 Considerations:** Other transportation-related considerations include the following:

- 3a) The northbound lane of East 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 East Governor John Sevier Highway. This sign would be appropriate to be installed just south of the bridge crossing the French Broad River, where the TWLTL begins. This sign is recommended to 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 East Governor John Sevier Highway for motorists traveling east on French Road.



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

## **APPENDIX A**

### **HISTORICAL TRAFFIC COUNT DATA**

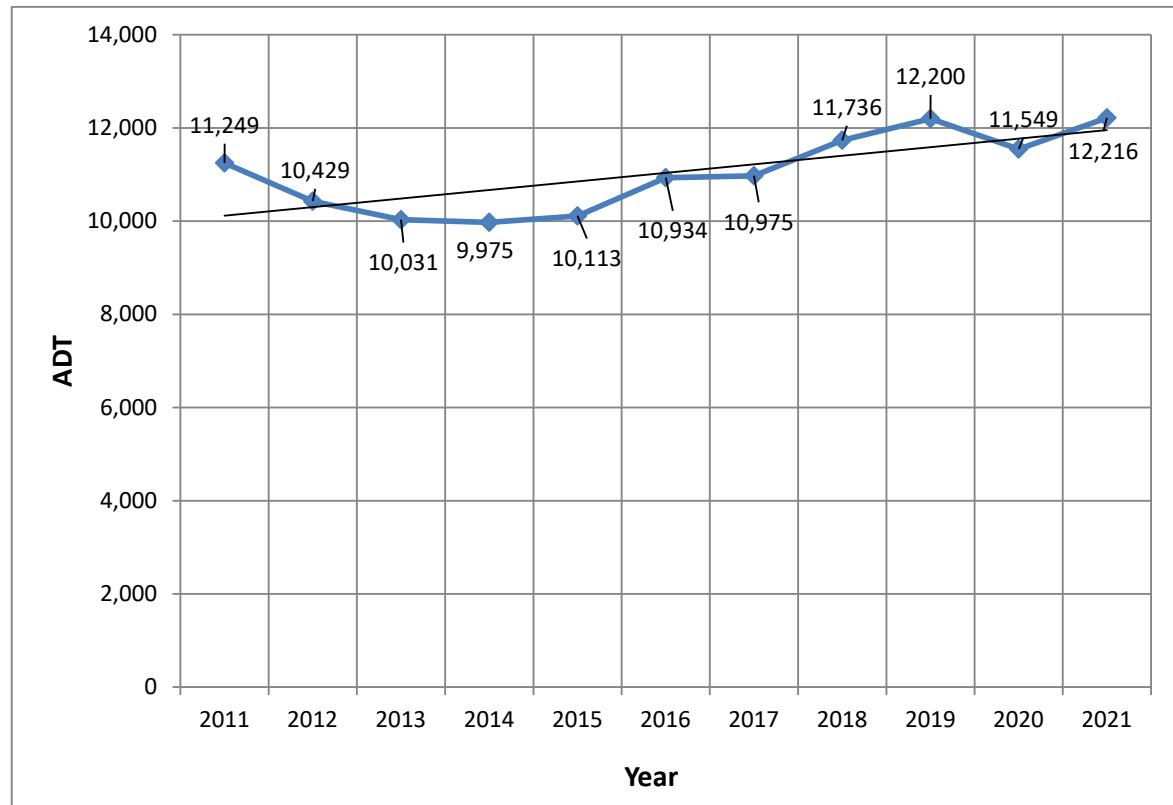
## Historical Traffic Counts

Organization: TDOT

Station ID #: 47000168

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

YEAR	AADT	
2011	11,249	Trendline ↓
2012	10,429	
2013	10,031	
2014	9,975	
2015	10,113	
2016	10,934	
2017	10,975	
2018	11,736	
2019	12,200	
2020	11,549	
2021	12,216	



2011 - 2021 Growth Rate = 8.6%

Average Annual Growth Rate = 0.8%



TN

TDOT

Department of Transportation

MS2

Transportation Data Management System

Home

TMC

TCLS

TTDS

RSMS

NMDS

WOTS

RTN

Login

Locate

Locate All

Email This

Auto Locate Off

List View

All DGRs

Record

257

of 660

Go to Record

go

Location ID	47000168	MPO ID	
Type	SPOT	HPMS ID	
On IIS		On HPMS	
LRS ID	47SR168001	LRS Loc Pt.	10.811
St Group	Urban	Route Type	
AF Group	10	Route	
GF Group	Knox	Active	Yes
Class Dist Grp	16	Category	CC
Seas Class Grp			
WIM Group			
QC Group	Default		
Functl Class	Minor Arterial	Milepost	
Located On	W. GOV. JOHN SEVER HWY.		
Loc On Alias	E. OF FRENCH BROAD RIVER		

More Detail

STATION DATA

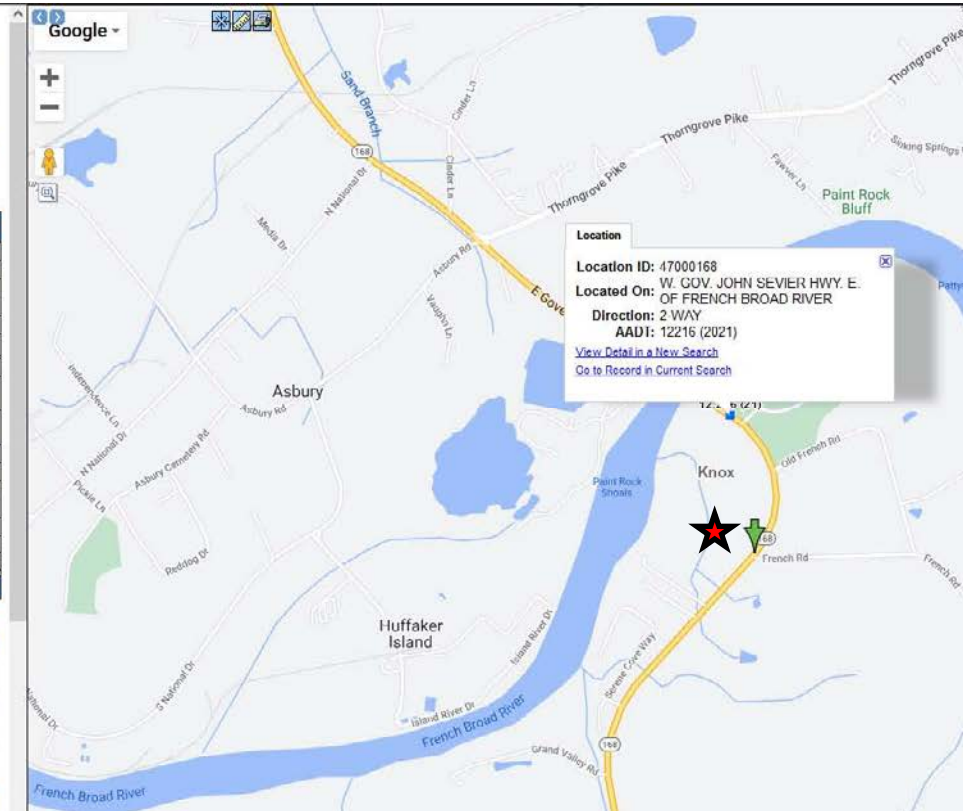
Directions: 2-WAY

AADT

Year	AADT	DHV 30	K %	D %	PA	BC	Src
2021	12,216	1,102	9	65	11,015 (97%)	401 (3%)	
2020	11,549	1,168	10	65	11,110 (96%)	430 (4%)	
2019	12,200		12	65			
2018	11,736		9	65			
2017	10,975 <sup>2</sup>						

<<< < > >>> 15 of 37

Travel Demand Model



## **APPENDIX B**

### **WALK SCORE**

# WALKSCORE

(from walkscore.com)

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

[Go](#)

## 2000 East Governor John Sevier Highway

Knoxville, Tennessee, 37920

Commute to **Downtown Knoxville** 

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

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

[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.

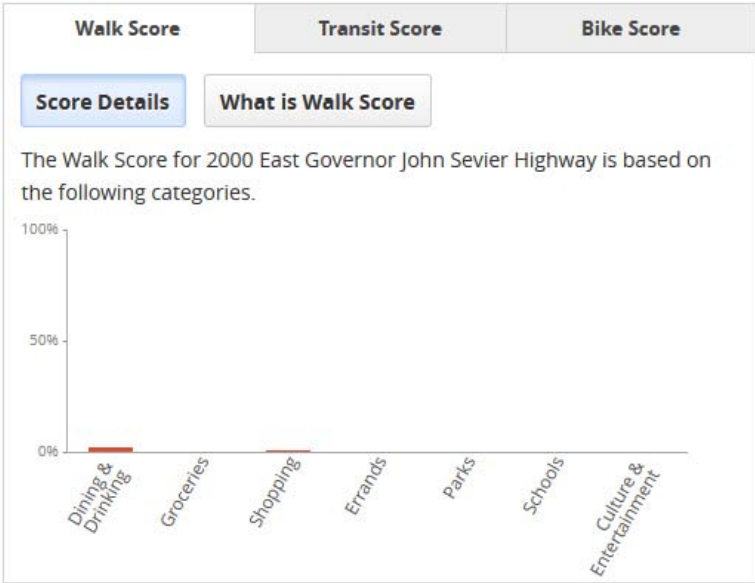
Bike Score

13

**Somewhat Bikeable**  
Minimal bike infrastructure.

[About your score](#)

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	<b>Rider's Paradise</b> World-class public transportation	
70-89	<b>Excellent Transit</b> Transit is convenient for most trips	
50-69	<b>Good Transit</b> Many nearby public transportation options	
25-49	<b>Some Transit</b> A few nearby public transportation options	
0-24	<b>Minimal Transit</b> It is possible to get on a bus	



## Scores for 2000 East Governor John Sevier Highway ✕

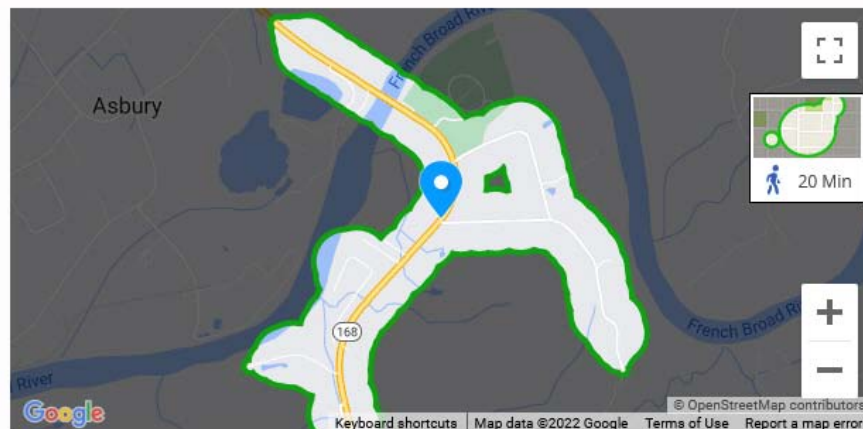


Walk Score	Transit Score	Bike Score
Bike Score measures whether an area is good for biking based on bike lanes and trails, hills, road connectivity, and destinations.		
90-100	<b>Biker's Paradise</b>	Daily errands can be accomplished on a bike
70-89	<b>Very Bikeable</b>	Biking is convenient for most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





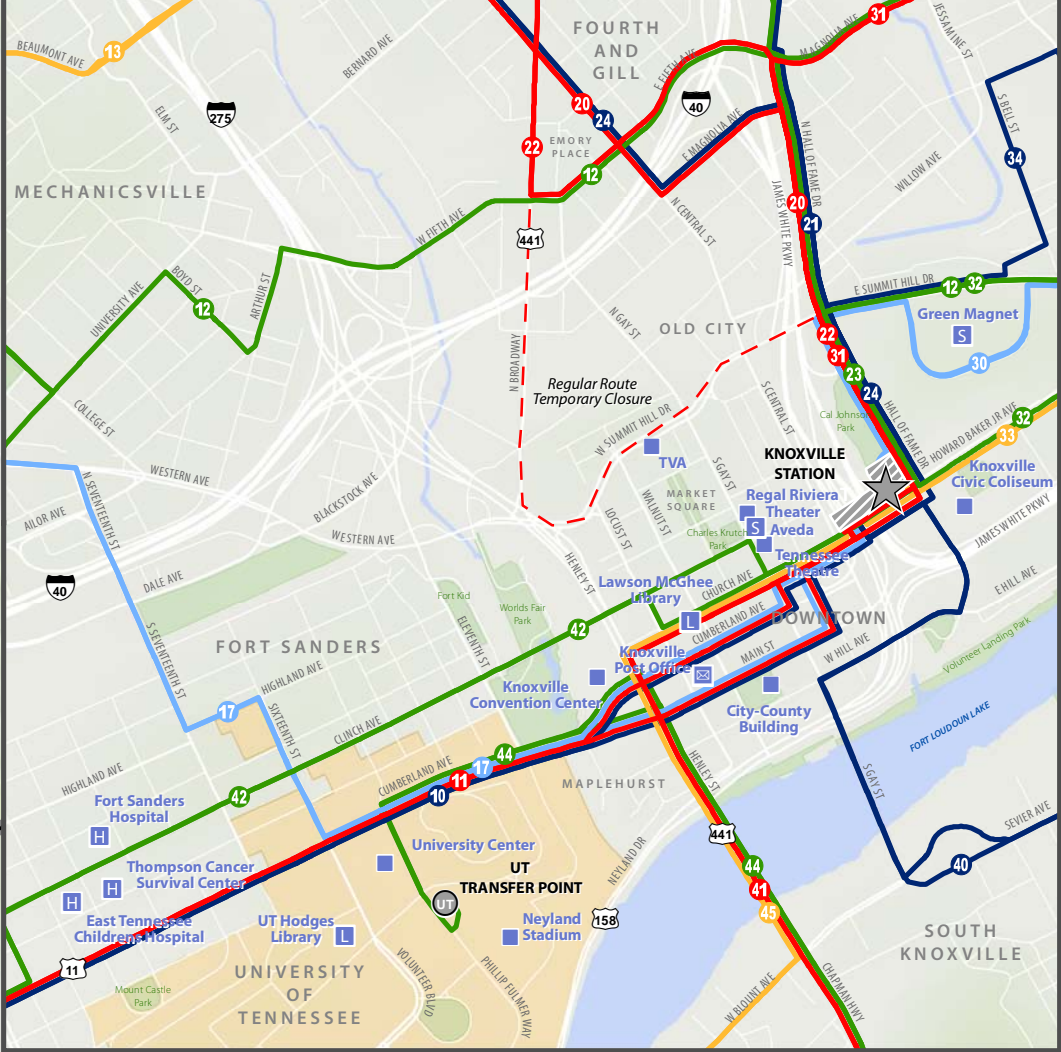
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## **APPENDIX C**

### **KNOXVILLE AREA TRANSIT MAP AND INFORMATION**



Knoxville City Center



**Legend**

Transfer Point

Lift Service Area Boundary

**Points of Interest**

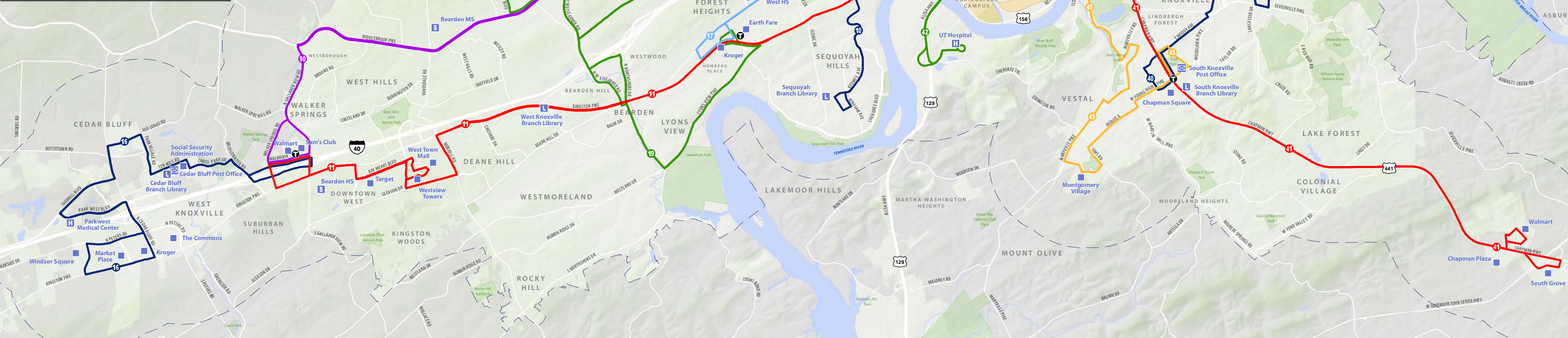
- Hospital
- School
- Library
- Point of Interest
- Post Office

**Distances**

0 5 10 Minutes Walking

0 5 10 Minutes Biking

0 0.5 1 Map Scale in Miles



FARE INFORMATION

With a base fare of \$1.50, KAT offers a variety of passes. Please note that only the fares marked with an asterisk can be purchased when boarding the bus. Others are available at KAT's Customer Service Counter at Knoxville Station (301 Church Ave.) or by mail via [katbus.com](http://katbus.com).

FARE TYPE	REGULAR FARE	REDUCED FARE
One-Ride Pass*	\$1.50	\$0.75
1 Day Pass*	\$4.00	\$2.00
7 Day Pass	\$15.00	\$7.50
30 Day Pass	\$50.00	\$25.00
20 Ride Pass	\$25.00	\$12.50
Transfer*	\$0.50	\$0.25

REDUCED FARE INFORMATION

A reduced fare is available to those who qualify. Qualifying individuals include seniors age 65 or over, Medicare card holders, students under the age of 18, and persons with disabilities. Proper identification (Medicare card or a valid KAT I.D. card) is required before boarding. For more information on how to obtain a discounted-fare I.D. visit [katbus.com/fares](http://katbus.com/fares) or call 637-3000.

BUS STOPS ONLY!

KAT buses stop ONLY at locations designated by bus stop signs. Generally, bus stops are located at least every ¼ mile along the route.

KAT HOLIDAYS

KAT buses do not run on the following holidays:

- New Year's Day
- Thanksgiving
- Independence Day
- Christmas

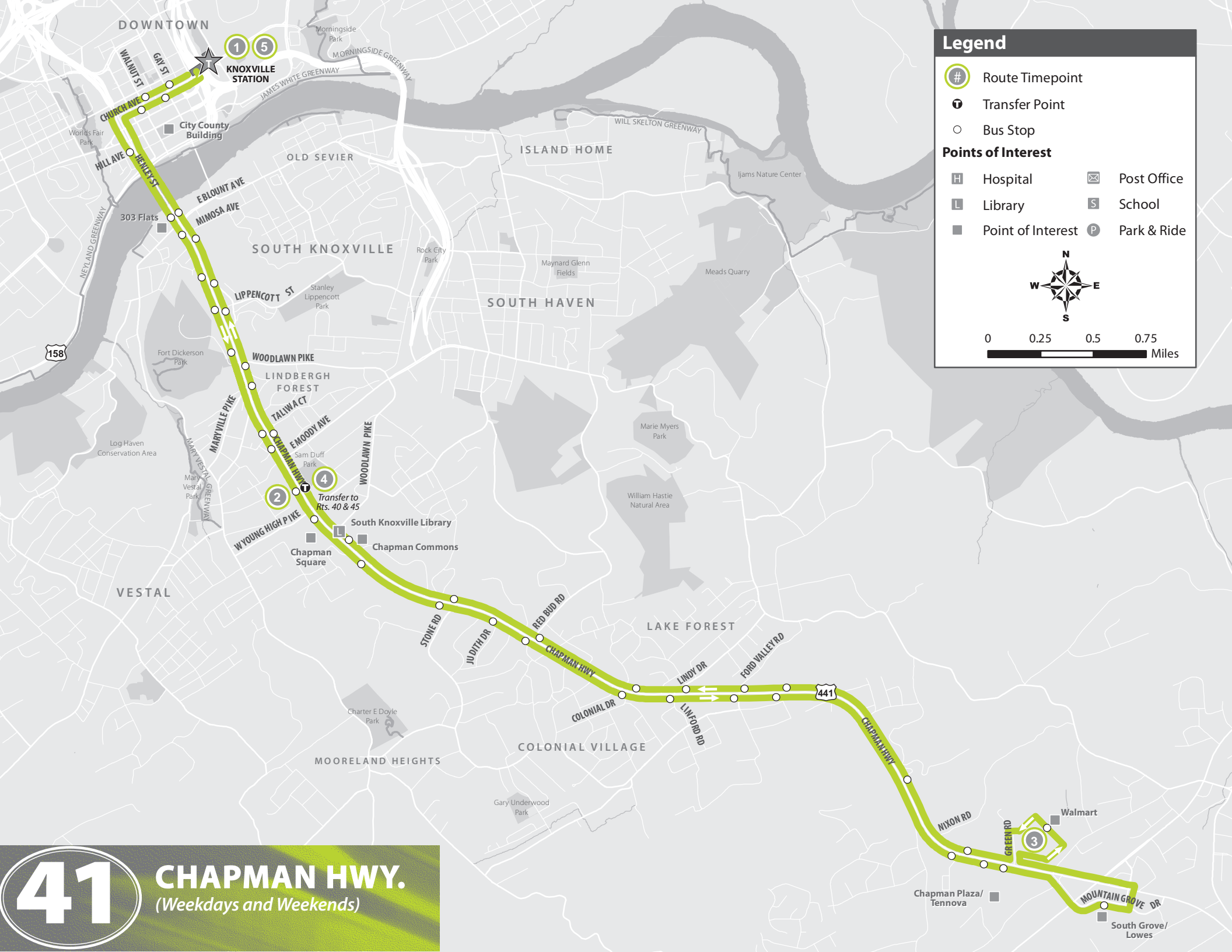
Please note that KAT's Knoxville Station Customer Service counter is also closed during those days.

KAT buses run on a Saturday schedule on the following holidays:

- Martin Luther King, Jr. Day
- Day after Thanksgiving
- Memorial Day
- Christmas Eve
- Labor Day

KAT's administrative offices are closed on all holidays listed above.





### Legend

#

Route Timepoint

T

Transfer Point

O

Bus Stop

### Points of Interest

H

Hospital

L

Library

■

Point of Interest

ⓧ

Post Office

S

School

P

Park & Ride

N

W

E

S

0

0.25

0.5

0.75

Miles

41

CHAPMAN HWY.

(Weekdays and Weekends)

# 41

## CHAPMAN HIGHWAY

(Weekdays and Weekends)

### SERVES:

- ★ Chapman Commons
- ★ Chapman Plaza
- ★ Chapman Square
- ★ Knoxville Station/Downtown
- ★ South Grove Shopping Center

South Knoxville Branch Library  
Tennova South  
Walmart

**kat**  
KNOXVILLE  
AREA TRANSIT

Effective Date: January 6, 2020

Going away from Downtown			Going toward Downtown		
Knoxville Station—Platform P	Chapman Hwy. past Moody	Walmart	Chapman Hwy. past Young High Pike	Knoxville Station	
1	2	3	4	5	
WEEKDAY SCHEDULE					
A.M.			5:41	5:50	6:10
	6:15	6:26	6:41	6:50	7:10
	6:45	6:56	7:11	7:20	7:40
	7:15	7:26	7:41	7:50	8:10
	7:45	7:56	8:11	8:20	8:40
	8:15	8:26	8:41	8:50	9:10
	8:45	8:56	9:11	9:20	9:40
	9:15	9:26	9:41	9:50	10:10
	9:45	9:56	10:11	10:20	10:40
	10:15	10:26	10:41	10:50	11:10
	10:45	10:56	11:11	11:20	11:40
	11:15	11:26	11:41	11:50	12:10
	11:45	11:56	12:11	12:20	12:40
P.M.	12:15	12:26	12:41	12:50	1:10
	12:45	12:56	1:11	1:20	1:40
	1:15	1:26	1:41	1:50	2:10
	1:45	1:56	2:11	2:20	2:40
	2:15	2:26	2:41	2:50	3:10
	2:45	2:56	3:11	3:20	3:40
	3:15	3:26	3:41	3:50	4:10
	3:45	3:56	4:11	4:20	4:40
	4:15	4:26	4:41	4:50	5:10
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	5:15	5:26	5:41	5:50	6:10
	5:45	5:56	6:11	6:20	6:40
	6:15	6:26	6:41	6:50	7:10
	6:45	6:56	7:11	7:20	7:40
	7:15	7:26	7:41	7:50	8:10
	7:45	7:56	8:11	8:20	8:40
	8:15	8:26	8:41	8:50	9:10
	8:45	8:56	9:11	9:20	9:40
	9:15	9:26	9:41	9:50	10:10
	9:45	9:56	10:11	10:20	10:40
	10:15	10:26	10:41	10:50	11:10
	11:15	11:26	11:41	11:50	To Garage

Going away from Downtown			Going toward Downtown		
Knoxville Station—Platform P	Chapman Hwy. past Moody	Walmart	Chapman Hwy. past Young High Pike	Knoxville Station	
1	2	3	4	5	
SATURDAY SCHEDULE					
A.M.	7:15	7:26	7:41	7:50	8:10
	7:45	7:56	8:11	8:20	8:40
	8:15	8:26	8:41	8:50	9:10
	8:45	8:56	9:11	9:20	9:40
	9:15	9:26	9:41	9:50	10:10
	9:45	9:56	10:11	10:20	10:40
	10:15	10:26	10:41	10:50	11:10
	10:45	10:56	11:11	11:20	11:40
	11:15	11:26	11:41	11:50	12:10
	11:45	11:56	12:11	12:20	12:40
P.M.	12:15	12:26	12:41	12:50	1:10
	12:45	12:56	1:11	1:20	1:40
	1:15	1:26	1:41	1:50	2:10
	1:45	1:56	2:11	2:20	2:40
	2:15	2:26	2:41	2:50	3:10
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	9:15	9:26	9:41	9:50	10:10
	9:45	9:56	10:11	10:20	10:40
	10:15	10:26	10:41	10:50	11:10
	10:45	10:56	11:11	11:20	11:40
	11:15	11:26	11:41	11:50	To Garage
SUNDAY SCHEDULE					
A.M.	8:15	8:26	8:41	8:50	9:10
	9:15	9:26	9:41	9:50	10:10
	10:15	10:26	10:41	10:50	11:10
	11:15	11:26	11:41	11:50	12:10
P.M.	12:15	12:26	12:41	12:50	1:10
	1:15	1:26	1:41	1:50	2:10
	2:15	2:26	2:41	2:50	3:10
	3:15	3:26	3:41	3:50	4:10
	4:15	4:26	4:41	4:50	5:10
	5:15	5:26	5:41	5:50	6:10
	6:15	6:26	6:41	6:50	7:10
	7:15	7:26	7:41	7:50	8:10
	8:15	8:26	8:41	To Garage	

Need help reading this schedule?

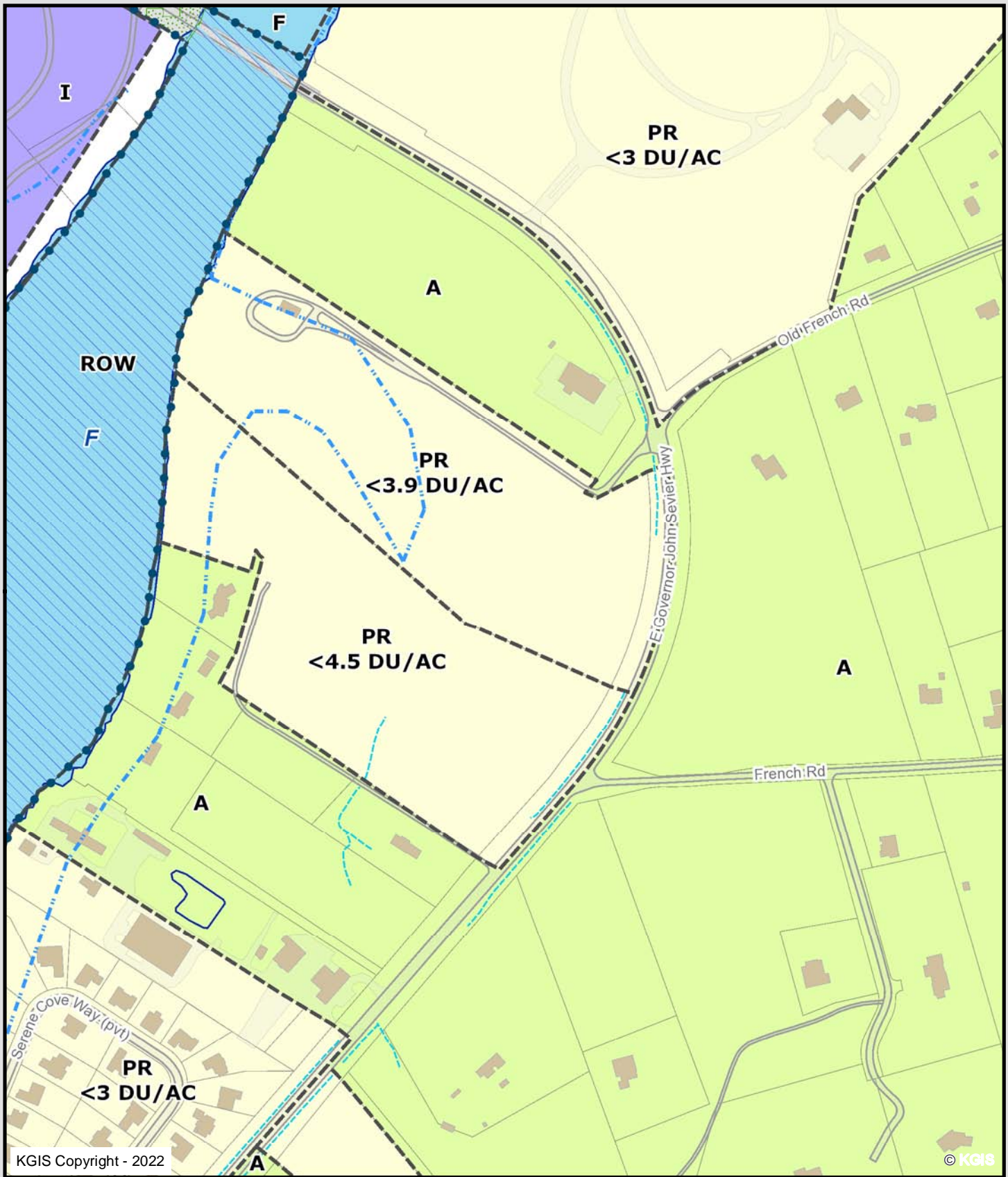
Need other general information on how to ride?

[Click here to Download the General Schedule Information pdf](#) available from [katbus.com](http://katbus.com)

## **APPENDIX D**

### **ZONING MAP**





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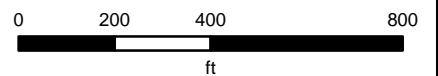
## Zoning Map on 7.19.22

Price - Toole Subdivision

Knoxville - Knox County - KUB Geographic Information System



Printed: 7/19/2022 at 10:10:52 AM



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## **APPENDIX E**

### **MANUAL TRAFFIC COUNT DATA**

## TRAFFIC COUNT DATA

Major Street: East Governor John Sevier Highway (SB and NB)

Minor Street: French Road (WB)

Traffic Control: Stop Sign on French Road

6/29/2022 (Wednesday)

Hot, Sunny

Conducted by: Ajax Engineering

	E Governor John Sevier Highway		French Road		E Governor John Sevier Highway			
TIME BEGIN	SOUTHBOUND		WESTBOUND		NORTHBOUND		VEHICLE TOTAL	PEAK HOUR
	LT	THRU	LT	RT	THRU	RT		
7:00 AM	0	84	0	0	96	0	180	
7:15 AM	0	99	0	3	126	0	228	7:15 AM - 8:15 AM
7:30 AM	1	95	1	1	122	0	220	
7:45 AM	1	95	0	2	157	0	255	
8:00 AM	0	98	1	5	94	0	198	
8:15 AM	0	68	2	1	105	0	176	
8:30 AM	1	72	0	1	88	2	164	
8:45 AM	1	66	0	1	84	0	152	
TOTAL	4	677	4	14	872	2	1573	
2:00 PM	1	88	3	1	103	0	196	
2:15 PM	0	97	1	2	98	0	198	
2:30 PM	0	137	2	1	96	0	236	
2:45 PM	1	109	1	0	78	0	189	
3:00 PM	1	139	0	0	99	0	239	
3:15 PM	0	100	0	1	91	3	195	
3:30 PM	1	145	0	4	105	2	257	
3:45 PM	2	103	1	0	105	1	212	
4:00 PM	1	145	0	1	143	1	291	
4:15 PM	2	146	2	0	119	1	270	
4:30 PM	3	156	0	1	149	1	310	4:30 PM - 5:30 PM
4:45 PM	2	140	2	0	133	1	278	
5:00 PM	3	169	0	3	141	0	316	
5:15 PM	4	149	1	0	155	0	309	
5:30 PM	5	154	0	1	110	1	271	
5:45 PM	2	126	0	2	102	0	232	
TOTAL	28	2103	13	17	1827	11	3999	

2022 AM Peak Hour

7:15 AM - 8:15 AM

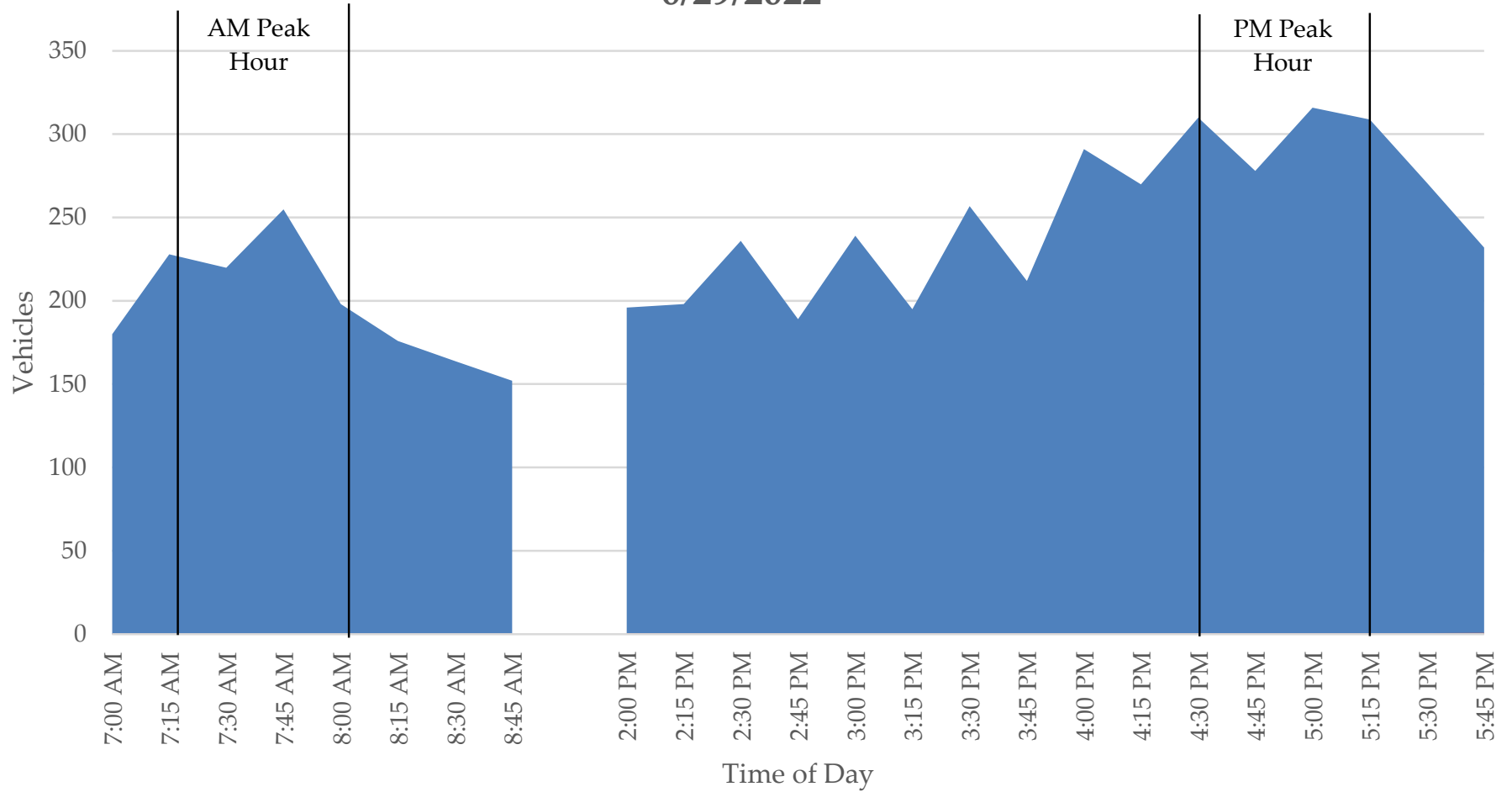
TIME BEGIN	E Governor John Sevier Highway		French Road		E Governor John Sevier Highway	
	SOUTHBOUND		WESTBOUND		NORTHBOUND	
	LT	THRU	LT	RT	THRU	RT
7:15 AM	0	99	0	3	126	0
7:30 AM	1	95	1	1	122	0
7:45 AM	1	95	0	2	157	0
8:00 AM	0	98	1	5	94	0
TOTAL	2	387	2	11	499	0
PHF	0.50	0.98	0.50	0.55	0.79	-

2022 PM Peak Hour

4:30 PM - 5:30 PM

TIME BEGIN	E Governor John Sevier Highway		French Road		E Governor John Sevier Highway	
	SOUTHBOUND		WESTBOUND		NORTHBOUND	
	LT	THRU	LT	RT	THRU	RT
4:30 PM	3	156	0	1	149	1
4:45 PM	2	140	2	0	133	1
5:00 PM	3	169	0	3	141	0
5:15 PM	4	149	1	0	155	0
TOTAL	12	614	3	4	578	2
PHF	0.75	0.91	0.38	0.33	0.93	0.50

# East Governor John Sevier Highway at French Road Intersection Traffic Count Totals 6/29/2022



### TDOT ADT COUNT DATA





Location Info								Count Data Info	
Location ID	47000168							Start Date	1/31/2022
Type	I-SECTION							End Date	2/1/2022
Functional Class	4							Start Time	11:00 AM
Located On	W. GOV. JOHN SEVIER HWY.							End Time	11:00 AM
	E. OF FRENCH BROAD RIVER							Direction	
Direction	2-WAY							Notes	
Community	-							Count Source	21920
MPO_ID								File Name	22-02-04 A4701680 (Start 22-01-31 at 1100).63.BIN
HPMS ID								Weather	
Agency	TDOT							Study	
								Owner	jj01380
								QC Status	Accepted
Interval: 15 mins									
Time	15 Min				Hourly Count				
	1st	2nd	3rd	4th					
00:00 - 01:00	12	17	8	14	51				
01:00 - 02:00	10	22	9	8	49				
02:00 - 03:00	10	10	11	12	43				
03:00 - 04:00	16	18	19	40	93	Ajax Engineering Notes and Calculations:			
04:00 - 05:00	25	42	50	57	174				
05:00 - 06:00	55	61	104	131	351				
06:00 - 07:00	128	152	161	208	649	TDOT Peak Hour		7:15-8:15 from 6/29 count = 901 vehicles (slightly earlier peak hour than TDOT count)	
07:00 - 08:00	185	218	280	307	990	7:00 - 8:00	990	901 * .15 = 135 (15% factor)	
08:00 - 09:00	230	236	192	201	859	7:15 - 8:15	1035	<b>901 + 135 = 1036</b>	
09:00 - 10:00	157	181	200	215	753	<b>7:30 - 8:30</b>	<b>1053</b>	(underestimates TDOT results by 17 vehicles)	
10:00 - 11:00	198	191	181	204	774	7:45 - 8:45	965		
11:00 - 12:00	168	177	225	209	779				
12:00 - 13:00	209	206	240	216	871				
13:00 - 14:00	230	201	181	197	809				
14:00 - 15:00	201	212	216	196	825	TDOT Peak Hour		16:30-17:30 from 6/29 count = 1213 vehicles (same peak hour as TDOT count)	
15:00 - 16:00	199	247	325	239	1010	16:15-17:15	1198	1213 * .05 = 182 (5% factor)	
16:00 - 17:00	249	276	318	300	1143	<b>16:30-17:30</b>	<b>1239</b>	<b>1213 + 61 = 1274</b>	
17:00 - 18:00	304	317	308	239	1168	16:45-17:45	1229	(overestimates TDOT results by 35 vehicles)	
18:00 - 19:00	193	211	168	141	713	17:00-18:00	1168		
19:00 - 20:00	122	111	122	94	449				
20:00 - 21:00	62	48	81	77	268				
21:00 - 22:00	64	53	49	45	211				
22:00 - 23:00	32	23	27	30	112				
23:00 - 24:00	24	19	17	12	72				
TOTAL					13216				



## **APPENDIX F**





### **CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 11)**

**EXISTING CONDITIONS (+15%)**

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	2	13	574	0	2	445
Future Vol, veh/h	2	13	574	0	2	445
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	55	79	90	50	98
Heavy Vehicles, %	0	0	2	0	0	2
Mvmt Flow	4	24	727	0	4	454
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1189	727	0	0	727	0
Stage 1	727	-	-	-	-	-
Stage 2	462	-	-	-	-	-
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	273	463	-	-	886	-
Stage 1	567	-	-	-	-	-
Stage 2	708	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	272	463	-	-	886	-
Mov Cap-2 Maneuver	408	-	-	-	-	-
Stage 1	567	-	-	-	-	-
Stage 2	704	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	13.4	0	0.1			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	454	886	-	
HCM Lane V/C Ratio	-	-	0.061	0.005	-	
HCM Control Delay (s)	-	-	13.4	9.1	-	
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	3	4	607	2	13	645
Future Vol, veh/h	3	4	607	2	13	645
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	38	33	93	50	75	91
Heavy Vehicles, %	0	0	2	0	0	2
Mvmt Flow	8	12	653	4	17	709

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1398	655	0
Stage 1	655	-	-
Stage 2	743	-	-
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	214	505	-
Stage 1	602	-	-
Stage 2	559	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	210	505	-
Mov Cap-2 Maneuver	358	-	-
Stage 1	602	-	-
Stage 2	549	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.7	0	0.2
HCM LOS	B		





Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	435	940
HCM Lane V/C Ratio	-	-	0.046	0.018
HCM Control Delay (s)	-	-	13.7	8.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1



## **PROJECTED CONDITIONS (WITHOUT THE PROJECT)**

**Intersection**

Int Delay, s/veh 0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	2	14	608	0	2	472
Future Vol, veh/h	2	14	608	0	2	472
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	55	79	90	50	98
Heavy Vehicles, %	0	0	2	0	0	2
Mvmt Flow	4	25	770	0	4	482





Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1260	770	0
Stage 1	770	-	-
Stage 2	490	-	-
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	251	440	-
Stage 1	546	-	-
Stage 2	691	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	250	440	-
Mov Cap-2 Maneuver	389	-	-
Stage 1	546	-	-
Stage 2	688	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.9	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	432	854
HCM Lane V/C Ratio	-	-	0.068	0.005
HCM Control Delay (s)	-	-	13.9	9.2
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	3	4	643	2	14	684
Future Vol, veh/h	3	4	643	2	14	684
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	38	33	93	50	75	91
Heavy Vehicles, %	0	0	2	0	0	2
Mvmt Flow	8	12	691	4	19	752

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1483	693	0
Stage 1	693	-	-
Stage 2	790	-	-
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	193	483	-
Stage 1	583	-	-
Stage 2	537	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	189	483	-
Mov Cap-2 Maneuver	338	-	-
Stage 1	583	-	-
Stage 2	526	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.2	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	413	910
HCM Lane V/C Ratio	-	-	0.048	0.021
HCM Control Delay (s)	-	-	14.2	9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1

## **PROJECTED CONDITIONS (WITH THE PROJECT)**



## Intersection

Int Delay, s/veh 1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱	↰	↱		↰	↱	
Traffic Vol, veh/h	41	0	34	2	0	14	12	608	0	2	472	14
Future Vol, veh/h	41	0	34	2	0	14	12	608	0	2	472	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	40	-	-	-	100	-	-	110	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	-4	-	-	1	-	-	-1	-
Peak Hour Factor	90	90	90	50	90	55	90	79	90	50	98	90
Heavy Vehicles, %	0	0	0	0	0	0	0	2	0	0	2	0
Mvmt Flow	46	0	38	4	0	25	13	770	0	4	482	16

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1307	1294	490	1313	1302	770	498	0	0	770	0	0
Stage 1	498	498	-	796	796	-	-	-	-	-	-	-
Stage 2	809	796	-	517	506	-	-	-	-	-	-	-
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	138	164	582	183	217	440	1076	-	-	854	-	-
Stage 1	558	548	-	458	480	-	-	-	-	-	-	-
Stage 2	377	402	-	611	608	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	128	161	582	169	213	440	1076	-	-	854	-	-
Mov Cap-2 Maneuver	249	279	-	304	336	-	-	-	-	-	-	-
Stage 1	551	545	-	453	474	-	-	-	-	-	-	-
Stage 2	351	397	-	569	605	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	17.7		14.3		0.1		0.1	
HCM LOS	C		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1076	-	-	249	582	415	854	-	-
HCM Lane V/C Ratio	0.012	-	-	0.183	0.065	0.071	0.005	-	-
HCM Control Delay (s)	8.4	-	-	22.7	11.6	14.3	9.2	-	-
HCM Lane LOS	A	-	-	C	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.7	0.2	0.2	0	-	-

Intersection												
Int Delay, s/veh	1.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↗	↖		↗	↖	
Traffic Vol, veh/h	28	0	22	3	0	4	39	643	2	14	684	47
Future Vol, veh/h	28	0	22	3	0	4	39	643	2	14	684	47
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	-	-	40	-	-	-	100	-	-	110	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	-4	-	-	1	-	-	-1	-
Peak Hour Factor	90	90	90	38	90	33	90	93	50	75	91	90
Heavy Vehicles, %	0	0	0	0	0	0	0	2	0	0	2	0
Mvmt Flow	31	0	24	8	0	12	43	691	4	19	752	52
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1601	1597	778	1607	1621	693	804	0	0	695	0	0
Stage 1	816	816	-	779	779	-	-	-	-	-	-	-
Stage 2	785	781	-	828	842	-	-	-	-	-	-	-
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	86	108	400	122	149	483	829	-	-	910	-	-
Stage 1	374	393	-	466	486	-	-	-	-	-	-	-
Stage 2	389	408	-	443	462	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	79	100	400	108	138	483	829	-	-	910	-	-
Mov Cap-2 Maneuver	195	217	-	231	260	-	-	-	-	-	-	-
Stage 1	355	385	-	442	461	-	-	-	-	-	-	-
Stage 2	360	387	-	407	452	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	21.5		16.3		0.6		0.2					
HCM LOS	C		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR			
Capacity (veh/h)	829	-	-	195	400	338	910	-	-			
HCM Lane V/C Ratio	0.052	-	-	0.16	0.061	0.059	0.021	-	-			
HCM Control Delay (s)	9.6	-	-	26.9	14.6	16.3	9	-	-			
HCM Lane LOS	A	-	-	D	B	C	A	-	-			
HCM 95th %tile Q(veh)	0.2	-	-	0.6	0.2	0.2	0.1	-	-			

## **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

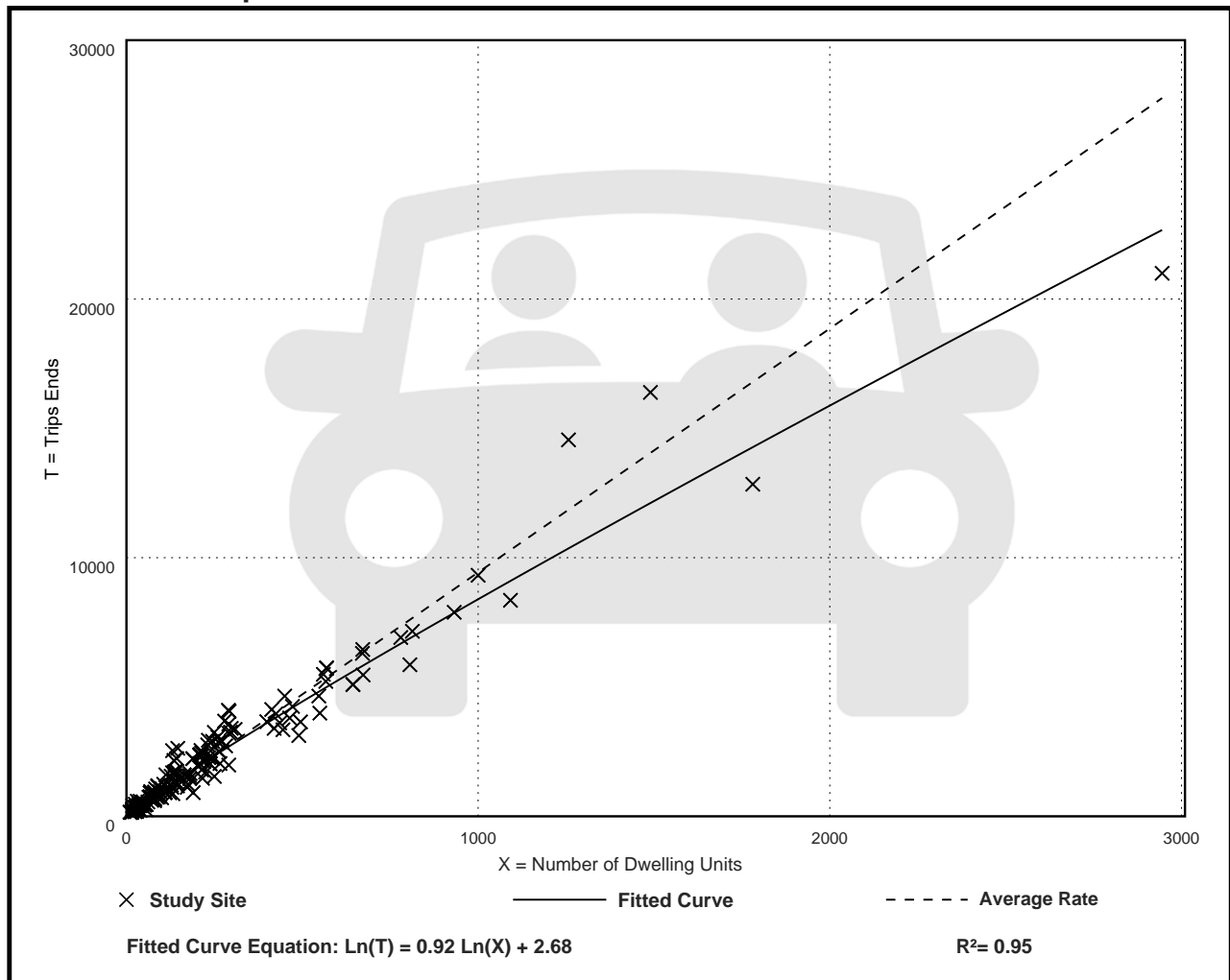
Avg. Num. of Dwelling Units: 246

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

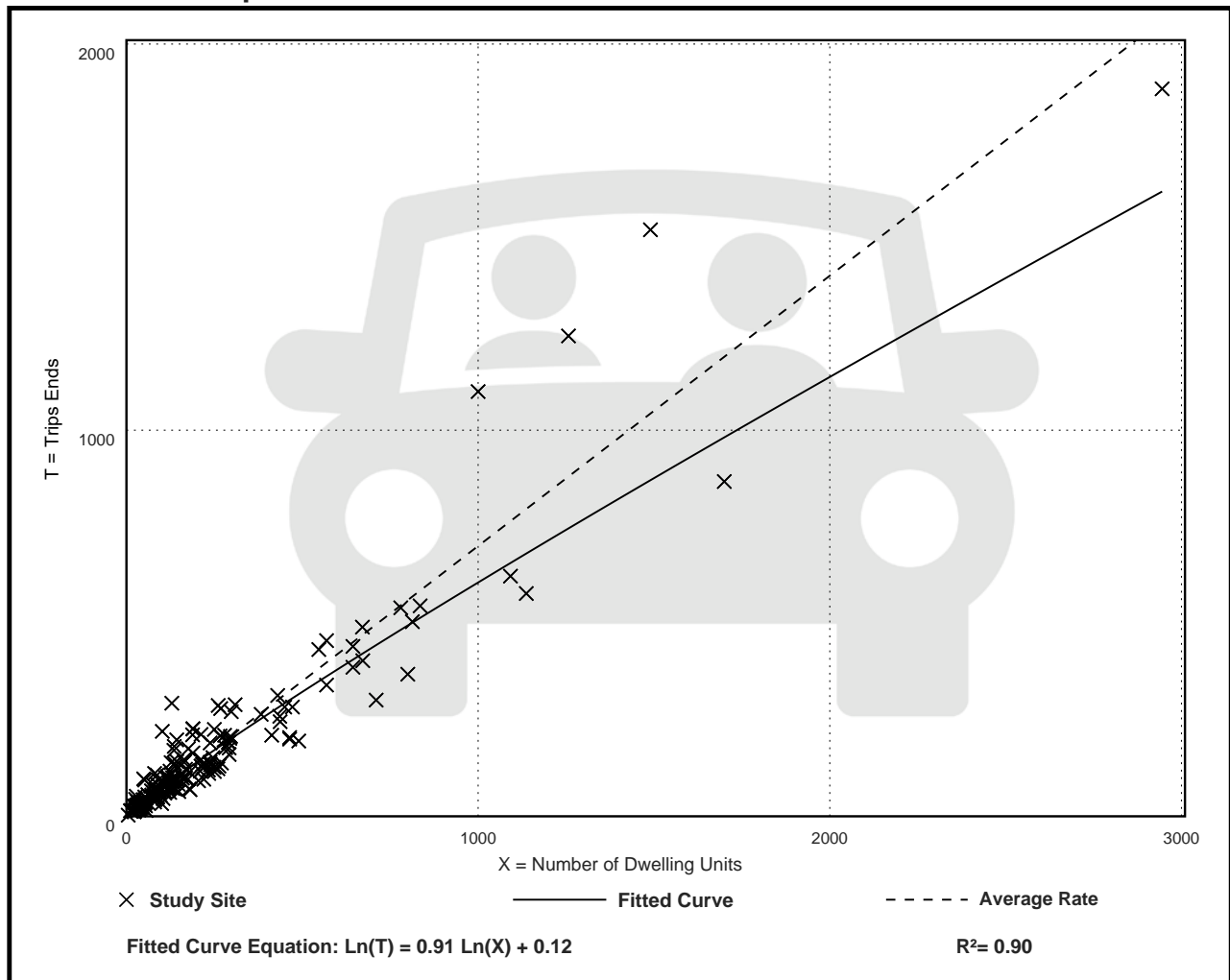
Avg. Num. of Dwelling Units: 226

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

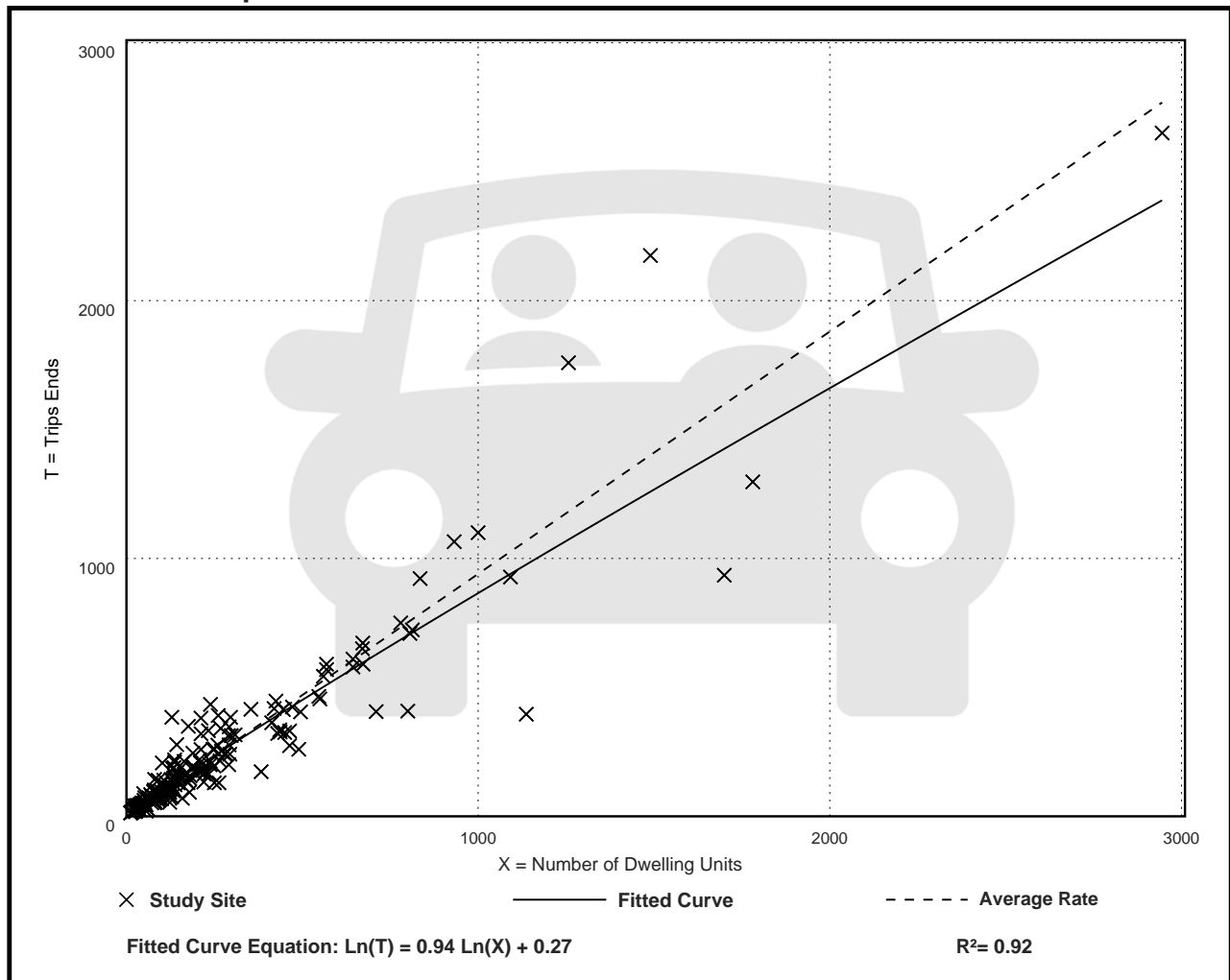
Avg. Num. of Dwelling Units: 248

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 PRICE-TOOLE SUBDIVISION

140 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	140 Houses	1,376	26%	74%		63%	37%	
				26	75	101	86	50	136
Total New Volume Site Trips			1,376	26	75	101	86	50	136

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



## TRIP GENERATION FOR PRICE-TOOLE SUBDIVISION

### 140 Single-Family Detached Houses

140 Residential Houses = X

---

#### Weekday:

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

$$\ln(T) = 0.92 * 4.94 + 2.68$$

$$\ln(T) = 7.23$$

$$T = \underline{\underline{1,376 \text{ trips}}}$$

---

#### Peak Hour of Adjacent Traffic between 7 and 9 am:

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

$$T = 0.91 * 5 + 0.12$$

$$\ln(T) = 4.62$$

$$T = \underline{\underline{101 \text{ trips}}}$$

---

#### Peak Hour of Adjacent Traffic between 4 and 6 pm:

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

$$\ln(T) = 0.94 * 4.94 + 0.27$$

$$\ln(T) = 4.92$$

$$T = \underline{\underline{136 \text{ trips}}}$$

## **APPENDIX H**

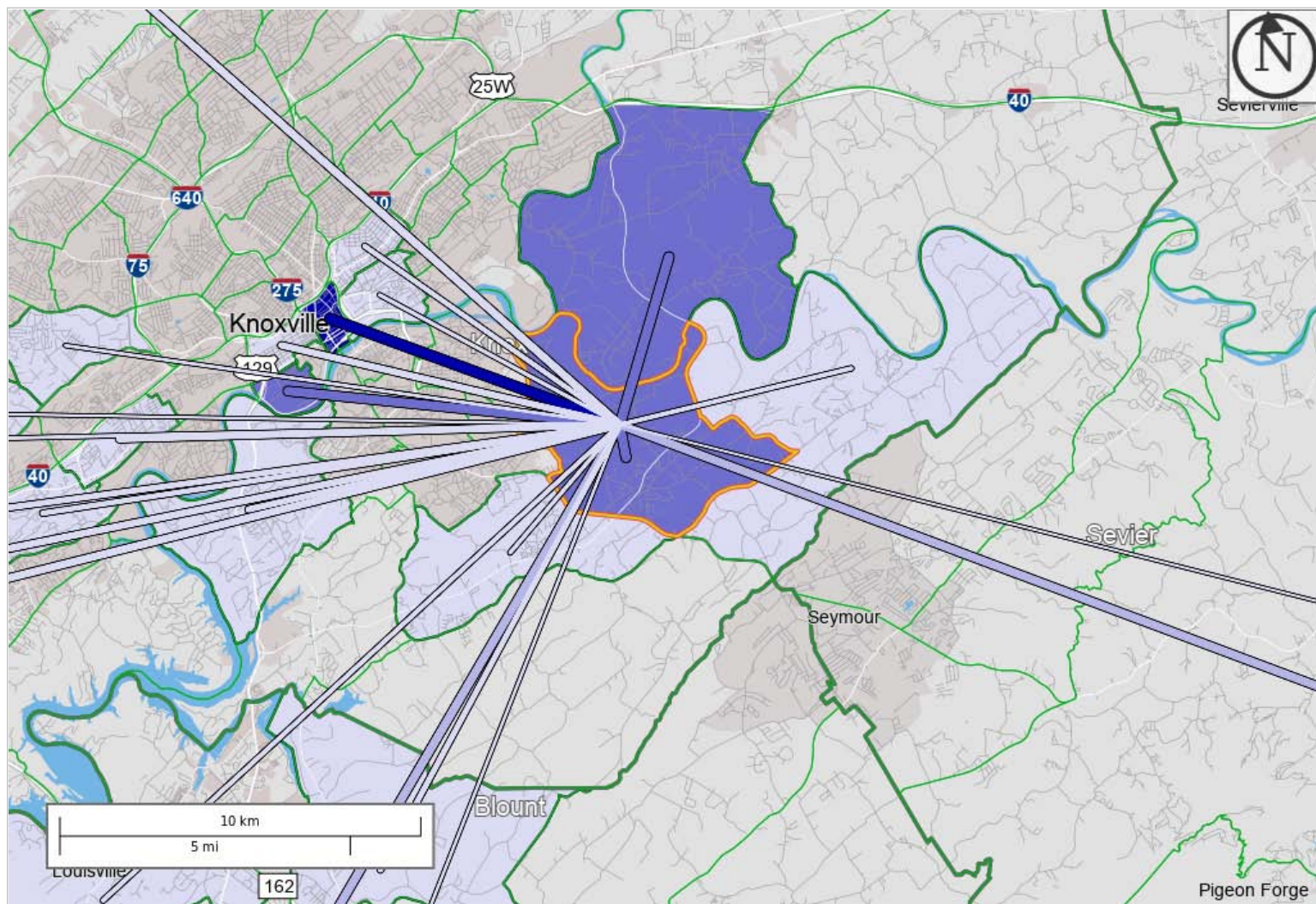
### **2019 CENSUS BUREAU DATA**

## Work Destination Report - Home Selection Area to Work Census Tracts All Jobs for All Workers in 2019

Created by the U.S. Census Bureau's OnTheMap <https://onthemap.ces.census.gov> on 07/02/2022

### Counts of All Jobs from Home Selection Area to Work Census Tracts in 2019

#### All Workers



#### Map Legend

##### Job Count

- 91 - 103
- 78 - 90
- 65 - 77
- 52 - 64
- 39 - 51
- 26 - 38
- 13 - 25

##### Selection Areas

- ▲ Analysis Selection

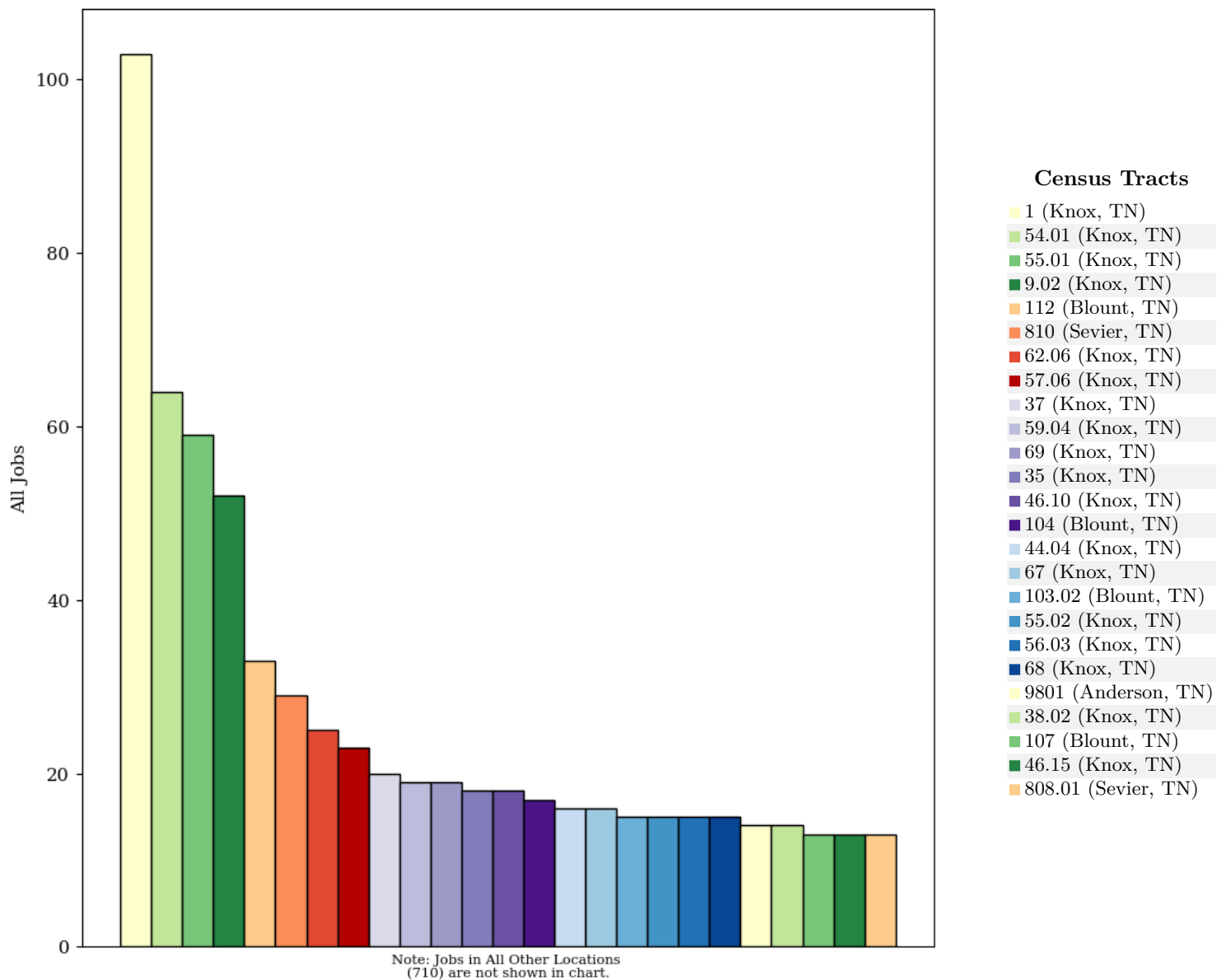
##### Job Count

- ▲ 91 - 103
- ▲ 78 - 90
- ▲ 65 - 77
- ▲ 52 - 64
- ▲ 39 - 51
- ▲ 26 - 38
- ▲ 13 - 25



# All Jobs from Home Selection Area to Work Census Tracts in 2019

## All Workers



# All Jobs from Home Selection Area to Work Census Tracts in 2019

## All Workers

Census Tracts as Work Destination Area	2019	
	Count	Share
All Census Tracts	1,368	100.0
1 (Knox, TN)	103	7.5
54.01 (Knox, TN)	64	4.7
55.01 (Knox, TN)	59	4.3
9.02 (Knox, TN)	52	3.8
112 (Blount, TN)	33	2.4
810 (Sevier, TN)	29	2.1
62.06 (Knox, TN)	25	1.8
57.06 (Knox, TN)	23	1.7
37 (Knox, TN)	20	1.5
59.04 (Knox, TN)	19	1.4



Census Tracts as Work Destination Area	2019	
	Count	Share
69 (Knox, TN)	19	1.4
35 (Knox, TN)	18	1.3
46.10 (Knox, TN)	18	1.3
104 (Blount, TN)	17	1.2
44.04 (Knox, TN)	16	1.2
67 (Knox, TN)	16	1.2
103.02 (Blount, TN)	15	1.1
55.02 (Knox, TN)	15	1.1
56.03 (Knox, TN)	15	1.1
68 (Knox, TN)	15	1.1
9801 (Anderson, TN)	14	1.0
38.02 (Knox, TN)	14	1.0
107 (Blount, TN)	13	1.0
46.15 (Knox, TN)	13	1.0
808.01 (Sevier, TN)	13	1.0
All Other Locations	710	51.9

## Additional Information

### Analysis Settings

Analysis Type	Destination
Destination Type	Census Tracts
Selection area as	Home
Year(s)	2019
Job Type	All Jobs
Selection Area	55.01 (Knox, TN) from Census Tracts
Selected Census Blocks	81
Analysis Generation Date	07/02/2022 13:52 - OnTheMap 6.8.1
Code Revision	f9358819d46a60bb89052036516a1c8fe8bbbbeac
LODES Data Version	20211018_1647

### Data Sources

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2nd Quarter of 2002-2019).

### 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**

### **KNOX COUNTY AND TDOT TURN LANE VOLUME THRESHOLD WORKSHEETS**

TABLE 6B

**RIGHT-TURN LANE VOLUME THRESHOLDS  
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 46 TO 55 MPH**

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

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

472

East Governor John  
Sevier Highway at  
Proposed Entrance

2028 Projected AM  
SB Right Turns = 14

SB Right Turn Lane  
NOT  
Warranted

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



TABLE 6B

**RIGHT-TURN LANE VOLUME THRESHOLDS  
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 46 TO 55 MPH**

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

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	684 + / > 600
Fewer Than 25 25 - 49 50 - 99			Yes	Yes Yes	Yes Yes	Yes Yes
100 - 149 150 - 199	Yes	<div style="border: 2px dashed green; padding: 5px;">                     East Governor John Sevier Highway at Proposed Entrance                       2028 Projected PM SB Right Turns = 47                       SB Right Turn Lane Warranted                 </div>		Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	Yes Yes			Yes Yes	Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes			Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes			Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

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

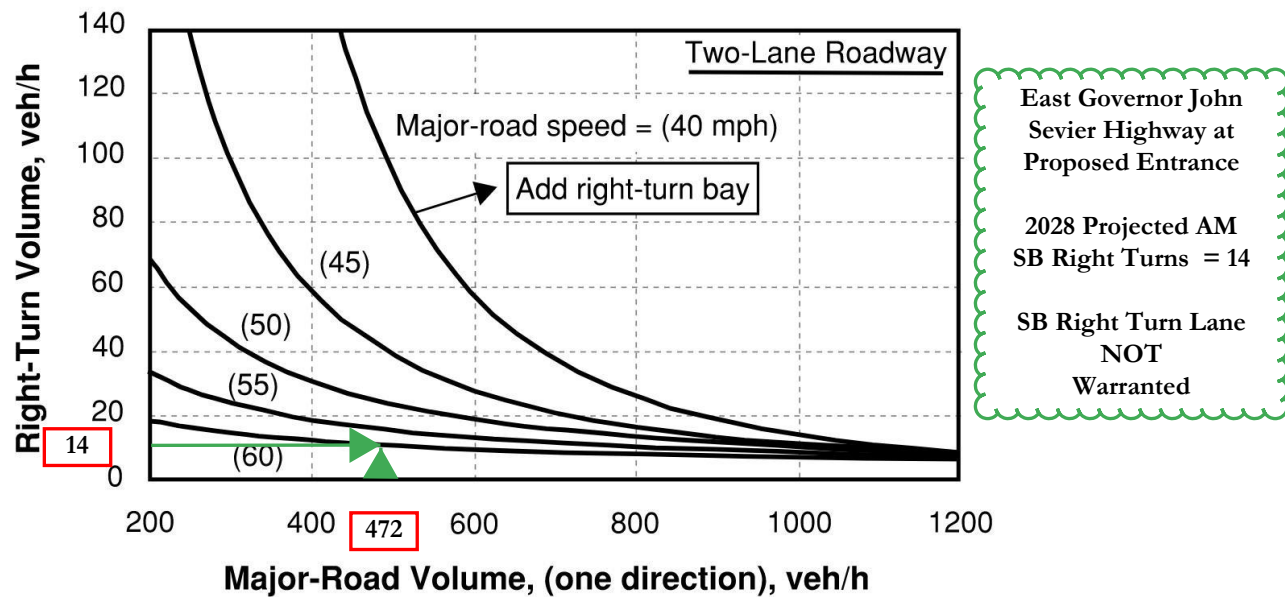


Figure 3-18: Right-Turn Lane Warrant along Two-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)<sup>24</sup>

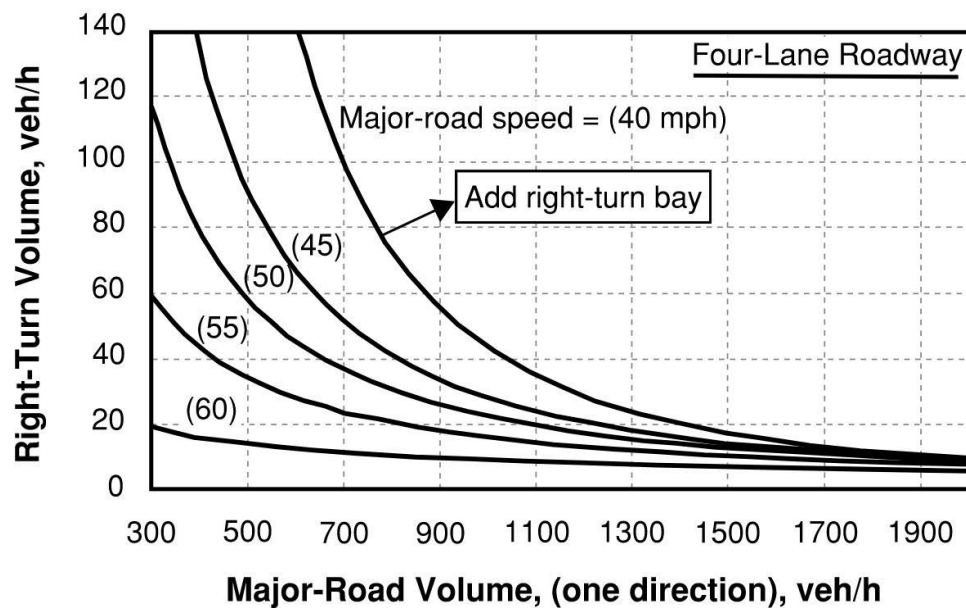


Figure 3-19: Right-Turn Lane Warrant along Four-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)<sup>25</sup>

<sup>24</sup> TRB, NCHRP 457, Evaluating Intersection Improvements (2001)

<sup>25</sup> TRB, NCHRP 457, Evaluating Intersection Improvements (2001)

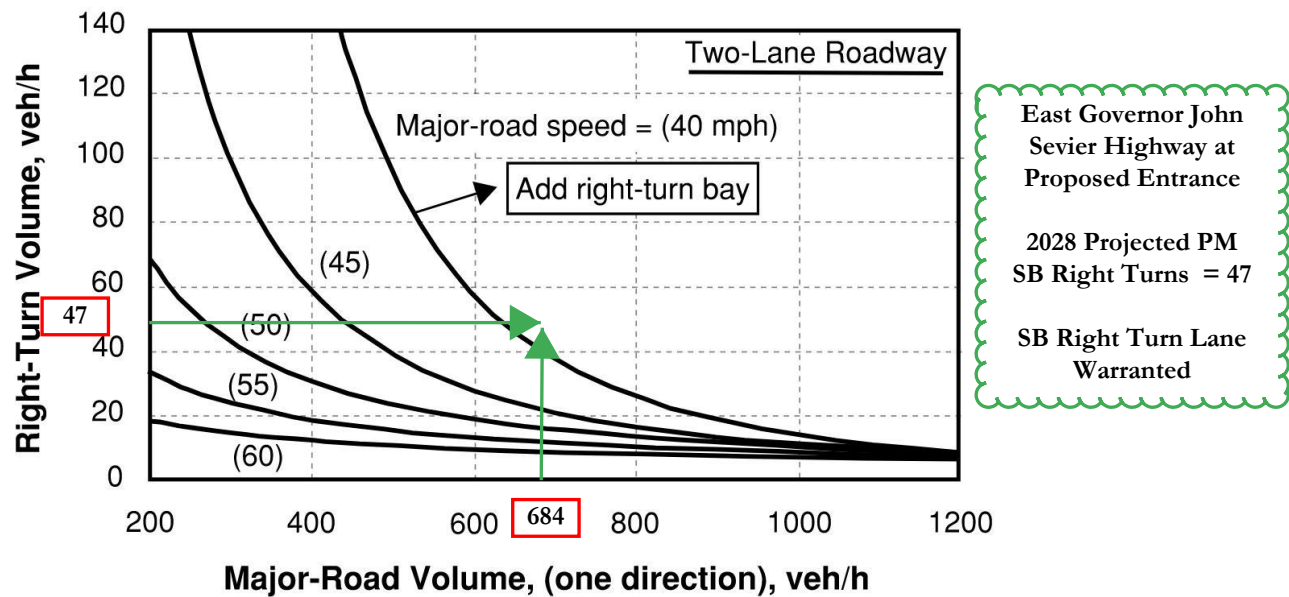


Figure 3-18: Right-Turn Lane Warrant along Two-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)<sup>24</sup>

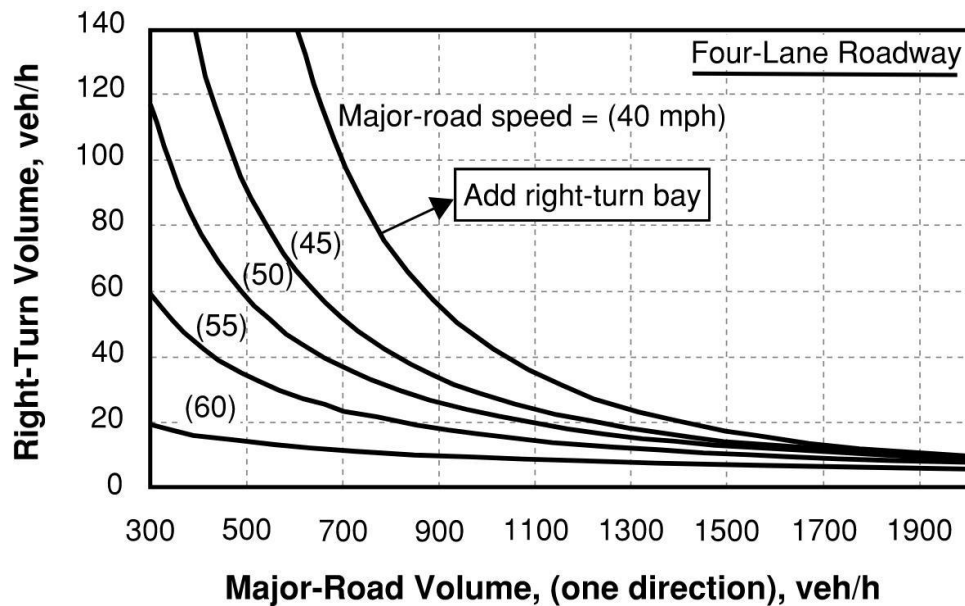


Figure 3-19: Right-Turn Lane Warrant along Four-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)<sup>25</sup>

<sup>24</sup> TRB, NCHRP 457, Evaluating Intersection Improvements (2001)

<sup>25</sup> 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)	75	61	34	30	14
Average Queue (ft)	27	24	10	4	1
95th Queue (ft)	57	55	32	20	6
Link Distance (ft)	144		701		
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		40		100	110
Storage Blk Time (%)	4	1			
Queuing Penalty (veh)	1	1			

## Network Summary

Network wide Queuing Penalty: 2



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

Movement	EB	EB	WB	NB	SB	SB
Directions Served	LT	R	LTR	L	L	TR
Maximum Queue (ft)	82	61	28	40	27	12
Average Queue (ft)	25	19	6	16	4	0
95th Queue (ft)	63	52	24	38	19	7
Link Distance (ft)	144		701			533
Upstream Blk Time (%)	0					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)		40		100	110	
Storage Blk Time (%)	8	1				
Queuing Penalty (veh)	2	0				

## Network Summary

Network wide Queuing Penalty: 2

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