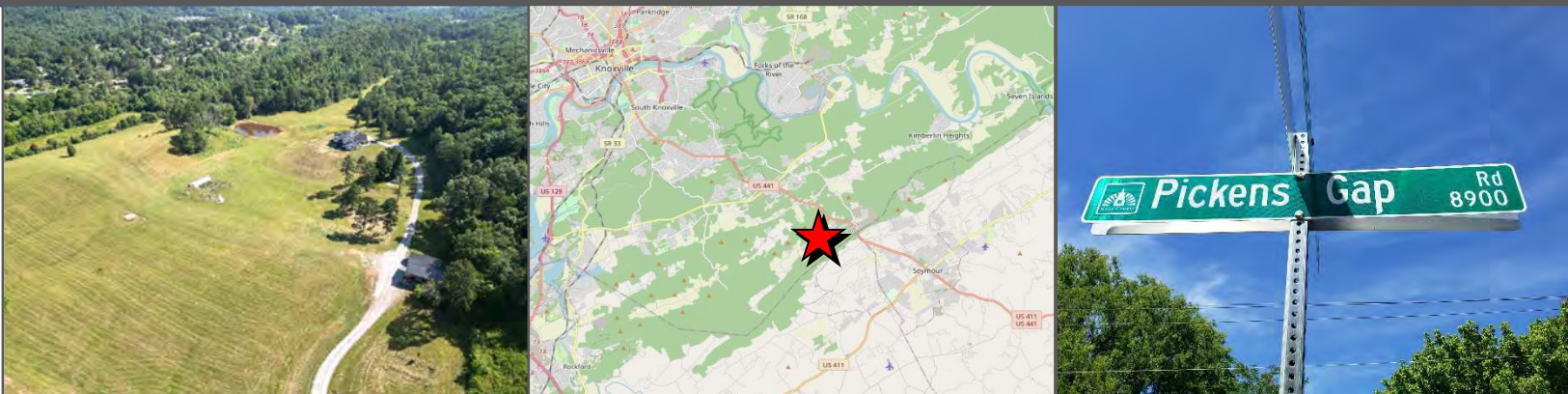




# Transportation Impact Study Pickens Gap Road Subdivision Knox County, Tennessee



Revised October 2024

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



11-SE-24-C / 11-H-24-DP  
TIS Version 2  
10/31/2024

## TABLE OF CONTENTS

SECTION	PAGE
<b>EXECUTIVE SUMMARY.....</b>	<b>1</b>
<b>DESCRIPTION OF EXISTING CONDITIONS .....</b>	<b>6</b>
STUDY AREA .....	6
EXISTING ROADWAYS .....	9
PICKENS GAP ROAD SECTIONS .....	11
PHOTO EXHIBITS.....	21
EXISTING TRANSPORTATION VOLUMES PER MODE .....	23
WALK SCORE .....	24
TRANSIT SERVICES.....	24
CRASH DATA .....	25
<b>PROJECT DESCRIPTION .....</b>	<b>26</b>
LOCATION AND SITE PLAN .....	26
PROPOSED USES AND ZONING REQUIREMENTS.....	28
ON-SITE CIRCULATION .....	29
SERVICE AND DELIVERY VEHICLE ACCESS AND CIRCULATION .....	29
<b>ANALYSIS OF EXISTING AND PROJECTED CONDITIONS .....</b>	<b>30</b>
EXISTING TRAFFIC CONDITIONS .....	30
PROJECTED TRAFFIC CONDITIONS WITHOUT THE PROJECT .....	36
TRIP GENERATION.....	38
TRIP DISTRIBUTION AND ASSIGNMENT .....	39
PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT .....	43
POTENTIAL TRANSPORTATION SAFETY ISSUES.....	46
<b>CONCLUSIONS &amp; RECOMMENDATIONS .....</b>	<b>50</b>
PICKENS GAP ROAD AT THE PROPOSED ENTRANCE .....	50
PICKENS GAP ROAD .....	52
PICKENS GAP ROAD SUBDIVISION INTERNAL ROADS.....	55
<b>APPENDIX</b>	

## APPENDIX

APPENDIX A -	HISTORICAL TRAFFIC COUNT DATA
APPENDIX B -	KNOXVILLE AREA TRANSIT MAP AND INFORMATION
APPENDIX C -	ZONING MAP
APPENDIX D -	MANUAL TRAFFIC COUNT DATA
APPENDIX E -	CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 12)
APPENDIX F -	ITE TRIP GENERATION DATA
APPENDIX G -	2021 CENSUS BUREAU DATA
APPENDIX H -	KNOX COUNTY TURN LANE VOLUME THRESHOLD WORKSHEETS
APPENDIX I -	SIMTRAFFIC VEHICLE QUEUE WORKSHEETS
APPENDIX J -	LETTER RESPONSE TO ADDRESS COMMENTS – 10.31.24

## LIST OF FIGURES

FIGURE	PAGE
1. LOCATION MAP .....	8
2. TRAFFIC COUNT LOCATIONS, TRAFFIC SIGNAGE & EXISTING LANE CONFIGURATIONS .....	20
3. PROPOSED PLAN LAYOUT – PICKENS GAP ROAD SUBDIVISION .....	27
4A. 2024 PEAK HOUR TRAFFIC VOLUMES – EXISTING TRAFFIC CONDITIONS .....	31
4B. 2024 PEAK HOUR TRAFFIC VOLUMES – EXISTING TRAFFIC CONDITIONS (ADJUSTED FOR MISSING SCHOOL TRAFFIC) .....	32
5. 2028 PEAK HOUR TRAFFIC VOLUMES – PROJECTED TRAFFIC CONDITIONS WITHOUT THE PROJECT .....	37
6. DIRECTIONAL DISTRIBUTION OF GENERATED TRAFFIC DURING AM AND PM PEAK HOUR.....	41
7. TRAFFIC ASSIGNMENT OF GENERATED TRAFFIC DURING AM AND PM PEAK HOUR.....	42
8. 2028 PEAK HOUR TRAFFIC VOLUMES – PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT .....	44



## LIST OF TABLES

TABLE	PAGE
1. STUDY CORRIDOR CHARACTERISTICS.....	9
2. LEVEL OF SERVICE AND DELAY FOR UNSIGNALIZED INTERSECTIONS .....	34
3. 2024 INTERSECTION CAPACITY ANALYSIS RESULTS – EXISTING TRAFFIC CONDITIONS.....	35
4. 2028 INTERSECTION CAPACITY ANALYSIS RESULTS – PROJECTED TRAFFIC CONDITIONS WITHOUT THE PROJECT .....	36
5. TRIP GENERATION FOR PICKENS GAP ROAD SUBDIVISION .....	38
6. 2028 INTERSECTION CAPACITY ANALYSIS RESULTS – PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT .....	45
7. TURN LANE STORAGE & VEHICLE QUEUE SUMMARY – 2028 PROJECTED PEAK HOUR TRAFFIC WITH THE PROJECT .....	49

## EXECUTIVE SUMMARY

### **Preface:**

Heartland Development proposes a residential development adjacent to Pickens Gap Road in deep South Knox County, TN. The proposed development will include a total of 169 single-family detached houses on 84.55 +/- acres. One of the 169 single-family detached houses on the proposed development property will include an existing house located at 8922 Pickens Gap Road that will remain. Thus, 168 new single-family detached houses will be constructed, creating additional trips on the road network. This development is referenced as the “Pickens Gap Road Subdivision” since an official name has not been chosen. The development will be built in a single phase and is anticipated to be fully built and occupied by 2028. The development proposes a single entrance at Pickens Gap Road, 860 feet south of the existing t-intersection with Tarklin Valley Road and 360 feet north of the existing t-intersection with Whaley Lane.

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

### **Study Results:**

The significant findings of this study include the following:

- The Pickens Gap Road Subdivision, with a total of 168 new single-family detached houses, is estimated to generate 1,626 trips at full build-out and occupancy on an average weekday. Of these daily trips, 119 are estimated to occur during the AM peak hour and 162 in the PM peak hour in 2028.
- The projected 2028 peak hour level of service calculations for the intersection of Pickens Gap Road at the Proposed Entrance and Pickens Gap Road at Tarklin Valley Road resulted in reasonable and short vehicle delays. The projected 2028 vehicle queue lengths are also calculated to be minimal and sufficiently contained in the provided vehicle lanes at the intersections.
- Visual observations of the sight distances at the Proposed Entrance were undertaken. Based on visual observation, the available sight distance from the Proposed Entrance location at Pickens Gap Road to the north is estimated to be

- adequate for motorists exiting the development. Also, after further investigation by the site engineer, the sight distance to the south was determined to be adequate.
- Based on Knox County standards, the projected intersection 2028 volumes of Pickens Gap Road at the Proposed Entrance will not warrant an exclusive southbound left-turn lane or a northbound right-turn lane on Pickens Gap Road for motorists entering the development.
  - The primary access road for this development, Pickens Gap Road, has measured road widths of 17.0 to 25.1 feet between the proposed subdivision entrance and the existing 3-way intersection of Tarklin Valley Road at Pickens Gap Road to the north.
  - Due to the narrowness of Pickens Gap Road to the south and east of the proposed development, it is preferable that the future residents of the Pickens Gap Road Subdivision utilize the wider section of Pickens Gap Road to the north and access Tarklin Valley Road, Highland View Drive, and Tipton Station Road for travel to and from external destinations.

### **Recommendations:**

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

### **Pickens Gap Road at the Proposed Entrance:**

- 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 Pickens Gap Road. The stop bar should be applied a minimum of 4 feet away from the edge of Pickens Gap Road 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. Visual distance observations were made and followed up by the site designer, who determined that the sight distance is 400 feet to the north and 350 feet to the south, with existing and future vegetation management. A sight distance to the south of 350 feet would be adequate since Pickens Gap Road on this southern section is recommended to have a posted speed limit of 25 mph and also recommended to be posted with a Side Road Warning

Sign (W2-2) and an advisory speed limit plaque of 25 mph (W13-1). Furthermore, the existing road width and horizontal alignment on Pickens Gap Road south of the Proposed Entrance will significantly counteract vehicle speeds greater than 35 mph.

- At the Proposed Entrance, it is recommended that a mountable barrier allowing exiting right-turns only to the north be installed to restrict exiting left turns towards the south on Pickens Gap Road due to its narrowness. Appropriate signage should also be installed to dissuade left turns to the south. However, entering left turns from the north and entering right turns from the south on Pickens Gap Road should be fully accommodated. This recommendation should be discussed further with Knox County Engineering.
- It is recommended that Side Road Warning Signs (W2-2) be installed on Pickens Gap Road in both directions a minimum of 125 feet from the Proposed Entrance with an advisory speed limit plaque of 25 mph (W13-1).

**Pickens Gap Road:**

- \* • During a prior site visit in February 2024, a Stop Ahead Sign (W3-1) was observed posted on Pickens Gap Road for northbound traffic in advance of the intersection with Tarklin Valley Road. This sign was posted between the roadway and creek near the 8913 Pickens Gap Road residence and has since disappeared. It is recommended that this sign be re-installed at this location.
- \* • Due to the unconventional nature of the stop conditions at the t-intersection of Tarklin Valley Road at Pickens Gap Road (southbound traffic on Pickens Gap Road does not stop), it is recommended that Knox County install supplemental plaque signage below the Stops Signs (R1-1). These include a "Traffic From Left Does Not Stop" Sign (W4-4aLP) for the Tarklin Valley Road approach, and an "Oncoming Traffic Does Not Stop" Sign (W4-4bP) for the northbound Pickens Gap Road approach.
- \* • The eastern pavement edge of Pickens Gap Road between Whaley Lane and Tarklin Valley Road is compromised in several spots, and this is due to the undercutting of the roadway by the creek adjacent to Pickens Gap Road. White spray pavement markings have been applied at one of these compromised spots where this is occurring, and it is unknown if Knox County Engineering or others marked this for future attention. These pavement edges need to be stabilized.
- \* • Due to the narrowness of Pickens Gap Road to the south of the development site, it is recommended that the edges of the roadway south of Whaley Lane be

delineated with white edge lines up to the Blount County line.

- \* • Due to the narrowness of Pickens Gap Road to the south of the development site, it is recommended that a Road Narrows Sign (W5-1) be posted for southbound traffic on Pickens Gap Road and installed north of Whaley Lane.
- \* • In advance of the Blount County line and a very sharp vertical crest curve, a Hill Blocks View Sign (W7-6) is recommended to be installed in advance of the blind hill for southbound traffic on Pickens Gap Road heading towards Blount County.
- \* • The Type 3 Object Marker at the sharp vertical curve at the Blount County line facing northbound traffic is incorrectly installed. It is shown as a “left” object marker but should be displayed as a “right” object marker.
- \* • Knox County should consider installing 25-mph Speed Limit Signs (R2-1) for the narrowed section of Pickens Gap Road to the south and east of the development site. These signs should be installed for northbound vehicles entering Knox County from Blount County and for southbound vehicles heading towards Blount County and posted prior to Whaley Lane.
- Pickens Gap Road is recommended to be widened to a minimum width of 18.5 feet between the Proposed Entrance and the intersection with Tarklin Valley Road, which is approximately 860 feet.

#### **Pickens Gap Road Subdivision Internal Roads:**

- A 25-mph Speed Limit (R2-1) sign is recommended to be posted near the beginning of the development entrance off Pickens Gap Road. It is also recommended that a “No Outlet” Sign (W14-2a) be posted at the front of the subdivision. This sign can be posted above or below the street name sign.
- Stop Signs (R1-1) with 24” white stop bars are recommended to be installed at the internal road locations, as shown in the report.
- Dual end-of-roadway object markers (OM4-1) should be installed at the end of the internal roads in the subdivision that end in partial hammerhead turnarounds. Furthermore, an additional sign should be posted at the end of the stub-out road on the northeast side of the site to follow Knoxville-Knox County Subdivision regulations. This sign is for notification of a possible future street connection. It should state, “NOTICE – This road may be extended and connected to the east – for more info. contact Knox Co. Engineering & Public Works (865) 215-5800”.
- Sight distance at the new internal intersections must not be impacted by new signage, parked cars, or future landscaping. With a proposed speed limit of 25-mph in the development, the internal intersection sight distance is 250 feet. The

required stopping sight distance is 155 feet for a level road grade. The site designer should ensure that internal sight distance lengths are met and account for different proposed road grades.

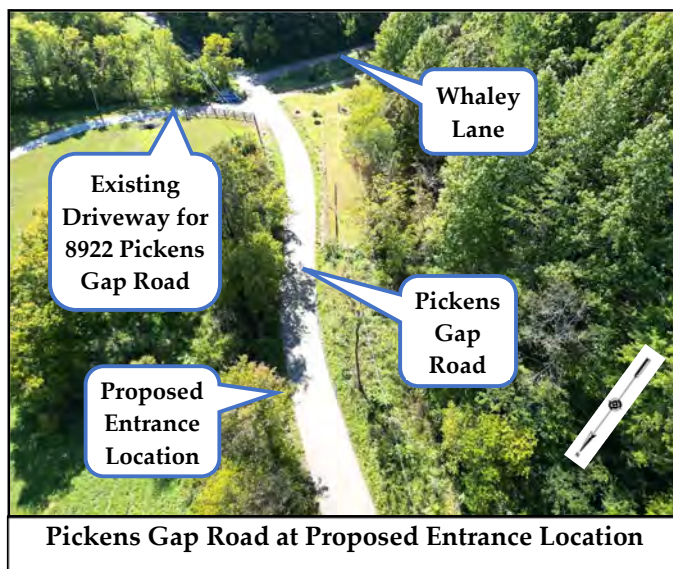
- All drainage grates and covers for the residential development must be pedestrian and bicycle-safe.
- Several of the internal roadways will have long, straight segments. Straight road segments encourage higher vehicle speeds. It is recommended that the site designer consider including traffic calming measures on these segments, such as speed humps or tables. Specifics regarding this recommendation should be discussed in the design phase with Knox County Engineering.
- For residential subdivisions with more than 150 housing units, Knox County has a long-standing unwritten design policy requiring a boulevard road section at the entrance if a secondary access point is not provided. Since the proposed layout of the Pickens Gap Road Subdivision only provides one means of ingress and egress and will have 168 new units, the subdivision entrance may need to be designed and constructed with a boulevard roadway section. A decision regarding this issue should be coordinated with Knox County Engineering.
- All road and intersection elements should be designed to AASHTO and Knox County specifications and guidelines to ensure proper transportation operations.



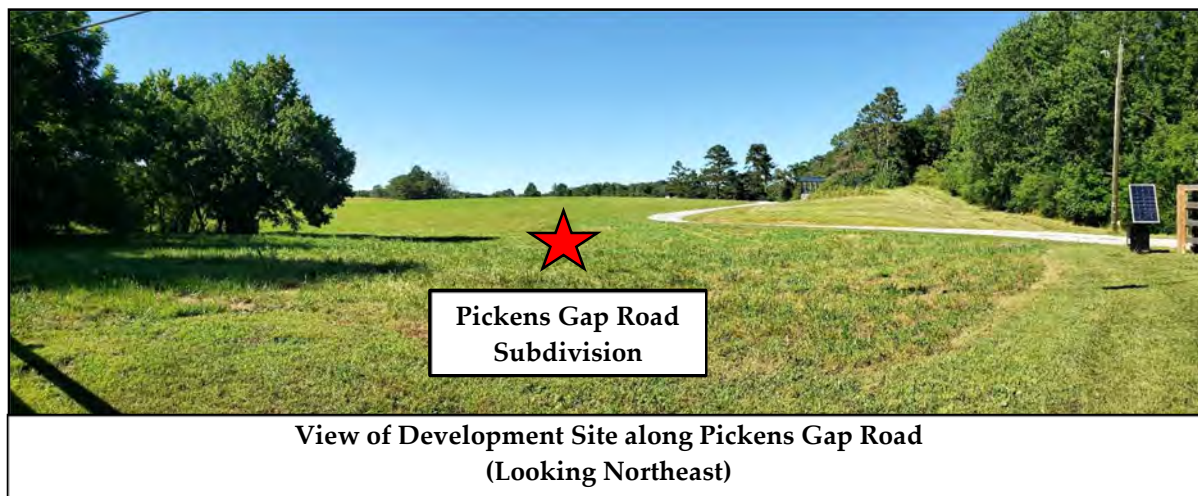
## DESCRIPTION OF EXISTING CONDITIONS

### ▪ STUDY AREA:

The proposed location of this new residential development is shown on a map in Figure 1. This proposed development will be located on the east side of Pickens Gap Road between Tarklin Valley Road and Whaley Lane in deep South Knox County, TN. The development site is about 2.5 miles (as the crow flies) to the south of the intersection of Chapman Highway (US 441/SR 71) and Governor John Sevier Highway (SR 168). The proposed development will have a single entrance to Pickens Gap Road that is also approximately 300 feet north of the existing driveway for the residence at 8922 Pickens Gap Road.



As Knoxville/Knox County Planning requested, transportation impacts associated with the proposed development were analyzed at the intersection where the Proposed Entrance will tie into Pickens Gap Road and at the existing t-intersection of Pickens Gap Road at Tarklin Valley Road. The intersection of Pickens Gap Road at Tarklin Valley Road is uncommon in that two of the three approaches are controlled by a Stop Sign (R1-1), with the southbound leg of Pickens Gap Road operating freely without any control.





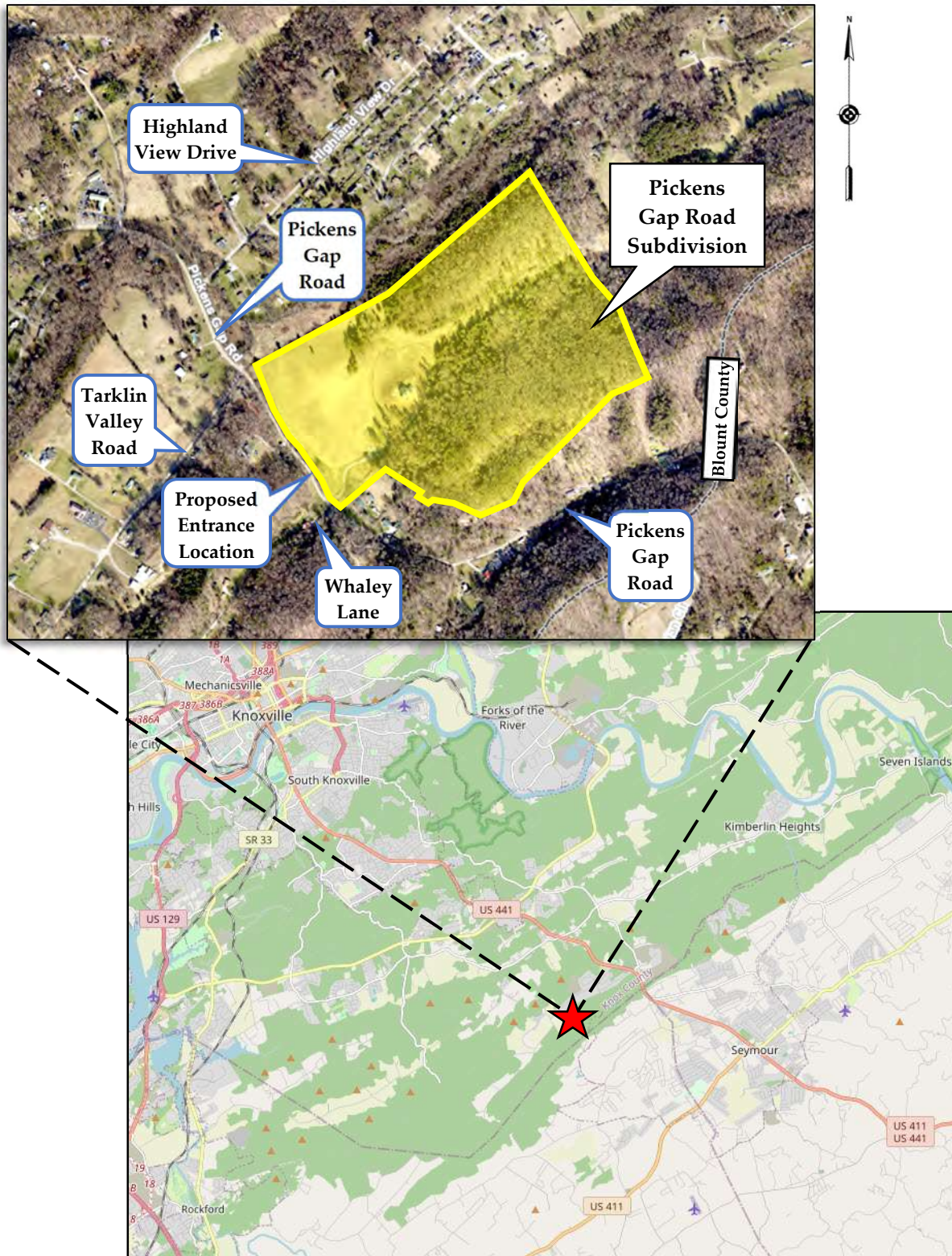
The proposed development property is in a rural area at the southern end of Knox County, close to the Blount County boundary. The Knox/Blount County boundary is 0.6 miles to the east-southeast of the proposed development property by roadway. The area surrounding the proposed development property primarily consists of residential houses on large parcels, with the bulk of the properties being forested or used for agricultural purposes.

The development property has over 900 feet of road frontage on the east side of Pickens Gap Road. However, road access is hampered due to the adjacent creek, an unnamed conveyance of Nickels Branch, which runs alongside the east side edge of Pickens Gap Road.

The proposed development property is primarily undeveloped, split between open areas previously used for farm activities and areas covered with forest. The development property was recently subdivided from a sizeable single parcel occupied by a large, new single-family detached house at 8922 Pickens Gap Road that will be incorporated into the proposed development. An existing large barn and other outbuildings will remain with the new house, and all will be partitioned into a separate estate of approximately 5.7 acres.



**Aerial View of Existing Single-Family Detached House and Barn**



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



▪ **EXISTING ROADWAYS:**

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

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

NAME	CLASSIFICATION <sup>1</sup>	SPEED LIMIT	LANES	ROAD WIDTH <sup>2</sup>	TRANSIT <sup>3</sup>	PEDESTRIAN FACILITIES	BICYCLE FACILITIES
Pickens Gap Road	Minor Collector	40 mph	2 lanes	17' - 25' (Variable)	None	No sidewalks	No bike lanes

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

<sup>2</sup> From edges of pavement near project site

<sup>3</sup> According to Knoxville Area Transit System Map

**Pickens Gap Road** is a Minor Collector roadway traversing generally in a northwest-southeast direction but is represented in this study with a north-south orientation. Pickens Gap Road has a total length of 3.9 miles and runs in Knox and Blount Counties. It begins to the northwest at a t-intersection with Tipton Station Road in Knox County and ends to the southeast in Blount County at a t-intersection with Burnett Station Road.

To the north of the t-intersection with Tarklin Valley Road, the posted speed limit on Pickens Gap Road is 40 mph. To the north, Pickens Gap Road has moderately wide lane widths on the section between the intersection of Tipton Station Road and Tarklin Valley Road. It is striped with white edge lines and a double yellow centerline. To the south of Tarklin Valley Road and along the proposed site road frontage, Pickens Gap Road is less generous in width and is delineated with only a double yellow centerline. Further to the south and east, past Whaley Lane and the development site, Pickens Gap Road is narrow and has no pavement markings. This narrower section of Pickens Gap Road is not posted with a speed limit but would be assumed to be lower than 40 mph due to the road geometry and width. At the county boundary, Pickens Gap Road has a very sharp, blind vertical crest curve. Pickens Gap Road is posted with a speed limit of 25 mph for southbound motorists entering Blount County.

Pickens Gap Road provides access to residential houses, farm properties, and undeveloped properties. Sidewalks and bike lanes are not provided on this road, and utility lights for road illumination are not provided. Curbing is not provided along the edge of Pickens Gap Road. Along the eastern edge of the development property road frontage, the stability of the Pickens

Gap Road pavement is compromised at points by the unnamed water conveyance adjacent to the roadway, with some asphalt being lost and damaged.

Overall, Pickens Gap Road has relatively good pavement surface conditions; however, its width is less than optimal and significantly narrows south of Whaley Lane and the proposed development site as it progresses towards Blount County.

For the most part, the majority of the proposed subdivision's generated traffic will be encouraged and preferred to travel on Pickens Gap Road to and from the north to and from external destinations. Nonetheless, as part of the Transportation Impact Study (TIS) requested scope of work provided by Knoxville/Knox County Planning, road width measurements were made on Pickens Gap Road between Highland View Drive to the north in Knox County and IC King Road to the south in Blount County, a distance of 5,850 feet. The following pages list the road width measurements made on Pickens Gap Road and include pictures of the roadway. Road width measurements on Pickens Gap Road were made every 250 feet. As shown in the following road sections, the width of Pickens Gap Road was measured at its widest at 27 feet at the intersection of Highland View Drive and its narrowest at 15.3 feet just north of IC King Road in Blount County. The road's narrowest point in Knox County was measured at 15.4 feet. Adjacent to the proposed development site, Pickens Gap Road was measured with road widths between 17.0 and 25.1 feet.

Following these road section pages, Figure 2 shows the existing lane configurations in the study area, the traffic count locations for the study, and the current traffic road signage near the development site. The road signage shown in Figure 2 only includes warning and regulatory signage near the development site. After Figure 2, a further overview of the site study area with photographs is provided.

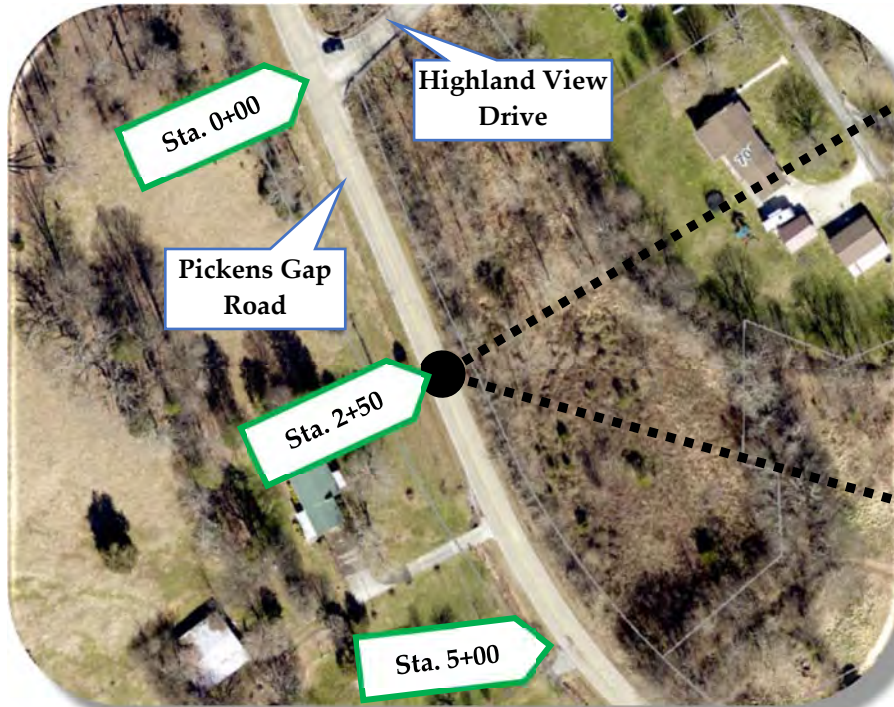
Section 1 Information:

Pavement Width of Pickens Gap Road @:

Station 0+00 = 27.0' (Center of Highland View Drive)

Station 2+50 = 23.8'

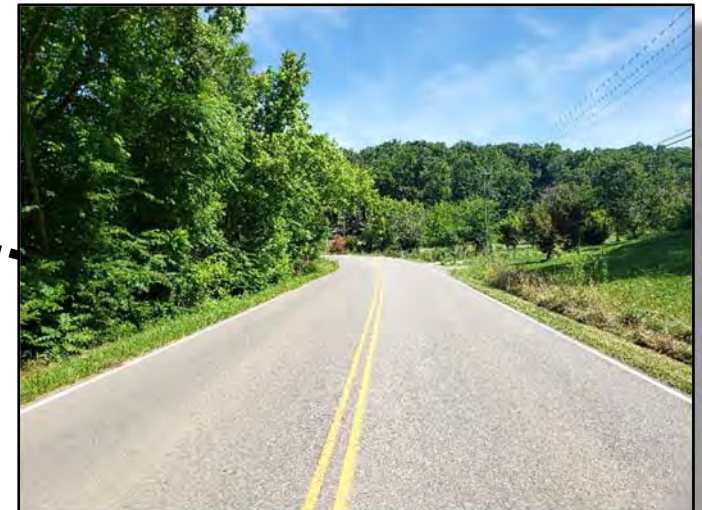
Station 5+00 = 23.8'



Pickens Gap Road  
Station 2+50



View of Pickens Gap Road  
(Looking Northwest)



View of Pickens Gap Road  
(Looking Southeast)

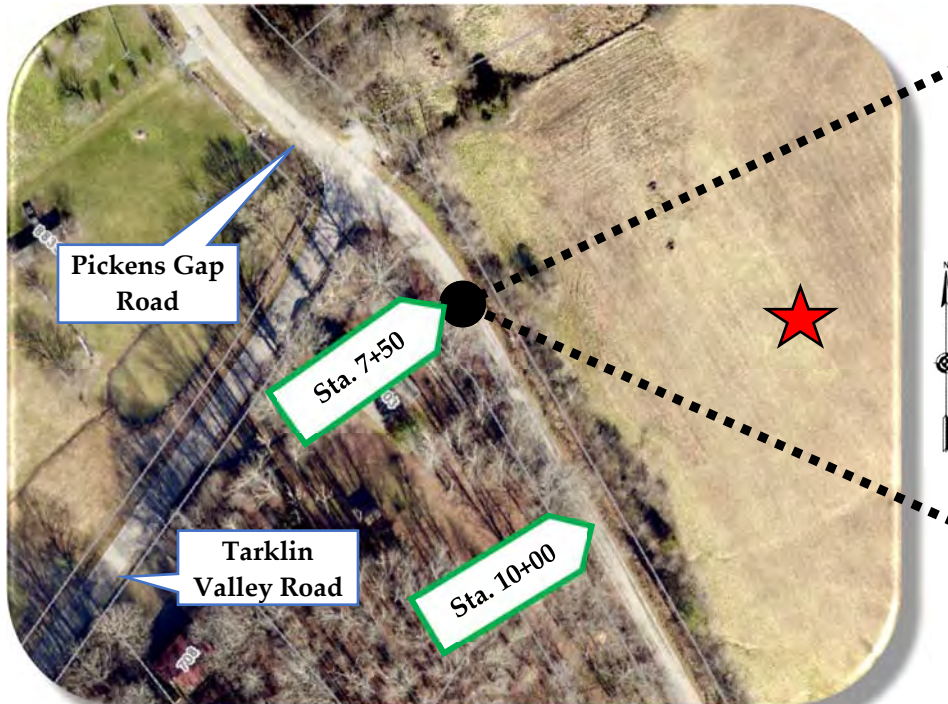


Section 2 Information:

Pavement Width of Pickens Gap Road @:

Station 7+50 = 25.1'

Station 10+00 = 17.0'



Pickens Gap Road  
Station 7+50



View of Pickens Gap Road  
(Looking Northwest)



View of Pickens Gap Road  
(Looking Southeast)



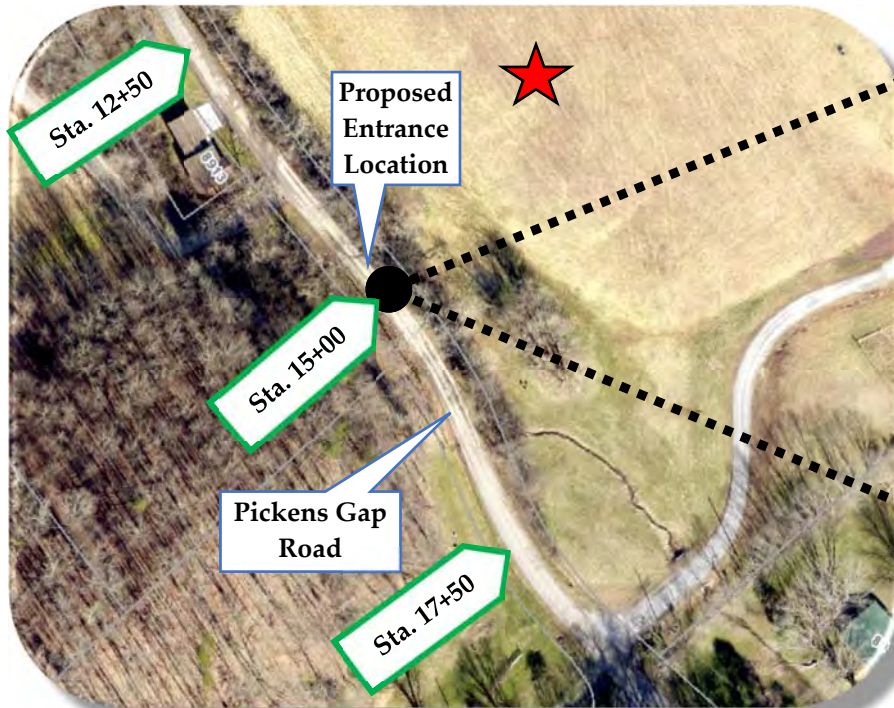
Section 3 Information:

Pavement Width of Pickens Gap Road @:

Station 12+50 = 18.5'

Station 15+00 = 17.3'

Station 17+50 = 18.9'



Pickens Gap Road  
Station 15+00



View of Pickens Gap Road  
(Looking Northwest)



View of Pickens Gap Road  
(Looking Southeast)



#### Section 4 Information:

Pavement Width of Pickens Gap Road @:

Station 20+00 = 18.0'

Station 22+50 = 18.0'

Station 25+00 = 16.5'



Pickens Gap Road  
Station 22+50



View of Pickens Gap Road  
(Looking Northwest)



View of Pickens Gap Road  
(Looking Southeast)



Section 5 Information:

Pavement Width of Pickens Gap Road @:

Station 27+50 = 15.7'

Station 30+00 = 16.0'



Pickens Gap Road  
Station 30+00



View of Pickens Gap Road  
(Looking Southwest)



View of Pickens Gap Road  
(Looking Northeast)



Section 6 Information:

Pavement Width of Pickens Gap Road @:

Station 32+50 = 16.5'

Station 35+00 = 15.4'

Station 37+50 = 16.0'



Pickens Gap Road  
Station 35+00



View of Pickens Gap Road  
(Looking Southwest)



View of Pickens Gap Road  
(Looking Northeast)



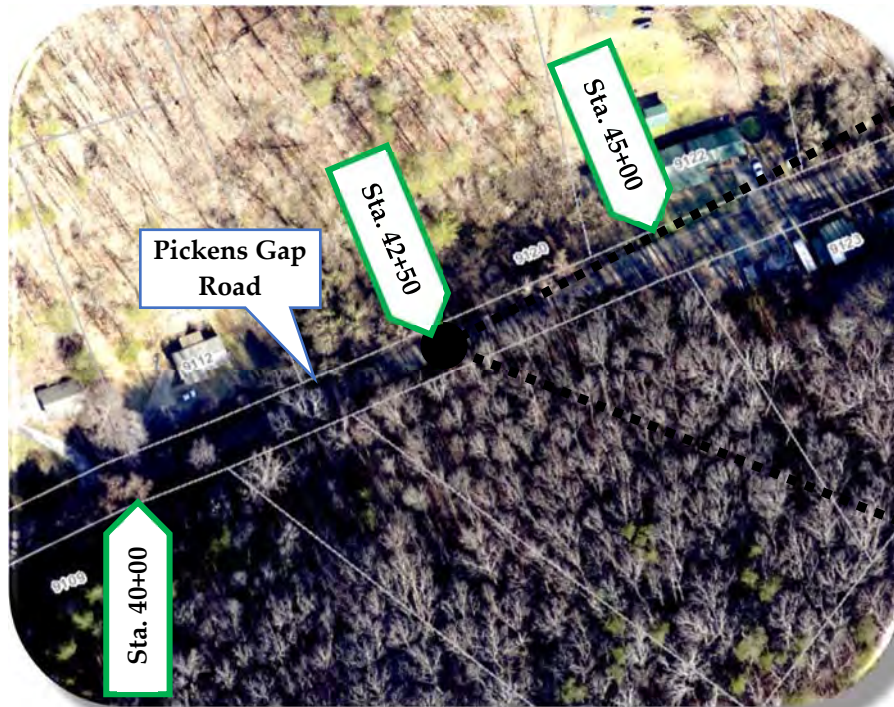
Section 7 Information:

Pavement Width of Pickens Gap Road @:

Station 40+00 = 17.1'

Station 42+50 = 16.7'

Station 45+00 = 17.9'



Pickens Gap Road  
Station 42+50



View of Pickens Gap Road  
(Looking Southwest)



View of Pickens Gap Road  
(Looking Northeast)



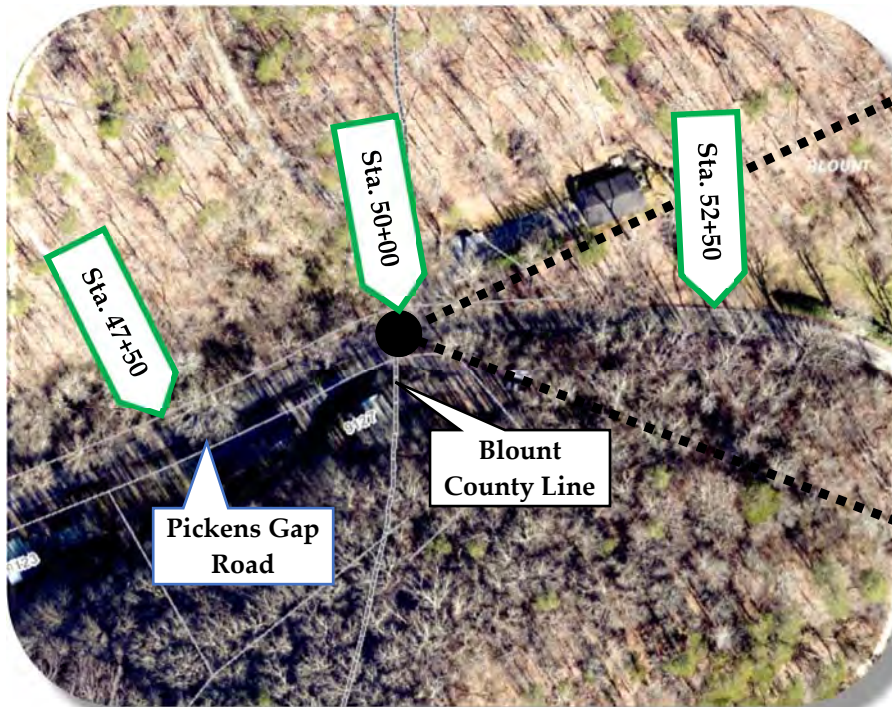
Section 8 Information:

Pavement Width of Pickens Gap Road @:

Station 47+50 = 17.4'

Station 50+00 = 19.2'

Station 53+50 = 17.8'



Pickens Gap Road  
Station 50+00



View of Pickens Gap Road  
(Looking Southwest)



View of Pickens Gap Road  
(Looking East)



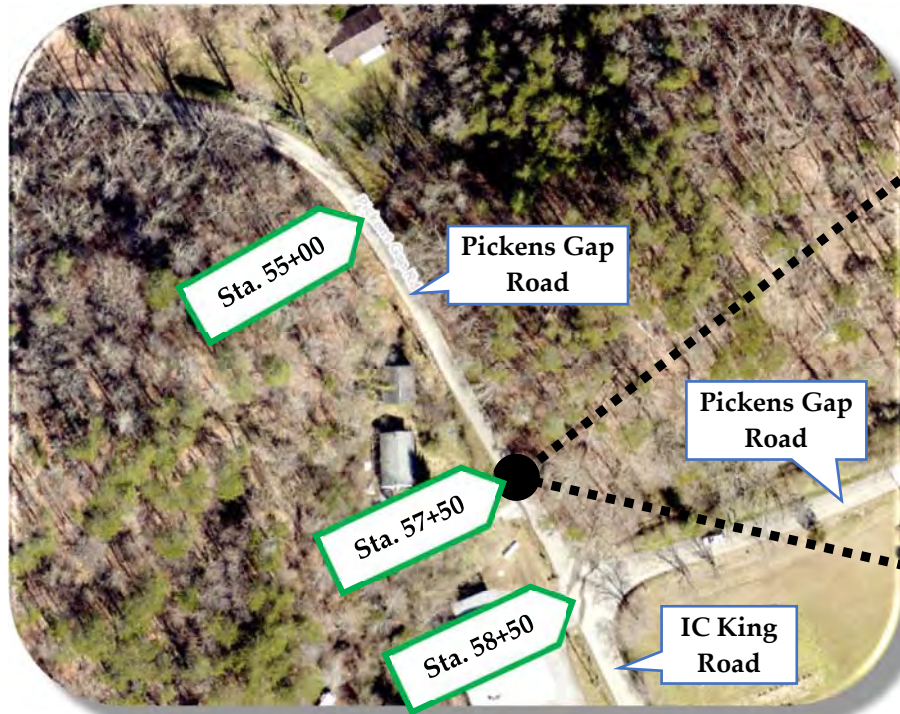
Section 9 Information:

Pavement Width of Pickens Gap Road @:

Station 55+00 = 15.4'

Station 57+50 = 15.3'

Station 58+50 = 18.5' (at I.C. King Road)



Pickens Gap Road  
Station 57+50

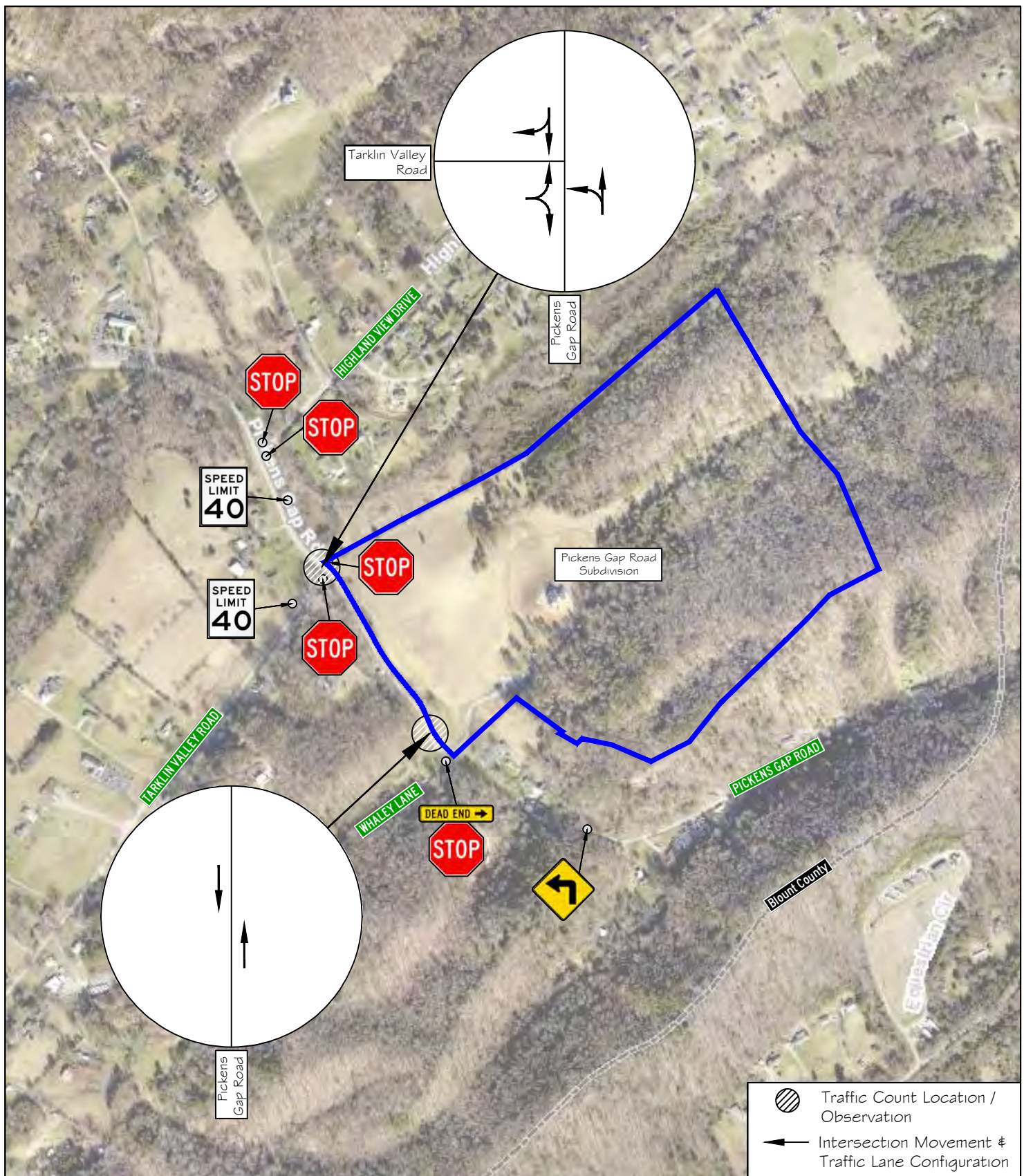


View of Pickens Gap Road  
(Looking Northwest)



View of Pickens Gap Road  
(Looking Southeast)





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

NOT TO SCALE



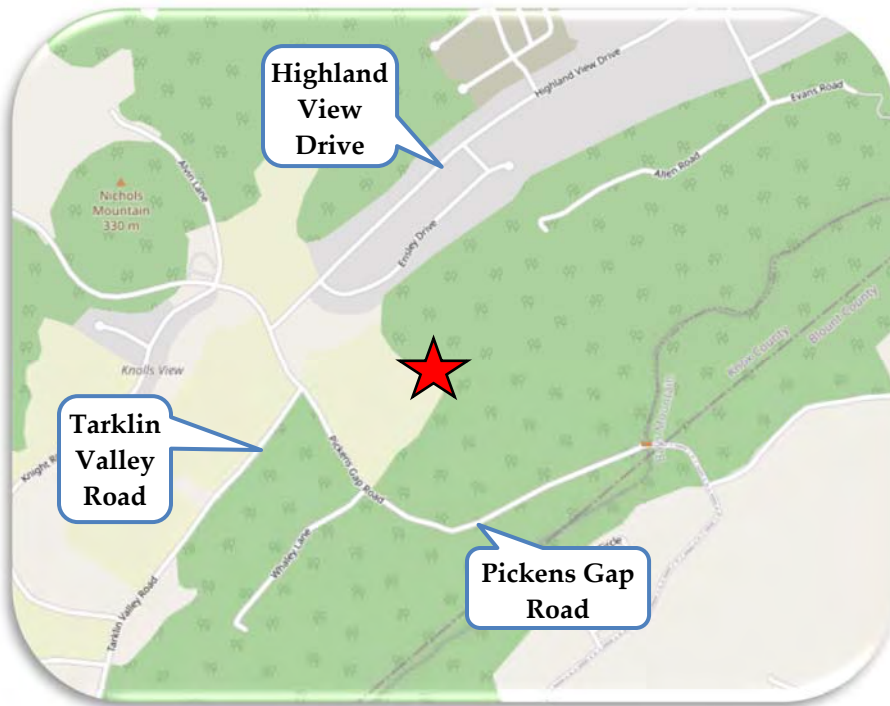
FIGURE 2

Pickens Gap Road Subdivision

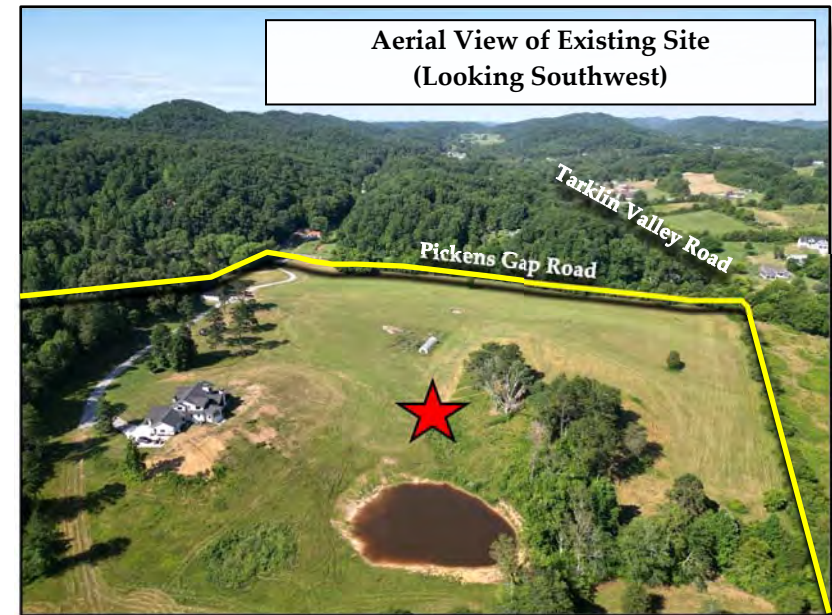
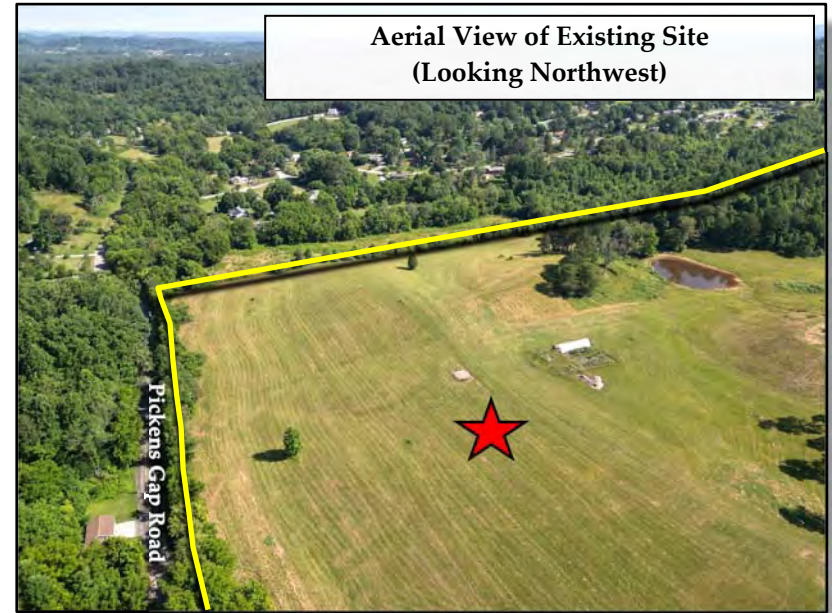
Traffic Count Locations, Traffic Signage & Existing Lane Configurations



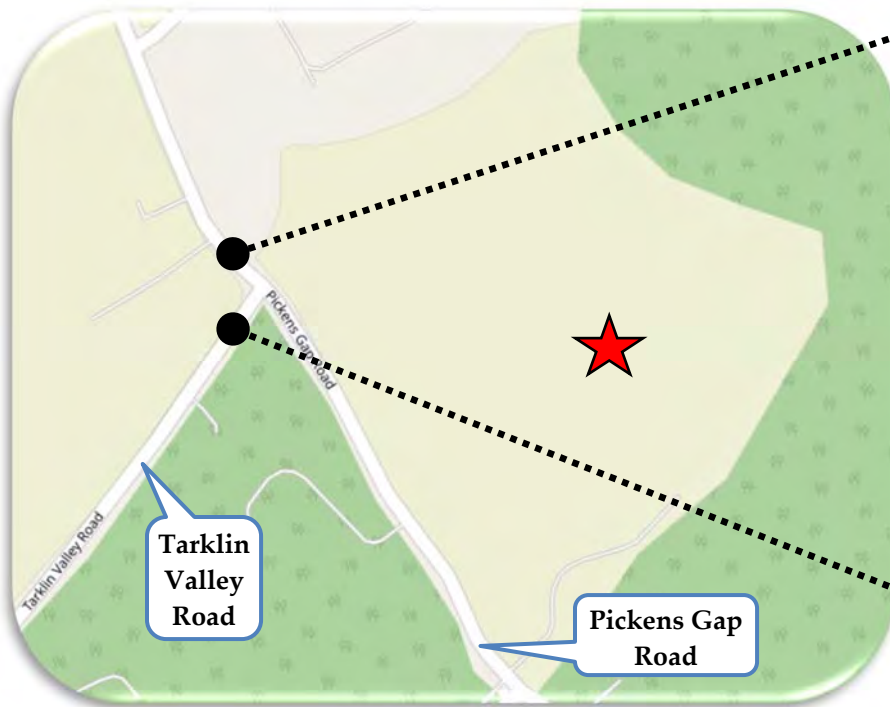
## PHOTO EXHIBITS



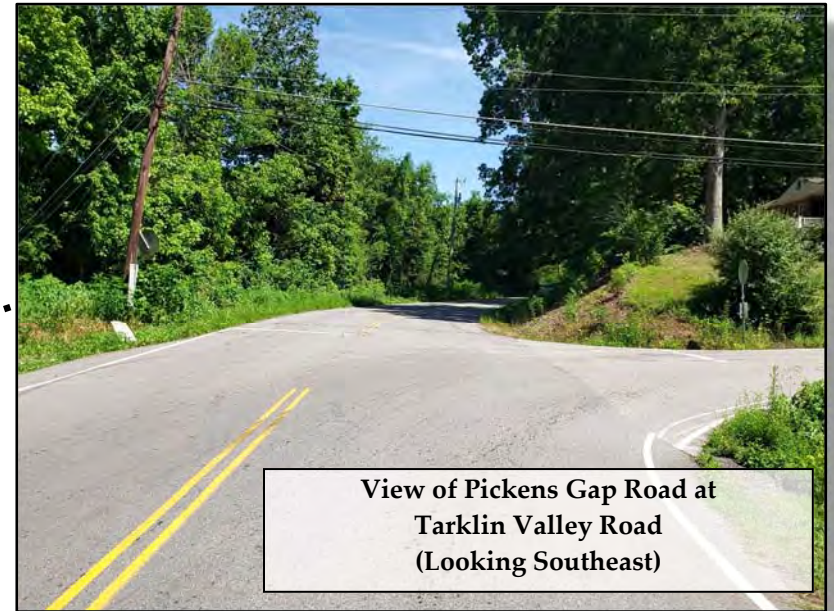
Proposed Development Site







Pickens Gap Road at Tarklin Valley Road



View of Pickens Gap Road at  
Tarklin Valley Road  
(Looking Southeast)



View of Tarklin Valley Road at  
Pickens Gap Road  
(Looking Northeast)

▪ **EXISTING TRANSPORTATION VOLUMES PER MODE:**

Two annual vehicular traffic count locations exist near the study area, and the Knoxville Transportation Planning Organization (TPO) conducts these counts. These counts have been conducted sporadically over the past ten years, with the latest published data being from 2022. The count location data is the following and can be viewed with further details in Appendix A:

○ Existing vehicular roadway traffic:

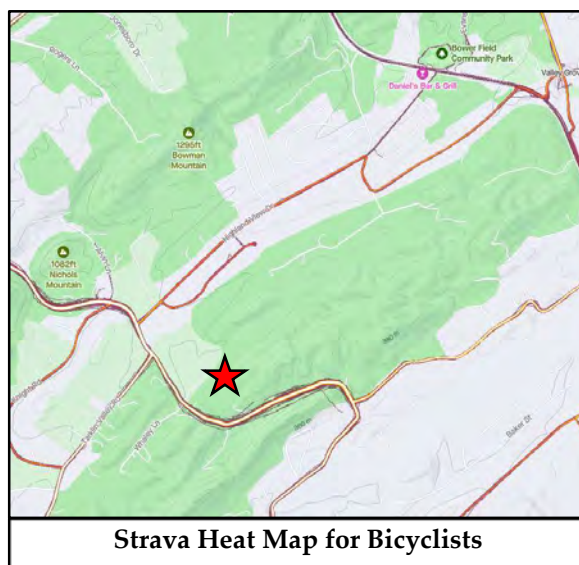
The TPO reported an Average Daily Traffic (ADT) on Pickens Gap Road south of Tipton Station Road and north of the development site at 1,980 vehicles per day in 2022. From 2016 to 2022, this count station has indicated a -2.7% average annual traffic growth rate.

The TPO reported an ADT on Highland View Drive west of Simpson Road and north of the development site at 2,030 vehicles per day in 2022. From 2014 to 2022, this count station has indicated a 3.9% average annual traffic growth rate.

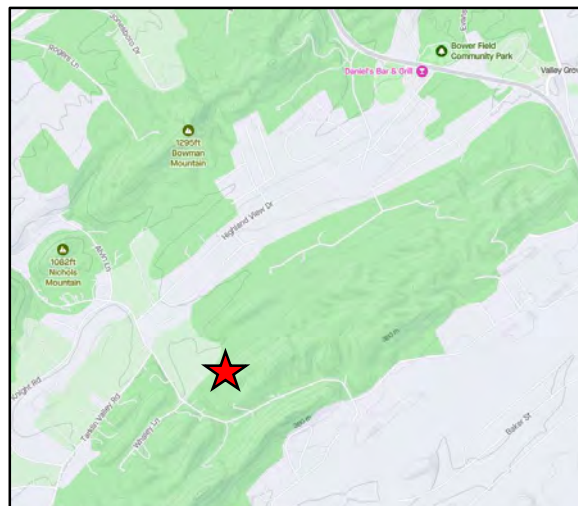
○ Existing bicycle and pedestrian volumes:

The average daily pedestrian and bicycle traffic along Pickens Gap Road is unknown. Due to the lack of facilities, it was initially presumed that few pedestrians and bicyclists use Pickens Gap Road in the study area. Only one jogger and two bicyclists were observed during the traffic counts for this project.

An online website, [strava.com](https://www.strava.com), provides “heat” maps detailing routes taken by pedestrians, joggers, and bicyclists. The provided heat maps show the last two years of data, are updated monthly, and are gathered from individuals, allowing their smart devices to track and compile their routes (millions of users). The activities in the maps are shown on the roads with color intensities with darker colors signifying higher activity. Surprisingly, against initial assumptions, a fair amount of bicycle activity is shown on Pickens Gap Road and several other roads in the surrounding area. However, no



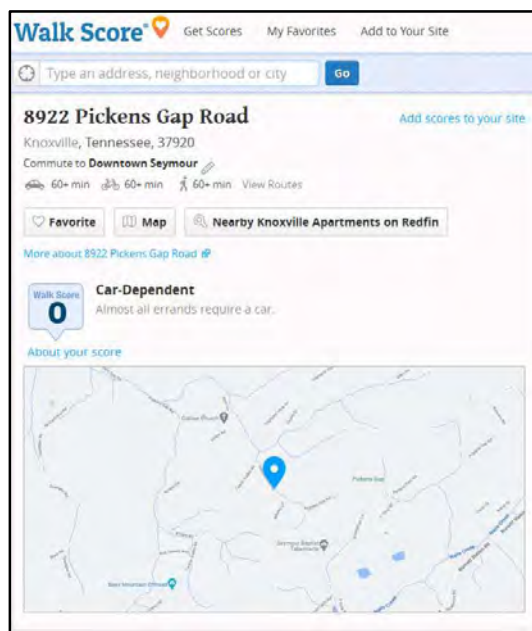
pedestrian activity is recorded on Pickens Gap Road or other roadways adjacent to the development site. It is suspected that the bicyclist activity in the area is due to the isolated nature of the roadways with lower vehicle volumes, the relative flatness of the terrain, and the attractiveness of the rural setting.



Strava Heat Map for Pedestrian and Joggers

▪ **WALK SCORE:**

A private company offers a 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.



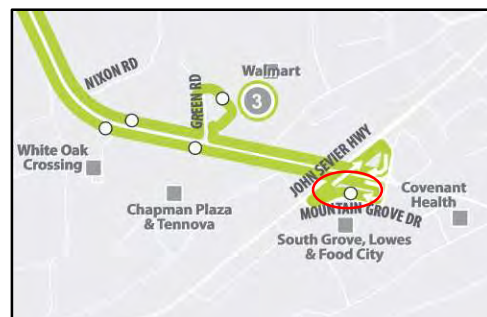
The project site location is graded with a Walk Score of 0 at the development property address (8922 Pickens Gap Road). This Walk Score indicates that almost all errands currently require a vehicle for travel at the development property. The Walk Score is graded at zero due to the lack of sidewalks and nearby amenities. The site is not given a Bike Score due to the lack of bike infrastructure. The site is also not given a Transit Score since no public transportation locations are near the development site. Overall, for this study, no trip reductions for pedestrian or bicyclist activity were used or assumed.

▪ **TRANSIT SERVICES:**

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



The closest public transit bus stop to the development site is 3.8 miles to the north on Route 41, “Chapman Highway”, and is on Mountain Grove Drive in front of the Lowe’s Home Improvement Store in the South Grove Development. On August 26<sup>th</sup>, 2024, KAT made several changes and improvements to their routes. Only a minor route change was made during this recent update. This route has established bus service every 30 minutes at this



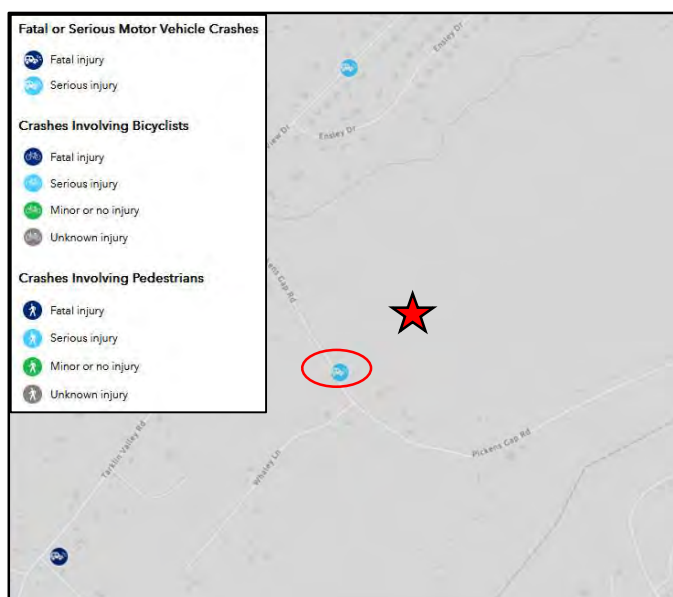
**KAT Route 41, “Chapman Highway”**

bus stop. It operates on weekdays and weekends; the route map is also included in Appendix B. The new schedule for this route is also included in Appendix B. Other transit services in the area include the East Tennessee Human Resource Agency (ETHRA) and the Community Action Committee (CAC), which provides transportation services when requested.

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

▪ **CRASH DATA:**

The Knoxville Transportation Planning Organization (TPO) provides a website that lists bicycle, pedestrian, and vehicle severe or fatal crashes from October 2016 to September 2021. The data shows one incident occurred near the proposed location of the subdivision entrance at Pickens Gap Road during those reported years. This incident involved a serious injury on October 22<sup>nd</sup>, 2019. However, no crash factors were listed as the cause.



**Bicycle, Pedestrian, and Vehicle Crash Data  
in Study Area (TPO)**

## PROJECT DESCRIPTION

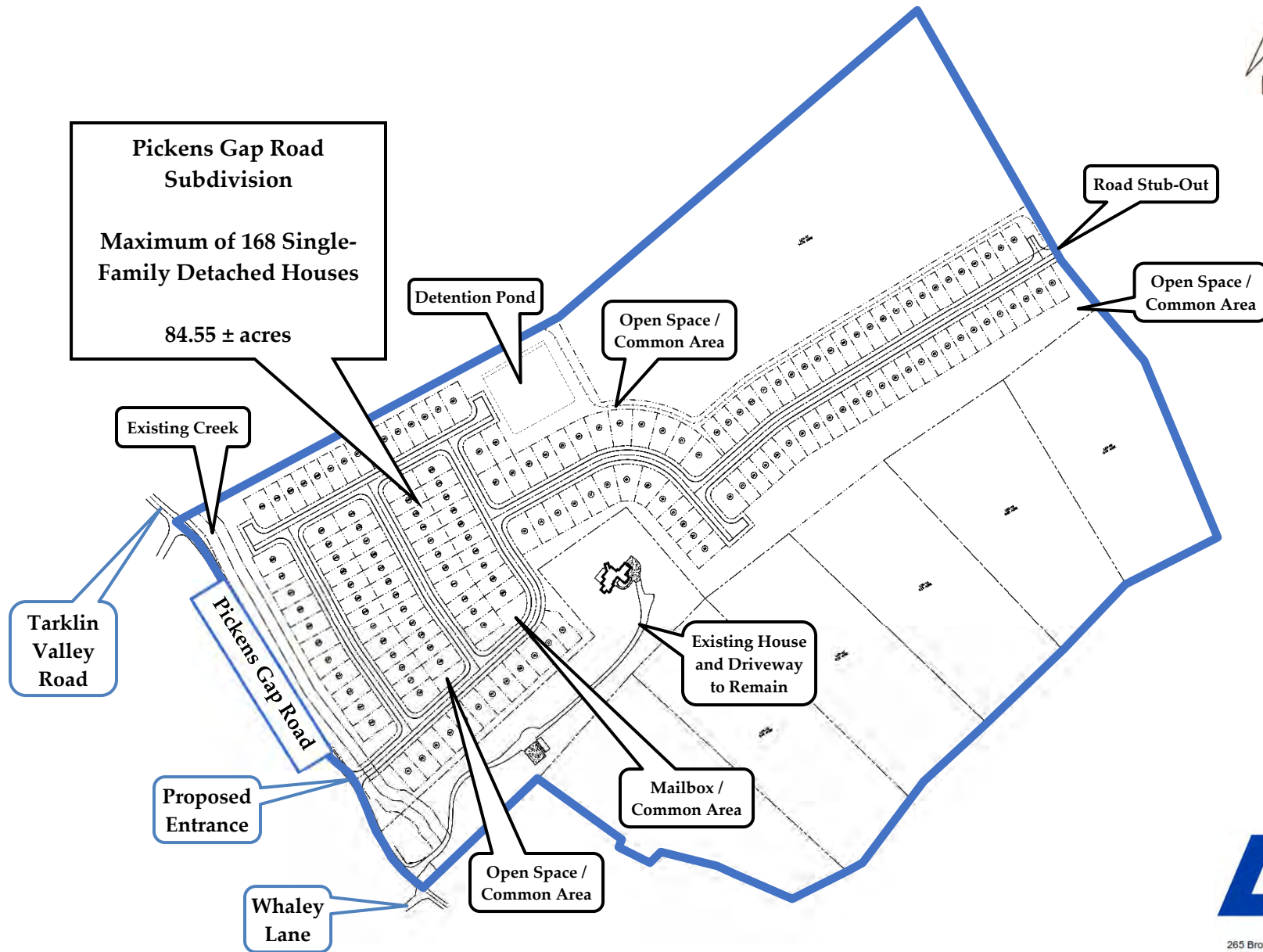
### ▪ LOCATION AND SITE PLAN:

The proposed plan layout with a total of 168 new single-family detached houses on 84.55 +/- acres is designed by LJA Engineering and is shown in Figure 3. As shown in the figure, six new streets will be constructed for the residential development. The majority of the internal intersections will be t-shaped. A few of the internal roads will end with partial hammerhead turnarounds. The internal roadway furthest to the northeast will end with a partial hammerhead turnaround and a stub-out road, allowing for a connection for any potential future development further to the east.

The subdivision will have one entrance on Pickens Gap Road, 860 feet south of the existing t-intersection with Tarklin Valley Road and 360 feet north of the existing t-intersection with Whaley Lane. This entrance will cross the unnamed conveyance of Nickels Branch, which is adjacent to Pickens Gap Road on the east side. The existing driveway for the new single-family detached house at 8922 Pickens Gap Road will remain. It will have separate road access to and from the development property via the existing driveway. Overall, large areas of the development property will remain undeveloped due to topography, hillside protections, zoning restrictions, and creek buffers.

The 84.55-acre residential development will incorporate several common areas with a few large, subdivided lots to the south and a single one to the northeast. These large lots will not be subdivided further and will be reserved for large estates with a single-family house on each. The minimum area of the single-family detached house lots along the proposed internal streets will be 4,200 ft<sup>2</sup>, with a few lots over 6,000 ft<sup>2</sup> in size. Each house will have a garage and driveway. Besides common areas for future residents, no other subdivision amenities are being proposed. Sidewalks are not proposed for this development.

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



**Figure 3**  
**Proposed Plan Layout**  
**Pickens Gap Road Subdivision**



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www.LJA.com

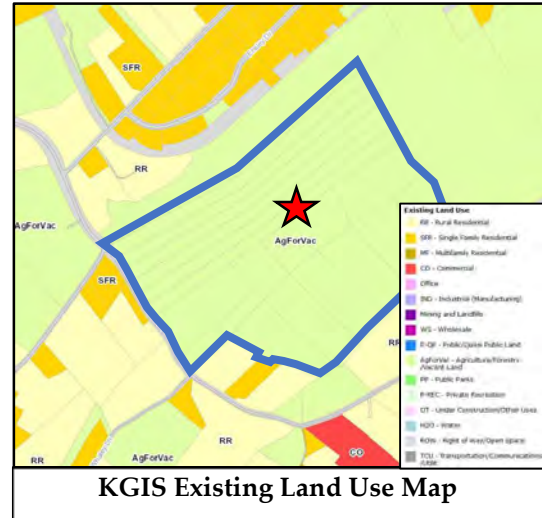
Not to Scale



▪ **PROPOSED USES AND ZONING REQUIREMENTS:**

The Pickens Gap Road Subdivision parcel was recently requested to be rezoned from Agricultural (A) to Planned Residential (PR). Knox County Commission gave this requested rezoning final approval on May 20<sup>th</sup>, 2024, and it was approved with a density of up to 2.0 units per acre. The Planned Residential (PR) zone in Knox County allows for various land uses primarily within the residential realm. Uses permitted in this zone include single-family dwellings, duplexes, and multi-dwelling structures and developments. The most recently published online KGIS zoning map is provided in Appendix C. The existing adjacent surrounding zoning and land uses are the following:

- All properties around the development property, except one to the northwest, are zoned as Agricultural (A), including those on the other side of Pickens Gap Road.
- One parcel is zoned to the northwest and north as General Residential (RB) and Agricultural (A). This parcel is undeveloped, narrow, long, nearly wholly forested, and bisected by Nickel Branch. This parcel has a field entrance with a gate at the intersection of Pickens Gap Road at Tarklin Valley Road.
- A single-family detached house is located on a large parcel to the east-northeast. In addition to the home, this property has a barn and a pasture, with most of the property covered in forest. Allen Road, a local street east of this parcel, provides road access to this residence.
- Six parcels are located south of the proposed development property, and all are zoned as Agricultural (A). These parcels are sandwiched between the proposed development property and Pickens Gap Road to the south. Most of these parcels have single-family detached houses located on them, and they have road access to Pickens Gap Road to the south. For the most part, outside of the house footprints, these parcels are nearly entirely forested.
- Pickens Gap Road binds the development property to the west-southwest. On the other side of Pickens Gap Road, all the properties are zoned as Agricultural (A). Single-family detached houses occupy each parcel on the other side of Pickens Gap Road, and all have road access to Pickens Gap Road to the east.



▪ **ON-SITE CIRCULATION:**

The total length of the six new streets within the development will be 5,215 feet (0.99 miles), designed and constructed to the Knox County, TN specifications. The development will have asphalt-paved internal roadways and concrete curbs. The lane widths internally will be 13 feet each for a total 26-foot pavement width. The Proposed Entrance is shown in the design with one exiting lane and one entering lane at Pickens Gap Road. 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 for service, delivery, maintenance, and fire protection/rescue vehicles. These vehicle types will not impact roadway operations except when they occasionally enter and exit the development. Curbside private garbage collection services are expected to be available for this residential subdivision if desired. The new public streets will be designed and constructed to Knox County specifications and are expected to be adequate for fire protection and rescue vehicles, trash collection trucks, and single-unit delivery trucks. The development's internal drives will accommodate the larger vehicle types and residents' standard passenger vehicles, and the partial hammerhead turnarounds will allow these vehicles to reverse direction at the streets that abruptly end.

## ANALYSIS OF EXISTING AND PROJECTED CONDITIONS

### ▪ EXISTING TRAFFIC CONDITIONS:

This study conducted a 6-hour traffic count at the unsignalized t-intersection of Pickens Gap Road and Tarklin Valley Road on Tuesday, July 2<sup>nd</sup>, 2024. The intersection functions with motorists on northbound Pickens Gap Road and Tarklin Valley Road operating under stop conditions and with Pickens Gap Road's southbound traffic operating freely. The manual traffic counts were conducted to tabulate the morning and afternoon peak period volumes and travel directions near the proposed development site. Based on the traffic volumes collected, the AM and PM peak hours were observed at 7:15 – 8:15 a.m. and 4:45 – 5:45 p.m. 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 D.

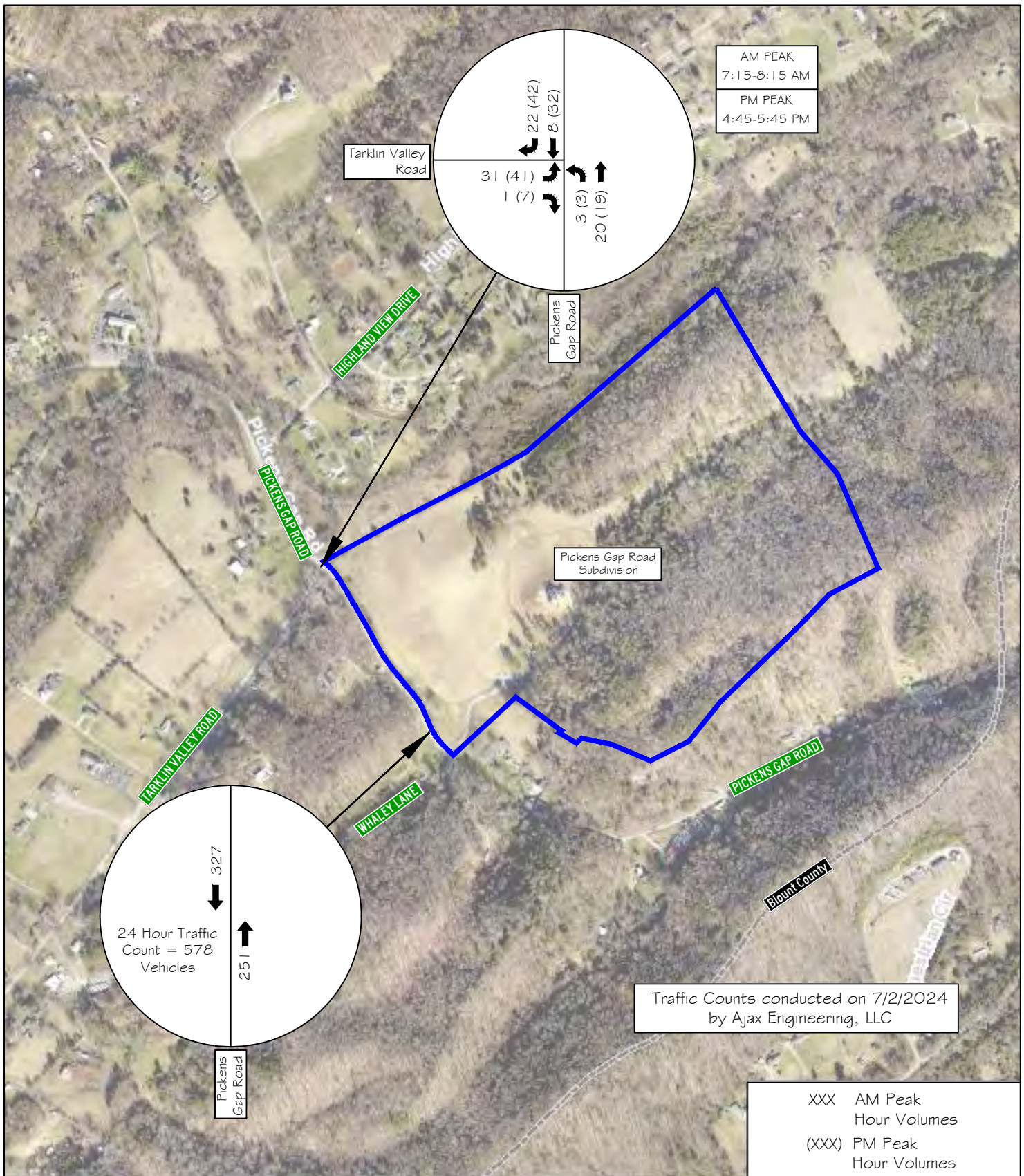
Since the traffic counts were collected while schools were out for summer break, an assumed factor was applied to the tabulated volumes to account for the missing school traffic. (This report was originally going to be submitted before schools started for Fall 2024, which is why traffic counts were conducted in the summer). The assumed factor was chosen based on past engineering experience when school traffic was not included. A factor of 15% was applied to the tabulated AM and PM peak hour volumes, and these adjusted volumes are shown in Figure 4b. The subsequent analyses in the study were based on these adjusted volumes. A factor higher than 15% was not considered appropriate since the development property is reasonably far away from any Knox County elementary, middle, and high schools.

A few observations from the count are listed below.

- One jogger and two bicyclists were observed during the traffic counts at the intersection. The jogger was observed running southbound on Pickens Gap Road and turned right to the west onto Tarklin Valley Road. One bicyclist was observed continuing south at the intersection on Pickens Gap Road from the north, and one was observed northbound on Pickens Gap Road and turned west onto Tarklin Valley Road at the intersection.
- Nearly all the observed traffic was passenger vehicles. No heavy and large vehicles were observed besides a large utility bucket truck.

In addition, a 24-hour count on Pickens Gap Road was conducted just north of the driveway at 8922 Pickens Gap Road. The results of this count are also shown in Figure 4a.





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FIGURE 4a

Pickens Gap Road Subdivision

2024 Peak Hour Traffic Volumes -  
EXISTING TRAFFIC CONDITIONS





Capacity analyses were undertaken to determine the Level of Service (LOS) for the existing 2024 traffic volumes shown in Figure 4b at the observed intersection. The capacity analyses were calculated following the Highway Capacity Manual (HCM) methods and Synchro Traffic Software (Version 12).

Methodology:

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



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

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



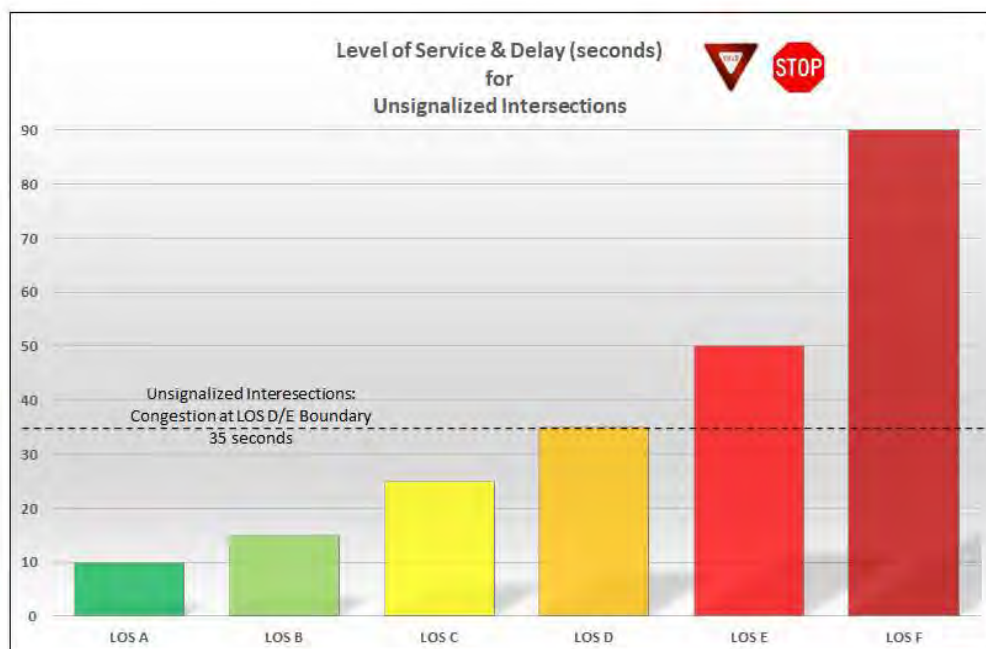
the delay for each minor approach and major street left-turn movements. Table 2 lists the level of service criteria for unsignalized intersections. The analysis results of unsignalized intersections using the HCM methodologies are conservative due to the more significant vehicle gap parameters used in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

**TABLE 2**  
**LEVEL OF SERVICE AND DELAY FOR UNSIGNALIZED INTERSECTIONS**



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


Source: Highway Capacity Manual, 6th Edition



Intersection capacity results from the existing 2024 peak hour traffic are shown in Table 3. The intersection in the table is shown with a LOS designation, delay (in seconds), and v/c ratio (volume/capacity) for the AM and PM peak hours. Appendix E includes the worksheets for the existing 2024 peak hour capacity analyses. It should be noted that the results shown are based on the intersection operating with all-way stop control. In actuality, as described previously, motorists on the southbound approach of Pickens Gap Road at the intersection are not required to stop. However, the HCM methods will not allow delay calculations for this type of t-intersection. Thus, this report modeled the intersection with all approaches operating under stop control in order to provide results.

As shown in Table 3, all the vehicle movements at the intersection are calculated to be operating with excellent LOS and short vehicle delays in the existing 2024 AM and PM peak hours, even assuming southbound traffic on Pickens Gap Road comes to a stop.

**TABLE 3**  
**2024 INTERSECTION CAPACITY ANALYSIS RESULTS -**  
**EXISTING TRAFFIC CONDITIONS**

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
Pickens Gap Road (SB & NB) at Tarklin Valley Road (EB)	 Unsignalized	Northbound Left/Thru	A	7.3	0.041	A	7.4	0.051
		Eastbound Left/Right	A	7.5	0.059	A	7.7	0.099
		Southbound Thru/Right	A	6.9	0.063	A	7.2	0.106

Note: All analyses were calculated in Synchro 12 software and reported using 7th Edition intersection methodology

Note: Intersection of Pickens Gap Road at Tarklin Valley Road analyzed as AWSC

<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). This proposed development's build-out and full occupancy are assumed to occur by 2028.

Vehicular traffic on Pickens Gap Road and Highland View Drive in the study area has shown both negative and marginal annual growth over the past ten years, according to the nearest TPO traffic count stations, as shown in Appendix A. Unfortunately, the TPO traffic count locations have only collected data sporadically and have not provided more recent data beyond 2022.

Ultimately, this study assumed and used an annual growth rate of 2% to calculate future growth on Pickens Gap Road and Tarklin Valley Road up to 2028 to account for potential traffic growth in the study area. The annual growth rate was applied to the 2024 volumes tabulated on Pickens Gap Road and Tarklin Valley Road on top of the 15% factor to account for missing school traffic in order to estimate the future volumes in the horizon year of 2028 without the potential development traffic.

Capacity analyses were undertaken to determine the projected LOS in 2028 without the project at the t-intersection. The results are shown in Table 4, and Appendix E includes the capacity analysis worksheets.

The results in Table 4 show just slightly increased vehicle delays for all the approaches in the 2028 projected conditions without the Pickens Gap Road Subdivision-generated trips versus the existing 2024 conditions. 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**

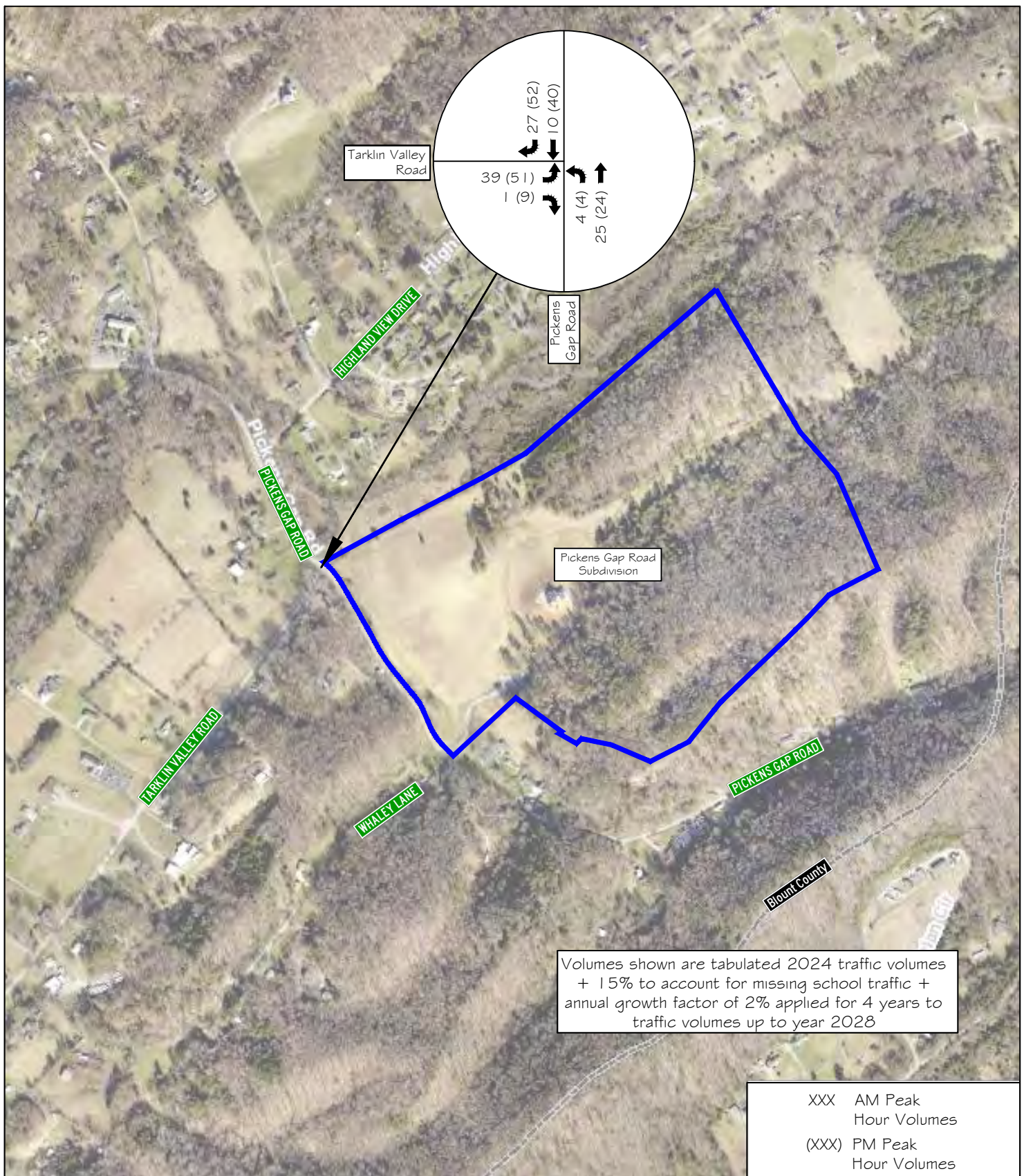
INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
Pickens Gap Road (SB & NB) at Tarklin Valley Road (EB)		Northbound Left/Thru	A	7.3	0.047	A	7.5	0.060
		Eastbound Left/Right	A	7.6	0.064	A	7.8	0.109
		Southbound Thru/Right	A	6.9	0.069	A	7.3	0.115

Note: All analyses were calculated in Synchro 12 software and reported using 7th Edition intersection methodology

Note: Intersection of Pickens Gap Road at Tarklin Valley Road analyzed as AWSC

<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

Pickens Gap Road Subdivision

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

▪ **TRIP GENERATION:**

A generated trip is a single or one-direction vehicle movement entering or exiting the study site. The estimated amount of traffic the proposed 168 new single-family detached houses in the subdivision will generate was calculated based on rates and equations provided by the Trip Generation Manual, 11th Edition, an Institute of Transportation Engineers (ITE) publication. The Trip Generation Manual is the traditional and most popular resource for determining trip generation rates when transportation impact studies are produced. The data and calculations from ITE for the proposed land use are shown in Appendix F. A summary of this information is presented in the following table:



**TABLE 5**  
**TRIP GENERATION FOR PICKENS GAP ROAD SUBDIVISION**  
**168 New 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	168 Houses	1,626	25%	75%		63%	37%	
				30	89	119	102	60	162
Total New Volume Site Trips			1,626	30	89	119	102	60	162

ITE Trip Generation Manual, 11th Edition

Trips calculated by using Fitted Curve Equation

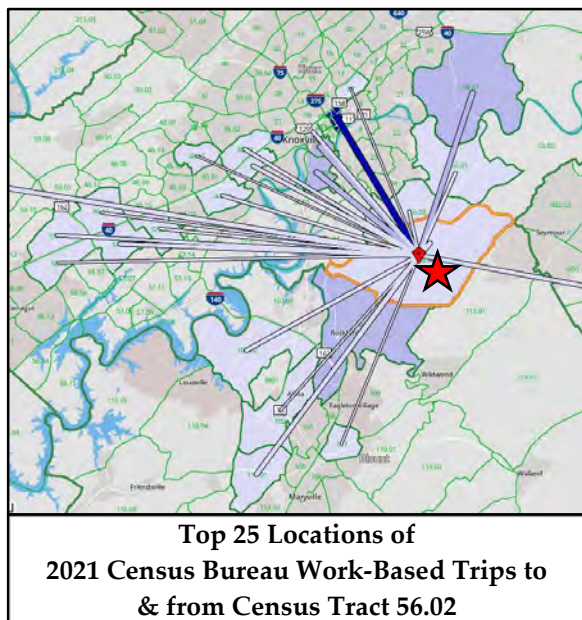
For the proposed residential development, with a total of 168 new single-family detached houses, it is estimated that 30 vehicles will enter and 89 will exit, for a total of 119 generated trips during the AM peak hour in the year 2028. Similarly, it is estimated that 102 vehicles will enter and 60 will exit, for a total of 162 generated trips during the PM peak hour in the year 2028. The calculated trips generated for an average weekday are estimated to be 1,626 vehicles for the proposed development. No vehicle trip reductions were included in the calculations or analysis. The trips for the 169<sup>th</sup> house in the proposed development, the existing residence at 8922 Pickens Gap Road, are assumed to be accounted for in the existing traffic counts.



▪ **TRIP DISTRIBUTION AND ASSIGNMENT:**

The Pickens Gap Road Subdivision's projected trip distribution and assignment are based on several sources and engineering judgment. The first source is based on the existing traffic count volumes and the observed travel directions collected at the intersection and roadway near the proposed development site.

Overall, during the 24-hour count on Pickens Gap Road, most vehicles were observed traveling southbound on Pickens Gap Road versus northbound. However, during the traffic count at the intersection, most of the travel on Pickens Gap Road and Tarklin Valley Road had a distinct preference for northbound travel over southbound travel in the morning and afternoon peak periods. The difference between the two locations can be attributed to most of the traffic at the intersection traveling on Tarklin Valley Road and the north approach of Pickens Gap Road. In the AM peak hour, the split was roughly 85% / 15% in the AM peak hour, with 85% heading northbound and 15% heading southbound. The travel split was not as pronounced in the PM peak hour, but northbound travel was still preferred to southbound travel, with a 60% / 40% split.



The second source for determining the projected trip distribution is based on work-related trips in the local area. Work-based trips will be a significant impetus for trips generated by the development, and these trips are more likely to travel to and from the west and northwest, with some towards the southwest, as observed during the traffic count. This assertion is based on data from the United States Bureau website for Census Tract 56.02, where the development property is located. Based on 2021 (latest available) census data and as presented in Appendix G, most work-based trips in the surrounding area correspond to

downtown Knoxville, the University of Tennessee, West Knoxville, and Oak Ridge, TN. These work-based trips also correspond to the Alcoa and Maryville, TN areas.

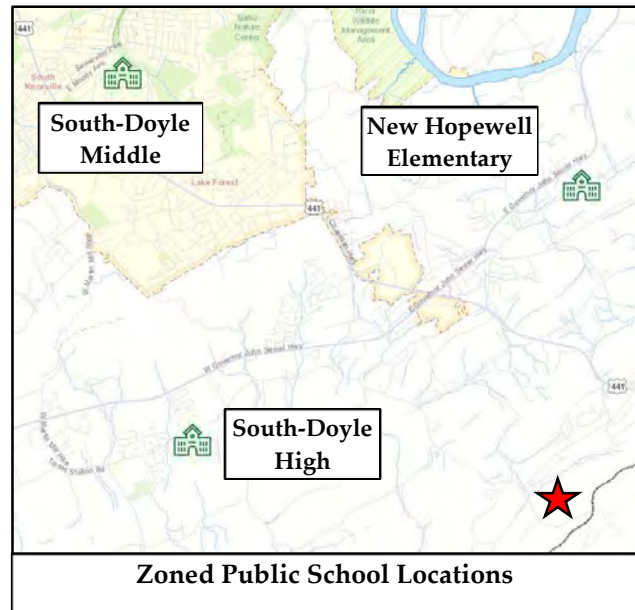
In addition to employment centers, some generated traffic will travel to and from public and private schools. Schools will be another impetus for external trip-making. The development property is currently zoned for New Hopewell Elementary, South-Doyle Middle, and South-



Doyle High School.

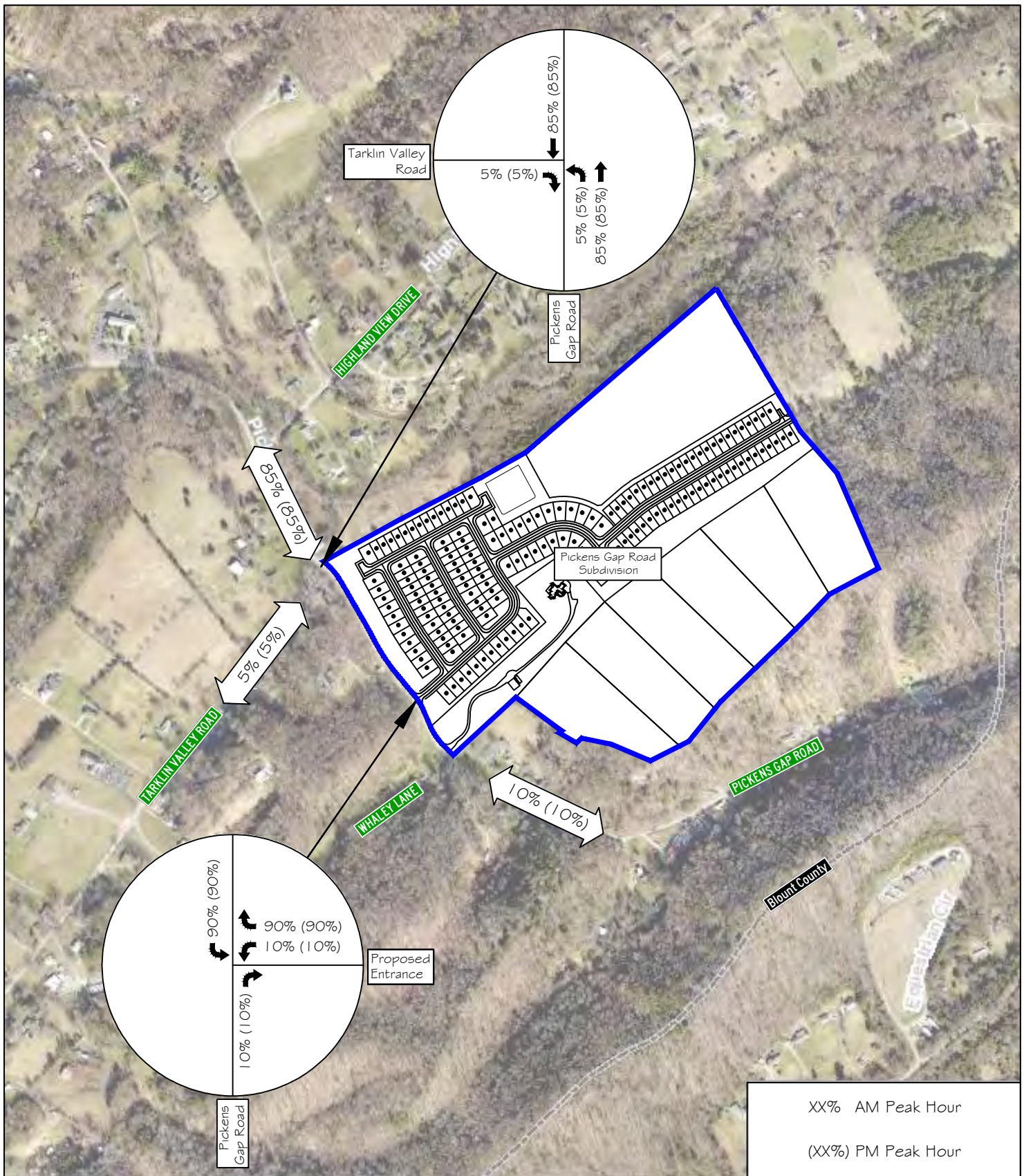
These public schools are all located north and northwest of the development site. These schools are between 4.5 and 8.1 miles from the proposed development entrance by roadway. All these schools will generate traffic from the subdivision to and from the north on Pickens Gap Road in the morning and afternoon either by private vehicle or school bus.

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



Based on these factors, Figure 6 shows the projected distribution of traffic entering and exiting the proposed development at the Proposed Entrance. The percentages shown in the figure only pertain to the trips generated by the proposed dwellings in the development calculated from the ITE trip rates. Overall, nearly all traffic generated by future residents in the subdivision will be attracted, preferred, and assumed to occur to and from the north.

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



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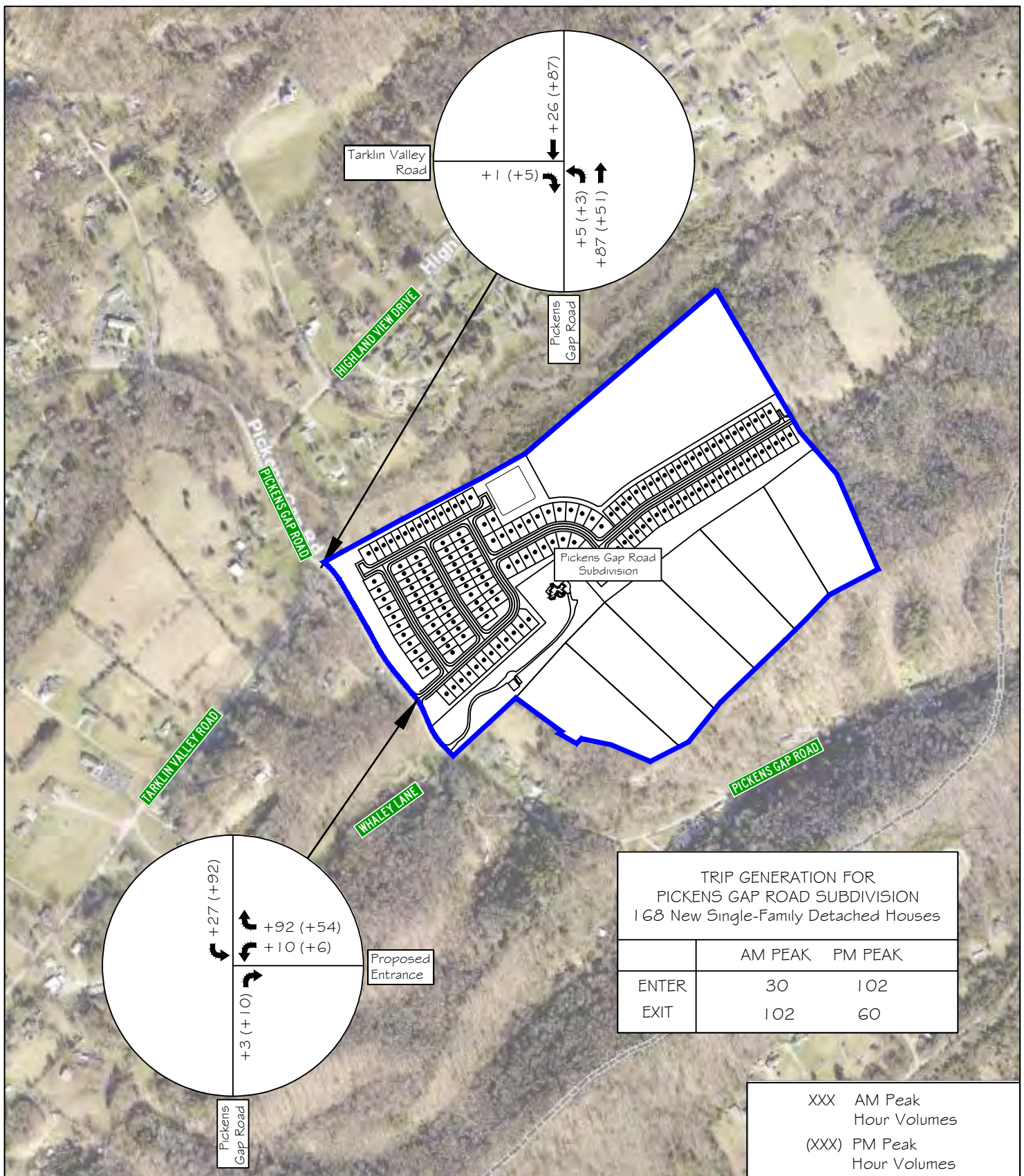


FIGURE 6

Pickens Gap Road Subdivision

Directional Distribution of Generated Traffic during AM and PM Peak Hour





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FIGURE 7

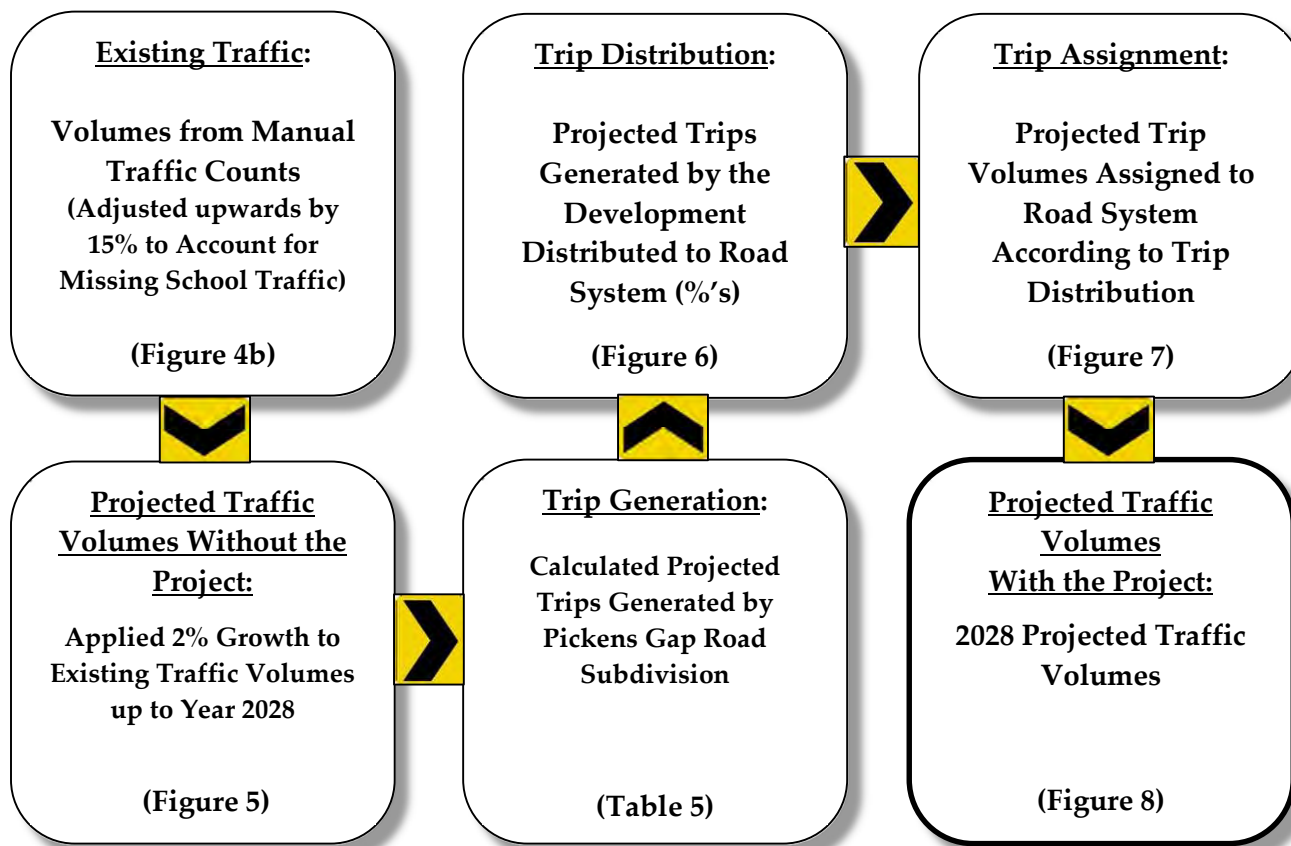
Pickens Gap Road Subdivision

Traffic Assignment of Generated Traffic  
during AM and PM Peak Hour

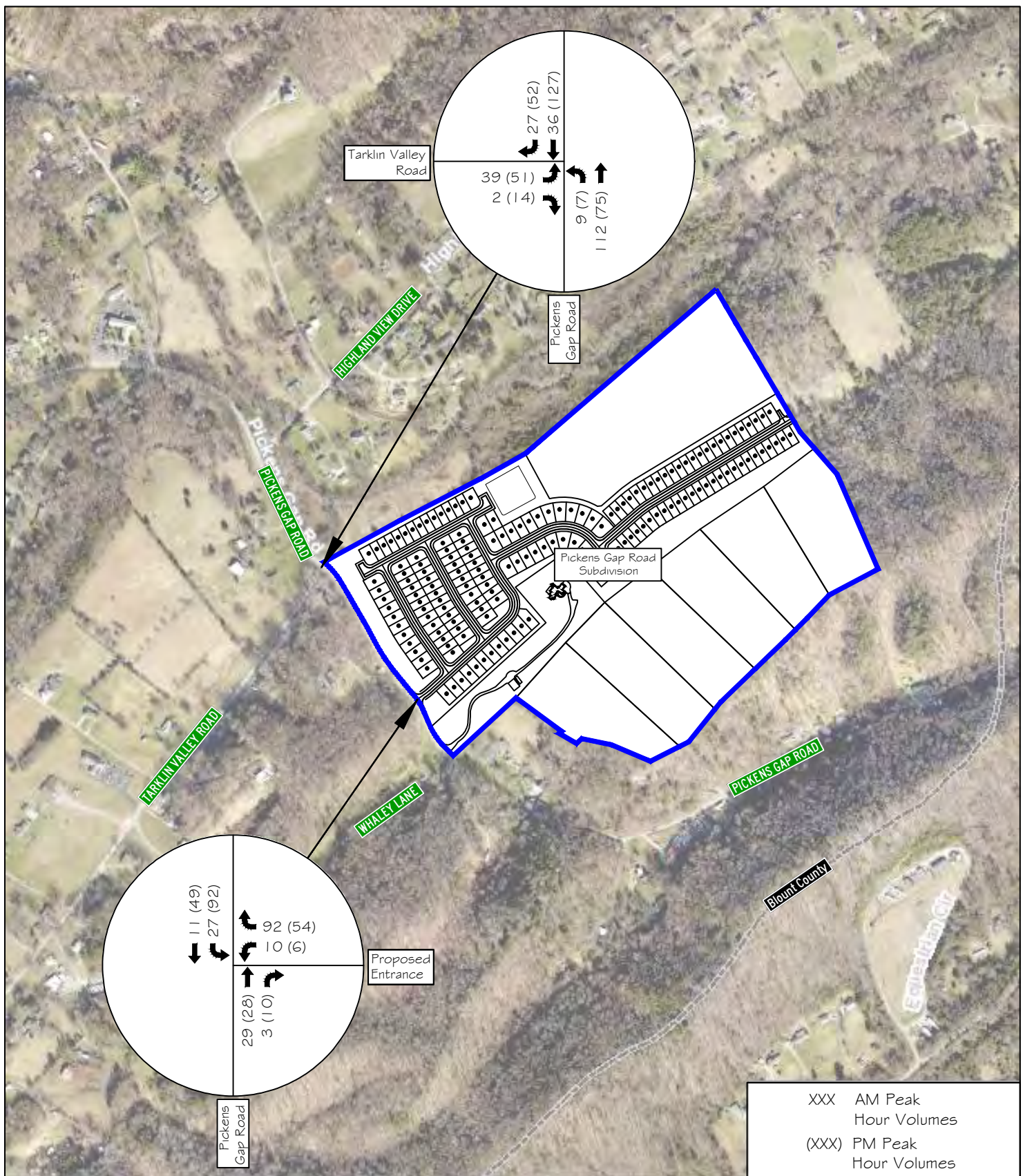


▪ **PROJECTED TRAFFIC CONDITIONS WITH THE PROJECT:**

Overall, several additive steps were taken to estimate the total projected traffic volumes at the intersection of Pickens Gap Road and Tarklin Valley Road and the Proposed Entrance at Pickens Gap Road when the subdivision is constructed and fully occupied in 2028. The steps are illustrated below for clarity and review:



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



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FIGURE 8

Pickens Gap Road Subdivision

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

Capacity analyses were conducted to determine the projected LOS at the Proposed Entrance with the development traffic in 2028 and the intersection of Pickens Gap Road at Tarklin Valley Road. Both intersections on Pickens Gap Road are projected to operate very well in the 2028 AM and PM peak hours with very short vehicle delays. These results can be seen in Table 6, and Appendix E 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
Pickens Gap Road (SB & NB) at Tarklin Valley Road (EB)	 Unsignalized	Northbound Left/Thru	A	8.1	0.184	A	8.3	0.168
		Eastbound Left/Right	A	8.1	0.075	A	8.4	0.129
		Southbound Thru/Right	A	7.6	0.147	A	8.5	0.249
Pickens Gap Road (SB & NB) at Proposed Entrance (WB)	 Unsignalized	Westbound Left/Right	A	9.0	0.111	A	9.0	0.069
		Southbound Left/Thru	A	7.3	0.019	A	7.5	0.065

Note: All analyses were calculated in Synchro 12 software and reported using 7th Edition intersection methodology

Note: Intersection of Pickens Gap Road at Tarklin Valley Road analyzed as AWSC

<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 transportation features are discussed in the following pages.

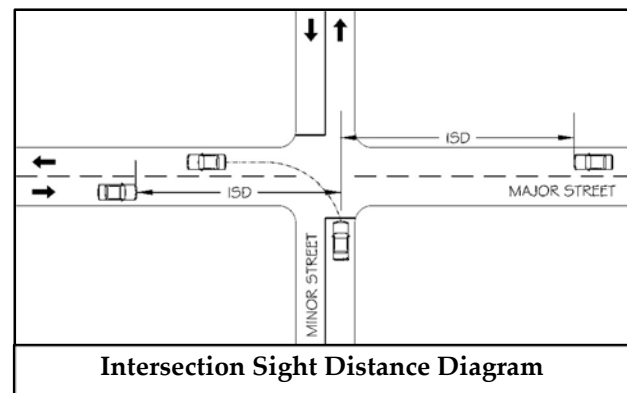
○ **EVALUATION OF SIGHT DISTANCE**

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

Methodology:

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

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

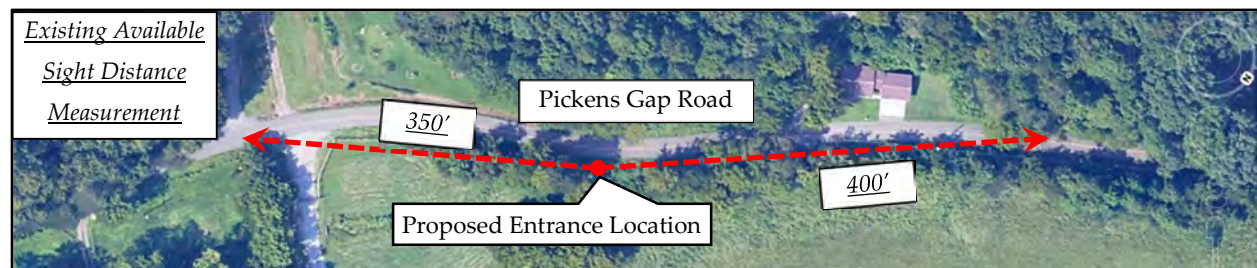


Three traffic maneuvers are available for vehicles stopped on a minor street at a 4-way intersection: (1) left-turn, (2) right-turn, (3) or a crossing maneuver across the major street. For turns from the minor street, ISD is needed to allow a stopped motorist to turn onto a major street without being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

With an assumed speed limit of 40 mph on Pickens Gap Road at the Proposed Entrance (there is not a posted speed limit on Pickens Gap Road south of the intersection of Pickens Gap Road at Tarklin Valley Road), the calculated ISD is 400 feet based on Knox County's policy requiring 10 feet of sight distance per 1-mph of speed. This distance is required for a motorist to exit safely to the left and right at Pickens Gap Road.

Visual observations of the sight distances at the Proposed Entrance location were undertaken. Using a Nikon Laser Rangefinder at the Proposed Entrance location, the available sight distances were visually estimated to be 400 feet to the north and 375 feet to the south on Pickens Gap Road. Based on visual observation, the available sight distance to the north from the Proposed Entrance at Pickens Gap Road will be adequate for motorists exiting the development. The site engineer determined the sight distance more accurately, confirming the visual result to the north and determining that the sight distance to the south is 350 feet with vegetation management.

Images of the existing sight distances at the Proposed Entrance location are labeled below with the ISD and site engineer-determined sight distances.



View of Sight Distance on Pickens Gap Road at the Proposed Entrance (Looking South)



View of Sight Distance on Pickens Gap Road at the Proposed Entrance (Looking North)



- **EVALUATION OF TURN LANE THRESHOLDS**

The need for separate left and right-turn lanes on Pickens Gap Road at the Proposed Entrance was evaluated in the projected 2028 conditions.

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

According to Knox County's guidelines, with an assumed speed limit of 40-mph, separate left and right-turn lanes on Pickens Gap Road at the Proposed Entrance will not be warranted based on the projected 2028 AM and PM peak hour volumes. The worksheets for these evaluations are provided in Appendix H.

- **PROJECTED VEHICLE QUEUES**

A companion software program was used to assist in the calculation of the 2028 AM and PM peak hour projected vehicle queues at the studied intersections. The previously mentioned Synchro 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. The SimTraffic software was used to estimate the projected vehicle queues.

The 95th percentile vehicle queue is the recognized measurement in the traffic engineering profession as the design standard used when considering vehicle queue lengths. A 95th percentile vehicle queue length means 95% certainty that the vehicle queue will not extend beyond that point. The calculated vehicle queue results in SimTraffic were based on averaging the outcome obtained during ten traffic simulations in the software. The 95th percentile vehicle queue lengths at the intersections are shown in Table 7 for the projected 2028 conditions, and the vehicle queue worksheets from the software are in Appendix I.

The results in Table 7 show very short and reasonable vehicle queues at both intersections during the projected 2028 AM and PM peak hours, even when assuming the southbound approach of Pickens Gap Road at Tarklin Valley Road operates under stop conditions. The longest calculated vehicle queue is 55 feet, which would be two passenger vehicles assuming 25 feet per vehicle.

**TABLE 7**  
**TURN LANE STORAGE & VEHICLE QUEUE SUMMARY -**  
**2028 PROJECTED PEAK HOUR TRAFFIC WITH THE PROJECT**

INTERSECTION	APPROACH/ MOVEMENT	PROVIDED STORAGE LENGTH (ft)	SYNCHRO 95 <sup>th</sup> PERCENTILE QUEUE LENGTH (ft)	
			AM PEAK HOUR	PM PEAK HOUR
Pickens Gap Road (SB & NB) at Tarklin Valley Road (EB)	Eastbound Left/Right	n/a	36	38
	Northbound Left/Thru	n/a	41	44
	Southbound Thru/Right	n/a	43	55
Pickens Gap Road (SB & NB) at Proposed Entrance (WB)	Westbound Left/Right	n/a	50	48
	Southbound Left/Thru	n/a	6	22

Note: 95<sup>th</sup> percentile queues were calculated in SimTraffic 12 software



## CONCLUSIONS & RECOMMENDATIONS

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



**Pickens Gap Road at the Proposed Entrance:** The projected 2028 level of service calculations for the intersection of Pickens Gap Road at the Proposed Entrance resulted in excellent LOS and short vehicle delays. Overall, the exiting left- and right-turning vehicles from the subdivision will experience minimal queue lengths, with a maximum of two passenger vehicles in the 2028 AM and PM peak hours.

- 1a) 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 Pickens Gap Road. The stop bar should be applied a minimum of 4 feet away from the edge of Pickens Gap Road and placed at the desired stopping point that maximizes the sight distance.
- 1b) Sight distances at the Proposed Entrance approach must not be impacted by future landscaping, signage, or vegetation. Visual distance observations were made and were followed up by the site designer, who determined that the sight distance is 400 feet to the north and 350 feet to the south with existing and future vegetation management. A sight distance to the south of 350 feet would be adequate since Pickens Gap Road on this southern section is recommended to have a posted speed limit of 25 mph and also recommended to be posted with a Side Road Warning Sign (W2-2) and an advisory speed limit plaque of 25 mph (W13-1). Furthermore, the existing road width and horizontal alignment on Pickens Gap Road south of the Proposed Entrance will significantly counteract vehicle speeds greater than 35 mph.
- 1c) At the Proposed Entrance, it is recommended that a mountable barrier allowing exiting right-turns only to the north be installed to restrict exiting left turns towards the south on Pickens Gap Road due to its narrowness. Appropriate signage should also be installed to dissuade left turns to the south. However, entering left turns from the north and entering right turns from the south on Pickens Gap Road should be fully accommodated. This recommendation should be discussed further with Knox County Engineering. This recommendation should be discussed further with Knox County Engineering. The success of dissuading southbound traffic on Pickens Gap Road due

to its narrowness will rely on self-enforcement since this entrance will be in an isolated area. This reality is acknowledged in the analysis since a minor amount of traffic is assumed will nonetheless travel to and from the south on Pickens Gap Road.

Precedence for this type of exit in the local area has been attempted at the intersection of Broome Road at the entrance for Parkview Senior Living in West Knoxville. In that case, left turns are discouraged with a traversable barrier allowing exiting right-turns only as a courtesy to the residents to the south in the West Hills Subdivision to reduce travel in their neighborhood. Another similar right-turn exit-only configuration in the local area has also been constructed at the intersection of Yarnell Road at Cedar Break Drive for the Everett Woods Subdivision in West Knox County.

- 1d) It is recommended that Side Road Warning Signs (W2-2) be installed on Pickens Gap Road in both directions a minimum of 125 feet from the Proposed Entrance with an advisory speed limit plaque of 25 mph (W13-1). An advisory speed of 25 mph would be appropriate since the southbound sight distance to the south was visually estimated to be 350 feet.







**Pickens Gap Road:** Pickens Gap Road has adequate road lane widths to the north of the Proposed Entrance location. To the south, Pickens Gap Road narrows and particularly narrows to the south past Whaley Lane. Due to this limitation, the following recommendations are offered for Pickens Gap Road to be addressed by Knox County.

- 2a) During a prior site visit in February 2024, a Stop Ahead Sign (W3-1) was observed posted on Pickens Gap Road for northbound traffic in advance of the intersection with Tarklin Valley Road. This sign was posted between the roadway and creek near the 8913 Pickens Gap Road residence and has since disappeared. It is recommended that this sign be re-installed at this location.



W3-1

- 2b) Due to the unconventional nature of the stop conditions at the T-intersection of Tarklin Valley Road at Pickens Gap Road (southbound traffic on Pickens Gap Road does not stop), it is recommended that Knox County install supplemental plaque signage below the Stops Signs (R1-1). These include a "Traffic From Left Does Not Stop" Sign (W4-4aLP) for the Tarklin Valley Road approach, and an "Oncoming Traffic Does Not Stop" Sign (W4-4bP) for the northbound Pickens Gap Road approach.



W4-4aLP



W4-4bP

- 2c) The eastern pavement edge of Pickens Gap Road between Whaley Lane and Tarklin Valley Road is compromised in several spots, and this is due to the undercutting of the roadway by the creek adjacent to Pickens Gap Road. White spray pavement markings have been applied at one of these compromised spots where this is occurring, and it is unknown if Knox County Engineering or others marked this for future attention. These pavement edges need to be stabilized.



Eastern Edge of Pickens Gap Road  
along Development Property Road  
Frontage

- 2d) Due to the narrowness of Pickens Gap Road to the south of the development site, it is

recommended that the edges of the roadway south of Whaley Lane be delineated with white edge lines up to the Blount County line.

- 2e) Due to the narrowness of Pickens Gap Road to the south of the development site, it is recommended that a Road Narrows Sign (W5-1) be posted for southbound traffic on Pickens Gap Road and installed north of Whaley Lane.



- 2f) In advance of the Blount County line and a very sharp vertical crest curve, a Hill Blocks View Sign (W7-6) is recommended to be installed in advance of the blind hill for southbound traffic on Pickens Gap Road heading towards Blount County.



- 2g) The Type 3 Object Marker at the sharp vertical curve at the Blount County line facing northbound traffic is incorrectly installed. It is shown as a "left" object marker but should be displayed as a "right" object marker.



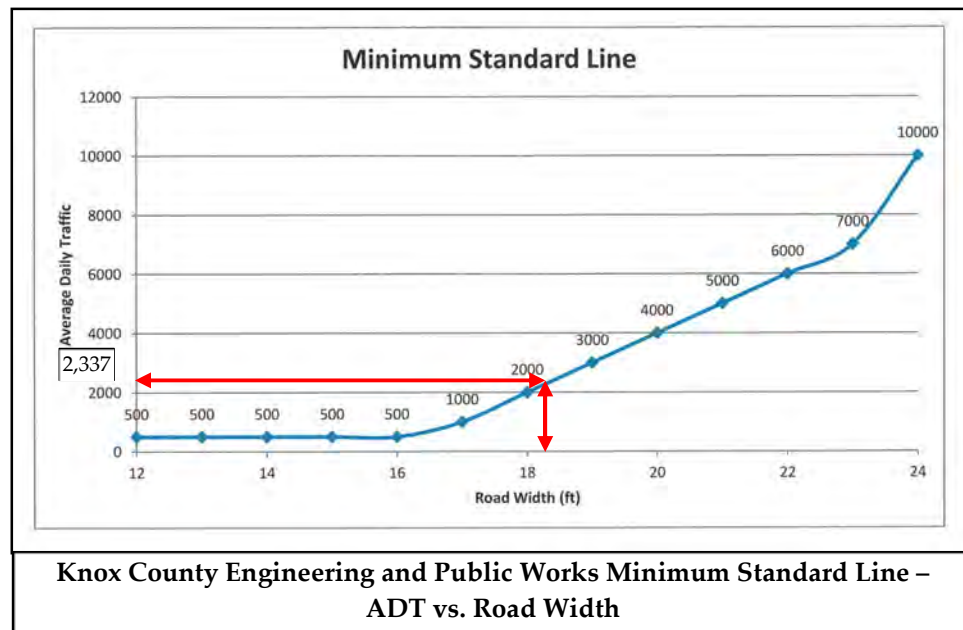
- 2h) Knox County should consider installing 25-mph Speed Limit Signs (R2-1) for the narrowed section of Pickens Gap Road to the south and east of the development site. These signs should be installed for northbound vehicles entering Knox County from Blount County and for southbound vehicles heading towards Blount County and posted prior to Whaley Lane.
- 2i) Knox County Engineering has published an informal minimum standard relating Average Daily Traffic (ADT) versus road widths. A graph of this minimum standard is shown in the image below.

The pavement road measurements conducted for this study showed existing road widths of 17.0' to 25.1' between the Proposed Entrance location and Tarklin Valley Road to the north. The measurements of the road were made every 250 feet. Based on the narrowest measured road width of 17 feet and the Knox County standard, the maximum

allowable ADT would be 1,000 vehicles per day. The existing ADT during the traffic count was 538 vehicles, which would be appropriate based on this standard. A projected 2028 ADT of 2,337 vehicles on Pickens Gap Road adjacent to the development site was calculated from the 24-hour count volume and includes 15% for the missing school traffic, 2% assumed growth for 4 years, and the calculated generated daily traffic for the proposed subdivision. This projected 2028 ADT on Pickens Gap Road adjacent to the development site is a worst-case scenario since it assumes that all exiting subdivision volumes head toward the north, even though the trip distribution and assignment assume some vehicles will exit to the south regardless. The results shown in the graph indicate that the minimum road width would be just over 18 feet in width based on an ADT of 2,237 vehicles.

An ADT of 2,237 would indicate that Pickens Gap Road's width between the proposed subdivision entrance and the t-intersection of Tarklin Valley Road (the first major roadway) would need to be widened to provide a minimum width of 18.5 feet. A road width of 18.5 feet would be appropriate for up to 2,500 vehicles per day based on Knox County's ADT/road width minimum standard.

To conform to this Knox County standard, Pickens Gap Road is recommended to be widened to a minimum width of 18.5 feet between the Proposed Entrance and the intersection with Tarklin Valley Road, which is approximately 860 feet.

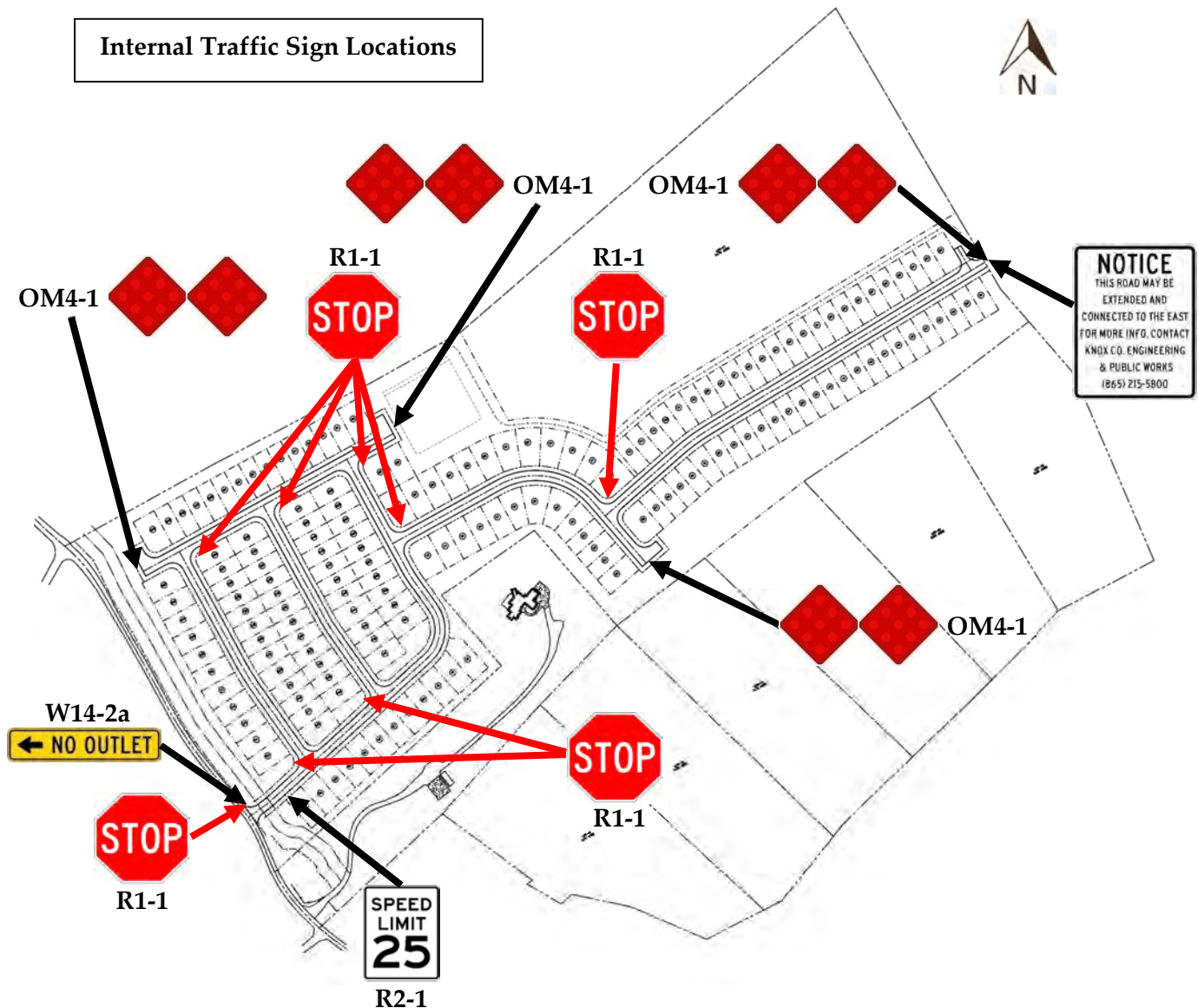






**Pickens Gap Road Subdivision Internal Roads:** The layout plan shows one entrance and six internal streets on Pickens Gap Road constructed for the development, as shown in Figure 3 and below.

- 3a) A 25-mph Speed Limit (R2-1) sign is recommended to be posted near the beginning of the development entrance off Pickens Gap Road. It is also recommended that a “No Outlet” Sign (W14-2a) be posted at the front of the subdivision. This sign can be posted above or below the street name sign.
- 3b) The image below shows the recommended internal road signage for the proposed subdivision.



Dual end-of-roadway object markers (OM4-1) should be installed at the end of the internal roads in the subdivision that end in partial hammerhead turnarounds. Furthermore, an additional sign should be posted at the end of the stub-out road on the northeast side of the site to follow Knoxville-Knox County Subdivision regulations. This sign is for notification of a possible future street connection. It should state, "NOTICE – This road may be extended and connected to the east – for more info. contact Knox Co. Engineering & Public Works (865) 215-5800".

- 3c) Sight distance at the new internal intersections must not be impacted by new signage, parked cars, or future landscaping. With a proposed speed limit of 25-mph in the development, the internal intersection sight distance is 250 feet. The required stopping sight distance is 155 feet for a level road grade. The site designer should ensure that internal sight distance lengths are met and account for different proposed road grades.
- 3d) All drainage grates and covers for the residential development must be pedestrian and bicycle-safe.
- 3e) Several of the internal roadways will have long, straight segments. Straight road segments encourage higher vehicle speeds. It is recommended that the site designer consider including traffic calming measures on these segments, such as speed humps or tables. Specifics regarding this recommendation should be discussed in the design phase with Knox County Engineering.
- 3f) For residential subdivisions with more than 150 housing units, Knox County has a long-standing unwritten design policy requiring a boulevard road typical section at the entrance if secondary access is not provided. This policy ensures access to the subdivision during potential emergencies. Since the proposed layout of the Pickens Gap Road Subdivision only provides one means of ingress and egress and will have 168 units, the subdivision entrance may need to be designed and constructed with a boulevard roadway section. Providing a boulevard section at the entrance at Pickens Gap Road would likely require a widened box culvert and alteration to the existing water conveyance along the east side of Pickens Gap Road. A decision regarding this issue should be coordinated with Knox County Engineering.
- 3g) All road and intersection elements should be designed to AASHTO and Knox County specifications and guidelines to ensure proper transportation operations.

## **APPENDIX A**

### **HISTORICAL TRAFFIC COUNT DATA**



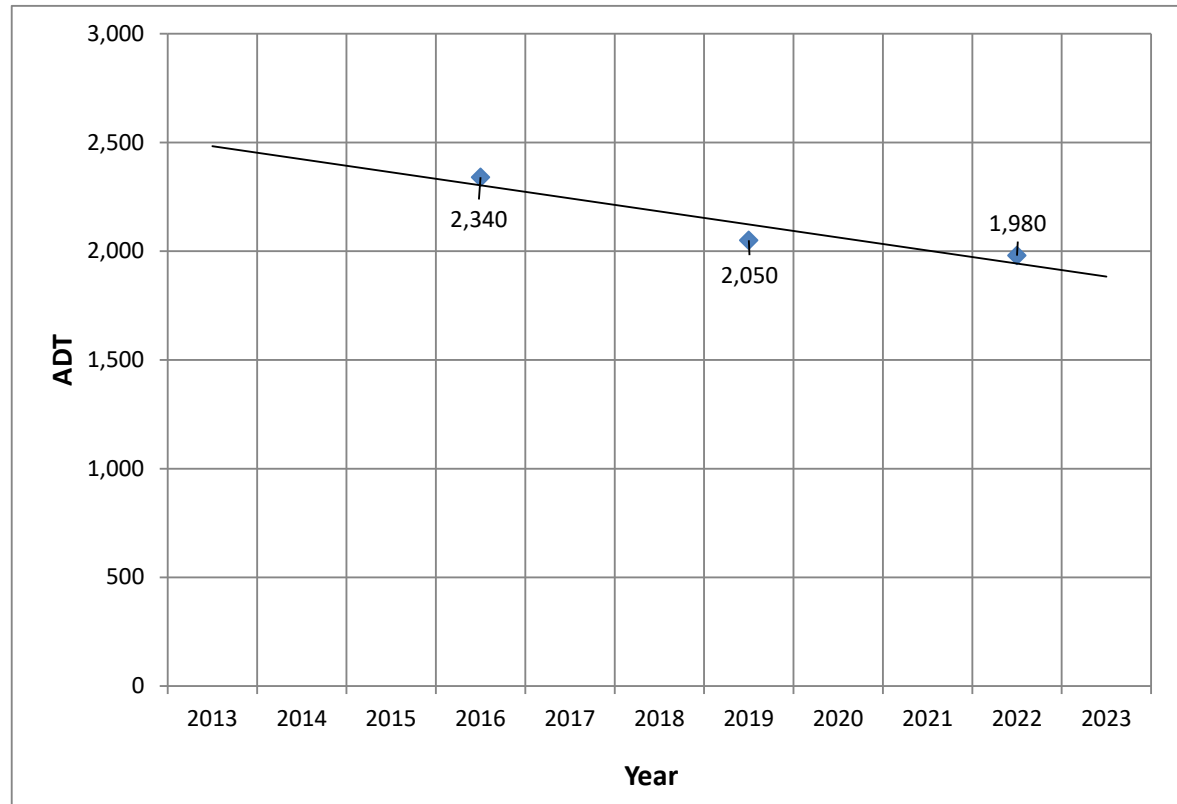
## Historical Traffic Counts

Organization: Knoxville TPO

Station ID #: 093M254

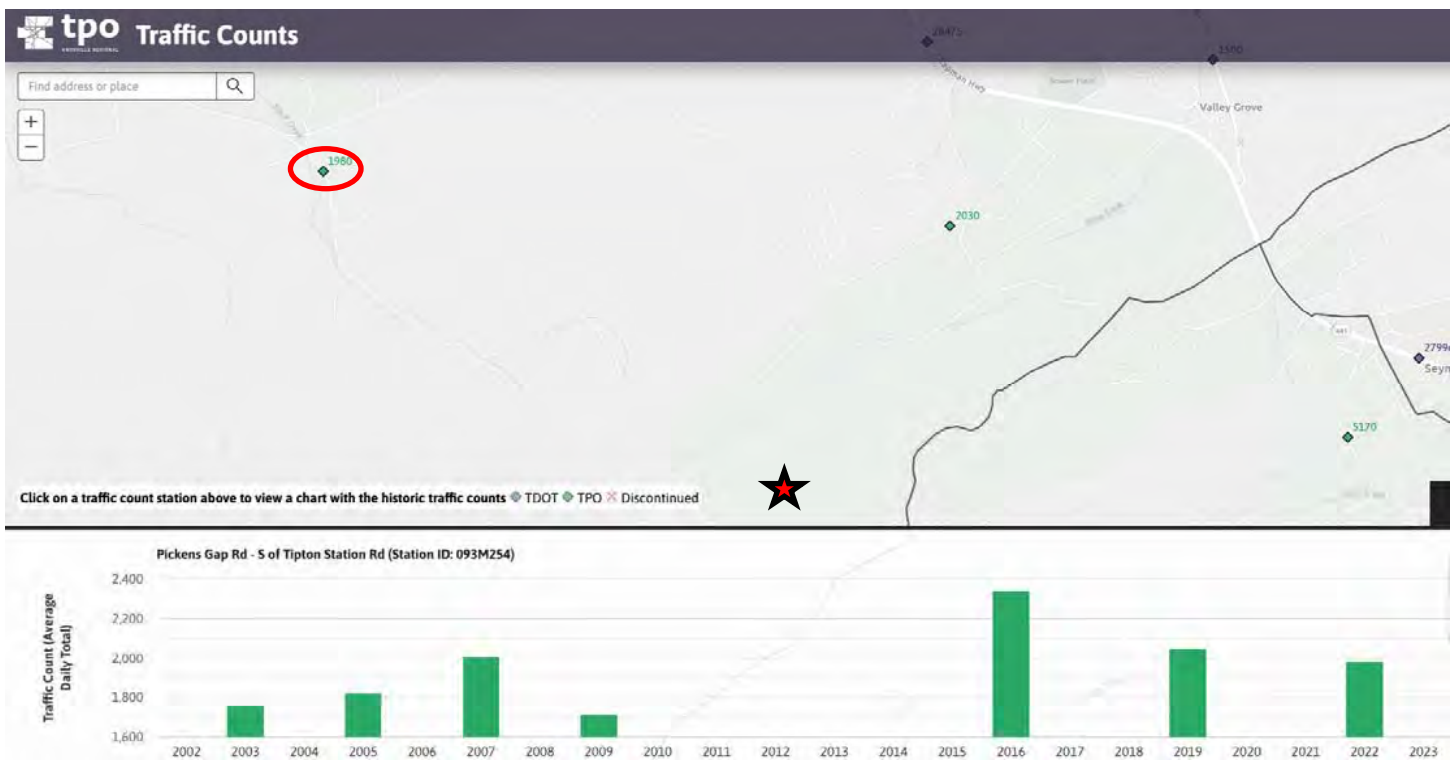
Location: Pickens Gap Road, south of Tipton Station Road

YEAR	AADT	
2013		
2014		
2015		
2016	2,340	Trendline
2017		
2018		
2019	2,050	
2020		
2021		
2022	1,980	
2023		



2016 - 2022 Growth Rate = -15.4%

Average Annual Growth Rate = -2.7%



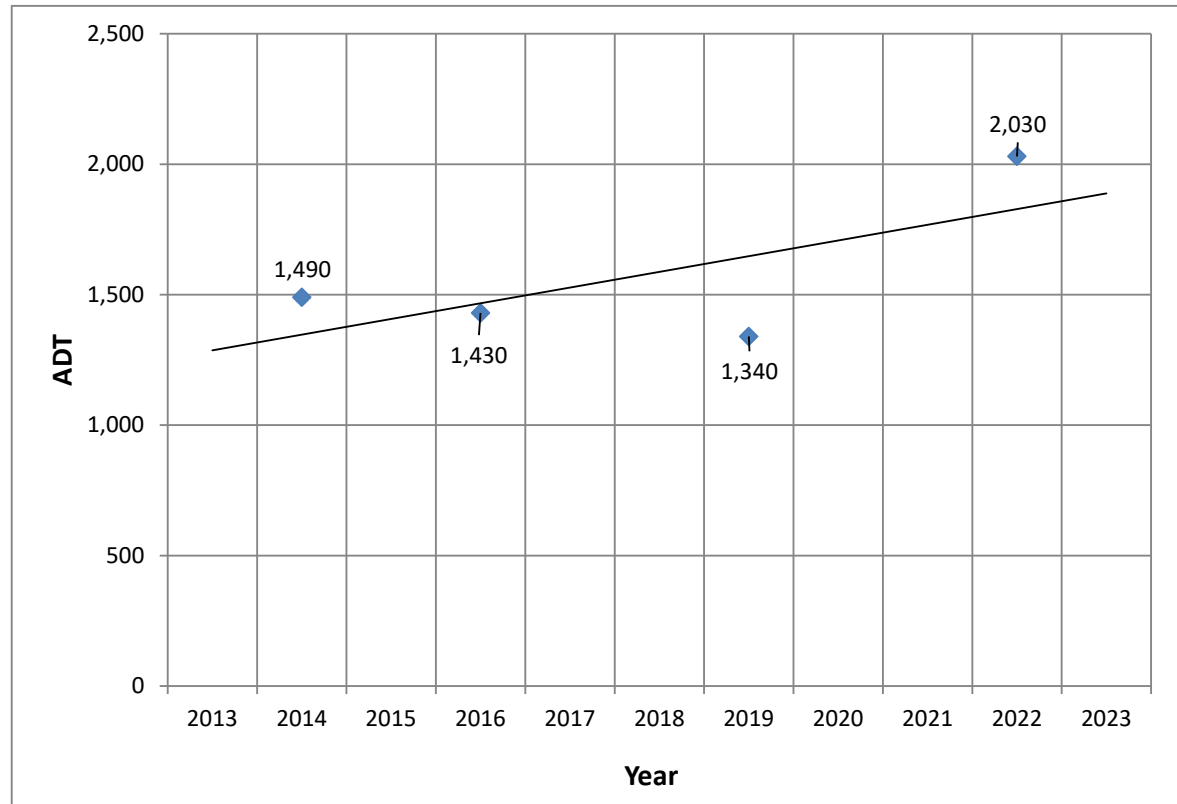
## Historical Traffic Counts

Organization: Knoxville TPO

Station ID #: 093M065

Location: Highland View Drive, west of Simpson Road

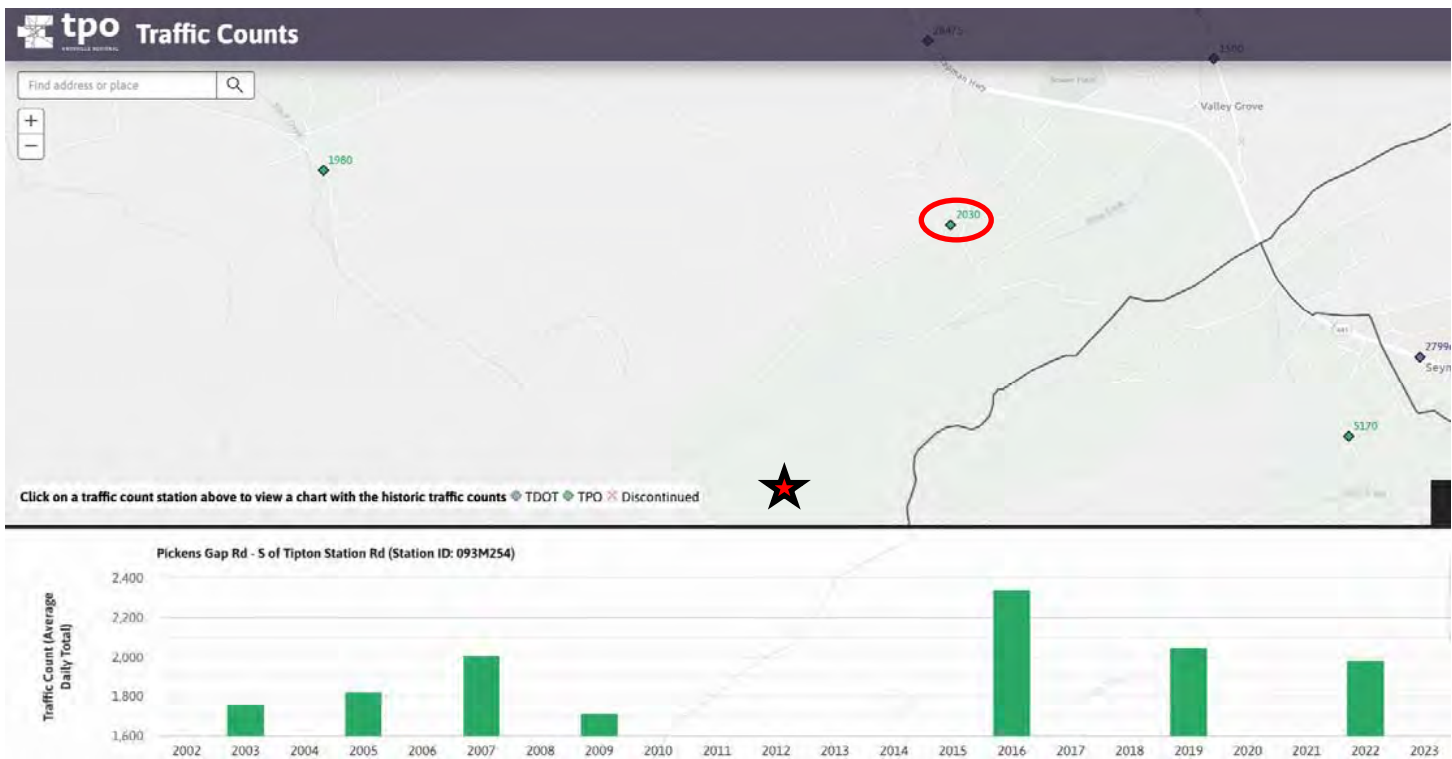
YEAR	AADT	
2013		
2014	1,490	Trendline ↓
2015		
2016	1,430	
2017		
2018		
2019	1,340	
2020		
2021		
2022	2,030	
2023		



2014 - 2022 Growth Rate = 36.2%

Average Annual Growth Rate = 3.9%





## **APPENDIX B**

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

Due to the temporary closing of the Gay Street Bridge, Route 41 will remain on its current detour which uses the Henley Street Bridge until further notice.



## Route 41 - Chapman Highway WEEKDAY

Going away from downtown		Going toward downtown		
Knoxville Station Bay P	Chapman Hwy after Moody Ave	Walmart	Chapman Hwy after Young High Pike	Knoxville Station Bay F*
			Transfer to Rts. 40 & 45	
1	2	3	4	5
		5:41 AM	5:50 AM	6:10 AM
6:15 AM	6:25 AM	6:41 AM	6:50 AM	7:10 AM
6:45 AM	6:55 AM	7:11 AM	7:20 AM	7:40 AM
7:15 AM	7:25 AM	7:41 AM	7:50 AM	8:10 AM
7:45 AM	7:55 AM	8:11 AM	8:20 AM	8:40 AM
8:15 AM	8:25 AM	8:41 AM	8:50 AM	9:10 AM
8:45 AM	8:55 AM	9:11 AM	9:20 AM	9:40 AM
9:15 AM	9:25 AM	9:41 AM	9:50 AM	10:10 AM
9:45 AM	9:55 AM	10:11 AM	10:20 AM	10:40 AM
10:15 AM	10:25 AM	10:41 AM	10:50 AM	11:10 AM
10:45 AM	10:55 AM	11:11 AM	11:20 AM	11:40 AM
11:15 AM	11:25 AM	11:41 AM	11:50 AM	12:10 PM
11:45 AM	11:55 AM	12:11 PM	12:20 PM	12:40 PM
12:15 PM	12:25 PM	12:41 PM	12:50 PM	1:10 PM
12:45 PM	12:55 PM	1:11 PM	1:20 PM	1:40 PM
1:15 PM	1:25 PM	1:41 PM	1:50 PM	2:10 PM
1:45 PM	1:55 PM	2:11 PM	2:20 PM	2:40 PM
2:15 PM	2:25 PM	2:41 PM	2:50 PM	3:10 PM
2:45 PM	2:55 PM	3:11 PM	3:20 PM	3:40 PM
3:15 PM	3:25 PM	3:41 PM	3:50 PM	4:10 PM
3:45 PM	3:55 PM	4:11 PM	4:20 PM	4:40 PM
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7:45 PM	7:55 PM	8:11 PM	8:20 PM	8:40 PM
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8:45 PM	8:55 PM	9:11 PM	9:20 PM	9:40 PM
9:15 PM	9:25 PM	9:41 PM	9:50 PM	10:10 PM
9:45 PM	9:55 PM	10:11 PM	10:20 PM	10:40 PM
10:15 PM	10:25 PM	10:41 PM	10:50 PM	11:10 PM
11:15 PM	11:25 PM	11:41 PM	11:50 PM	

\*bus goes on to serve another route



Due to the temporary closing of the Gay Street Bridge, Route 41 will remain on its current detour which uses the Henley Street Bridge until further notice.



## Route 41 - Chapman Highway SATURDAY

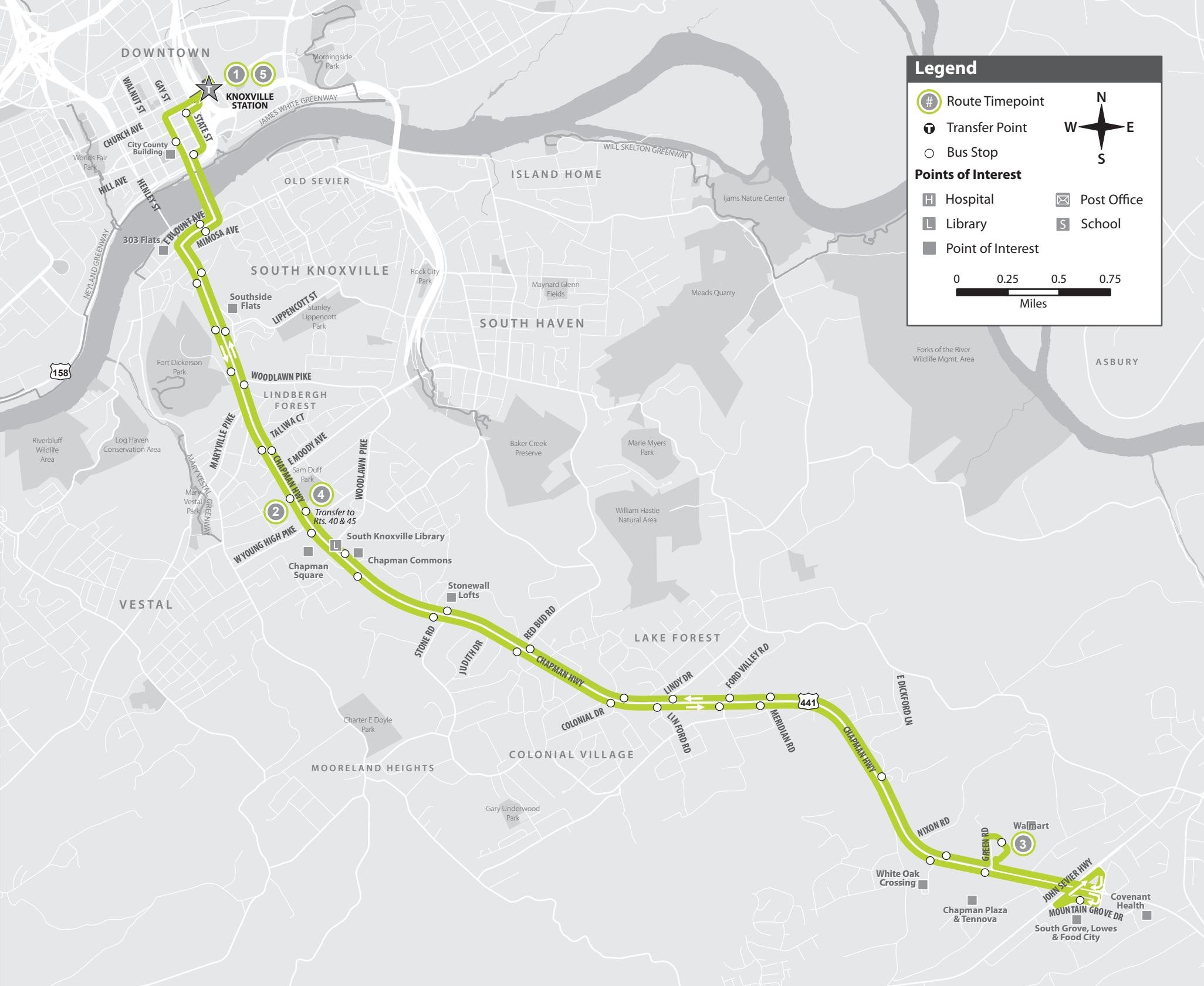
Going away from downtown		Going toward downtown		
Knoxville Station Bay P	Chapman Hwy after Moody Ave	Walmart	Chapman Hwy after Young High Pike	Knoxville Station Bay P
			Transfer to Rts. 40 & 45	
1	2	3	4	5
7:15 AM	7:25 AM	7:41 AM	7:50 AM	8:10 AM
7:45 AM	7:55 AM	8:11 AM	8:20 AM	8:40 AM
8:15 AM	8:25 AM	8:41 AM	8:50 AM	9:10 AM
8:45 AM	8:55 AM	9:11 AM	9:20 AM	9:40 AM
9:15 AM	9:25 AM	9:41 AM	9:50 AM	10:10 AM
9:45 AM	9:55 AM	10:11 AM	10:20 AM	10:40 AM
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5:45 PM	5:55 PM	6:11 PM	6:20 PM	6:40 PM
6:15 PM	6:25 PM	6:41 PM	6:50 PM	7:10 PM
6:45 PM	6:55 PM	7:11 PM	7:20 PM	7:40 PM
7:15 PM	7:25 PM	7:41 PM	7:50 PM	8:10 PM
7:45 PM	7:55 PM	8:11 PM	8:20 PM	8:40 PM
8:15 PM	8:25 PM	8:41 PM	8:50 PM	9:10 PM
8:45 PM	8:55 PM	9:11 PM	9:20 PM	9:40 PM
9:15 PM	9:25 PM	9:41 PM	9:50 PM	10:10 PM
9:45 PM	9:55 PM	10:11 PM	10:20 PM	10:40 PM
10:15 PM	10:25 PM	10:41 PM	10:50 PM	11:10 PM
10:45 PM	10:55 PM	11:11 PM	11:20 PM	11:40 PM
11:15 PM	11:25 PM	11:41 PM	11:50 PM	

Due to the temporary closing of the Gay Street Bridge, Route 41 will remain on its current detour which uses the Henley Street Bridge until further notice.



## Route 41 - Chapman Highway SUNDAY

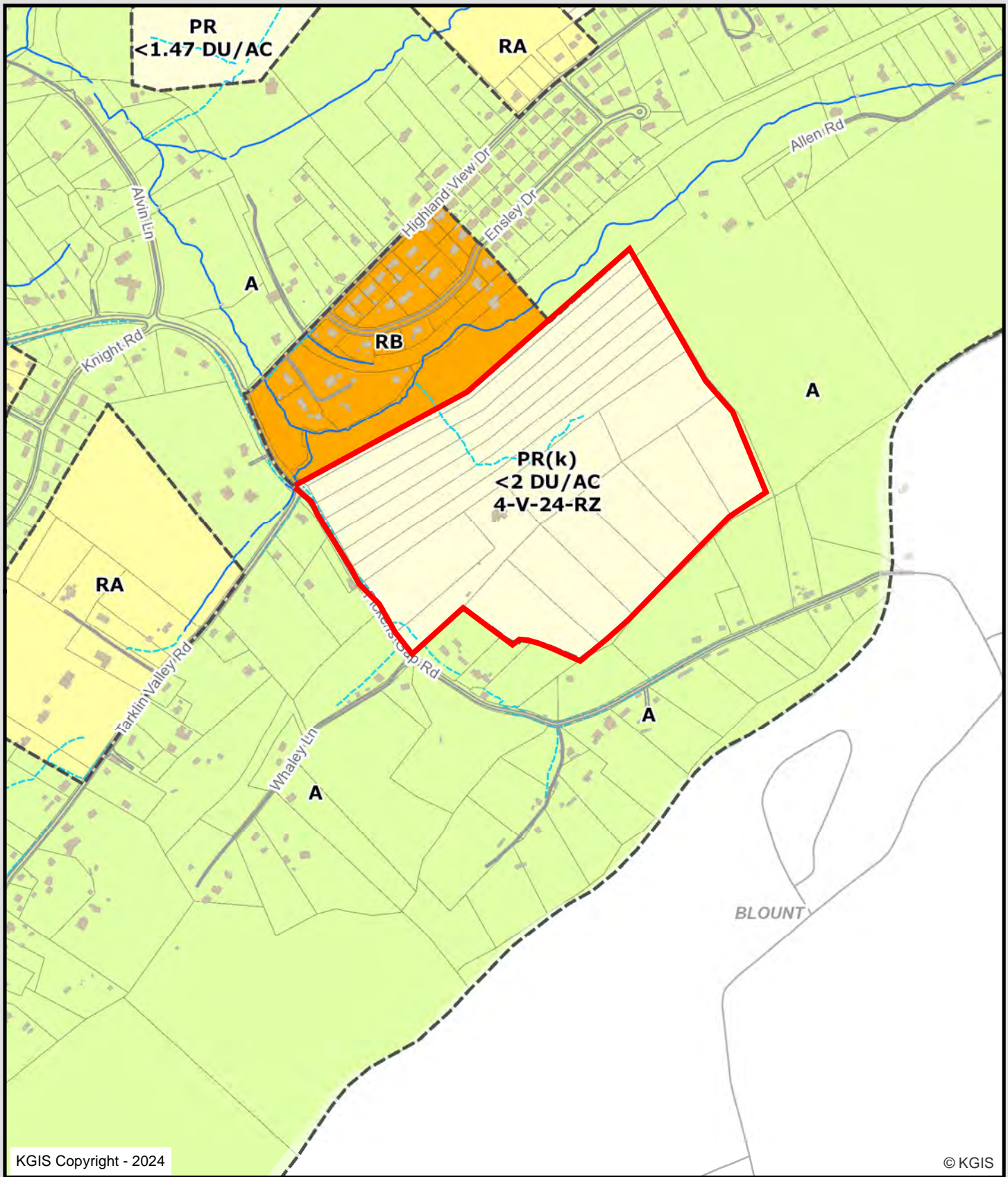
Going away from downtown		Going toward downtown		
Knoxville Station Bay P	Chapman Hwy after Moody Ave	Walmart	Chapman Hwy after Young High Pike	Knoxville Station Bay P
			Transfer to Rts. 40 & 45	
1	2	3	4	5
8:15 AM	8:25 AM	8:41 AM	8:50 AM	9:10 AM
8:45 AM	8:55 AM	9:11 AM	9:20 AM	9:40 AM
9:15 AM	9:25 AM	9:41 AM	9:50 AM	10:10 AM
9:45 AM	9:55 AM	10:11 AM	10:20 AM	10:40 AM
10:15 AM	10:25 AM	10:41 AM	10:50 AM	11:10 AM
10:45 AM	10:55 AM	11:11 AM	11:20 AM	11:40 AM
11:15 AM	11:25 AM	11:41 AM	11:50 AM	12:10 PM
11:45 AM	11:55 AM	12:11 PM	12:20 PM	12:40 PM
12:15 PM	12:25 PM	12:41 PM	12:50 PM	1:10 PM
12:45 PM	12:55 PM	1:11 PM	1:20 PM	1:40 PM
1:15 PM	1:25 PM	1:41 PM	1:50 PM	2:10 PM
1:45 PM	1:55 PM	2:11 PM	2:20 PM	2:40 PM
2:15 PM	2:25 PM	2:41 PM	2:50 PM	3:10 PM
2:45 PM	2:55 PM	3:11 PM	3:20 PM	3:40 PM
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3:45 PM	3:55 PM	4:11 PM	4:20 PM	4:40 PM
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4:45 PM	4:55 PM	5:11 PM	5:20 PM	5:40 PM
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5:45 PM	5:55 PM	6:11 PM	6:20 PM	6:40 PM
6:15 PM	6:25 PM	6:41 PM	6:50 PM	7:10 PM
7:15 PM	7:25 PM	7:41 PM	7:50 PM	8:10 PM
8:15 PM	8:25 PM	8:41 PM	8:50 PM	





## **APPENDIX C**

### **ZONING MAP**



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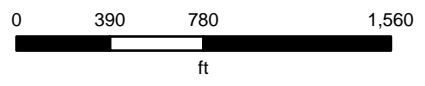
## Zoning Map

7.15.24

Knoxville - Knox County - KUB Geographic Information System



Printed: 7/15/2024 at 1:33:32 PM



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## **APPENDIX D**

### **MANUAL TRAFFIC COUNT DATA**



## TRAFFIC COUNT DATA

Major Street: Pickens Gap Road (SB and NB)

Minor Street: Tarklin Valley Road (EB)

Traffic Control: Stop Sign on Minor Street & NB Pickens Gap Road

7/2/2024 (Tuesday)

Mostly Sunny and Hot

Conducted by: Ajax Engineering

	Pickens Gap Road		Pickens Gap Road		Tarklin Valley Road			
TIME BEGIN	SOUTHBOUND		NORTHBOUND		EASTBOUND		VEHICLE TOTAL	PEAK HOUR
	THRU	RT	LT	THRU	LT	RT		
7:00 AM	2	4	0	3	4	0	13	
7:15 AM	2	8	0	5	10	0	25	7:15 AM - 8:15 AM
7:30 AM	5	3	2	5	4	1	20	
7:45 AM	0	9	0	6	10	0	25	
8:00 AM	1	2	1	4	7	0	15	
8:15 AM	2	3	0	3	5	2	15	
8:30 AM	1	7	0	3	3	1	15	
8:45 AM	5	9	0	4	7	0	25	
TOTAL	18	45	3	33	50	4	153	
2:00 PM	3	4	1	2	11	0	21	
2:15 PM	3	12	0	3	6	1	25	
2:30 PM	6	5	3	4	7	3	28	
2:45 PM	8	12	1	5	4	0	30	
3:00 PM	4	3	0	0	4	0	11	
3:15 PM	2	9	0	3	7	0	21	
3:30 PM	6	7	2	5	11	3	34	
3:45 PM	5	7	1	3	10	1	27	
4:00 PM	5	12	0	3	5	3	28	
4:15 PM	2	14	0	3	10	0	29	
4:30 PM	8	12	0	4	6	2	32	
4:45 PM	7	11	0	7	15	2	42	4:45 PM - 5:45 PM
5:00 PM	7	8	0	3	9	0	27	
5:15 PM	10	11	3	5	6	2	37	
5:30 PM	8	12	0	4	11	3	38	
5:45 PM	7	12	2	5	7	0	33	
TOTAL	91	151	13	59	129	20	463	

### 2024 AM Peak Hour

7:15 AM - 8:15 AM

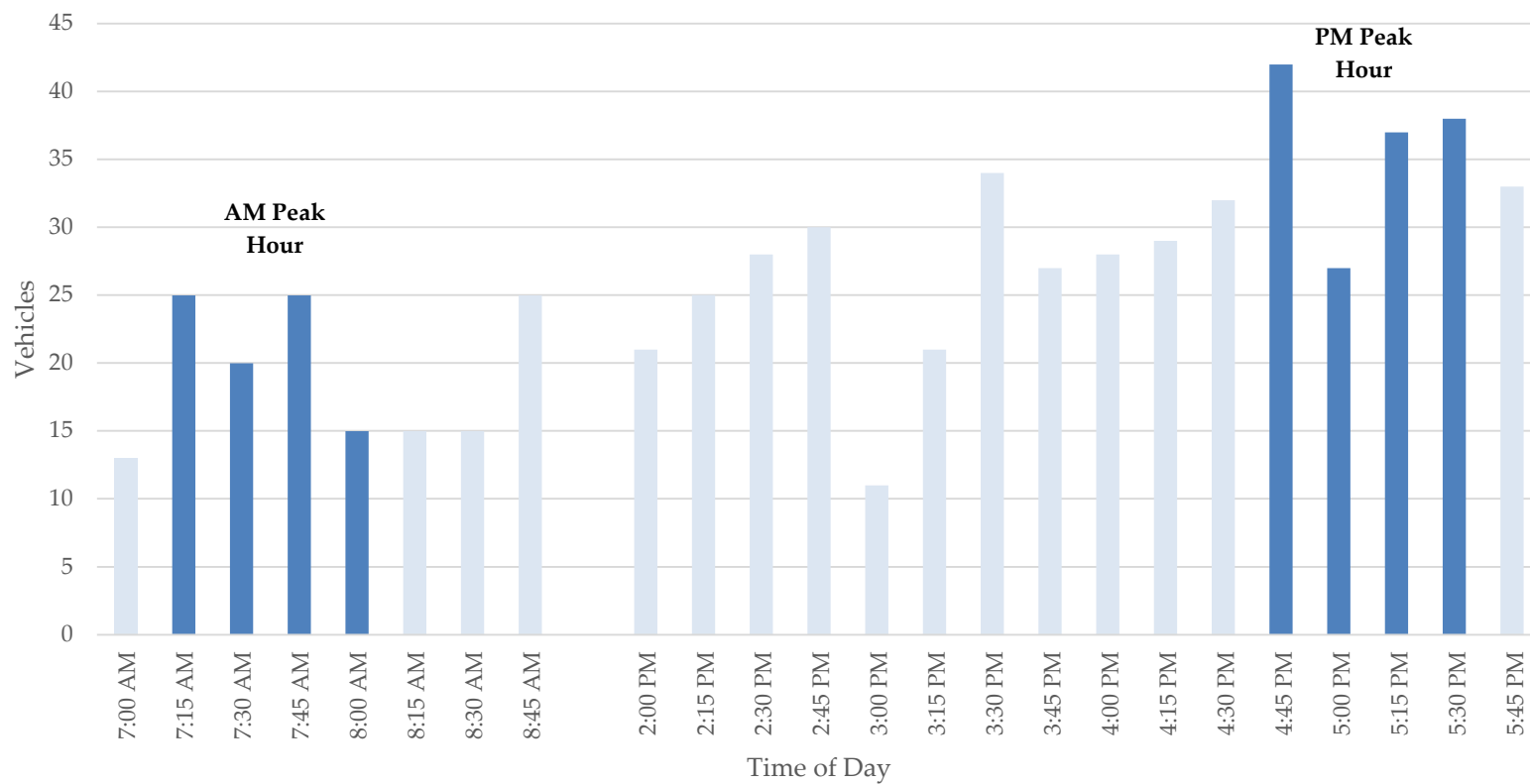
TIME BEGIN	Pickens Gap Road		Pickens Gap Road		Tarklin Valley Road	
	SOUTHBOUND		NORTHBOUND		EASTBOUND	
	THRU	RT	LT	THRU	LT	RT
7:15 AM	2	8	0	5	10	0
7:30 AM	5	3	2	5	4	1
7:45 AM	0	9	0	6	10	0
8:00 AM	1	2	1	4	7	0
TOTAL	8	22	3	20	31	1
PHF	0.40	0.61	0.38	0.83	0.78	0.25
TRUCK %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

### 2024 PM Peak Hour

4:45 PM - 5:45 PM

TIME BEGIN	Pickens Gap Road		Pickens Gap Road		Tarklin Valley Road	
	SOUTHBOUND		NORTHBOUND		EASTBOUND	
	THRU	RT	LT	THRU	LT	RT
4:45 PM	7	11	0	7	15	2
5:00 PM	7	8	0	3	9	0
5:15 PM	10	11	3	5	6	2
5:30 PM	8	12	0	4	11	3
TOTAL	32	42	3	19	41	7
PHF	0.80	0.88	0.25	0.68	0.68	0.58
TRUCK %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

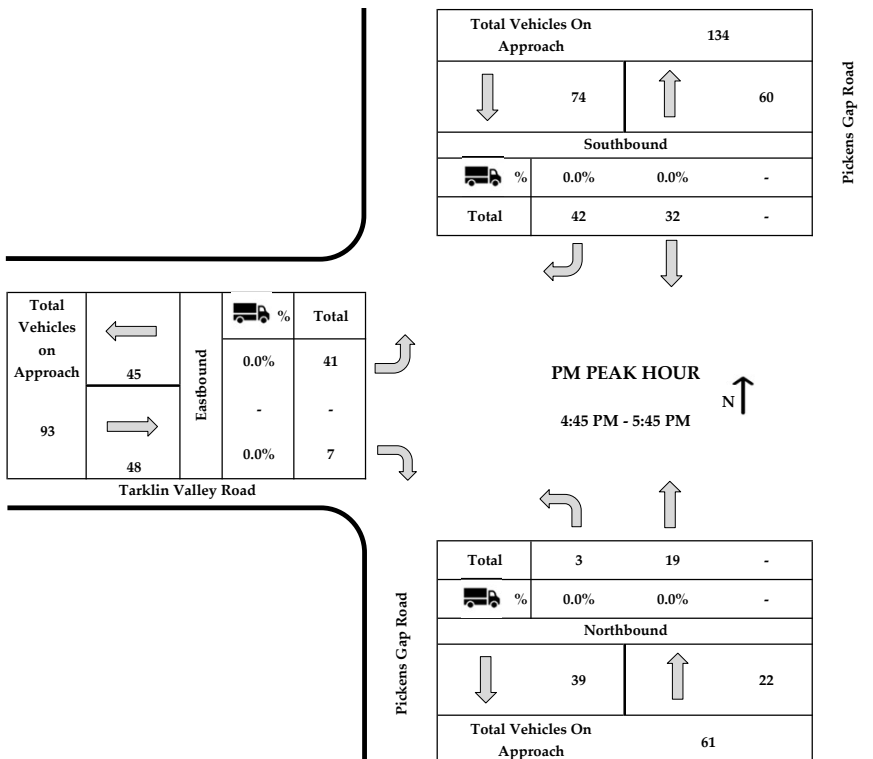
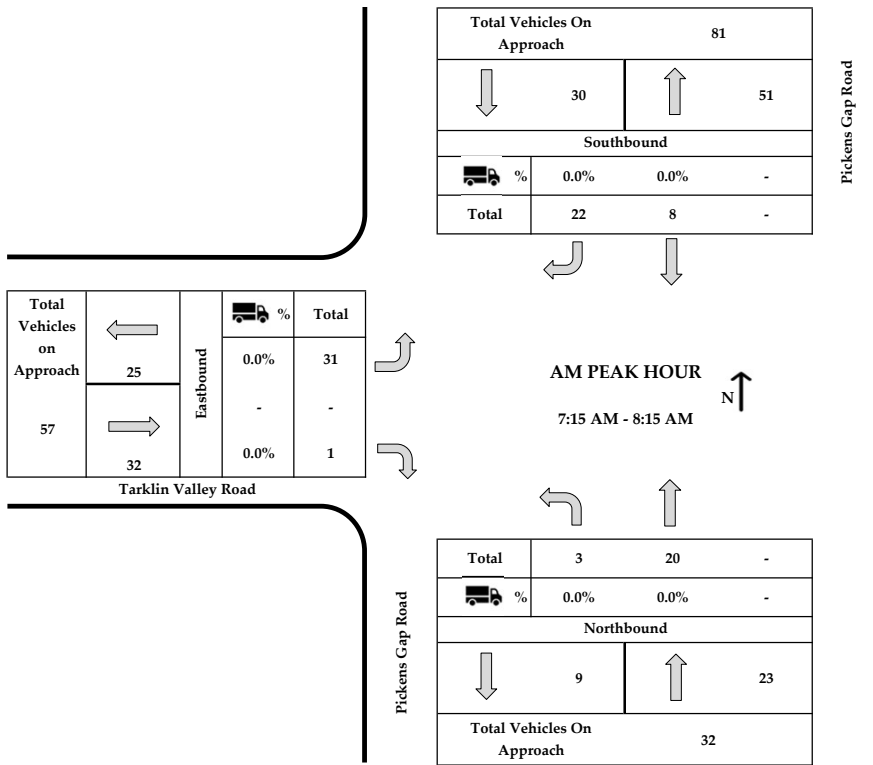
**Pickens Gap Road at Tarklin Valley Road  
Intersection Traffic Count Totals  
7/2/2024**



# **PEAK HOUR DATA**

Major Street: Pickens Gap Road (SB and NB)  
 Minor Street: Tarklin Valley Road (EB)  
 Traffic Control: Stop Sign on Minor Street & NB Pickens Gap Road

7/2/2024 (Tuesday)  
 Mostly Sunny and Hot  
 Conducted by: Ajax Engineering





## TRAFFIC COUNT DATA

Major Street: Pickens Gap Road (SB-NB)

7/2/2024 (Tuesday)

Minor Street: n/a

Mostly Sunny and Hot

Traffic Control: n/a

Conducted by: Ajax Engineering

TIME BEGIN	Pickens Gap Road	Pickens Gap Road	VEHICLE TOTAL	PEAK HOUR
	SOUTHBOUND	NORTHBOUND		
	THRU	THRU		
12:00 AM	1	4	5	
12:15 AM	2	0	2	
12:30 AM	0	0	0	
12:45 AM	0	0	0	
1:00 AM	2	1	3	
1:15 AM	0	1	1	
1:30 AM	0	1	1	
1:45 AM	3	0	3	
2:00 AM	0	0	0	
2:15 AM	0	1	1	
2:30 AM	0	1	1	
2:45 AM	1	0	1	
3:00 AM	0	0	0	
3:15 AM	0	1	1	
3:30 AM	0	1	1	
3:45 AM	0	1	1	
4:00 AM	0	1	1	
4:15 AM	0	0	0	
4:30 AM	0	0	0	
4:45 AM	0	1	1	
5:00 AM	0	1	1	
5:15 AM	1	0	1	
5:30 AM	1	0	1	
5:45 AM	0	2	2	
6:00 AM	0	3	3	
6:15 AM	0	2	2	
6:30 AM	1	1	2	
6:45 AM	2	4	6	
7:00 AM	2	3	5	
7:15 AM	2	6	8	
7:30 AM	6	6	12	
7:45 AM	1	6	7	
8:00 AM	0	2	2	
8:15 AM	4	4	8	
8:30 AM	2	1	3	
8:45 AM	5	4	9	8:45 AM - 9:45 AM
9:00 AM	5	5	10	
9:15 AM	4	6	10	
9:30 AM	4	1	5	
9:45 AM	2	3	5	
10:00 AM	8	3	11	
10:15 AM	1	2	3	
10:30 AM	4	3	7	
10:45 AM	2	4	6	
11:00 AM	3	4	7	
11:15 AM	7	2	9	

TIME BEGIN	Pickens Gap Road	Pickens Gap Road	VEHICLE TOTAL	PEAK HOUR
	SOUTHBOUND THRU	NORTHBOUND THRU		
11:30 AM	3	6	9	
11:45 AM	2	2	4	
12:00 PM	3	4	7	
12:15 PM	6	2	8	
12:30 PM	6	3	9	
12:45 PM	8	3	11	
1:00 PM	7	1	8	
1:15 PM	6	3	9	
1:30 PM	8	7	15	
1:45 PM	7	7	14	
2:00 PM	3	3	6	
2:15 PM	4	3	7	
2:30 PM	9	7	16	
2:45 PM	8	6	14	
3:00 PM	4	0	4	
3:15 PM	2	3	5	
3:30 PM	9	6	15	
3:45 PM	6	4	10	
4:00 PM	7	2	9	
4:15 PM	2	3	5	
4:30 PM	10	4	14	
4:45 PM	10	6	16	4:45 PM - 5:45 PM
5:00 PM	7	4	11	
5:15 PM	11	6	17	
5:30 PM	12	3	15	
5:45 PM	7	6	13	
6:00 PM	10	2	12	
6:15 PM	6	5	11	
6:30 PM	7	2	9	
6:45 PM	6	5	11	
7:00 PM	3	3	6	
7:15 PM	1	3	4	
7:30 PM	6	5	11	
7:45 PM	4	8	12	
8:00 PM	4	3	7	
8:15 PM	4	2	6	
8:30 PM	7	2	9	
8:45 PM	6	2	8	
9:00 PM	3	4	7	
9:15 PM	3	0	3	
9:30 PM	1	2	3	
9:45 PM	6	1	7	
10:00 PM	0	0	0	
10:15 PM	1	0	1	
10:30 PM	1	1	2	
10:45 PM	2	2	4	
11:00 PM	1	0	1	
11:15 PM	0	1	1	
11:30 PM	1	1	2	
11:45 PM	1	1	2	
<b>TOTAL</b>	<b>327</b>	<b>251</b>	<b>578</b>	

## **APPENDIX E**




### **CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 12)**



## EXISTING CONDITIONS

**Intersection**




Intersection Delay, s/veh	7.2
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	36	1	3	23	9	25
Future Vol, veh/h	36	1	3	23	9	25
Peak Hour Factor	0.78	0.25	0.38	0.83	0.40	0.61
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	46	4	8	28	23	41
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay, s/veh	7.5	7.3	6.9
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	12%	97%	0%
Vol Thru, %	88%	0%	26%
Vol Right, %	0%	3%	74%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	26	37	34
LT Vol	3	36	0
Through Vol	23	0	9
RT Vol	0	1	25
Lane Flow Rate	36	50	63
Geometry Grp	1	1	1
Degree of Util (X)	0.04	0.059	0.063
Departure Headway (Hd)	4.06	4.249	3.574
Convergence, Y/N	Yes	Yes	Yes
Cap	880	842	999
Service Time	2.094	2.278	1.609
HCM Lane V/C Ratio	0.041	0.059	0.063
HCM Control Delay, s/veh	7.3	7.5	6.9
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.2	0.2

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	47	8	3	22	37	48
Future Vol, veh/h	47	8	3	22	37	48
Peak Hour Factor	0.68	0.58	0.25	0.68	0.80	0.88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	69	14	12	32	46	55
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay, s/veh	7.7	7.4	7.2
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	12%	85%	0%
Vol Thru, %	88%	0%	44%
Vol Right, %	0%	15%	56%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	25	55	85
LT Vol	3	47	0
Through Vol	22	0	37
RT Vol	0	8	48
Lane Flow Rate	44	83	101
Geometry Grp	1	1	1
Degree of Util (X)	0.051	0.097	0.105
Departure Headway (Hd)	4.148	4.233	3.74
Convergence, Y/N	Yes	Yes	Yes
Cap	856	842	949
Service Time	2.207	2.285	1.796
HCM Lane V/C Ratio	0.051	0.099	0.106
HCM Control Delay, s/veh	7.4	7.7	7.2
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.2	0.3	0.4






## **PROJECTED CONDITIONS WITHOUT THE PROJECT**

**Intersection**

Intersection Delay, s/veh 7.2




Intersection LOS A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	39	1	4	25	10	27
Future Vol, veh/h	39	1	4	25	10	27
Peak Hour Factor	0.78	0.25	0.38	0.83	0.40	0.61
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	50	4	11	30	25	44
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay, s/veh	7.6	7.3	6.9
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	14%	98%	0%
Vol Thru, %	86%	0%	27%
Vol Right, %	0%	3%	73%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	29	40	37
LT Vol	4	39	0
Through Vol	25	0	10
RT Vol	0	1	27
Lane Flow Rate	41	54	69
Geometry Grp	1	1	1
Degree of Util (X)	0.046	0.064	0.069
Departure Headway (Hd)	4.075	4.27	3.587
Convergence, Y/N	Yes	Yes	Yes
Cap	876	838	994
Service Time	2.113	2.303	1.627
HCM Lane V/C Ratio	0.047	0.064	0.069
HCM Control Delay, s/veh	7.3	7.6	6.9
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.2	0.2

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	9	4	24	40	52
Future Vol, veh/h	51	9	4	24	40	52
Peak Hour Factor	0.68	0.58	0.25	0.68	0.80	0.88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	75	16	16	35	50	59
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay, s/veh	7.8	7.5	7.3
HCM LOS	A	A	A




Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	14%	85%	0%
Vol Thru, %	86%	0%	43%
Vol Right, %	0%	15%	57%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	28	60	92
LT Vol	4	51	0
Through Vol	24	0	40
RT Vol	0	9	52
Lane Flow Rate	51	91	109
Geometry Grp	1	1	1
Degree of Util (X)	0.059	0.107	0.114
Departure Headway (Hd)	4.17	4.256	3.758
Convergence, Y/N	Yes	Yes	Yes
Cap	850	835	944
Service Time	2.24	2.314	1.823
HCM Lane V/C Ratio	0.06	0.109	0.115
HCM Control Delay, s/veh	7.5	7.8	7.3
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.2	0.4	0.4



## **PROJECTED CONDITIONS WITH THE PROJECT**

**Intersection**

Intersection Delay, s/veh	7.9
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	39	2	9	112	36	27
Future Vol, veh/h	39	2	9	112	36	27
Peak Hour Factor	0.78	0.25	0.38	0.83	0.40	0.61
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	50	8	24	135	90	44
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay, s/veh	8.1	8.1	7.6
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	7%	95%	0%
Vol Thru, %	93%	0%	57%
Vol Right, %	0%	5%	43%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	121	41	63
LT Vol	9	39	0
Through Vol	112	0	36
RT Vol	0	2	27
Lane Flow Rate	159	58	134
Geometry Grp	1	1	1
Degree of Util (X)	0.181	0.075	0.144
Departure Headway (Hd)	4.119	4.679	3.865
Convergence, Y/N	Yes	Yes	Yes
Cap	863	770	914
Service Time	2.187	2.679	1.946
HCM Lane V/C Ratio	0.184	0.075	0.147
HCM Control Delay, s/veh	8.1	8.1	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.7	0.2	0.5




# HCM 7th TWSC

## 6: Pickens Gap Road & Proposed Entrance

Includes 15% for Missing School Traffic

### Intersection

Int Delay, s/veh 6.2




Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	92	29	3	27	11
Future Vol, veh/h	10	92	29	3	27	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	83	90	90	61
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	11	102	35	3	30	18

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	115	37	0	0	38
Stage 1	37	-	-	-	-
Stage 2	78	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2
Pot Cap-1 Maneuver	887	1042	-	-	1585
Stage 1	991	-	-	-	-
Stage 2	950	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	870	1042	-	-	1585
Mov Cap-2 Maneuver	870	-	-	-	-
Stage 1	991	-	-	-	-
Stage 2	932	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	8.96	0	4.57
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	1022	1124
HCM Lane V/C Ratio	-	-	0.111	0.019
HCM Control Delay (s/veh)	-	-	9	7.3
HCM Lane LOS	-	-	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1




Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	14	7	75	127	52
Future Vol, veh/h	51	14	7	75	127	52
Peak Hour Factor	0.68	0.58	0.25	0.68	0.80	0.88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	75	24	28	110	159	59
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay, s/veh	8.4	8.3	8.5
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	9%	78%	0%
Vol Thru, %	91%	0%	71%
Vol Right, %	0%	22%	29%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	82	65	179
LT Vol	7	51	0
Through Vol	75	0	127
RT Vol	0	14	52
Lane Flow Rate	138	99	218
Geometry Grp	1	1	1
Degree of Util (X)	0.168	0.129	0.249
Departure Headway (Hd)	4.378	4.694	4.117
Convergence, Y/N	Yes	Yes	Yes
Cap	821	765	876
Service Time	2.393	2.714	2.128
HCM Lane V/C Ratio	0.168	0.129	0.249
HCM Control Delay, s/veh	8.3	8.4	8.5
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.6	0.4	1



Intersection						
Int Delay, s/veh	4.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	6	54	28	10	92	49
Future Vol, veh/h	6	54	28	10	92	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	68	90	90	80
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	7	60	41	11	102	61
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	312	47	0	0	52	0
Stage 1	47	-	-	-	-	-
Stage 2	266	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	684	1028	-	-	1567	-
Stage 1	981	-	-	-	-	-
Stage 2	783	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	638	1028	-	-	1567	-
Mov Cap-2 Maneuver	638	-	-	-	-	-
Stage 1	981	-	-	-	-	-
Stage 2	731	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s/v	8.99	0		4.66		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	- 969		1126	-	
HCM Lane V/C Ratio	-	- 0.069		0.065	-	
HCM Control Delay (s/veh)	-	- 9		7.5	0	
HCM Lane LOS	-	- A		A	A	
HCM 95th %tile Q(veh)	-	- 0.2		0.2	-	

## **APPENDIX F**

### **ITE TRIP GENERATION DATA**

# Land Use: 210

## Single-Family Detached Housing

---

### Description

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

### Specialized Land Use

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

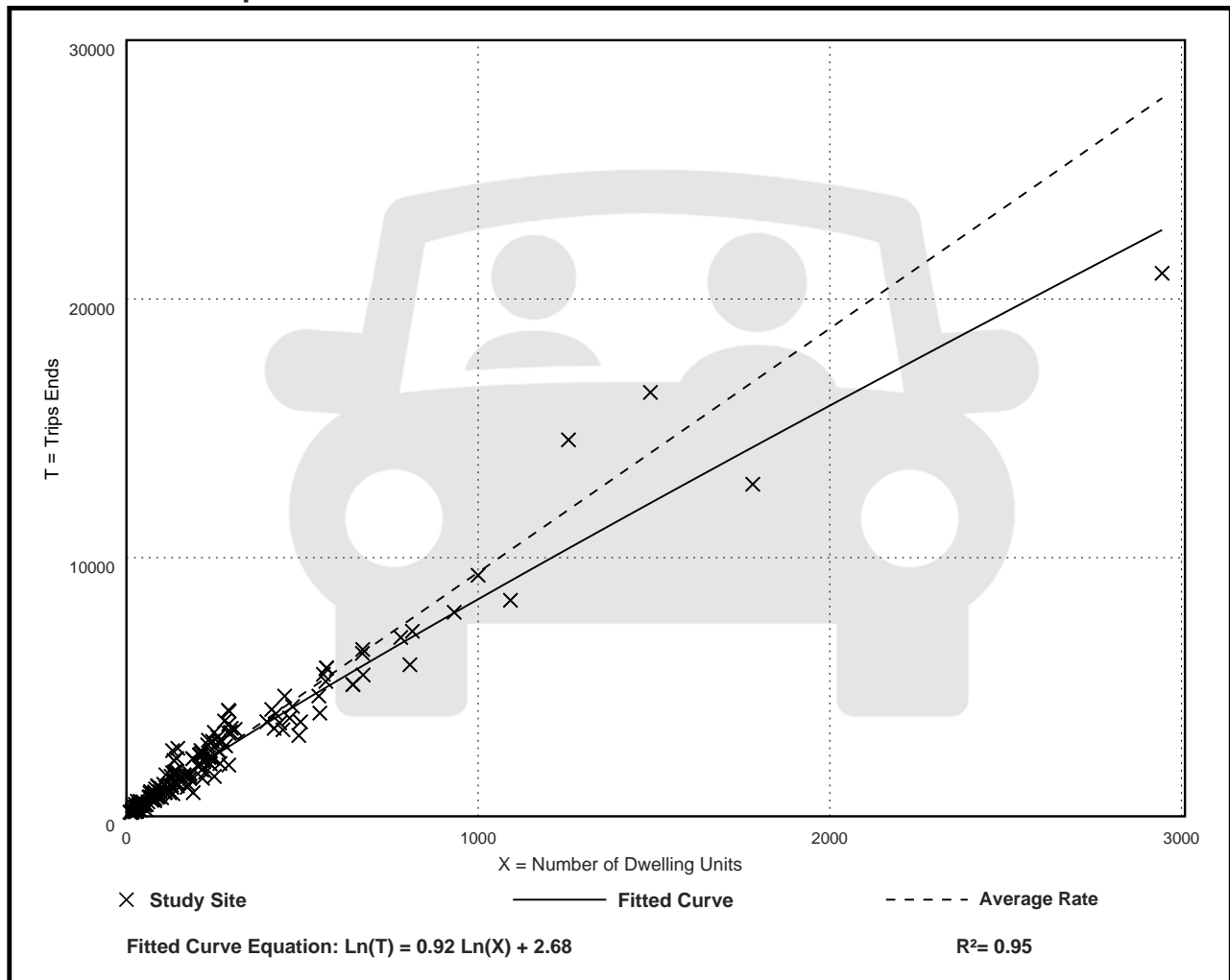
Avg. Num. of Dwelling Units: 246

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

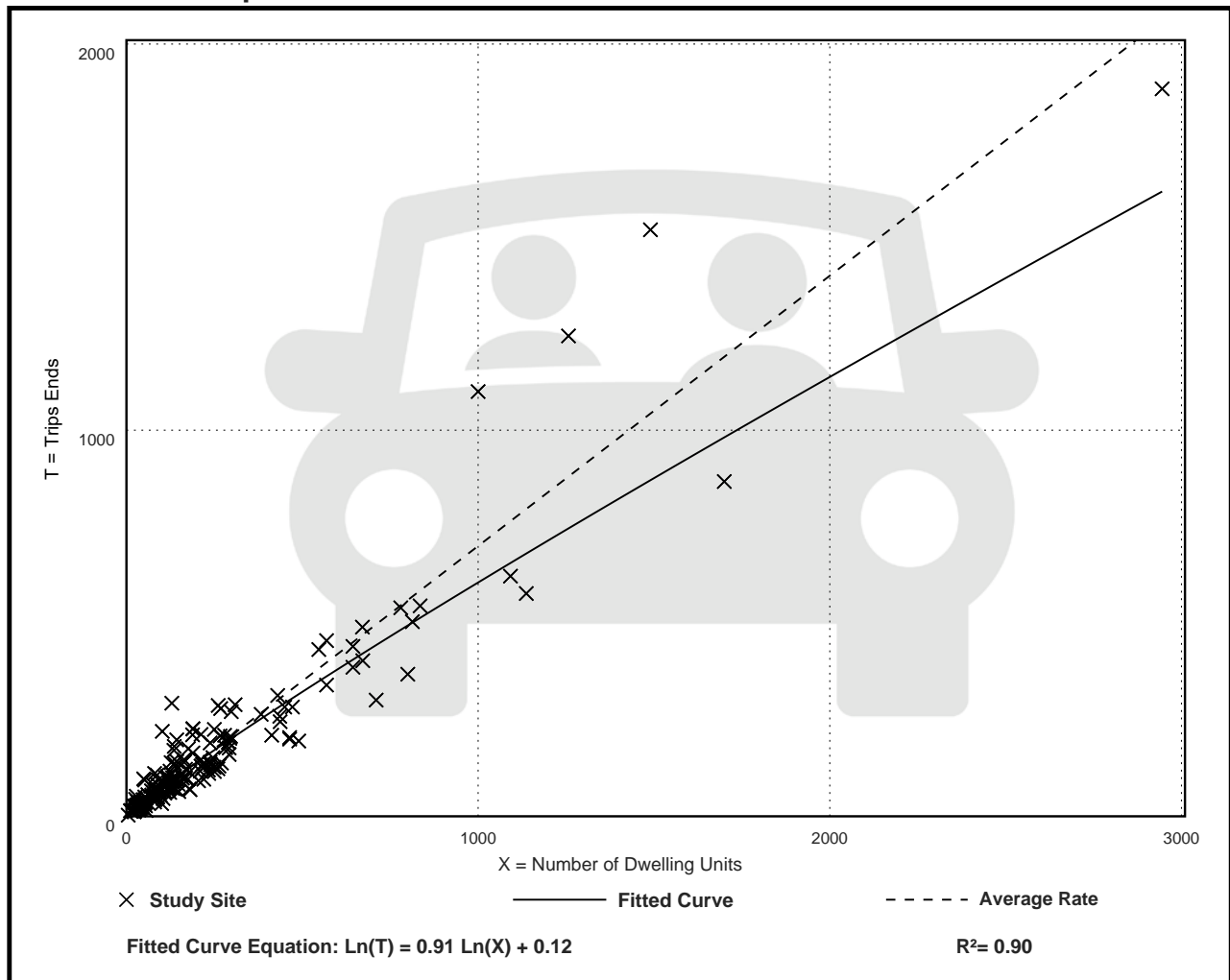
Avg. Num. of Dwelling Units: 226

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

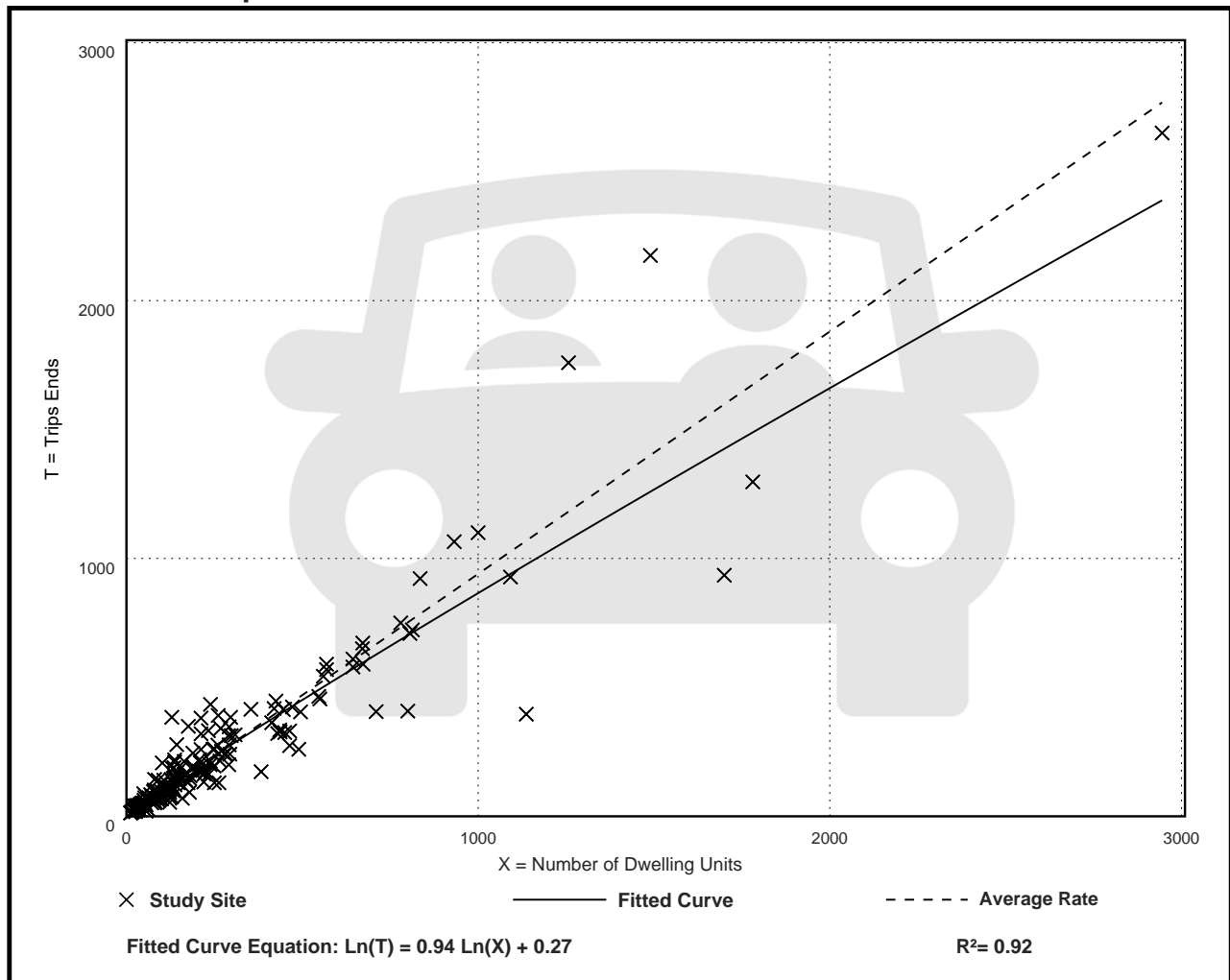
Avg. Num. of Dwelling Units: 248

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 PICKENS GAP ROAD SUBDIVISION

168 New 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	168 Houses	1,626	25%	75%		63%	37%	
				30	89	119	102	60	162
Total New Volume Site Trips			1,626	30	89	119	102	60	162

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

## TRIP GENERATION FOR PICKENS GAP ROAD SUBDIVISION

### 168 New Single-Family Detached Houses

168 Residential Houses = X

---

#### Weekday:

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

$$\ln(T) = 0.92 * 5.12 + 2.68$$

$$\ln(T) = 7.39$$

$$T = \underline{\underline{1,626 \text{ trips}}}$$

---

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

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

$$T = 0.91 * 5 + 0.12$$

$$\ln(T) = 4.78$$

$$T = \underline{\underline{119 \text{ trips}}}$$

---

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

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

$$\ln(T) = 0.94 * 5.12 + 0.27$$

$$\ln(T) = 5.09$$

$$T = \underline{\underline{162 \text{ trips}}}$$



## **APPENDIX G**

### **2021 CENSUS BUREAU DATA**

## Destination Analysis

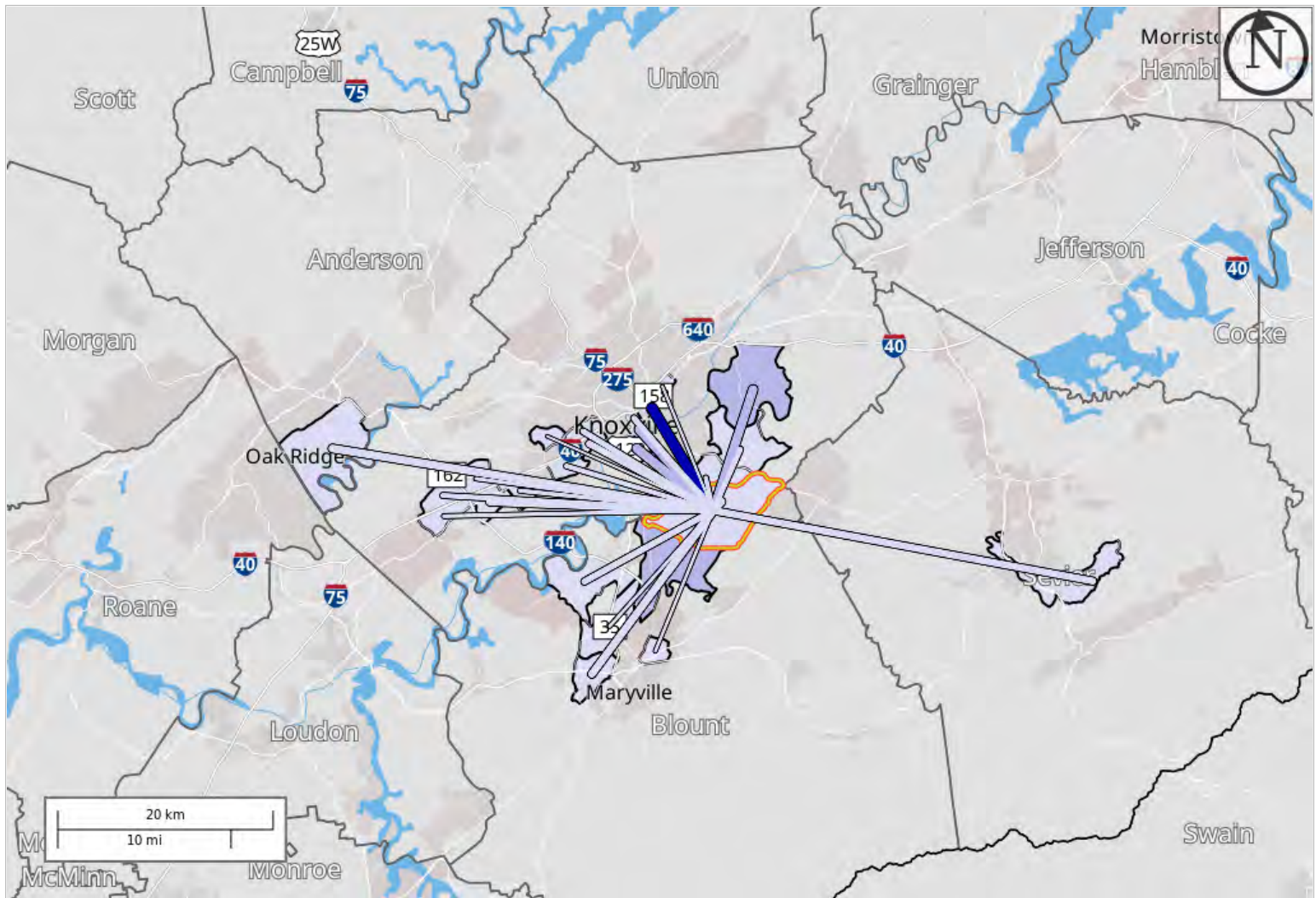
**Workers:** Living in 56.02 (Knox, TN)

**Showing:** Employment locations grouped by Census Tracts

Created by the U.S. Census Bureau's OnTheMap <https://onthemap.ces.census.gov> on 07/15/2024

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

#### All Workers



#### Map Legend

##### Job Count

- 149 - 170
- 127 - 148
- 105 - 126
- 83 - 104
- 61 - 82
- 39 - 60
- 16 - 38

##### Selection Areas

- ▮ Home Area

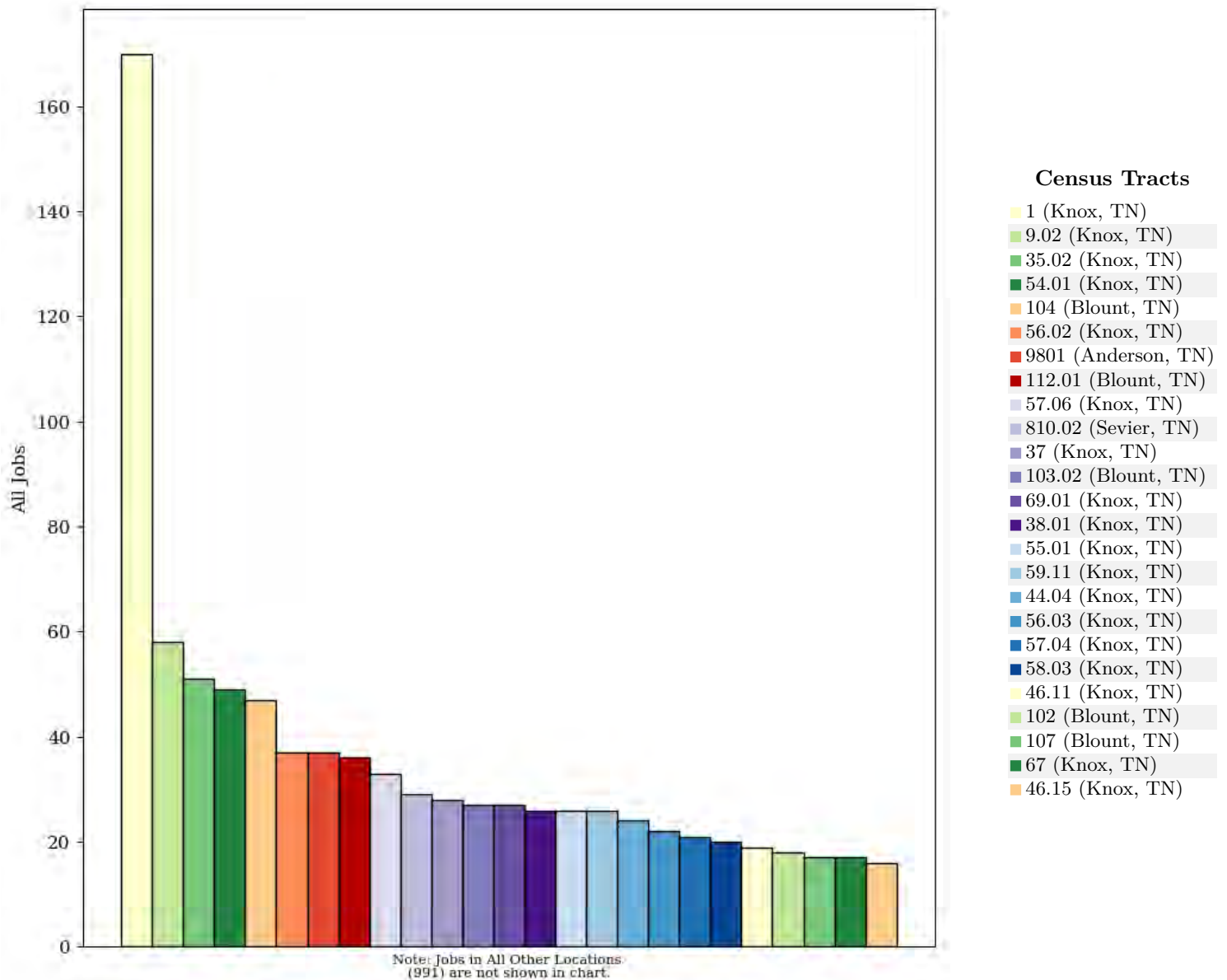
##### Job Count

- ▮ 149 - 170
- ▮ 127 - 148
- ▮ 105 - 126
- ▮ 83 - 104
- ▮ 61 - 82
- ▮ 39 - 60
- ▮ 16 - 38



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

## All Workers



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

## All Workers

Census Tracts as Work Destination Area	2021	
	Count	Share
All Census Tracts	1,872	100.0%
1 (Knox, TN)	170	9.1%
9.02 (Knox, TN)	58	3.1%
35.02 (Knox, TN)	51	2.7%
54.01 (Knox, TN)	49	2.6%
104 (Blount, TN)	47	2.5%
56.02 (Knox, TN)	37	2.0%
9801 (Anderson, TN)	37	2.0%
112.01 (Blount, TN)	36	1.9%
57.06 (Knox, TN)	33	1.8%
810.02 (Sevier, TN)	29	1.5%

Census Tracts as Work Destination Area	2021	
	Count	Share
37 (Knox, TN)	28	1.5%
103.02 (Blount, TN)	27	1.4%
69.01 (Knox, TN)	27	1.4%
38.01 (Knox, TN)	26	1.4%
55.01 (Knox, TN)	26	1.4%
59.11 (Knox, TN)	26	1.4%
44.04 (Knox, TN)	24	1.3%
56.03 (Knox, TN)	22	1.2%
57.04 (Knox, TN)	21	1.1%
58.03 (Knox, TN)	20	1.1%
46.11 (Knox, TN)	19	1.0%
102 (Blount, TN)	18	1.0%
107 (Blount, TN)	17	0.9%
67 (Knox, TN)	17	0.9%
46.15 (Knox, TN)	16	0.9%
All Other Locations	991	52.9%



## Additional Information

### Analysis Settings

Analysis Type	Destination
Destination Type	Census Tracts
Selection area as	Home
Year(s)	2021
Job Type	All Jobs
Selection Area	56.02 (Knox, TN) from Census Tracts
Selected Census Blocks	67
Analysis Generation Date	07/15/2024 11:30 - OnTheMap 6.24.1
Code Revision	bc639735180b6b7ade65403c2bedfe53b70b1e56
LODES Data Vintage	20231016_1512

### Data Sources

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

### Notes

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

## **APPENDIX H**

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

TABLE 5A

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

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

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149	250	180	140	110	80	70
150 - 199	200	140	105	90	70	60
200 - 249	<div> Pickens Gap Road at Proposed Entrance   2028 Projected AM SB Left Turns = 27   Left Turn Lane NOT Warranted </div>		85	75	65	55
250 - 299			75	65	60	50
300 - 349			70	60	55	45
350 - 399			65	55	50	40
400 - 449			60	50	45	35
450 - 499			55	45	40	30
500 - 549			45	35	35	25
550 - 599			40	35	30	25
600 - 649	60	45	35	30	25	25
650 - 699	55	35	35	30	25	20
700 - 749	50	35	30	25	20	20
750 or More	45	35	25	25	20	20

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

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

TABLE 5B

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

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

Pickens Gap Road at  
Proposed Entrance  
  
 2028 Projected AM  
NB Right Turns = 3  
  
 Right Turn Lane NOT  
Warranted

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

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



TABLE 5A

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

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

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149	250	180	140	110	80	70
150 - 199	200	140	105	90	70	60
200 - 249	<div> Pickens Gap Road at Proposed Entrance   2028 Projected PM SB Left Turns = 92   Left Turn Lane NOT Warranted </div>		85	75	65	55
250 - 299			75	65	60	50
300 - 349			70	60	55	45
350 - 399			65	55	50	40
400 - 449			60	50	45	35
450 - 499			55	45	40	30
500 - 549			45	35	35	25
550 - 599			40	35	30	25
600 - 649	60	45	35	30	25	25
650 - 699	55	35	35	30	25	20
700 - 749	50	35	30	25	20	20
750 or More	45	35	25	25	20	20

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

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

TABLE 5B

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

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

Pickens Gap Road at  
Proposed Entrance  
  
 2028 Projected PM  
NB Right Turns = 10  
  
 Right Turn Lane NOT  
Warranted

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

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

## **APPENDIX I**

### **SIMTRAFFIC VEHICLE QUEUE WORKSHEETS**

---

## Queuing and Blocking Report

### Intersection: 4: Pickens Gap Road & Tarklin Valley Road

---

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	32	47	38
Average Queue (ft)	19	31	25
95th Queue (ft)	36	41	43
Link Distance (ft)	458	148	492
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

### Intersection: 6: Pickens Gap Road & Proposed Entrance

---

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	55	12
Average Queue (ft)	34	0
95th Queue (ft)	50	6
Link Distance (ft)	290	148
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

### Network Summary

---

Network wide Queuing Penalty: 0

---



---

## Queuing and Blocking Report

### Intersection: 4: Pickens Gap Road & Tarklin Valley Road

---

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	40	43	63
Average Queue (ft)	23	29	37
95th Queue (ft)	38	44	55
Link Distance (ft)	458	148	492
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

### Intersection: 6: Pickens Gap Road & Proposed Entrance

---

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	50	33
Average Queue (ft)	28	4
95th Queue (ft)	48	22
Link Distance (ft)	290	148
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

### Network Summary

---

Network wide Queuing Penalty: 0

---

## **APPENDIX J**

### **LETTER RESPONSE TO ADDRESS COMMENTS – 10.31.24**



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

October 31, 2024

**PROJECT NAME:** Pickens Gap Road Subdivision (11-H-24-DP/11-SE-24-C)  
**TO:** Knoxville-Knox County Planning  
**SUBJECT:** Response Document for Pickens Gap Road Subdivision Review Comments

Knoxville-Knox County Planning and Knox County Engineering and Public Works Staff:

The following response document addresses comments in an email from Mike Conger, PE, dated October 30, 2024. This letter is added to the end of the revised report in Appendix J.

- 1) The TIS notes that "recommendations and mitigation measures are offered if transportation operations are projected to be below recognized engineering standards" however the TIS does not provide specific mitigation measures for the sections of Pickens Gap Rd between the development access and next major roadway intersection (Tarklin Valley Rd) that are below recognized local and national standards such as the AASHTO "Green Book" of a minimum 2-way pavement width of 18-feet, i.e. 9-foot lanes in each direction. Knox County EPW has also previously published a "Minimum Standard Line" chart (see below screenshot) that relates roadway AADT with desired pavement width that should be cited for cases such as this to document projected AADT volume post-development and associated recommended pavement width in at least one direction from the development to another major roadway.

Response: Knox County EPW's Minimum Standard Width chart and a discussion regarding the pavement width of Pickens Gap Road are added on Pages 53-54. This inclusion resulted in a recommendation to widen Pickens Gap Road from the Proposed Entrance to Tarklin Valley Road to a minimum of 18 feet on Pages 4 and 54.

- 2) Regarding the sections of Pickens Gap Rd to the south of the proposed development including outside of Knox County, the TIS notes "the majority of the proposed subdivision's generated traffic will be encouraged and preferred to travel on Pickens Gap Road to and from the north to and from external destinations" however it is not clear how this behavior will be encouraged. Please include a statement about the potential use of a channelizing island or similar traffic control device to require exiting traffic to make a right turn only to discourage travel towards the south on Pickens Gap Rd.

Response: A recommendation regarding a right-turn-out-only configuration for the Proposed Entrance was added to Pages 3 and 50-51 as a means to discourage travel toward the north on Pickens Gap Road.

- 3) **The TIS notes that sight distance to the south will need further measurement and attention to determine if the ISD will be met - please coordinate with the site engineer to determine if vegetation clearing is possible to achieve the necessary amount.**

Response: The site engineer has determined that the sight distance to the north has a minimum of 400 feet available, and to the south, the available sight distance is a minimum of 350 feet with managed existing vegetation and proposed landscaping. A sight distance to the south of 350 feet would be adequate since Pickens Gap Road on this southern section is recommended to have a posted speed limit of 25 mph and also recommended to be posted with a Side Road Warning Sign (W2-2) and an advisory speed limit plaque of 25 mph (W13-1). Furthermore, the existing road width and horizontal alignment on Pickens Gap Road south of the Proposed Entrance will significantly counteract vehicle speeds greater than 35 mph. Updates on the southern sight distance issue are provided on Pages 2-3, 47, 50, and 51.

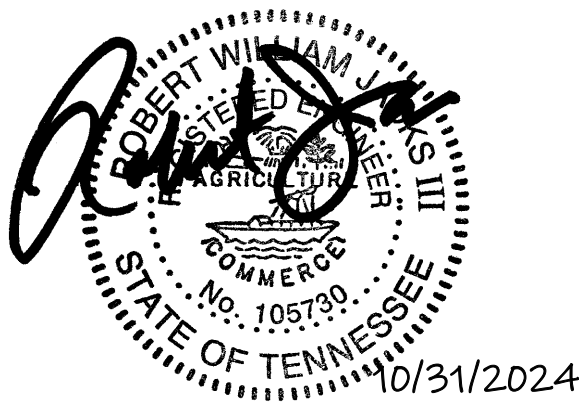
In addition to the revisions listed above, other changes in the report include the following:

- Updated Title Page
- Updated Page Footers and Page Numbers
- Added response letter to the end of the report in Appendix J
- Minor grammar and commentary changes to improve readability

If you have any questions or further comments, don't hesitate to get in touch with me. We look forward to your final approval.

Sincerely,

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





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CIVIL ENGINEERING / TRAFFIC ENGINEERING