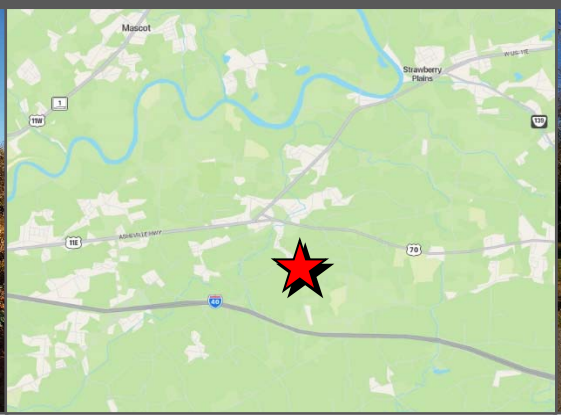
AJAX ENGINEERING

CIVIL ENGINEERING / TRAFFIC ENGINEERING

Transportation Impact Study

Carter Ridge Phases VI - VIII

Knox County, Tennessee



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EXECUTIVE SUMMARY

Preface:

Oakland, LLC proposes additional phases in a residential subdivision off Carter Mill Drive in East Knox County, TN. The subdivision is Carter Ridge, and the additional phases will include Phases VI through VIII. These phases will see the construction of 128 single-family detached houses on 51.1 +/- acres, which will be developed over several stages, and are estimated to be fully built and occupied by 2028. Carter Ridge Subdivision already has one entrance on Carter Mill Drive, has just built a second entrance, and will provide a third entrance once Phase VIII is completed. Construction has recently begun for Carter Ridge Phase IV, including the second entrance. The previous Transportation Impact Study (TIS) for Carter Ridge Subdivision in 2017 only included Phase IV. This study includes Phases IV and V to consolidate the analyses. It includes Phase IV under construction, Phase V, and the proposed future phases of Phases VI – VIII for a total of 202 single-family detached houses in Phases IV - VIII.

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

Study Results:

The significant findings of this study include the following:

- The combined total of Carter Ridge Phases IV – VIII with 202 single-family detached houses is estimated to generate 2,097 trips at full build-out and occupancy on an average weekday. Of these daily trips, 156 are estimated to occur during the AM peak hour and 205 in the PM peak hour in 2028.
- The existing intersection of Carter Mill Drive at Carter Ridge Drive / Carter View Lane will not be significantly impacted by the construction of the remaining houses in the Carter Ridge Subdivision. Low vehicle delays at this intersection have been calculated in the existing and projected 2028 conditions.
- The two other subdivision entrance intersections for Carter Ridge Subdivision on Carter Mill Drive, including Oglethrope Road and Madison Oaks Road, are expected to operate with very low vehicle delays in the projected 2028 AM and PM peak hours and will operate well with respect to vehicle capacity.

- The projected 2028 traffic volumes do not warrant the construction of separate entering left and right-turn lanes on Carter Mill Drive at any of the three subdivision entrances.

Recommendations:

The following recommendations are offered based on the study analyses to minimize the impacts of the proposed development on the adjacent transportation system while attempting to achieve an acceptable traffic flow and improved safety. More details regarding the recommendations are discussed at the end of the report.

- A 24″ white stop bar is recommended to be applied to the recently constructed Oglethrope Road approach at Carter Mill Drive. The stop bar should be applied a minimum of 4 feet away from the edge of Carter Mill Drive and placed at the desired stopping point that maximizes the sight distance. A Stop Sign (R1-1) has already been installed on the Oglethrope Road approach at Carter Mill Drive.
- Sight distance looking to the east at Oglethrope Road at Carter Mill Drive is impacted by an existing sign posted by the developer announcing houses for sale. This sign interferes with sight distance to the east and should be moved further away (to the south) from Carter Mill Drive. Furthermore, vegetation control on the slope south of Carter Mill Drive and east of Oglethrope Road will be crucial since the visually measured sight distance is estimated to be only 350 feet.
- It is recommended that a Stop Sign (R1-1) be installed, and a 24″ white stop bar be applied to the Madison Oaks Road approach at Carter Mill Drive when constructed. The stop bar should be applied a minimum of 4 feet away from the edge of Carter Mill Drive and placed at the desired stopping point that maximizes the sight distance.
- Sight distances at the Madison Oaks Road approach at Carter Mill Drive must not be impacted by future landscaping, signage, or existing vegetation. Based on an assumed speed limit of 30-mph on Carter Mill Drive, the required intersection sight distance is 300 feet looking in each direction at the entrance. The stopping sight distance is 185 feet to the east and 195 feet to the west at the Madison Oaks Road approach at Carter Mill Drive. A visual inspection determined that the intersection and stopping sight distances are available at this future entrance location. The site designer must ensure that these sight distances are accounted for and provided in the design plans.

- A 25-mph Speed Limit Sign (R2-1) is recommended to be posted near the beginning of the future Madison Oaks Road entrance off Carter Mill Drive. 25-mph Speed Limit Signs (R2-1) are already posted on the Oglethrope Road and Carter Ridge Drive entrances in Carter Ridge Subdivision.
- As shown in the report, Stop Signs (R1-1) and 24" white stop bars are recommended on the new internal roadways in Carter Ridge Phases VI - VIII.
- Sight distance at the new internal road intersections must not be impacted by 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.
- The extension of Carter Ridge Drive and the new Road "H" in Carter Ridge Phases VI and VII have long, straight road segments with steeper road grades. Straight road segments with steeper grades encourage higher vehicle speeds. It is recommended that the site designer consider traffic calming measures on these internal roads.
- All drainage grates and covers for the residential development must be pedestrian and bicycle safe.
- Internal sidewalks are proposed along Madison Oaks Road and a portion of Carter Ridge Drive in Carter Ridge Phase VI. Sidewalks should have appropriate ADA-compliant ramps at intersection corners, and the internal sidewalks are recommended to be 5 feet minimum in width to meet Knox County regulations. White crosswalks should be marked on the road pavement internally where pedestrians are expected to cross.
- If directed by the local post office, the site designer should include a parking area within the development for a centralized mail delivery center. The site plan does not currently show a general location in the development, and a specific plan with a parking area should be designed and provided if required.
- All road grade and intersection elements should be designed to AASHTO, TDOT, and Knox County specifications and guidelines to ensure proper operation.

DESCRIPTION OF EXISTING CONDITIONS

- **STUDY AREA:**

The proposed location of Carter Ridge Phases VI - VIII is shown on a map in Figure 1a. The proposed additional phases for the subdivision will be located off Carter Mill Drive, east of the existing Phase III houses in East Knox County, TN. Carter Ridge Subdivision is just over a mile southeast of the Andrew Johnson Highway (US 11E / SR 34) and Asheville Highway (US 11E / US 70 / US 25W / SR 9) interchange. Phases I and II were constructed and developed several years ago and are located between Strawberry Plains Pike to the north and Carter Mill Drive on the south side. Phases I and II are designated as "Carter Mill Subdivision" and are fully built out. Carter Ridge Subdivision comprises Phases III – IX (future), and all these phases will be on the south side of Carter Mill Drive. Carter Ridge Subdivision has recently completed the construction of Phase III and is fully built out with 98 single-family detached houses. Phase IV has recently begun and included the construction of the Oglethrope Road subdivision entrance at Carter Mill Drive, along with nine houses in various stages of completion. Figure 1b shows the various phases and the overall master plan of the Carter Ridge and Carter Ridge Subdivisions.

As Knoxville/Knox County Planning requested, transportation impacts associated with the proposed additional phases of Carter Ridge Subdivision were analyzed at the following intersections: the existing intersection of Carter Mill Drive at Carter Ridge Drive / Carter View Lane, the recently constructed subdivision entrance of Oglethrope Road at Carter Mill Drive, and the future entrance of Madison Oaks Road at Carter Mill Drive that will be constructed in Phase VIII.

The proposed development property is in a rural area that is sparsely occupied outside the Carter Mill and Carter Ridge Subdivisions. In the immediate vicinity, the land uses include residential, agricultural, and undeveloped properties. Paschal Carter Memorial Park is adjacent to Carter Ridge Subdivision on the east end of Carter Mill Drive. The development property for Phases VI – VIII is currently undeveloped and completely forested.

The recent Carter Ridge Phase IV construction included site clearing, earthwork grading, road construction, and the initial stages of house building. The road construction consisted of the Oglethrope Road entrance at Carter Mill Drive, an additional portion of Madison Oaks Road, and Kirkhaven Lane.

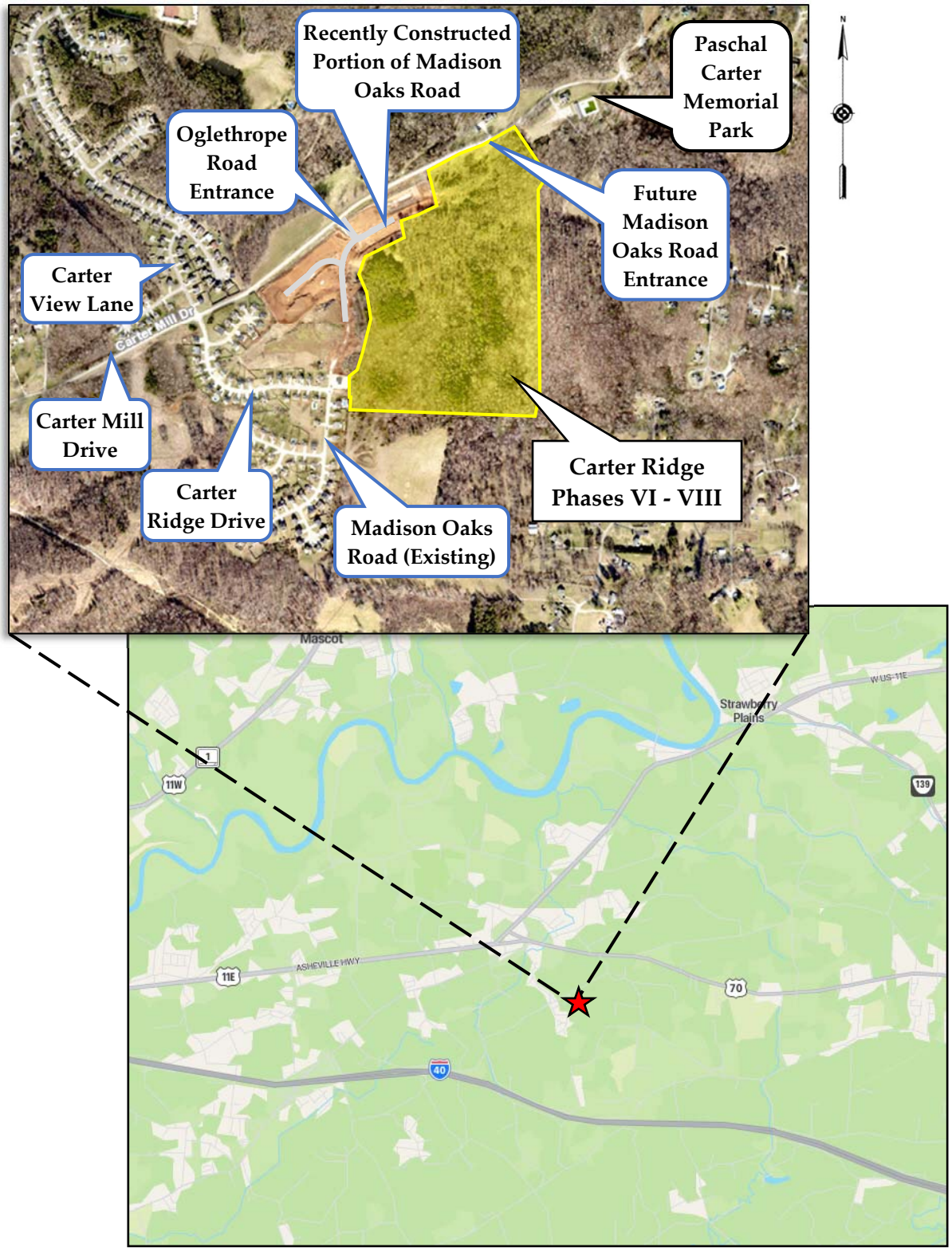


Figure 1a
Location Map

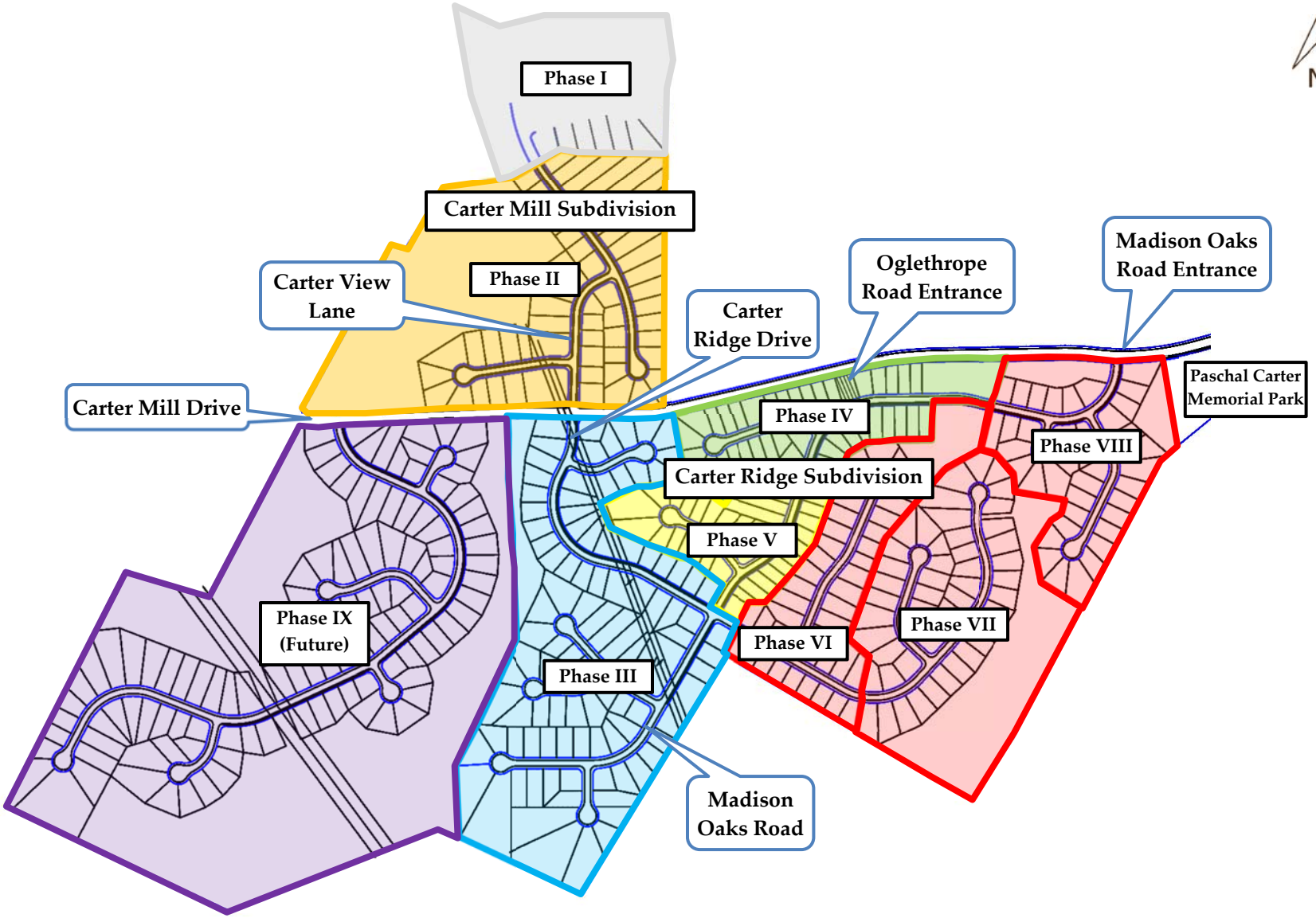


Figure 1b
Master Plan
Carter Ridge and Carter Mill Subdivisions

Not to Scale

- **EXISTING ROADWAYS:**

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

TABLE 1
STUDY CORRIDOR CHARACTERISTICS

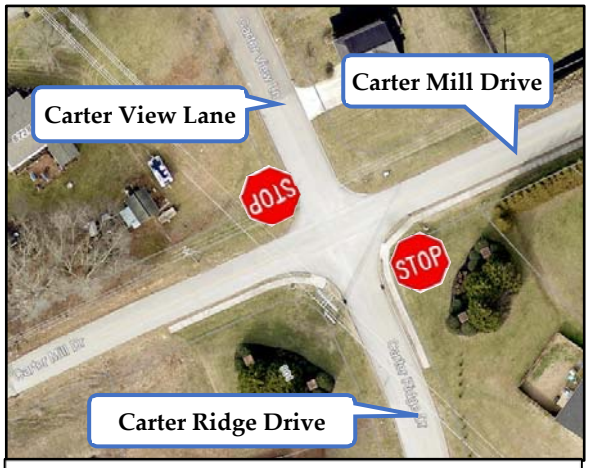
NAME	CLASSIFICATION [1]	SPEED LIMIT	LANES	ROAD WIDTH [2]	TRANSIT [3]	PEDESTRIAN FACILITIES	BICYCLE FACILITIES
Carter Mill Drive	Minor Collector	Not Posted	2 undivided	20 feet	None	Sidewalk on south side of road alongside limits of Phase III	No bike lanes
Carter Ridge Drive	Local Street	25 mph	2 undivided	26 feet	None	Sidewalk on portions of east side of road	No bike lanes
Carter View Lane	Local Street	25 mph	2 undivided	26 feet	None	None	No bike lanes
Oglethrope Road	Local Street	25 mph	2 divided	44 feet	None	None	No bike lanes

[1] 2018 Major Road Plan by Knoxville/Knox County Planning
[2] From edges of pavement or face of curbs
[3] According to Knoxville Area Transit (KAT) System Map

Carter Mill Drive is classified as a Minor Collector from McCubbins Road from the southwest to South Carter School Road to the northeast, with a total length of 1.6 miles. Adjacent to the project study area, the roadway has some mild roadway horizontal and vertical curvature. Several hundred feet to the west of the intersection with Carter Ridge Drive / Carter View Lane, Carter Mill Drive narrows to a total pavement width of approximately 16 feet to McCubbins Road, and the double yellow center line and white edge lines are dropped. The narrower western portion of Carter Mill Drive provides access to several residences and farms on large properties. The majority of Carter Mill Drive in the center and eastern portions o the road was widened for the previous residential phases of Carter Ridge and Carter Mill Subdivisions. To the east of Carter Ridge Subdivision, Carter Mill Drive provides access to Paschal Carter Memorial Park. Carter Mill Drive has no posted speed limit in either direction.

Carter Mill Drive adjacent to the Carter Ridge and Carter Mill Subdivisions currently consists of a 2-lane pavement section with a total pavement width of 20 feet. The roadway is striped with faded white edge lines and a faded double yellow center line. Outside the white edge lines, the pavement edge extends only a few inches on each side. The speed limit on Carter Mill Drive is

not posted and is assumed to be 30-mph. There are no utility streetlights on Carter Mill Drive for roadway illumination.



Intersection of Carter Mill Drive at Carter Ridge Drive / Carter View Lane

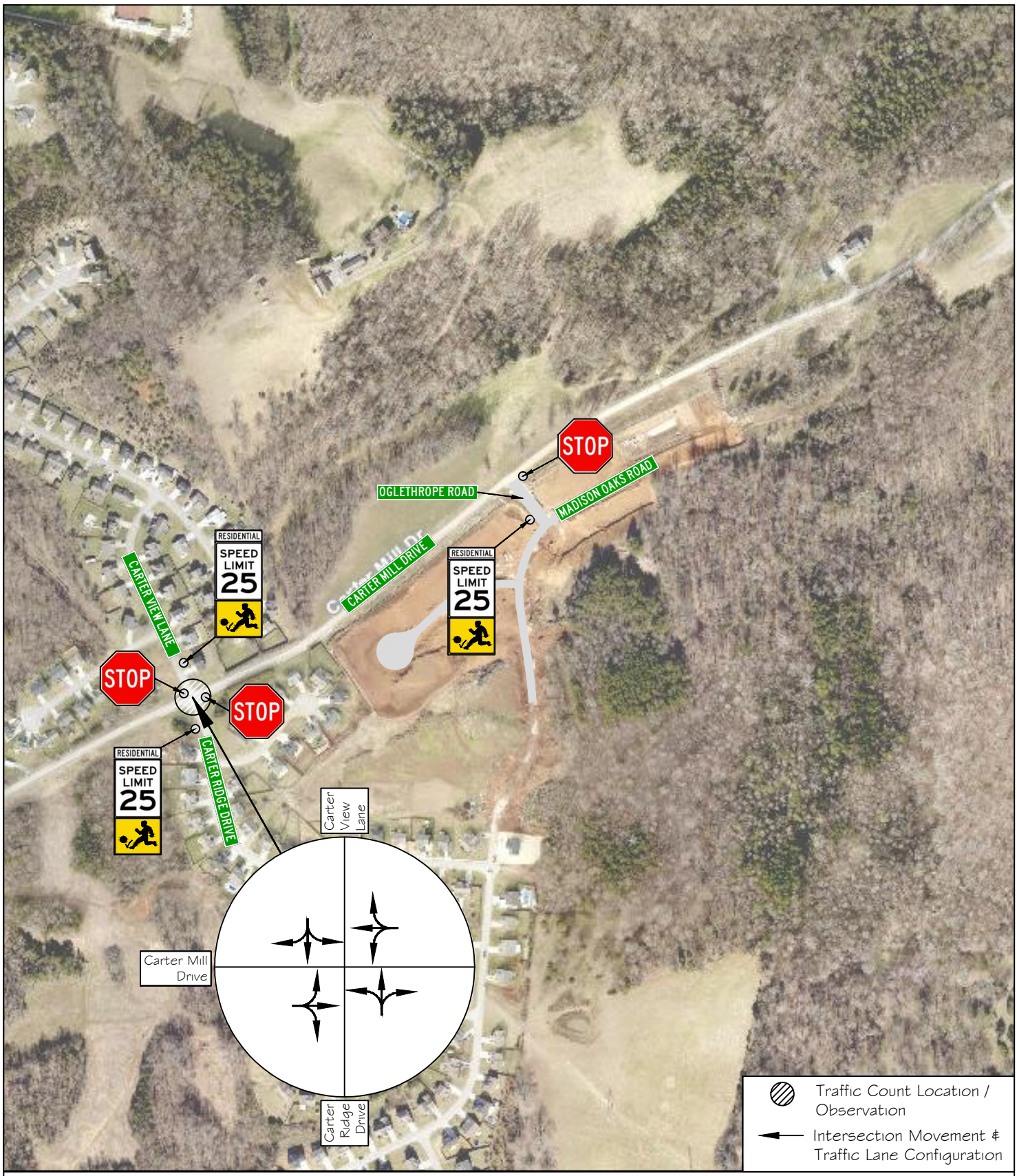
At the unsignalized four-way intersection of Carter Mill Drive at Carter Ridge Drive / Carter View Lane, each approach has a single lane. A 4-foot sidewalk is provided on Carter Mill Drive for a short distance to the east and west of the intersection. The Carter Ridge Drive and Carter View Lane approaches are controlled by Stop Signs (R1-1), and vehicles on Carter Mill Drive operate freely.

Carter Ridge Drive is classified as a Local Street and traverses from Carter Mill Drive on the north side to Madison Oaks Road in the interior of Carter Ridge Subdivision with a total length of 0.3 miles. Carter Ridge Drive currently provides the sole access to Phase III of the Carter Ridge Subdivision to and from Carter Mill Drive and traverses in a generally northwest-southeast direction. Carter Ridge Drive consists of 2 – 13 foot vehicular lanes with concrete curbing. Roadway lighting is not present on Carter Ridge Drive. A 4-foot sidewalk is provided on the east side of Carter Ridge Drive on portions of Carter Mill Drive.

Carter View Lane is classified as a Local Street and traverses from Carter Mill Drive on the south side to Drakewood Road to the north in the interior of the Carter Mill Subdivision with a total length of 0.1 miles. Carter View Lane generally traverses in a north-south direction. Carter View Lane consists of 2 – 13 foot vehicular lanes with concrete curbing. Roadway lighting is not present on Carter View Lane, and no sidewalks are provided.

Oglethrope Road is classified as a Local Street and traverses a short distance between Carter Mill Drive and Madison Oaks Road in Carter Ridge Phase IV. This road was recently constructed and has a boulevard typical section with a total width of 44 feet.

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



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NOT TO SCALE

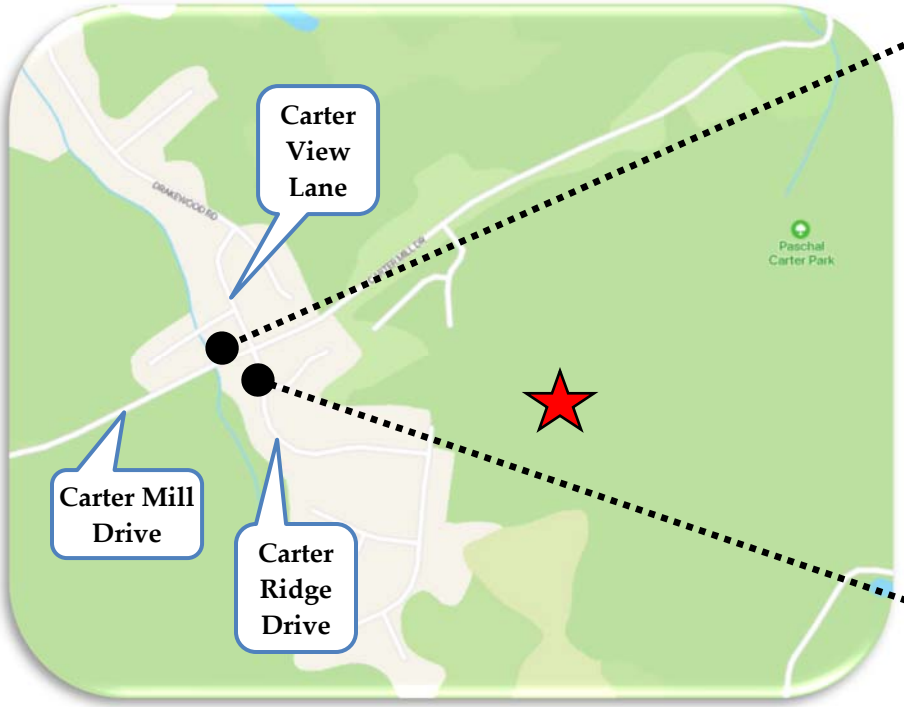
NORTH

FIGURE 2

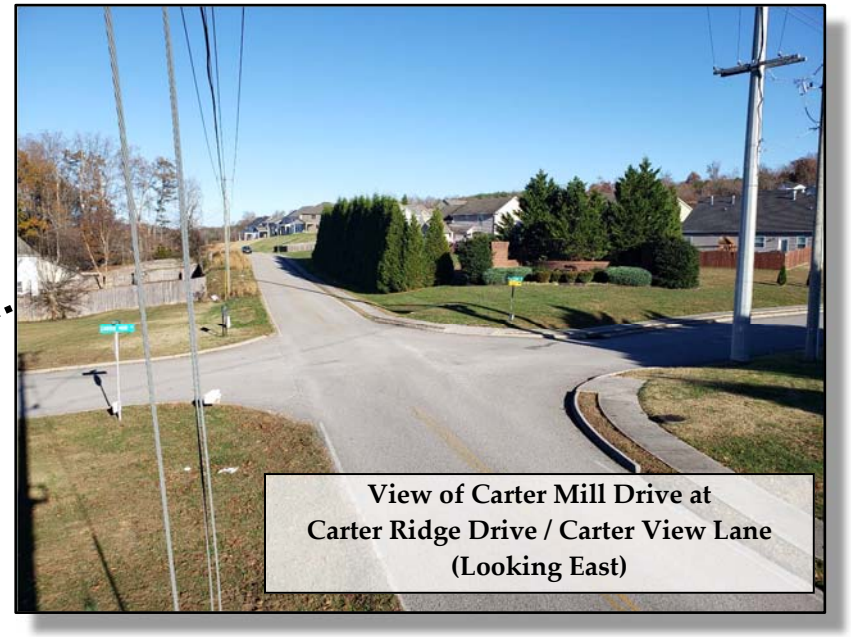
Carter Ridge Phases VI - VIII

Traffic Count Location, Traffic Signage & Existing Lane Configurations

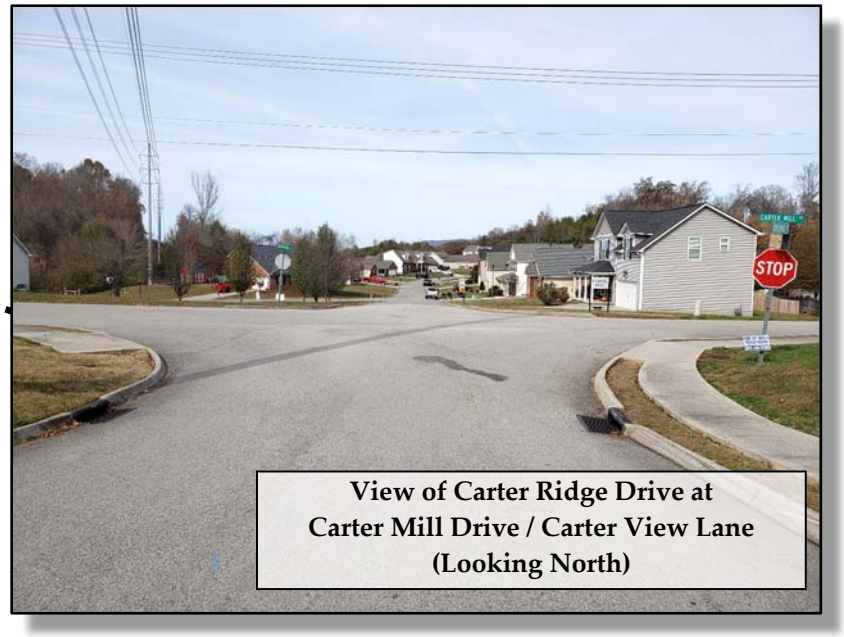
PHOTO EXHIBITS



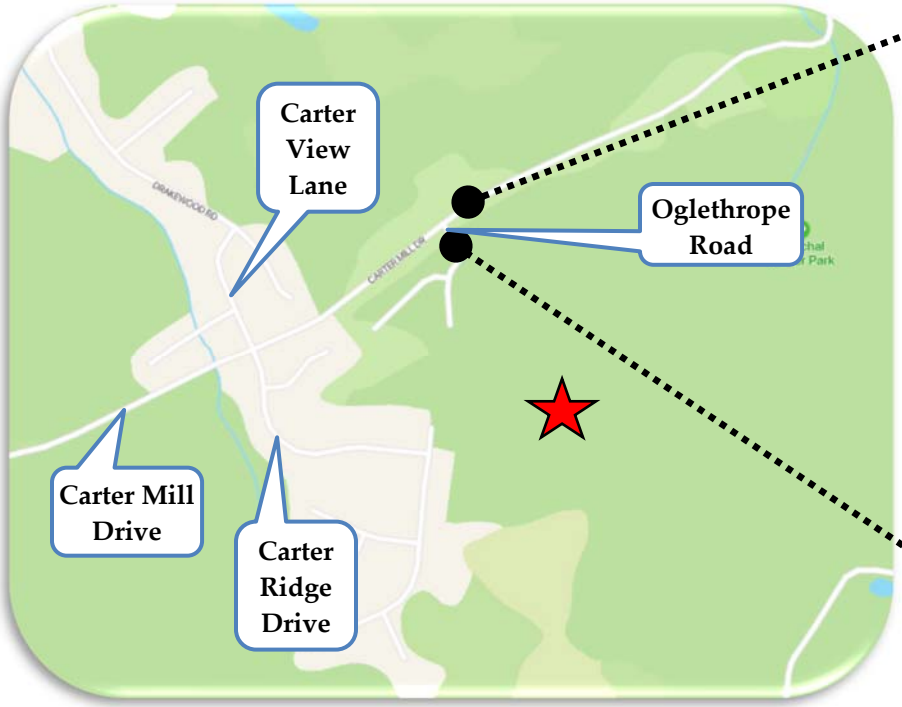
Carter Mill Drive



View of Carter Mill Drive at
Carter Ridge Drive / Carter View Lane
(Looking East)

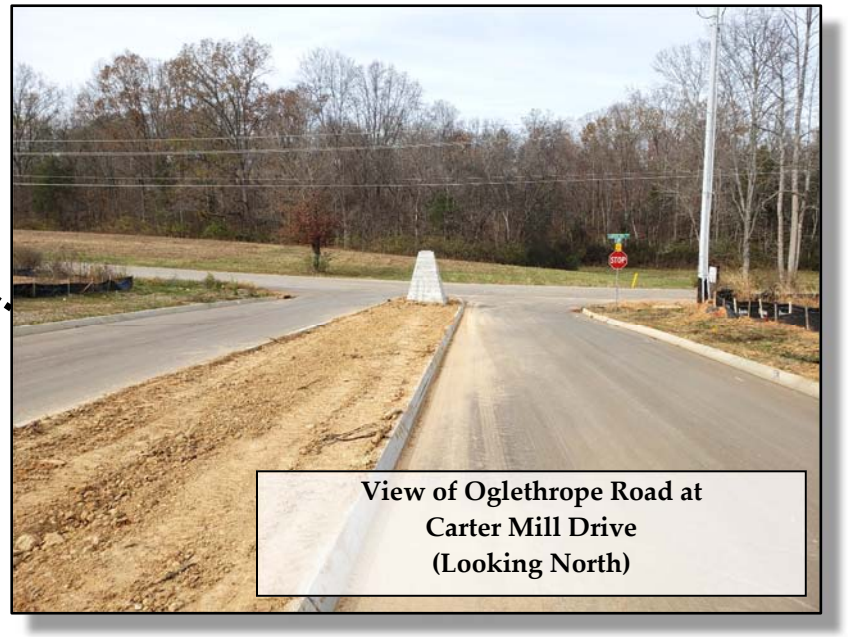


View of Carter Ridge Drive at
Carter Mill Drive / Carter View Lane
(Looking North)

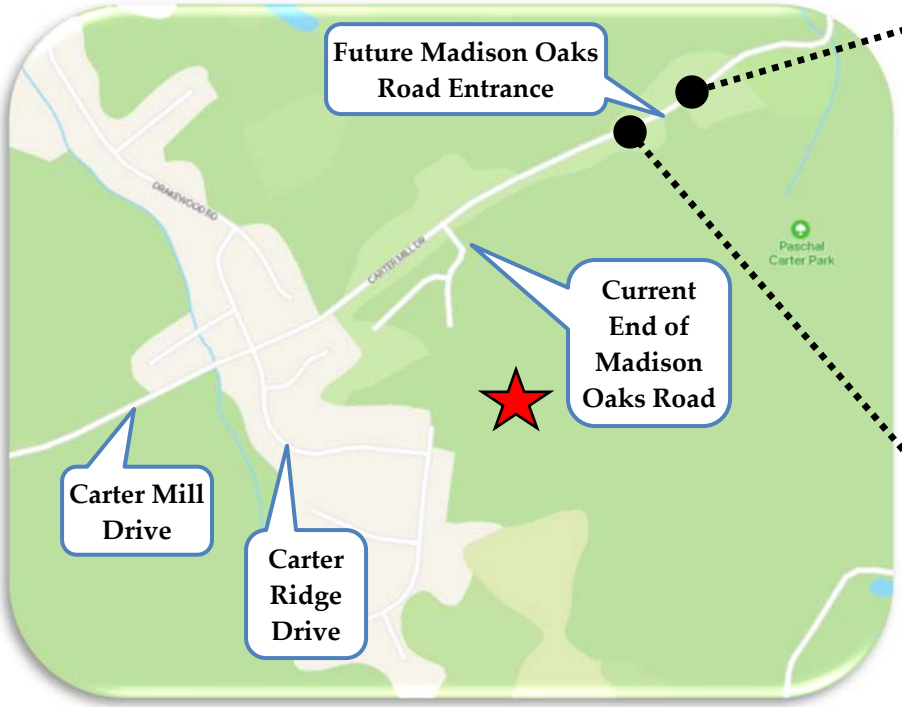


Carter Mill Drive

View of Carter Mill Drive at Oglethrope Road (Looking Southwest)

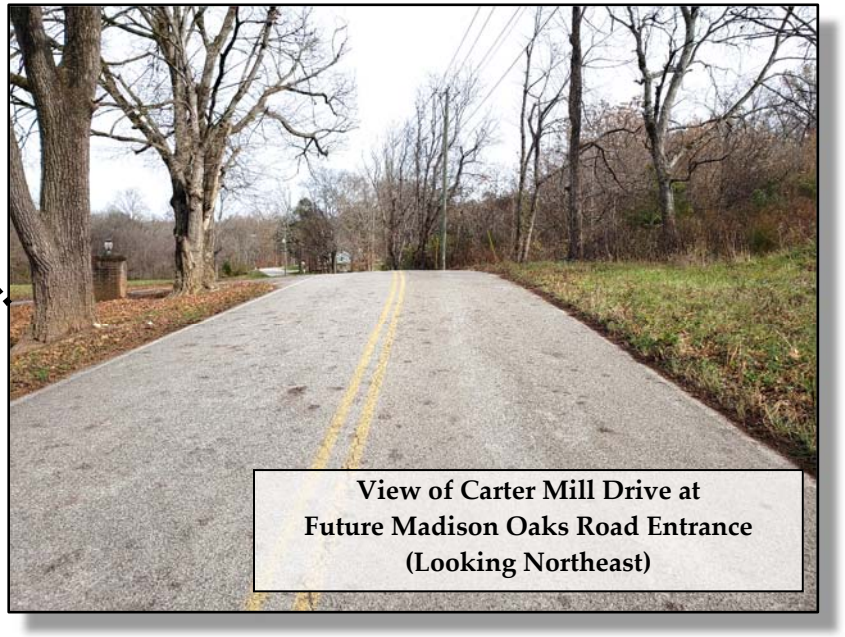


View of Oglethrope Road at Carter Mill Drive (Looking North)

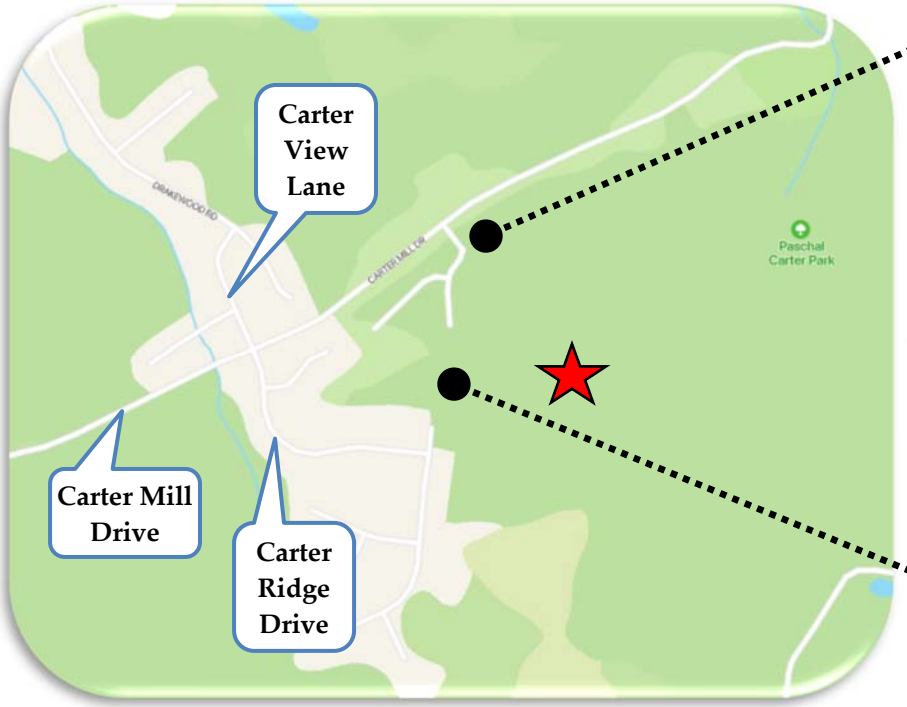


Carter Mill Drive

View of Carter Mill Drive at Future Madison Oaks Road Entrance (Looking Southwest)



View of Carter Mill Drive at Future Madison Oaks Road Entrance (Looking Northeast)



Carter Mill Drive

View of Future Development Site for Phases VI – VIII at Current End of Madison Oaks Road (Looking Northeast)

View of Future Development Site for Phases IV – VIII (Looking Northeast)

- **EXISTING TRANSPORTATION VOLUMES PER MODE**:

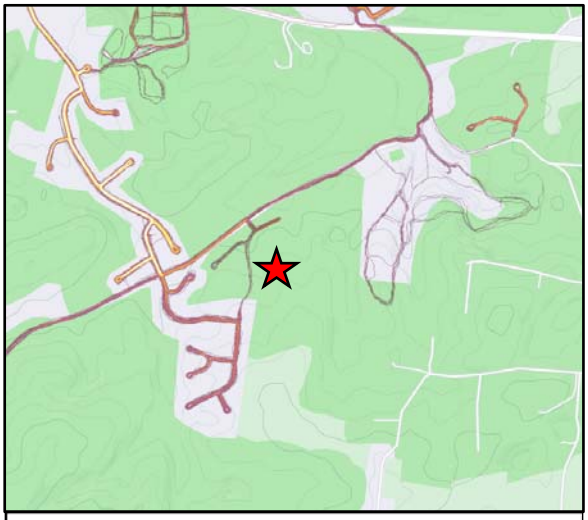
There are no annual vehicular traffic count locations along Carter Mill Drive or close to the project site. The closest traffic count locations are conducted by the Tennessee Department of Transportation (TDOT). The TDOT data is the following and can be viewed with further details in Appendix A:

- Existing vehicular roadway traffic:
  - TDOT reported an Average Daily Traffic (ADT) on Asheville Highway (US 25E) north and east of the project site, at 4,971 vehicles per day in 2021. From 2011 to 2021, this count station has indicated a +0.2% average annual traffic growth rate.
  - TDOT reported an Average Daily Traffic (ADT) on Strawberry Plains Pike, north and west of the development site, at 6,249 vehicles per day in 2021. From 2011 to 2021, this count station has indicated a +0.5% average annual traffic growth rate.
  - TDOT reported an Average Daily Traffic (ADT) on South Carter School Road, south and east of the development site, at 1,237 vehicles per day in 2021. From 2011 to 2021, this count station has indicated a 0% average annual traffic growth rate.

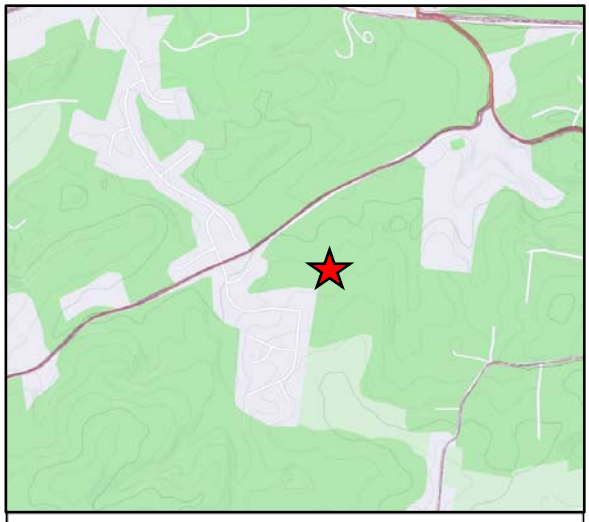
- Existing bicycle and pedestrian volumes:
  The average daily pedestrian and bicycle traffic is unknown along the studied roadways. Due to the lack of nearby amenities and sporadic sidewalks, there is assumed minimal pedestrian and bicyclist activity on these roads in the study area. However, during the traffic counts for this project, about two dozen pedestrians were observed over 6 hours at the intersection of Carter Mill Drive at Carter Ridge Drive / Carter View Lane. One bicyclist was observed crossing Carter Mill Drive. All these pedestrian activities were exercise-related except for several handfuls of school-age children entering and exiting school buses on Carter Mill Drive.

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

area. Higher pedestrian activity is shown in Carter Mill Subdivision, Carter Ridge Subdivision, and the nearby Paschal Carter Memorial Park. No bicycle traffic is shown in the heat maps in the residential subdivisions, but some are shown on Carter Mill Drive.



Strava Heat Map for Pedestrian and Joggers



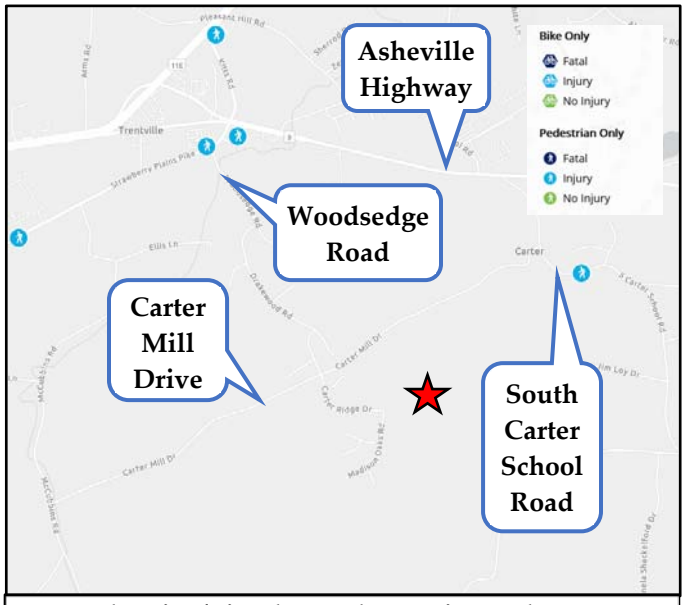
Strava Heat Map for Bicyclists

- **ON-STREET PARKING:**

On-street parking was not observed during the site review and is not allowed on Carter Mill Drive adjacent to the subdivision. However, on-street parking was observed on Carter Ridge Drive and Carter View Lane and is associated with the residents in the subdivisions.

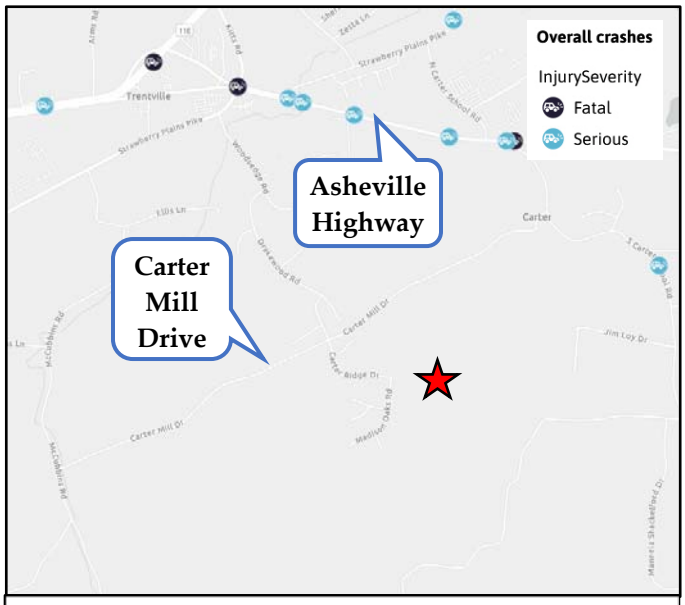
- **PEDESTRIAN AND BICYCLE FACILITIES**:

Bicycle facilities (lanes) are not currently available on any of the studied roadways within the project site study area. A 4-foot wide concrete sidewalk is provided on the south side and along Carter Mill Drive in front of Phase III of Carter Ridge Subdivision, with a total length of 525 feet. The sidewalk begins just west of the 4-way unsignalized intersection of Carter Mill Drive at Carter Ridge Drive / Carter View Lane and ends 375 feet to the east of the intersection. Carter Ridge Drive in Phase III of Carter Ridge Subdivision has sporadic sections of sidewalk on its east side, and there are no sidewalks on Carter View Lane in Carter Mill Subdivision.



Pedestrian/Bicycle Crash Data in Study Area

The Knoxville Transportation Planning Organization (TPO) provided a 2020 update to bicycle and pedestrian crash data for Knox County and other surrounding counties. The data shows none of these incidents occurred near the development site. The closest incidents occurred on Strawberry Plains Pike near Woodsedge Road, and the two crashes involved pedestrians. Details regarding the cause of these crashes were not provided other than that injuries occurred. Another incident occurred east of the development site on South Carter School Road and involved a pedestrian. According to the data, a pedestrian was injured on October 14th, 2015, while walking along South Carter School Road. One of the attributed causes of this incident was the lack of sidewalks.

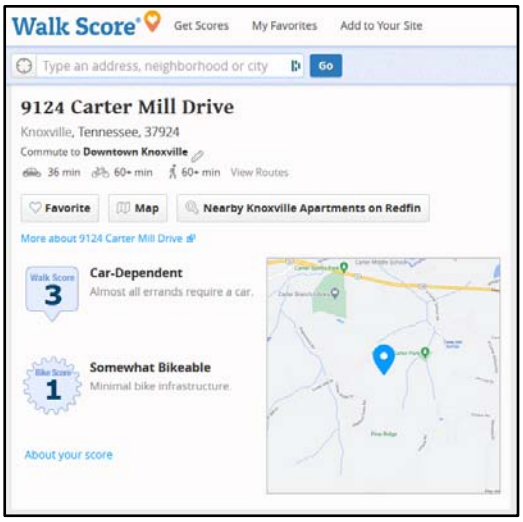


Vehicular Crash Data in Study Area

The Knoxville TPO also provides data related to "Life-Altering Traffic Crashes". This data lists "the location of 2,326 traffic crashes in the Knoxville region that resulted in a fatality or serious injury between January 2016 and June 2019." According to the data, none of these incidents occurred near the development site in those years. However, three fatal crashes occurred to the north along Asheville Highway and Andrew Johnson Highway. Of these incidents, all three are listed as single-vehicle crashes, with one involving a motorcycle.

- **WALK SCORE**:

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



Appendix B shows maps and other information for the Walk Score, Bike Score, and Transit Score at the development property at 9124 Carter Mill Drive (development property address). The project site location is graded with a Walk Score of 3. This Walk Score indicates that the site is car-dependent and that almost all errands currently require a vehicle for travel to and from the development property. The site is graded with a Bike Score of 1, which means there is minimal bike infrastructure. The site is not given a Transit Score since public transportation is unavailable near the development site.

- **TRANSIT SERVICES:**

The City of Knoxville has a network of public transit opportunities offered by Knoxville Area Transit (KAT). Bus service is not available in the study area. The overall KAT bus system map is provided in Appendix C. The closest public transit bus stop to the development site is 8.6 miles away to the west by roadway. This bus stop is located on Asheville Highway near Chilhowee Drive on Route 31, "Magnolia". It operates on weekdays and weekends; this route map is included in Appendix C. KAT had to reduce its service schedule due to workforce shortages. These changes took place on August 29th, 2022, and the reduced schedule for Route 31 is also included in Appendix C. Other transit services in the area include the East Tennessee Human Resource Agency (ETHRA) and the Community Action Committee (CAC), which provides transportation services when requested.

KAT Route 31

PROJECT DESCRIPTION

- **LOCATION AND SITE PLAN:**

The proposed plan layout for Phases VI – VIII with 128 single-family detached houses on 51.1 +/- acres is designed by Ideal Engineering Solutions, Inc. and is shown in Figure 3. The design for these phases shows four new streets and the extension of two existing internal roads. The road extensions will be constructed for Carter Ridge Drive and Madison Oaks Road. Carter Ridge Drive currently ends at Madison Oaks Road in Phase III. Carter Mill Drive will be extended in Phases VI and VII just over 2,000 feet before terminating at a cul-de-sac. Madison Oaks Road currently exists in the rear of Carter Ridge Phase III, ends at Carter Ridge Drive, and then starts again inside Phase IV between the recently constructed streets of Kirkhaven Lane and Oglethrope Road. Madison Oaks Road will be extended to provide further access in Phases V and VIII. After all the Carter Ridge Subdivision phases are constructed, Madison Oaks Road will traverse throughout the development to Carter Mill Drive on the northeast side of the development and provide a third entrance. Other proposed roads in Phases VI – VIII include Road C, H, I, and J, and all will terminate at cul-de-sacs.

Phases VI – VIII will include three large areas for stormwater controls on the northern side of the subdivision. A large undeveloped area of 8.6 acres will remain on the southeast side of Phases VI – VIII. The proposed house lot sizes in Phases VI – VIII will vary from around 7,250 square feet (0.16 acre) to 19,000 square feet (0.44 acre). Each housing unit will be two stories with an attached garage and driveway. Internal sidewalks are proposed along Madison Oaks Road and a portion of the Carter Ridge Drive extension in Phase VI.

The schedule for the completion of this new residential development is dependent on economic factors and construction timelines. This project is also contingent on permitting, design, and other regulatory approvals. In the past couple of years, the real estate market in the area has been experiencing large amounts of activity and growth. However, the market has slowed down from its peak due to rising interest rates and other factors. For this study, the total construction build-out of the development and full occupancy for the phases was assumed and analyzed for several horizon years. Phases IV and V (currently under construction) are assumed to reach full build-out and occupancy in 2025, Phases VI and VII in 2027, and Phase VIII will occur by 2028. The developer will not be constructing the Madison Oaks Road entrance at Carter Mill Drive until the other phases are constructed and Phase VIII is commenced.

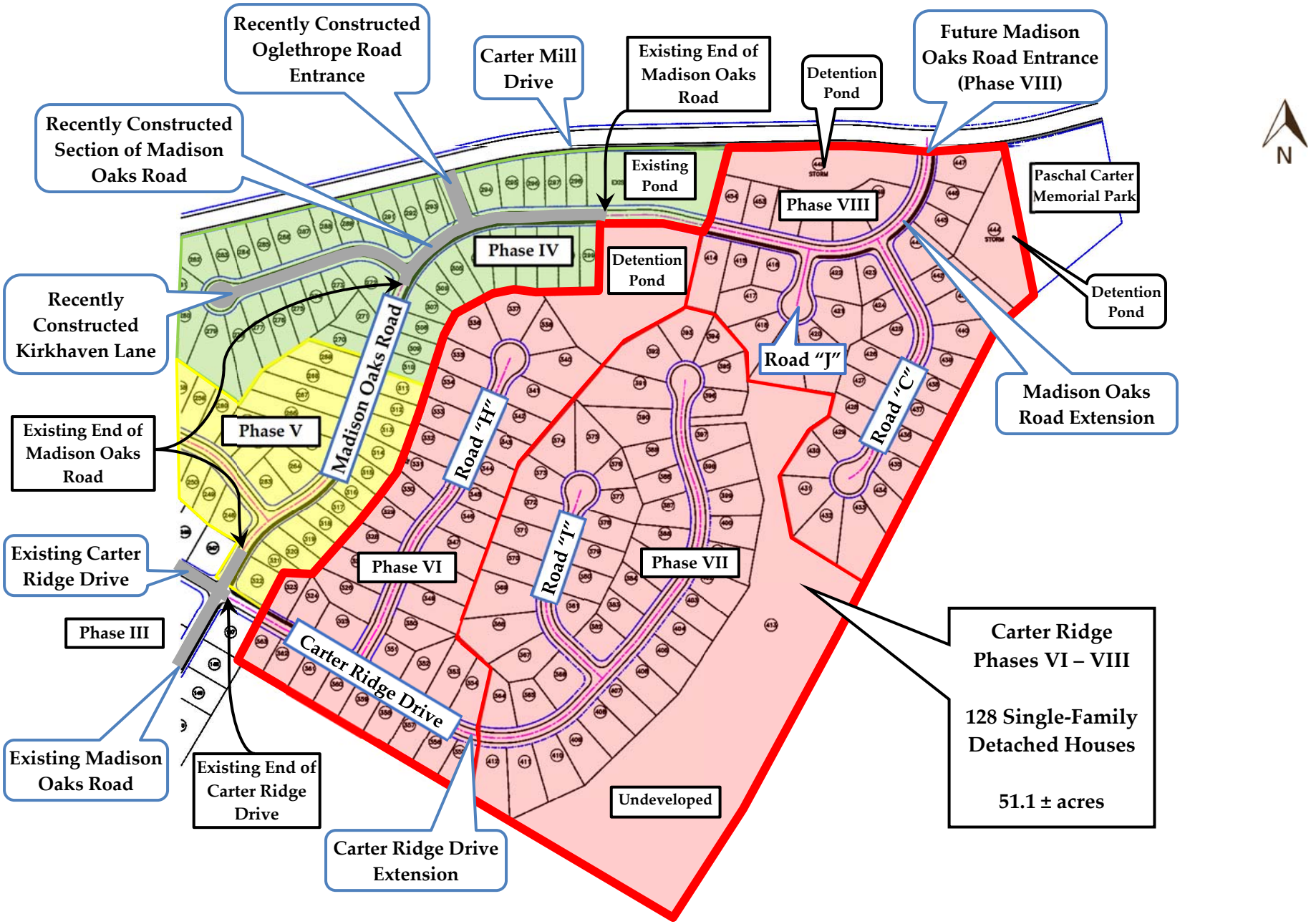


Figure 3
Proposed Plan Layout
Carter Ridge Phases VI - VIII

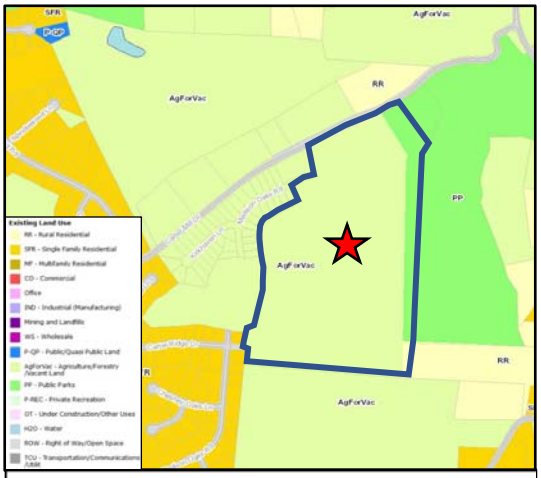
Not to Scale

- **PROPOSED USES AND ZONING REQUIREMENTS:**

The parcel comprising Carter Ridge Phases VI – VIII is zoned as Planned Residential (PR) with a density of up to 2.5 units per acre. Uses permitted in the Planned Residential (PR) zone include single-family dwellings, duplexes, and multi-dwelling structures and developments. The most recently published online KGIS zoning map is provided in Appendix D. The existing adjacent surrounding zoning and land uses are the following:

- Several large parcels to the north and northwest of the development site and across Carter Mill Drive are zoned as Planned Residential (PR) with a density of up to 2 units per acre. These parcels have immediate, adjacent road access to Carter Mill Drive to the south. These parcels are currently unoccupied, with some of the land used for agricultural purposes and the others containing woodlands.
- One small parcel to the northeast is zoned as Planned Residential (PR), undeveloped with woodlands and an open field. This parcel is owned and maintained by the Paschal Carter Memorial Park. This property has immediate, adjacent road access to Carter Mill Drive to the north.
- To the east, one large parcel is zoned as Agricultural (A), consisting of woodlands and a large open area in Paschal Carter Memorial Park. Paschal Carter Memorial Park is 44 acres in size and consists of hiking trails, a playground, a swimming pool, a picnic area, and a shelter. This Park is privately maintained and not by Knox County. The Park has two road access points on Carter Mill Drive.
- To the southeast, one parcel is zoned Agricultural (A) and is occupied by a single-family detached house with road access to Cooper Road to the south.
- One very large parcel exists to the south, is zoned Agricultural (A), is used for agricultural purposes with a few barns and woodlands, and has road access to Cooper Road.
- All the parcels to the west of Phases VI – VIII are located in Phases III, IV, and V of Carter Ridge Subdivision. These parcels are zoned as Planned Residential (PR) with the same density limits. Most of the property west of Phases VI – VIII will comprise the proposed single-family detached houses in Carter Ridge Phases IV and V.

KGIS Existing Zoning Map



KGIS Existing Land Use Map

- **DEVELOPMENT DENSITY:**

Carter Ridge Phases VI – VIII's proposed density is based on 128 dwelling units on 51.1 acres. One hundred twenty-eight dwelling units on 51.1 acres compute to 2.5 dwelling units per acre, equal to the allowed density for this property in the Planned Residential (PR) zone.

- **ON-SITE CIRCULATION:**

The total length of the new streets and road extensions within Carter Ridge Phases VI - VIII will be 5,580.1 feet (1.06 miles), designed and constructed to Knox County, TN specifications. Phases VI - VIII will have asphalt paved internal roadways and extruded concrete curbs. The lane widths internally will be 13 feet each for a total 26-foot pavement width. The public right-of-way within Phases VI - VIII will be 50 feet. Internal sidewalks are proposed along Madison Oaks Road and a portion of the Carter Ridge Drive extension in Phase VI. 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 in Carter Ridge Phases VI – VIII will provide access to service, delivery, maintenance, and fire protection/rescue vehicles. None of these vehicle types will impact roadway operations other than when they occasionally enter and exit the development. It is expected that curbside private garbage collection services will be available for this residential subdivision, as currently observed for Phase III of Carter Ridge Subdivision. Also, as currently occurring in Phase III, public school buses for the school-age

children in Carter Ridge Phases VI - VIII will likely be served by bus stops on Carter Mill Drive at the entrances.

The new public streets will be designed and constructed to Knox County specifications and are expected to be adequate for fire protection and rescue vehicles, trash collection trucks, and single-unit delivery trucks. The development's internal drives will accommodate the larger vehicle types and residents' standard passenger vehicles.

ANALYSIS OF EXISTING AND PROJECTED CONDITIONS

- **EXISTING TRAFFIC CONDITIONS:**

This study conducted a 6-hour traffic count at the unsignalized four-way intersection of Carter Mill Drive at Carter Ridge Drive / Carter View Lane on Wednesday, November 9th, 2022. The count was conducted while schools were in session. 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 at the intersection, the AM and PM peak hours were observed at 7:00 – 8:00 am and 5:00 – 6:00 pm.

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

- About two dozen pedestrians were observed at the intersection during the counts, with all these movements appearing to be exercise-related. Nearly all the pedestrians were observed in the afternoon hours. During the traffic count, about a dozen school-age children were observed entering and exiting school buses at the intersection. During the traffic count, school buses stopped on Carter Mill Drive at the intersection three times to load and unload students. These buses did not enter the subdivision streets. One bicyclist was observed crossing Carter Mill Drive from Carter Ridge Drive to Carter View Lane.
- Most of the observed traffic was passenger vehicles. However, the traffic stream on Carter Mill Drive, Carter Ridge Drive, and Carter View Lane also included school buses, delivery trucks, and trash collection trucks. No semi-tractor trailers were observed during the traffic count.

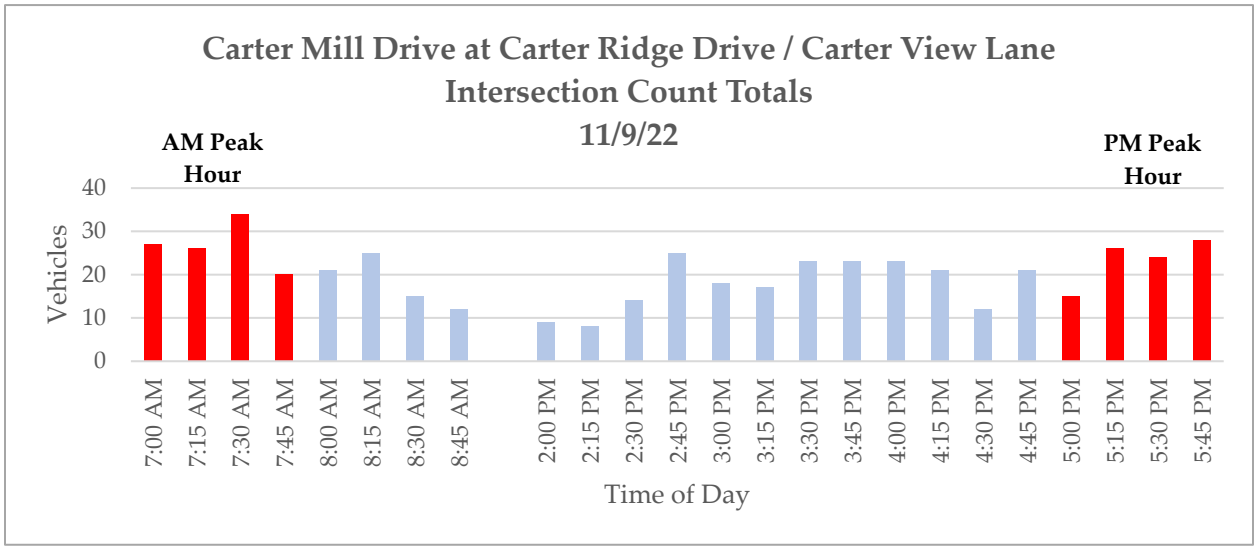


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FIGURE 4

Carter Ridge Phases VI - VIII

2022 Peak Hour Traffic Volumes - EXISTING TRAFFIC CONDITIONS

Capacity analyses were undertaken to determine the Level of Service (LOS) for the existing 2022 traffic volumes shown in Figure 4 at the intersection of Carter Mill Drive at Carter Ridge Drive / Carter View Lane. The capacity analyses were calculated following the Highway Capacity Manual (HCM) methods and Synchro Traffic Software (Version 11).

Methodology:

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

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

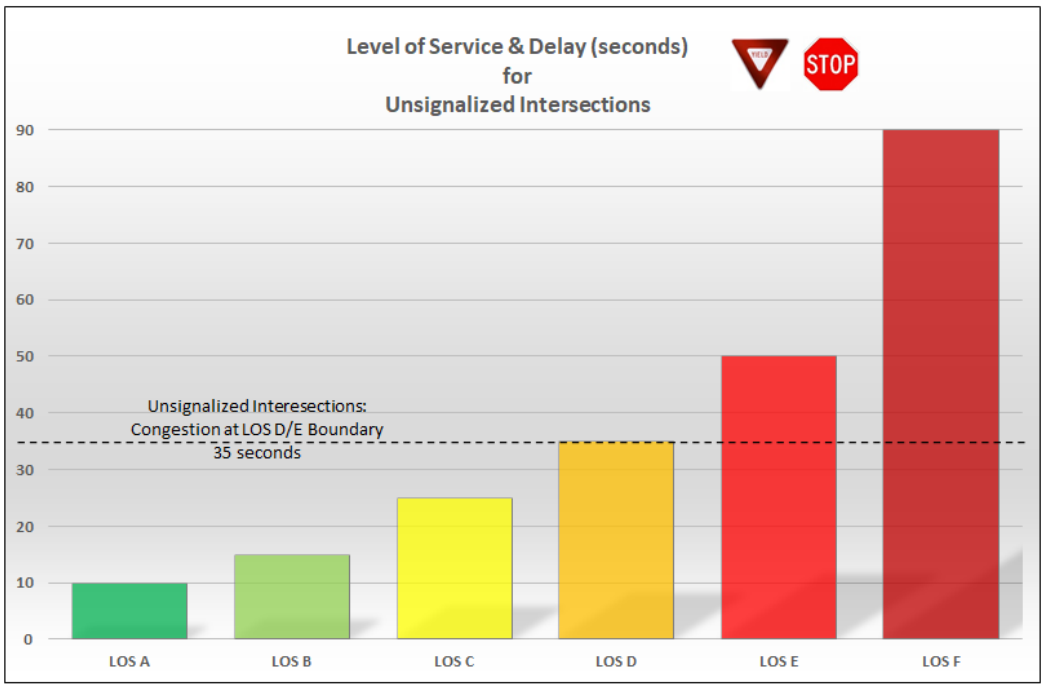
For unsignalized intersections, LOS is measured in terms of delay (in seconds). This measure is an attempt to quantify delay that includes travel time, driver discomfort, and fuel consumption. For unsignalized intersections, the analysis assumes that the mainline thru and right-turn traffic does not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

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

TABLE 2
LEVEL OF SERVICE AND DELAY FOR UNSIGNALIZED INTERSECTIONS

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

Source: Highway Capacity Manual, 6th Edition



Intersection capacity results from the existing 2022 peak hour traffic are shown in Table 3. The intersection in the table is shown with a LOS designation, delay (in seconds), and v/c ratio (volume/capacity) for the AM and PM peak hours. Appendix F includes the worksheets for the existing 2022 peak hour capacity analyses.

As shown in Table 3, the existing peak hour levels of service are shown to operate at an excellent level during the AM and PM peak hours for vehicular traffic at the intersection.

TABLE 3
2022 INTERSECTION CAPACITY ANALYSIS RESULTS -
EXISTING TRAFFIC CONDITIONS

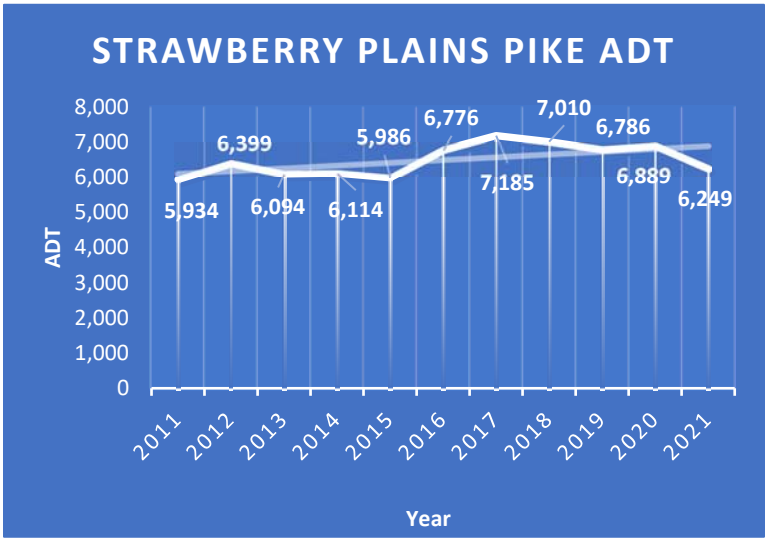
INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS [a]	DELAY [b] (seconds)	v/c [c]	LOS [a]	DELAY [b] (seconds)	v/c [c]
Carter Mill Drive (EB & WB) at Carter Ridge Drive (NB) / Carter View Lane (SB)	STOP Unsignalized	Northbound Left/Thru/Right	A	9.5	0.114	A	9.2	0.044
		Eastbound Left	A	7.7	0.003	A	7.3	0.007
		Westbound Left	A	7.2	0.002	A	7.3	0.015
		Southbound Left/Thru/Right	A	9.4	0.068	A	9.8	0.041

Note: All analyses were calculated in Synchro 11 software and reported using HCM 2010 intersection methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio

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

Horizon year traffic conditions represent the projected traffic volumes in the study area without the proposed project being developed (no-build option). The total build-out and full occupancy for Phases VI - VIII is assumed to occur by 2028 but will occur in several stages.

Vehicular traffic in the surrounding area has shown low to flat growth over the past ten years, according to the TDOT count stations. As shown in Appendix A, Strawberry Plains Pike has experienced annual growth of +0.5% over the past ten years, Asheville Highway has seen a 0.2% growth rate, and South Carter School Road has seen 0% growth.



Annual growth rates were assumed and applied to the existing 2022 volumes obtained at the intersection to calculate the future volumes in the horizon years without the potential development traffic. The horizon years were assumed to be 2025 for Phases IV (currently under construction) and V, 2027 for Phases VI and VII, and 2028 for Phase VIII. Phases IV and V were included in this study to simplify and consolidate the analysis. The traffic count obtained at the intersection of Carter Mill Drive at Carter Ridge Drive / Carter View Lane likely included some vehicles associated with the nine houses currently under construction in Phase IV. These vehicles were not removed from the counts, which will result in a conservative analysis.

A traffic growth rate of 2% was used and assumed for this study. A higher rate than experienced at the surrounding traffic count locations was used to provide a conservative analysis and consider the possibility of increased growth due to the construction of other developments in the vicinity.

Capacity analyses were undertaken to determine the projected LOS in the horizon years of 2025, 2027, and 2028 without the project at the intersection of Carter Mill Drive at Carter Ridge Drive / Carter View Lane. The results are shown in Tables 4a – 4c, and Appendix F includes the capacity analysis worksheets. The results in these tables are similar to the existing 2022 results shown in

Table 3, with excellent LOS and minimal vehicle delays. Figures 5a – 5c show the projected horizon traffic volumes in 2025, 2027, and 2028 without the project at the intersection during the AM and PM peak hours. The volumes shown at the intersection in the figures only include the assumed 2% growth and assume that none of the subsequent subdivision phases are ever constructed, including Phases IV and V.

TABLE 4a
2025 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS (WITHOUT THE PROJECT)

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS [a]	DELAY [b] (seconds)	v/c [c]	LOS [a]	DELAY [b] (seconds)	v/c [c]
Carter Mill Drive (EB & WB) at Carter Ridge Drive (NB) / Carter View Lane (SB)	STOP Unsignalized	Northbound Left/Thru/Right	A	9.5	0.122	A	9.2	0.046
		Eastbound Left	A	7.7	0.003	A	7.3	0.007
		Westbound Left	A	7.3	0.002	A	7.3	0.016
		Southbound Left/Thru/Right	A	9.4	0.074	A	9.8	0.043

Note: All analyses were calculated in Synchro 11 software and reported using HCM 2010 intersection methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio

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

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS [a]	DELAY [b] (seconds)	v/c [c]	LOS [a]	DELAY [b] (seconds)	v/c [c]
Carter Mill Drive (EB & WB) at Carter Ridge Drive (NB) / Carter View Lane (SB)	STOP Unsignalized	Northbound Left/Thru/Right	A	9.6	0.126	A	9.3	0.050
		Eastbound Left	A	7.7	0.003	A	7.3	0.009
		Westbound Left	A	7.3	0.002	A	7.3	0.017
		Southbound Left/Thru/Right	A	9.4	0.076	A	9.9	0.044

Note: All analyses were calculated in Synchro 11 software and reported using HCM 2010 intersection methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio

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

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS [a]	DELAY [b] (seconds)	v/c [c]	LOS [a]	DELAY [b] (seconds)	v/c [c]
Carter Mill Drive (EB & WB) at Carter Ridge Drive (NB) / Carter View Lane (SB)	STOP Unsignalized	Northbound Left/Thru/Right	A	9.6	0.128	A	9.3	0.051
		Eastbound Left	A	7.7	0.003	A	7.3	0.009
		Westbound Left	A	7.3	0.002	A	7.3	0.017
		Southbound Left/Thru/Right	A	9.4	0.076	A	10.0	0.046

Note: All analyses were calculated in Synchro 11 software and reported using HCM 2010 intersection methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio

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FIGURE 5a

Carter Ridge Phases VI - VIII

2025 Peak Hour Traffic Volumes - PROJECTED TRAFFIC CONDITIONS (WITHOUT THE PROJECT)

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FIGURE 5b

Carter Ridge Phases VI - VIII

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

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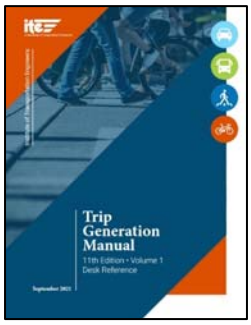
FIGURE 5c

Carter Ridge Phases VI - VIII

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

- **TRIP GENERATION:**



A generated trip is a single or one-direction vehicle movement entering or exiting the study site. The estimated amount of traffic that the 202 single-family detached houses in Phases IV – VIII will generate was calculated based on rates and equations provided by the Trip Generation Manual, 11th Edition, a publication of the Institute of Transportation Engineers (ITE). The Trip Generation Manual is the traditional and most popular resource for determining trip generation rates when transportation impact studies are produced.

The data and calculations from ITE for Carter Ridge Phases IV - VIII are shown in Appendix G. As stated previously, Phase IV is currently under construction and was included in this study along with Phase V. A summary of this information is presented in the following table:

TABLE 5
TRIP GENERATION FOR CARTER RIDGE PHASES IV - VIII
202 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	Phase IV & V 74 Houses	765	26%	74%		63%	37%	
				15	42	57	47	28	75
#210	Single-Family Detached Housing	Phase VI & VII 89 Houses	907	26%	74%		63%	37%	
				17	50	67	56	33	89
#210	Single-Family Detached Housing	Phase VIII 39 Houses	425	26%	74%		63%	37%	
				8	24	32	26	15	41
Total New Volume Site Trips		**202 Houses**	**2,097**	**40**	**116**	**156**	**129**	**76**	**205**

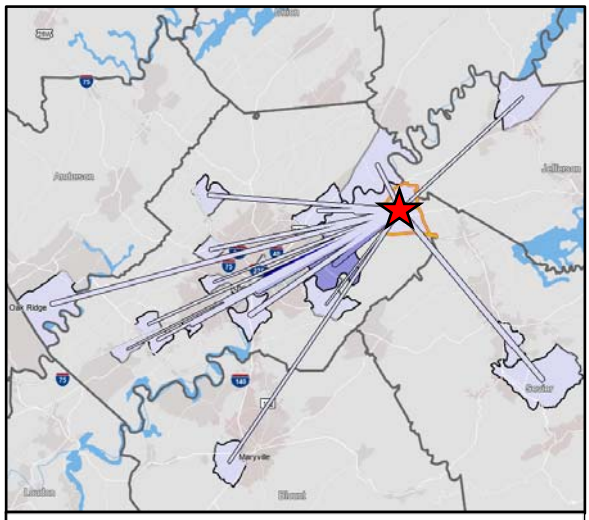
ITE Trip Generation Manual, 11th Edition
Trips calculated by using Fitted Curve Equation

For the combination of Phases IV - VIII, it is estimated that 40 vehicles will enter and 116 will exit, for a total of 156 generated trips during the AM peak hour. Similarly, it is estimated that 129 vehicles will enter and 76 will exit, for a total of 205 generated trips during the PM peak hour. The calculated trips generated for an average weekday are estimated to be 2,097 vehicles for Carter Ridge Phases IV - VIII. No vehicle trip reductions were included in the calculations or analysis.

- **TRIP DISTRIBUTION AND ASSIGNMENT:**

The projected trip distribution and assignment for Carter Ridge Phases VI - VIII (and Phases IV - V) are based on several sources and engineering judgments. The first source is based on the existing traffic count volumes and the observed travel directions collected at the intersection of Carter Mill Drive at Carter Ridge Drive / Carter View Lane.

The volumes and splits tabulated during the traffic count on November 9th, 2022, at the intersection of Carter Mill Drive at Carter Ridge Drive / Carter View Lane closely matched the traffic count volumes and distributions obtained by Ajax Engineering, LLC on August 23rd, 2017, for the TIS conducted for Carter Ridge Phase IV.



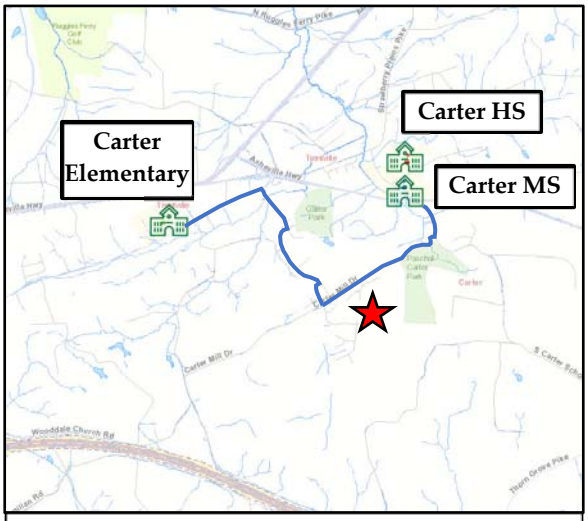
Top 10 Locations
2019 Census Bureau Work-Based Trips to & from Census Tract 53.02

The second source for determining the projected trip distribution is based on work-related trips in the local area. Work-based trips will be a significant impetus for generated trips by the development, and these trips are more likely to travel to and from the west and southwest. This assertion is based on data from the United States Bureau website for Census Tract 53.02, where the development property is located. Based on 2019 (latest available) census data and as shown in Appendix H, most work-based trips in the surrounding area correspond to downtown Knoxville, the University of Tennessee area, and areas of West Knoxville. Other, but fewer occurring, work-based locations in the Census Tract area include travel to and from Jefferson City, Oak Ridge, Maryville, and Sevier County, TN.

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 Carter Elementary, Middle, and High School.

Carter Middle and High School are both just over one mile away by roadway north and east of the subdivision. The quickest route (via routing by Google Maps) to these schools from the subdivision will be east on Carter Mill Drive, north on South Carter School Road, west on

Asheville Highway for a short distance, and then north on North Carter School Road. Carter Elementary is located 1.8 miles away by roadway on Strawberry Plains Pike, northwest of the subdivision. The quickest route to Carter Elementary from the subdivision will be via the Carter Mill Subdivision north of the Carter Ridge Subdivision. This route will include taking Carter View Lane to the north, north on Drakewood Road, north on Woodsedge Road, and then west on Strawberry Plains Pike.



Zoned Public School Locations

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. Some of the houses in the new phases in Carter Ridge Subdivision will likely be within the PRZ and will require private transportation to and from school. For the houses outside the PRZ, all school-age children attending public schools in the development will be able to utilize this service if desired.

Figures 6a – 6c show the projected distribution of traffic entering and exiting the development for Carter Ridge Subdivision for the years 2025 (Phases IV and V), 2027 (Phases VI and VII), and 2028 (Phase VIII). The percentages shown in the figure only pertain to the trips generated by the proposed dwellings in the development calculated from the ITE trip rates. Ultimately, the projected trip distribution was heavily based on the observed traffic at the intersection of Carter Mill Drive at Carter Ridge Drive / Carter View Lane during the recent traffic count and also followed the original assumed distribution used in the TIS for Carter Ridge Phase IV in 2017. Overall, the assumed splits were 30% to and from the east on Carter Mill Drive, 30% to and from the west on Carter Mill Drive, and 40% to and from the north on Carter Ridge Lane (to and from Strawberry Plains Pike via Carter Mill Subdivision).

As seen in Figures 6a – 6c, the trip distributions were based on the internal road layout, the quickest routes, and the location of the entrances for Carter Ridge Subdivision. Phases IV and V are assumed to enter and exit exclusively at the Oglethrope Road entrance on Carter Mill Drive. Phases VI and VII are split between the Oglethrope Road entrance and the Carter Ridge Drive

entrance at Carter Mill Drive / Carter View Lane. The split between the entrances for Phases VI and VII is based on whether the trips are heading east, west, or north and follows the same convention of 30% east, 30% west, and 40% north. Trips in Phase VIII are assumed will enter and exit exclusively at the Madison Oaks Road entrance on Carter Mill Drive. The Oglethrope Road entrance on Carter Mill Drive was recently constructed, and the Madison Oaks Road entrance will be constructed in Phase VIII.

Figures 7a – 7c show the traffic assignment of the computed trips generated by the phases of the development and are based on the assumed distribution of trips shown in Figures 6a – 6c.

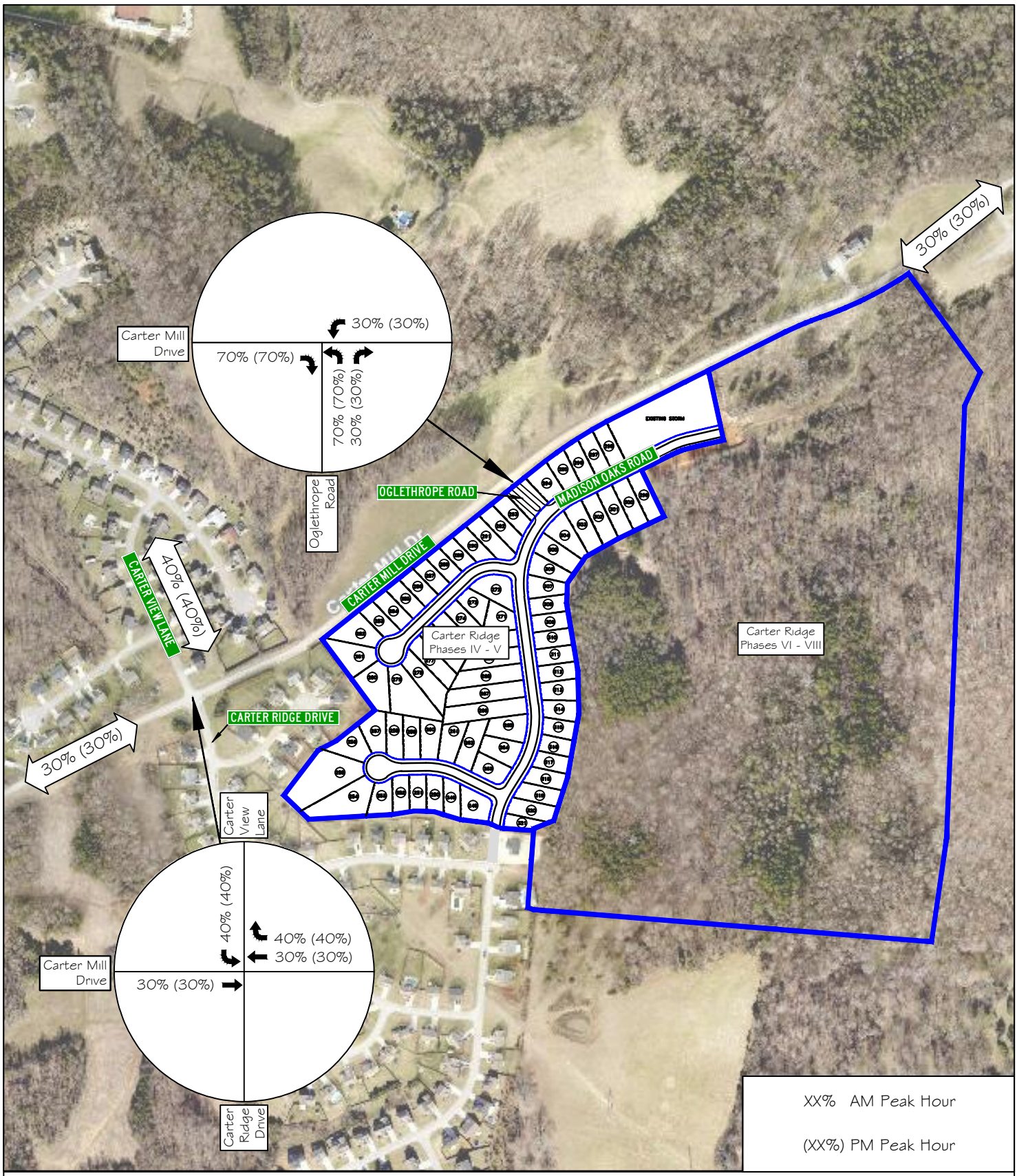


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FIGURE 6a

Carter Ridge Phases VI - VIII

Directional Distribution of Generated Traffic during AM and PM Peak Hour for Phases IV & V

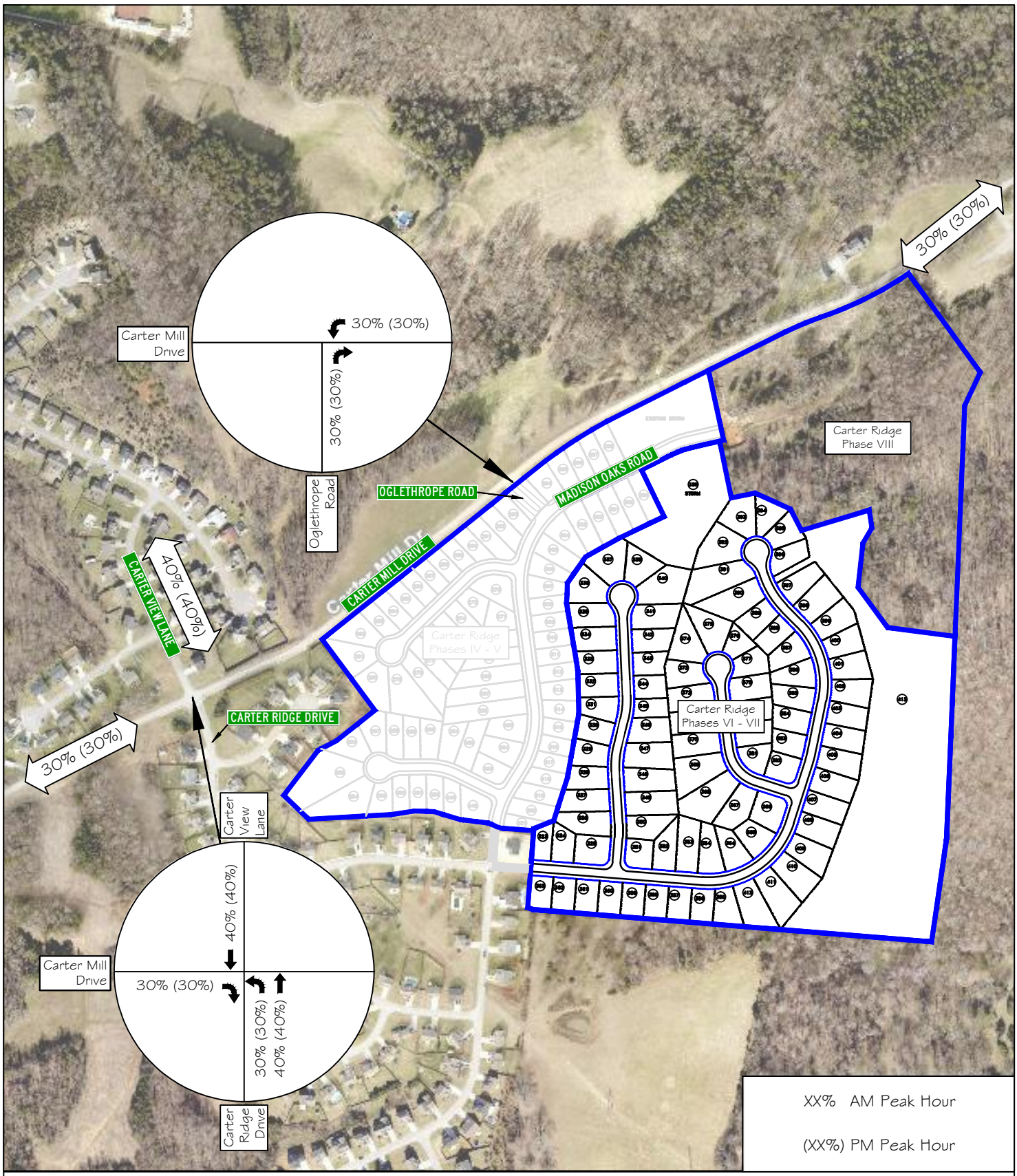

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FIGURE 6b

Carter Ridge Phases VI - VIII

Directional Distribution of Generated Traffic during AM and PM Peak Hour for Phases VI & VII

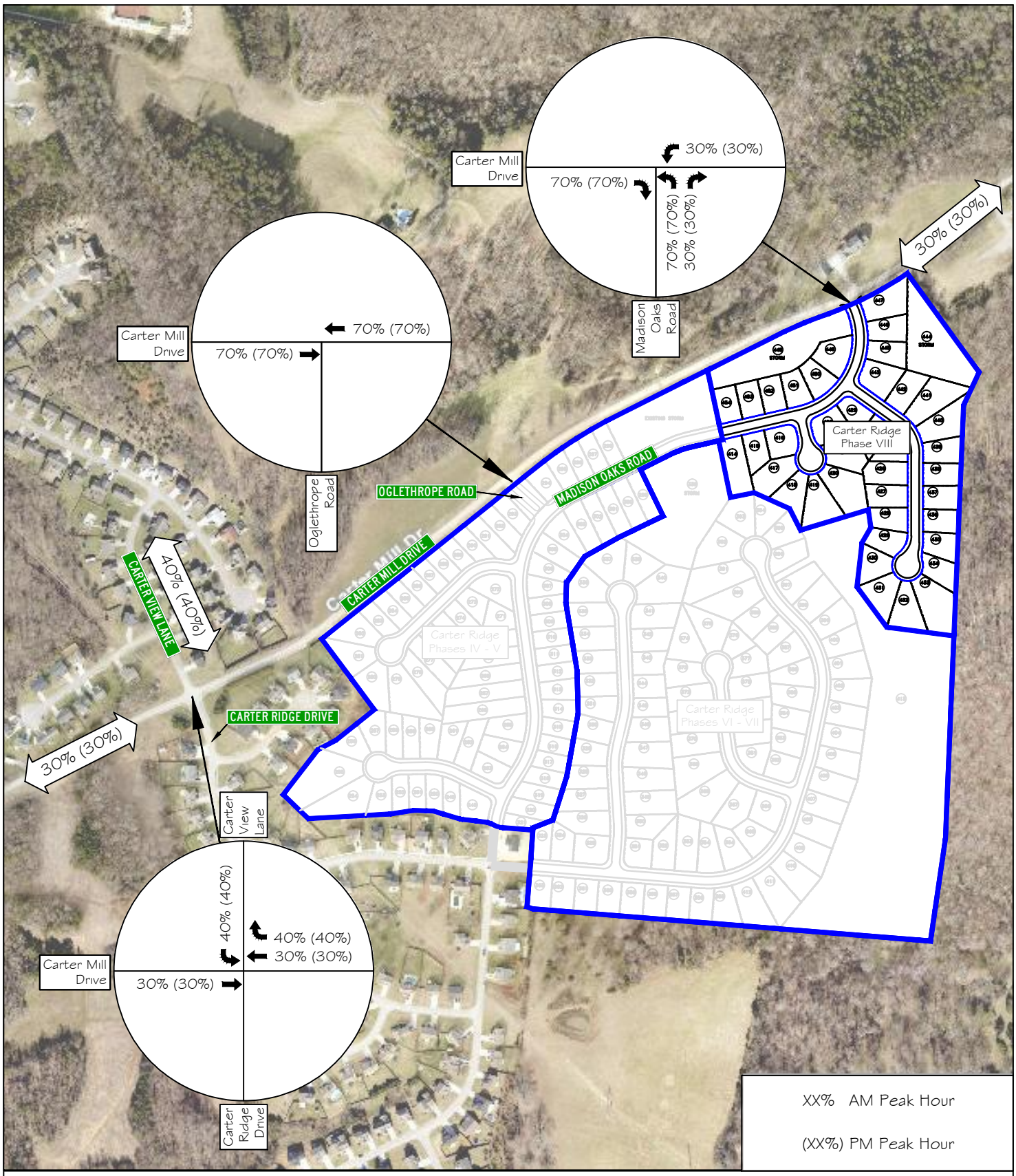

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FIGURE 6c

Carter Ridge Phases VI - VIII

Directional Distribution of Generated Traffic during AM and PM Peak Hour for Phase VIII

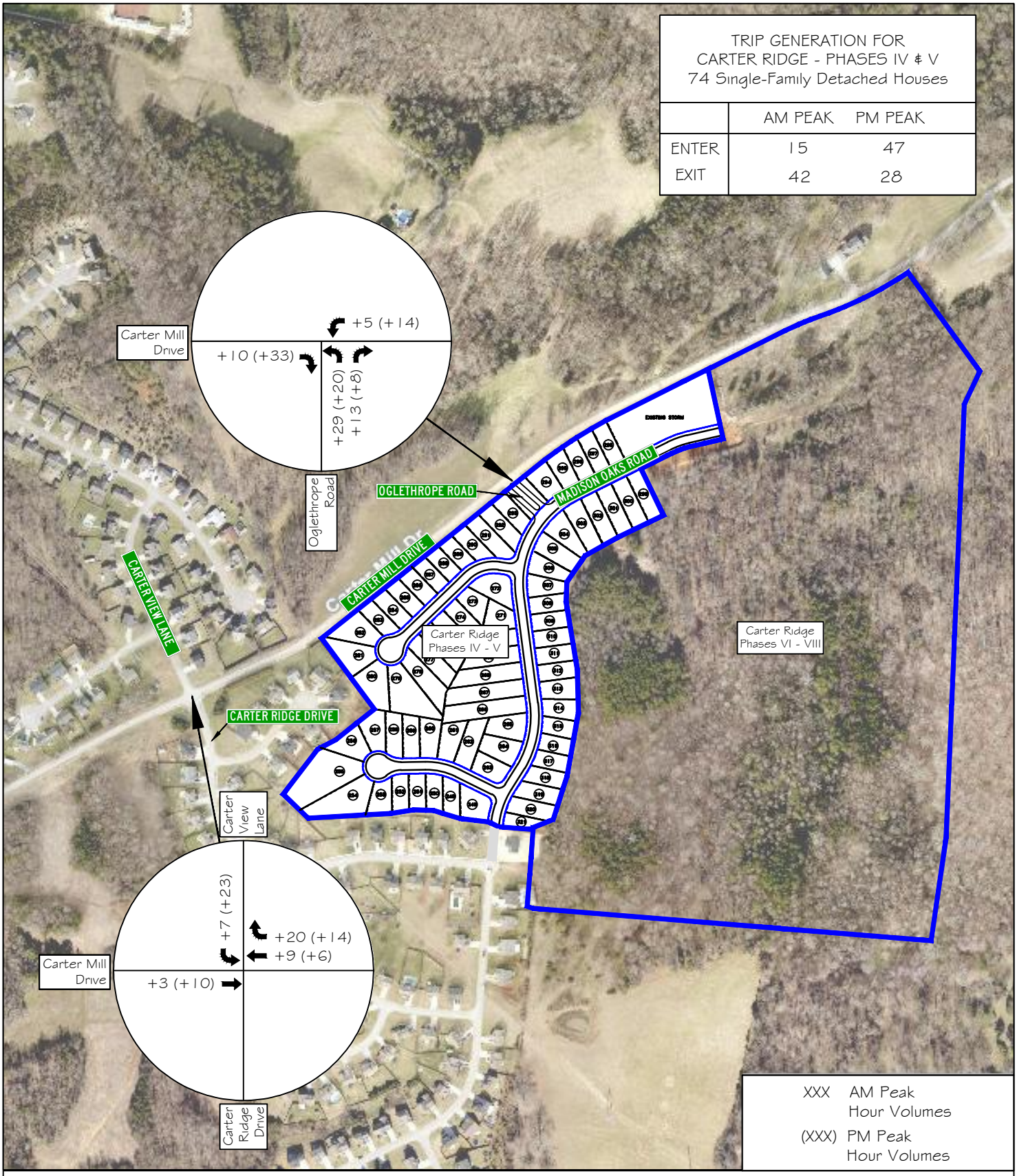

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FIGURE 7a

Carter Ridge Phases VI - VIII

Traffic Assignment of Generated Traffic during AM and PM Peak Hour for Phases IV & V

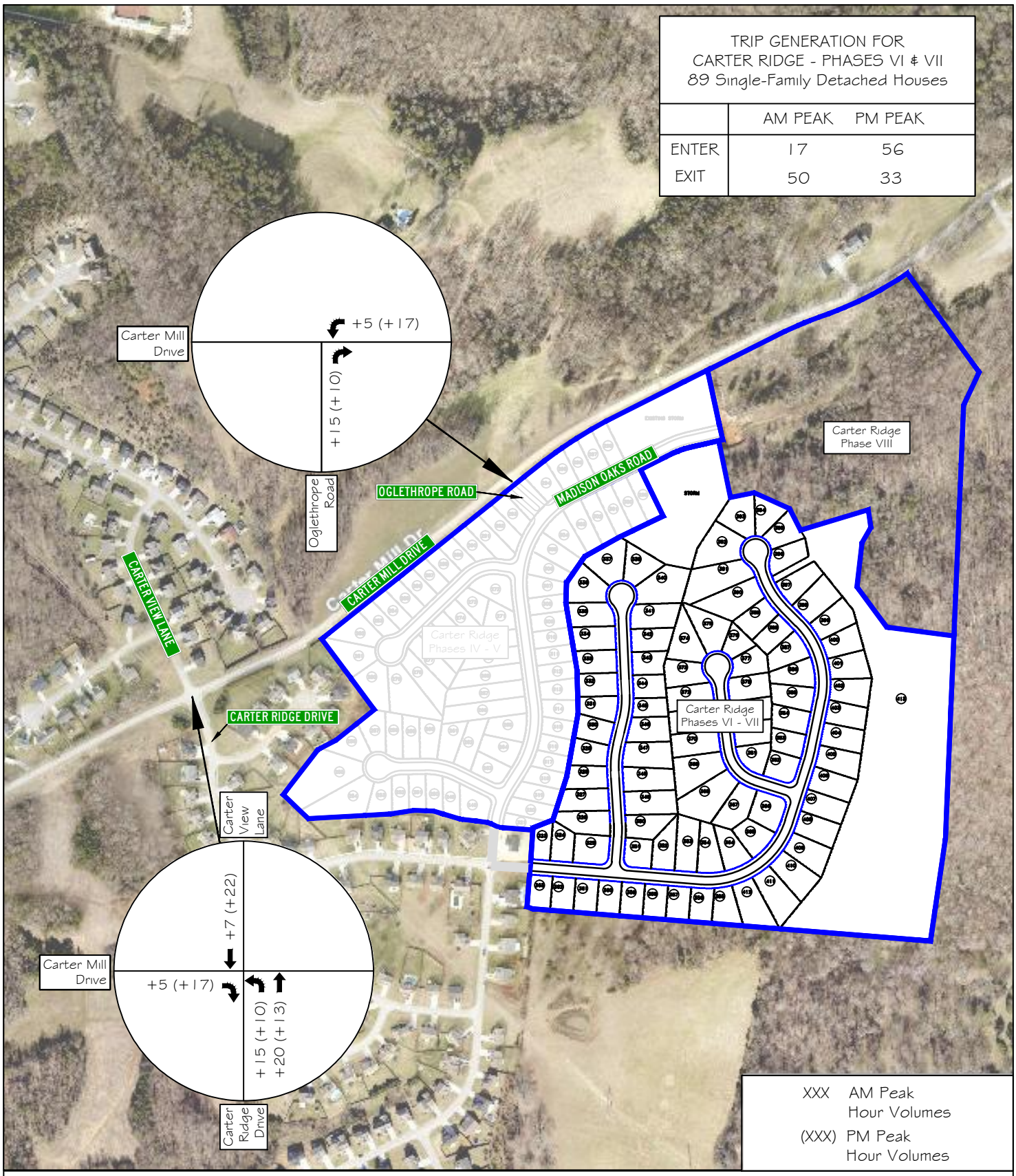

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FIGURE 7b

Carter Ridge Phases VI - VIII

Traffic Assignment of Generated Traffic during AM and PM Peak Hour for Phases VI & VII

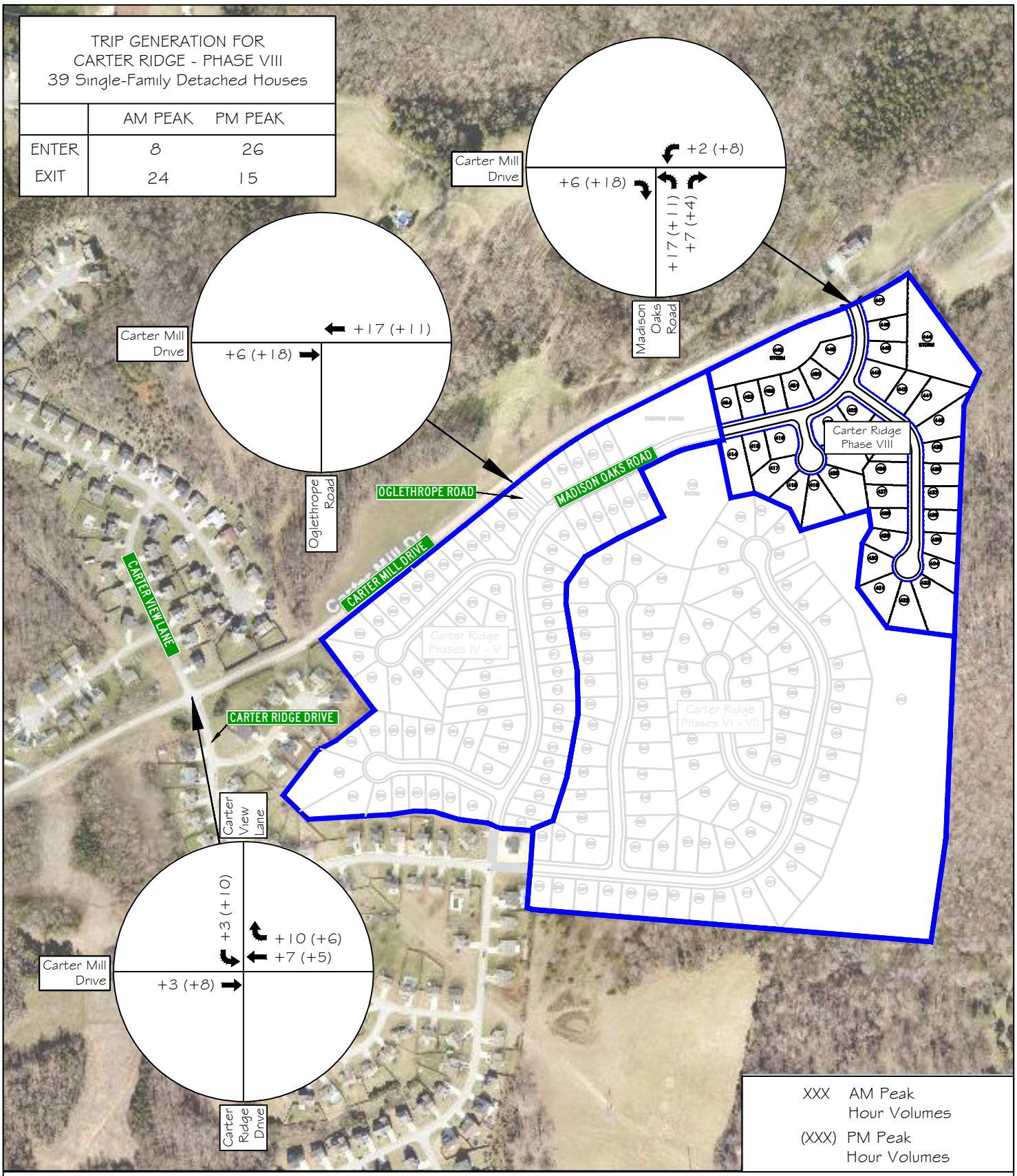

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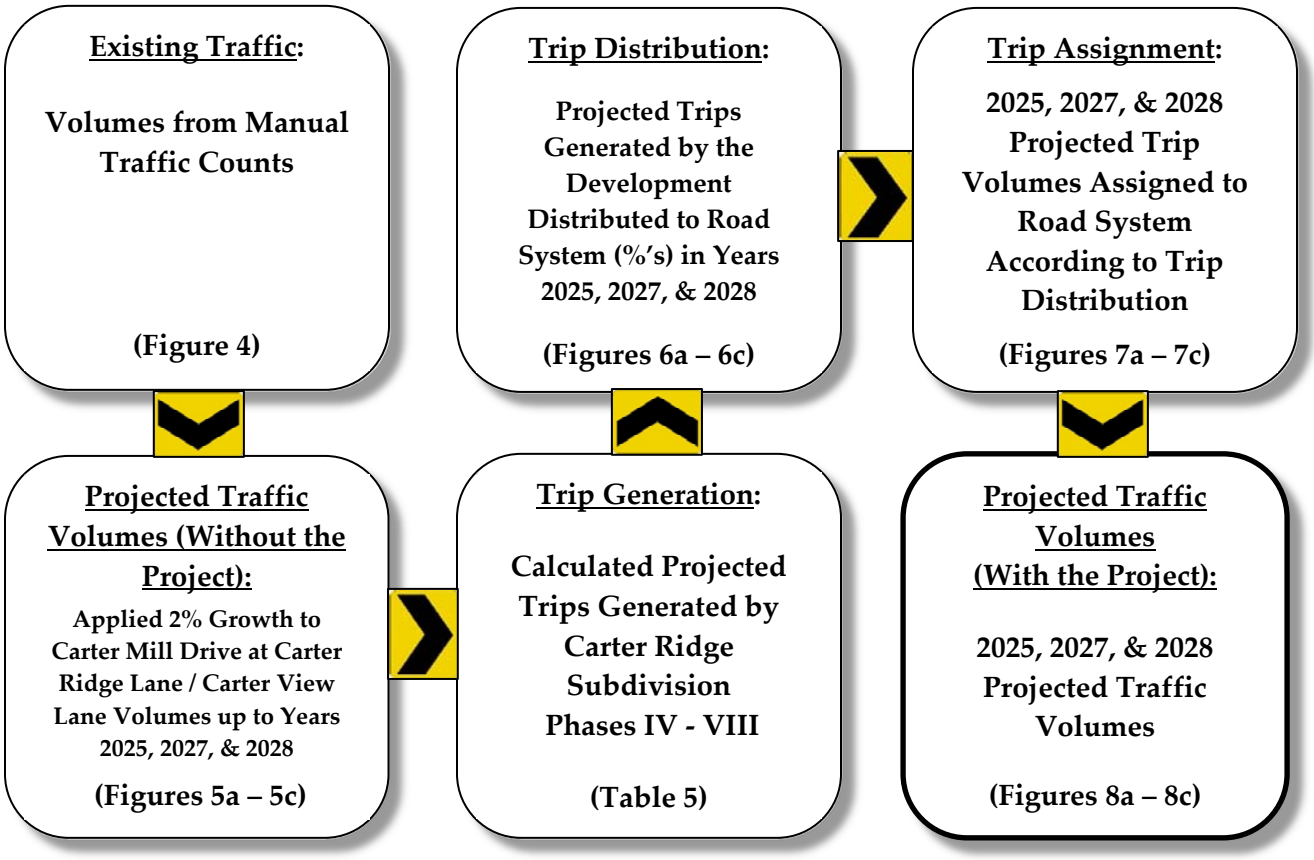
FIGURE 7c

Carter Ridge Phases VI - VIII

Traffic Assignment of Generated Traffic during AM and PM Peak Hour for Phase VIII

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

Overall, several additive steps were taken to estimate the total projected traffic volumes at the entrances on Carter Mill Drive when the Carter Ridge Subdivision phases are constructed and occupied in 2025, 2027, and 2028. The steps are illustrated below for clarity and review:



The calculated peak hour traffic (Table 5) generated by the phases of Carter Ridge Subdivision was added to the 2025, 2027, and 2028 horizon year traffic (Figures 5a – 5c) by following the predicted trip distributions and assignments (Figures 6a – 6c and 7a – 7c). This procedure was completed to obtain the total projected traffic volumes when the proposed development is fully built out and occupied in 2025, 2027, and 2028. Figures 8a – 8c show the projected 2025, 2027, and 2028 AM and PM peak hours with the generated development traffic at the studied intersections.

Note: The volumes shown in Figure 8a included the trips generated by Phases IV and V in 2025. The volumes shown in Figure 8b include the trips generated by Phases IV, V, VI, and VII in 2027. The volumes shown in Figure 8c include all trips generated by Phases IV – VIII.

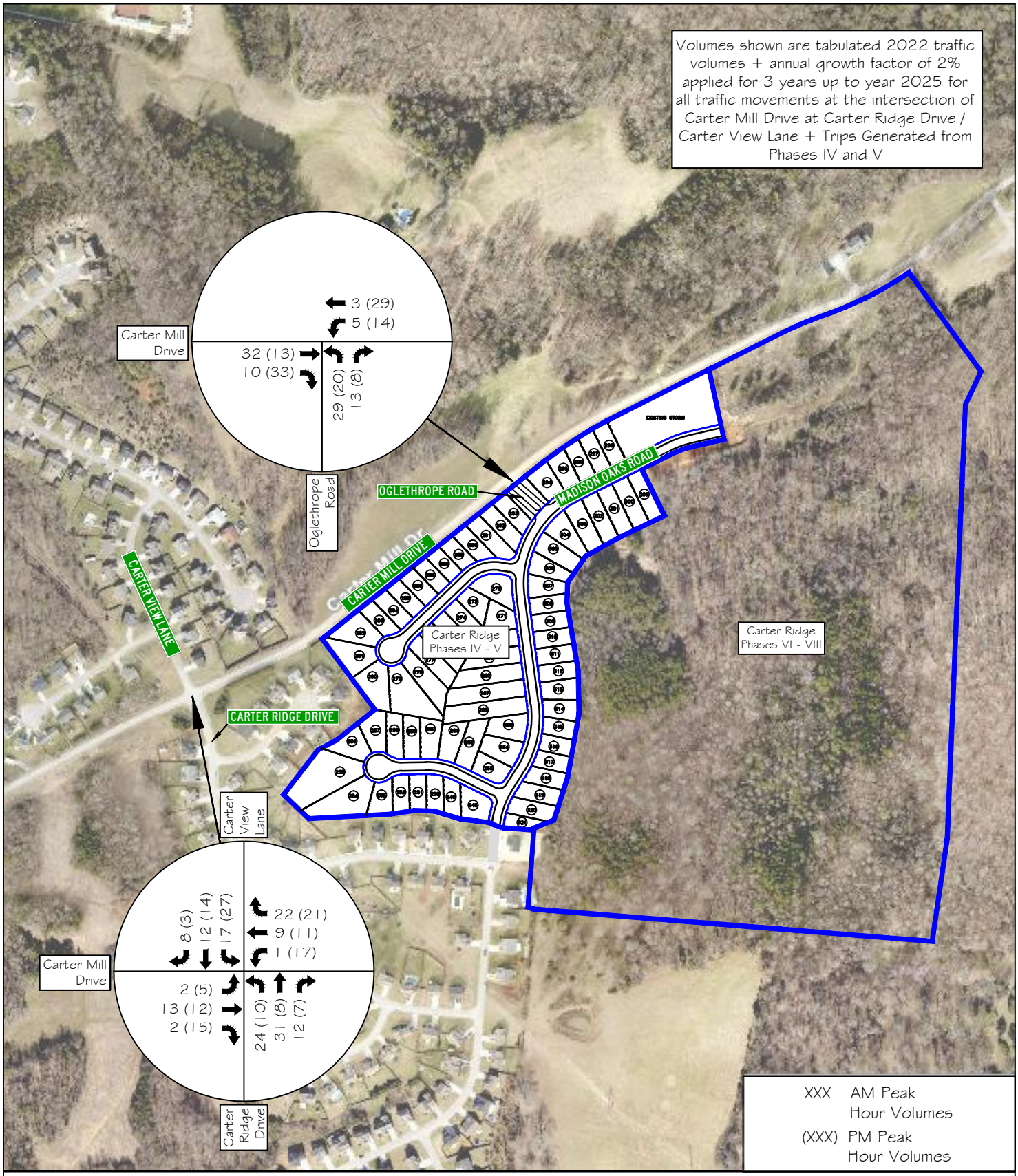


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FIGURE 8a

Carter Ridge Phases VI - VIII

2025 Peak Hour Traffic Volumes - PROJECTED TRAFFIC CONDITIONS (WITH THE PROJECT)

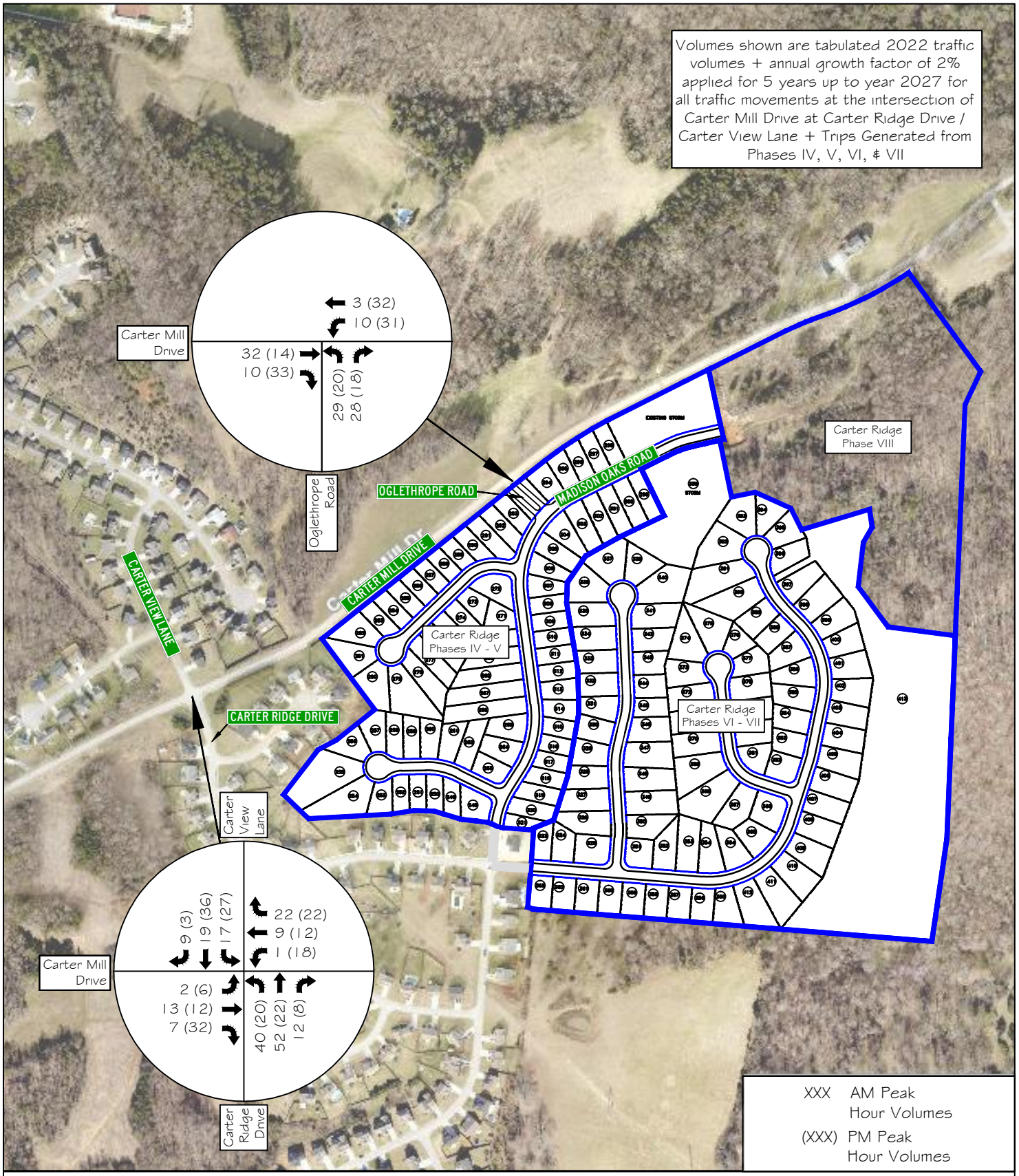

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FIGURE 8b

Carter Ridge Phases VI - VIII

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

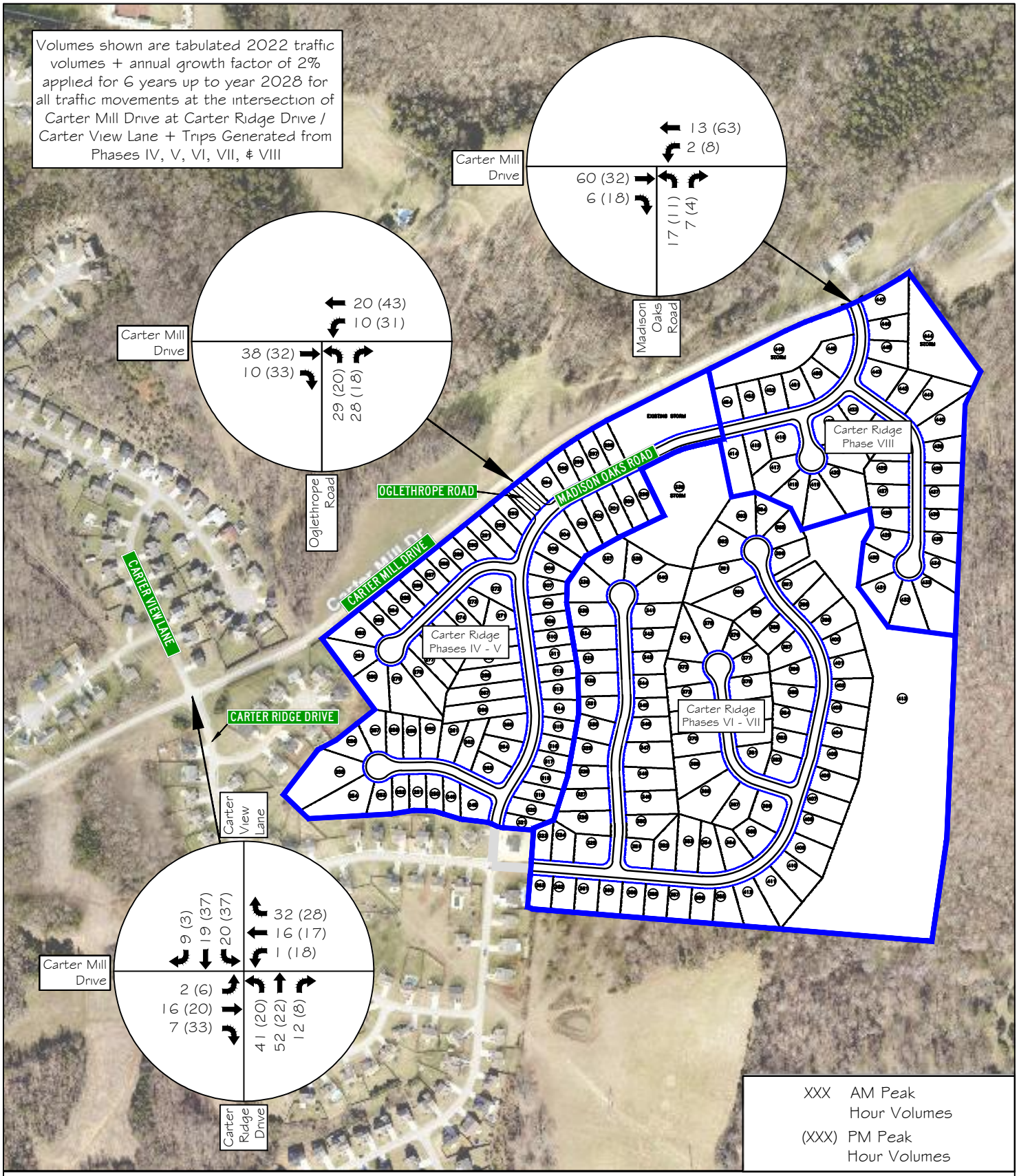

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FIGURE 8c

Carter Ridge Phases VI - VIII

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

Capacity analyses were conducted to determine the projected LOS at the studied intersections with the development traffic in 2025, 2027, and 2028. Appendix F includes the worksheets for these capacity analyses. The projected peak hour calculations with the project in all the horizon years resulted in good LOS with low vehicle delays for the entrances on Carter Mill Drive, as shown in Tables 6a – 6c.

TABLE 6a
2025 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS (WITH THE PROJECT)

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS [a]	DELAY [b] (seconds)	v/c [c]	LOS [a]	DELAY [b] (seconds)	v/c [c]
Carter Mill Drive (EB & WB) at Carter Ridge Drive (NB) / Carter View Lane (SB)	STOP Unsignalized	Northbound Left/Thru/Right	A	9.8	0.128	A	9.4	0.048
		Eastbound Left	A	7.8	0.003	A	7.3	0.008
		Westbound Left	A	7.3	0.003	A	7.3	0.016
		Southbound Left/Thru/Right	A	9.9	0.094	B	10.6	0.109
Carter Mill Drive (EB & WB) at Oglethrope Road (NB)	STOP Unsignalized	Northbound Left/Right	A	8.8	0.047	A	8.9	0.033
		Westbound Left	A	7.3	0.004	A	7.3	0.010

Note: All analyses were calculated in Synchro 11 software and reported using HCM 2010 intersection methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio

TABLE 6b
2027 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS (WITH THE PROJECT)

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS [a]	DELAY [b] (seconds)	v/c [c]	LOS [a]	DELAY [b] (seconds)	v/c [c]
Carter Mill Drive (EB & WB) at Carter Ridge Drive (NB) / Carter View Lane (SB)	STOP Unsignalized	Northbound Left/Thru/Right	B	10.5	0.207	B	10.2	0.101
		Eastbound Left	A	7.8	0.003	A	7.3	0.009
		Westbound Left	A	7.3	0.003	A	7.4	0.017
		Southbound Left/Thru/Right	B	10.2	0.123	B	11.5	0.171
Carter Mill Drive (EB & WB) at Oglethrope Road (NB)	STOP Unsignalized	Northbound Left/Right	A	8.9	0.064	A	9.0	0.045
		Westbound Left	A	7.3	0.007	A	7.4	0.022

Note: All analyses were calculated in Synchro 11 software and reported using HCM 2010 intersection methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio

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

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS [a]	DELAY [b] (seconds)	v/c [c]	LOS [a]	DELAY [b] (seconds)	v/c [c]
Carter Mill Drive (EB & WB) at Carter Ridge Drive (NB) / Carter View Lane (SB)	STOP Unsignalized	Northbound Left/Thru/Right	B	10.7	0.217	B	10.4	0.105
		Eastbound Left	A	7.9	0.003	A	7.4	0.009
		Westbound Left	A	7.3	0.003	A	7.4	0.018
		Southbound Left/Thru/Right	B	10.5	0.136	B	12.3	0.215
Carter Mill Drive (EB & WB) at Oglethrope Road (NB)	STOP Unsignalized	Northbound Left/Right	A	8.9	0.065	A	9.1	0.046
		Westbound Left	A	7.3	0.007	A	7.4	0.022
Carter Mill Drive (EB & WB) at Madison Oaks Road (NB)	STOP Unsignalized	Northbound Left/Right	A	8.9	0.028	A	9.0	0.018
		Westbound Left	A	7.3	0.001	A	7.3	0.006

Note: All analyses were calculated in Synchro 11 software and reported using HCM 2010 intersection methodology
[a] Level of Service , [b] Average Delay (sec/vehicle) , [c] Volume-to-Capacity Ratio

- **POTENTIAL TRANSPORTATION SAFETY ISSUES:**

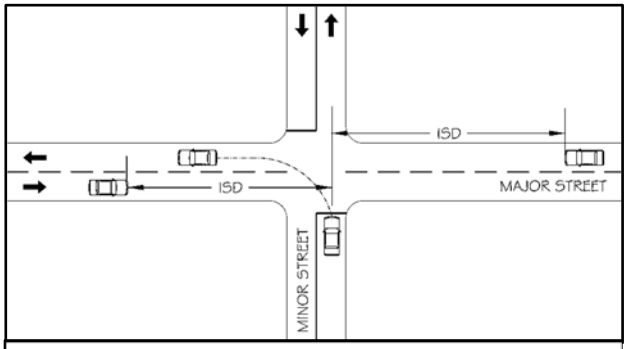
The study area was investigated for potential existing and future safety issues when the development is constructed. These adjacent transportation system features are discussed in the following pages.

EVALUATION OF SIGHT DISTANCE

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

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

ISD is 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.



Intersection Sight Distance Diagram

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 30-mph on Carter Mill Drive at the subdivision entrances, the ISD is 300 feet based on Knox County's requirement of providing 1 foot of sight distance per 1 mph of vehicle speed.

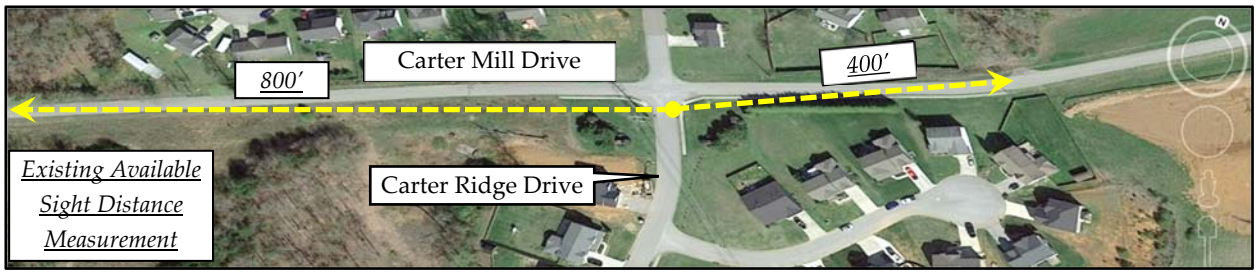
Carter Mill Drive has a 0.5% road grade downhill from the east to the west at Carter Ridge Drive / Carter View Lane. Based on the assumed speed limit of 30-mph on Carter Mill Drive and the existing road grade, the SSD is calculated to be 200 feet to the east and 200 feet to the west.

On the west side of Carter Mill Drive at Oglethrope Road, Carter Mill Drive has a 6% road grade downhill from the west to the east. On the east side of Carter Mill Drive at Oglethrope Road, Carter Mill Drive has a 3% road grade downhill from the west to the east. Based on the assumed speed limit of 30-mph on Carter Mill Drive and the existing road grades, the SSD is calculated to be 190 feet to the east and 215 feet to the west.

The future Madison Oaks Road entrance on Carter Mill Drive is proposed at a vertical crest curve on Carter Mill Drive. On the west side of Carter Mill Drive at the future Madison Oaks Road entrance, Carter Mill Drive has a 3% road grade downhill from the east to the west. On the east side of Carter Mill Drive at the future Madison Oaks Road entrance, Carter Mill Drive has a 7% road grade downhill from the west to the east. Based on the assumed speed limit of 30-mph on Carter Mill Drive and the existing road grades, the SSD is calculated to be 185 feet to the east and 195 feet to the west.

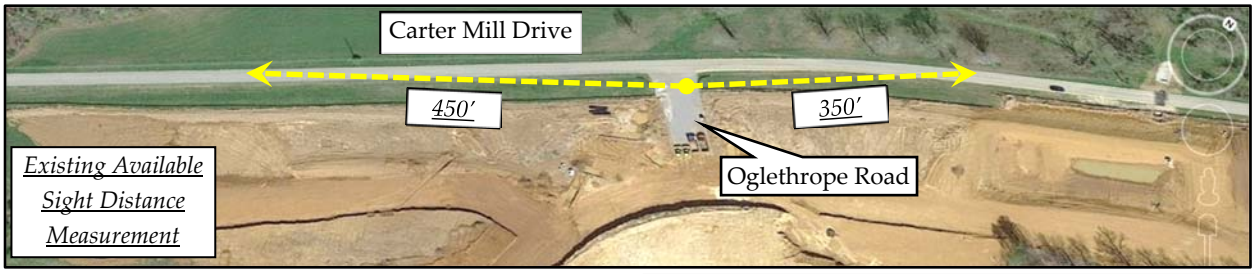
Visual observations of the sight distances at the existing entrances and the future entrance location were undertaken. Using a Nikon Laser Rangefinder on Carter Ridge Drive at Carter Mill Drive, the available sight distance was visually estimated to be 400 feet to the east and 800 feet to the west. On Oglethrope Road at Carter Mill Drive, the available sight distance was visually estimated to be 350 feet to the east and 450 feet to the west. At the future Madison Oaks Road entrance at Carter Mill Drive, the available sight distance was visually estimated to be 625 feet to the east and 999+ feet (limit of the rangefinder) to the west. Based on visual observation, the available sight distances from all the entrances at Carter Mill Drive will be adequate. A slightly longer sight distance may be available to the east on Carter Mill Drive from Oglethrope Road but is reduced by the grass vegetation on the south side of Carter Mill Drive and is hindered by an existing real estate sign.

Images of the existing sight distances are labeled below with the ISD, SSD, and rangefinder measured sight distances.



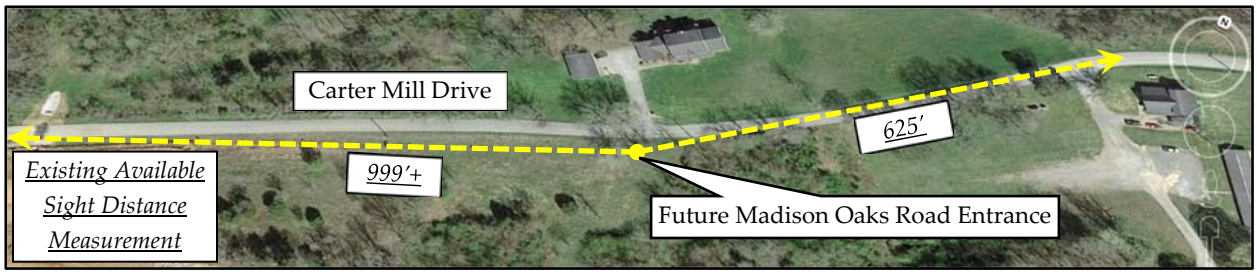
View of Sight Distance on Carter Mill Drive at Carter Ridge Drive / Carter View Lane (Looking West)

View of Sight Distance on Carter Mill Drive at Carter Ridge Drive / Carter View Lane (Looking East)



View of Sight Distance on Carter Mill Drive at Oglethrope Road (Looking West)

View of Sight Distance on Carter Mill Drive at Oglethrope Road (Looking East)



View of Sight Distance on Carter Mill Drive at Future Madison Oaks Road Entrance (Looking West)

View of Sight Distance on Carter Mill Drive at Future Madison Oaks Road Entrance (Looking East)

EVALUATION OF TURN LANE THRESHOLDS

An evaluation of the need for separate entering turn lanes into the development in the projected 2028 conditions was conducted for the Carter Ridge Subdivision entrances on Carter Mill Drive.

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. This Knox County policy follows TDOT and nationally accepted guidelines for unsignalized intersections.

With an assumed speed limit of 30-mph on Carter Mill Drive, separate left and right-turn entering lanes are not warranted at any of the entrances on Carter Mill Drive based on the projected 2028 AM and PM peak hour traffic volumes. The worksheets for these evaluations are provided in Appendix I.

CONCLUSIONS & RECOMMENDATIONS

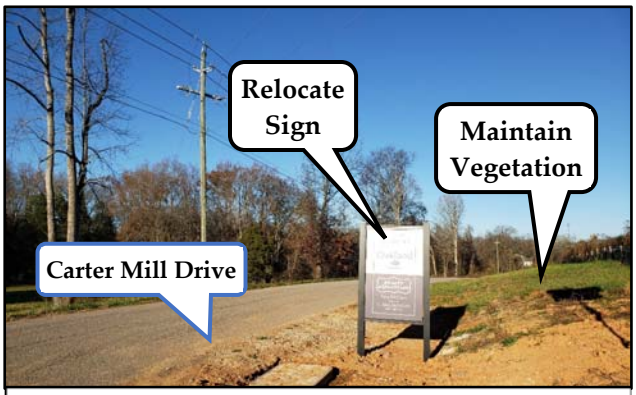
The following is an overview of recommendations to minimize the transportation impacts of Carter Ridge Phases VI – VIII on the adjacent transportation system while attempting to achieve an acceptable traffic flow and safety level.

1 **Carter Mill Drive at Carter Ridge Drive / Carter View Lane**: The existing and projected 2028 level of service calculations for this intersection resulted in excellent LOS and low vehicle delays. The construction of left and right-turn lanes on Carter Mill Drive for entering traffic into Carter Ridge Subdivision at Carter Ridge Drive is not warranted. No specific recommendations are offered for this intersection.

2 **Carter Mill Drive at Oglethrope Road**: The projected 2028 level of service calculations for this intersection resulted in excellent LOS and low vehicle delays. The construction of left and right-turn lanes on Carter Mill Drive for entering traffic into Carter Ridge Subdivision at Oglethrope Road is not warranted.

2a) A 24" white stop bar is recommended to be applied to the recently constructed Oglethrope Road approach at Carter Mill Drive. The stop bar should be applied a minimum of 4 feet away from the edge of Carter Mill Drive and placed at the desired stopping point that maximizes the sight distance. A Stop Sign (R1-1) has already been installed on the Oglethrope Road approach at Carter Mill Drive.

2b) Sight distance looking to the east at Oglethrope Road at Carter Mill Drive is impacted by an existing sign posted by the developer announcing houses for sale. This sign interferes with sight distance to the east and should be moved further away (to the south) from Carter Mill Drive. Furthermore, vegetation control on the slope south of Carter Mill Drive and east of Oglethrope Road will be crucial since the visually measured sight distance is estimated to be only 350 feet.



Existing Sight Distance View to the East on Oglethrope Road at Carter Mill Drive

Carter Mill Drive at Future Madison Oaks Road Entrance: The projected 2028 level of service calculations for this intersection resulted in excellent LOS and low vehicle delays. The construction of left and right-turn lanes on Carter Mill Drive for entering traffic into Carter Ridge Subdivision at the future Madison Oaks Road is not warranted. A single exiting lane for this entrance will be sufficient.

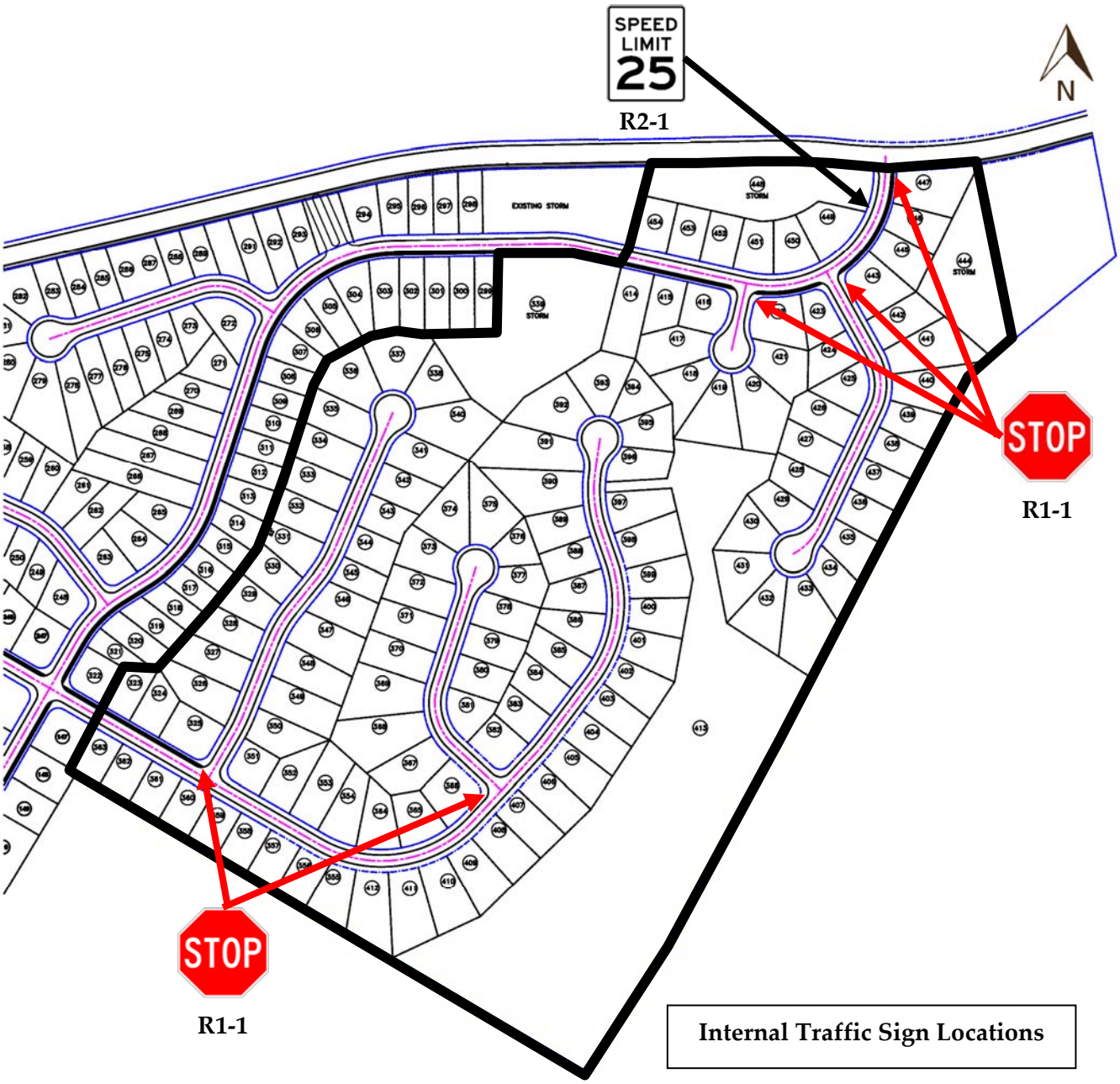
3a) It is recommended that a Stop Sign (R1-1) be installed, and a 24" white stop bar be applied to the Madison Oaks Road approach at Carter Mill Drive when constructed. The stop bar should be applied a minimum of 4 feet away from the edge of Carter Mill Drive and placed at the desired stopping point that maximizes the sight distance.

3b) Sight distances at the Madison Oaks Road approach at Carter Mill Drive must not be impacted by future landscaping, signage, or existing vegetation. Based on an assumed speed limit of 30-mph on Carter Mill Drive, the required intersection sight distance is 300 feet looking in each direction at the entrance. The stopping sight distance is 185 feet to the east and 195 feet to the west at the Madison Oaks Road approach at Carter Mill Drive. A visual inspection determined that the intersection and stopping sight distances are available at this future entrance location. The site designer must ensure that these sight distances are accounted for and provided in the design plans.

4 **Carter Ridge Phases VI - VIII Internal Roads:** The layout plan shows three entrances on Carter Mill Drive constructed for the Carter Ridge Subdivision, as shown in Figure 3.

4a) A 25-mph Speed Limit Sign (R2-1) is recommended to be posted near the beginning of the future Madison Oaks Road entrance off Carter Mill Drive. 25-mph Speed Limit Signs (R2-1) are already posted on the Oglethrope Road and Carter Ridge Drive entrances in Carter Ridge Subdivision.

4b) Stop Signs (R1-1) with 24" white stop bars and other traffic signage are recommended to be installed at the internal locations in Carter Ridge Phases VI - VIII, as shown below:



4c) Sight distance at the new internal road intersections must not be impacted by 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.

4d) The extension of Carter Ridge Drive and the new Road "H" in Carter Ridge Phases VI and VII have long, straight road segments with steeper road grades. Straight road segments with steeper grades encourage higher vehicle speeds. It is recommended that the site designer consider traffic calming measures on these internal roads.

Speed humps are a prevalent traffic calming measure to install in residential areas to reduce vehicle speeds due to their low cost. However, speed humps are not recommended on roads with grades greater than 8%. Road "H" has a short section with a grade of 10%. Thus, speed humps would be inappropriate for this section of Road "H". Outside the 10% grade section on Road "H", the site designer should consider speed humps on these internal roads. Specifics regarding this recommendation should be discussed in the design phase with Knox County Engineering.

4e) All drainage grates and covers for the residential development must be pedestrian and bicycle safe.

4f) Internal sidewalks are proposed along Madison Oaks Road and a portion of Carter Ridge Drive in Carter Ridge Phase VI. Sidewalks should have appropriate ADA-compliant ramps at intersection corners, and the internal sidewalks are recommended to be 5 feet minimum in width to meet Knox County regulations. White crosswalks should be marked on the road pavement internally where pedestrians are expected to cross.

4g) If directed by the local post office, the site designer should include a parking area within the development for a centralized mail delivery center. The site plan does not currently show a general location in the development, and a specific plan with a parking area should be designed and provided if required.

4h) All road grade and intersection elements should be designed to AASHTO, TDOT, and Knox County specifications and guidelines to ensure proper operation.

APPENDIX A

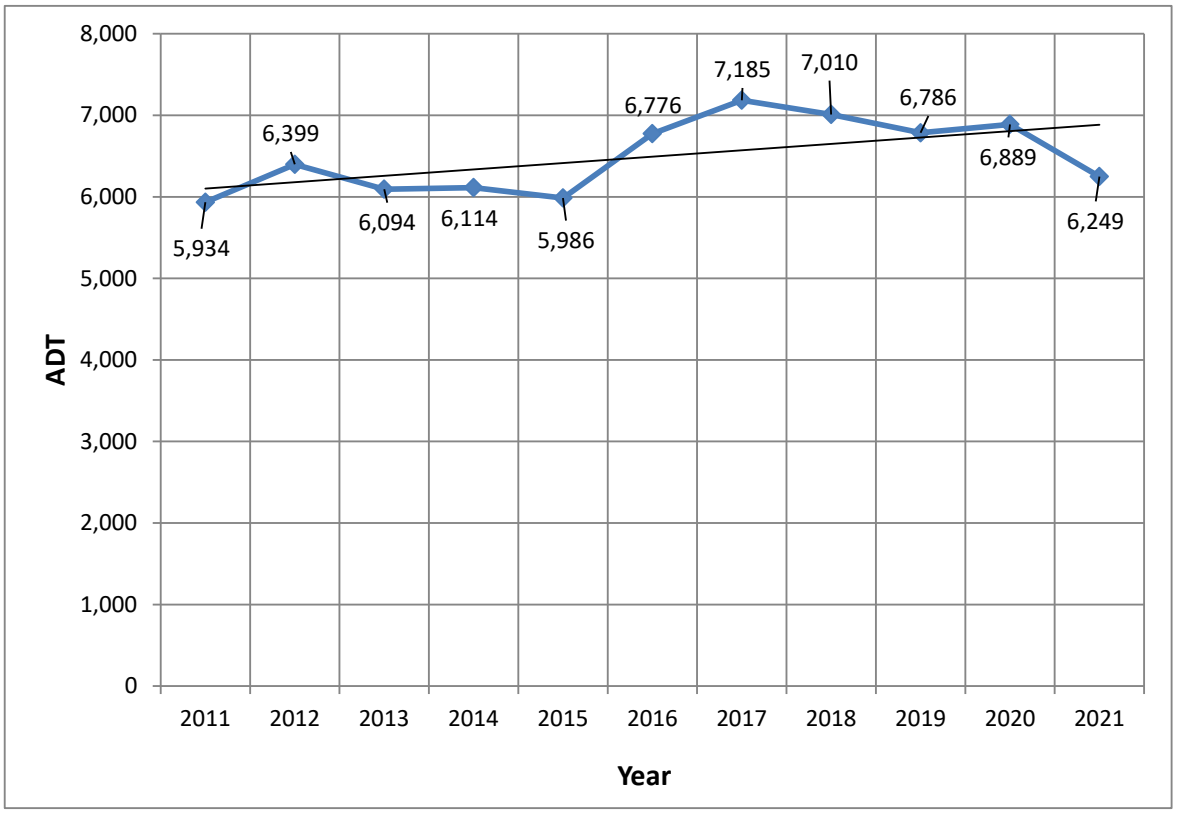
HISTORICAL TRAFFIC COUNT DATA

Historical Traffic Counts

Organization: TDOT
Station ID #: 47000059
Location: Strawberry Plains Pike - West of Trentville

YEAR	ADT
2011	5,934
2012	6,399
2013	6,094
2014	6,114
2015	5,986
2016	6,776
2017	7,185
2018	7,010
2019	6,786
2020	6,889
2021	6,249

Trendline



2011 - 2021 Growth Rate = 5.3%
Average Annual Growth Rate = 0.5%

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Record ⏮ ◀ 7161 ▶ ⏭ of 15616 Goto Record [ ] go

Location ID	47000059	MPO ID	
Type	SPOT	HPMS ID	
On NHS		On HPMS	
LRS ID	4701124001	LRS Loc Pt.	10.591
SF Group	Urban	Route Type	
AF Group	17	Route	
GF Group	Knox	Active	Yes
Class Dist Grp	17	Category	CC
Seas Clss Grp			
WIM Group			
QC Group	Default		
Fnct'l Class	Major Collector	Milepost	
Located On	STRAWBERRY PLAINS PK.		
Loc On Alias			
	WEST OF TRENTVILLE		
More Detail ▶			

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2021	6,249	661	11	65	6,063 (97%)	186 (3%)	
	2020	6,889	804	12	65	6,634 (96%)	255 (4%)	
	2019	6,786		14	65			
	2018	7,010[2]						
	2017	7,185		12	65			

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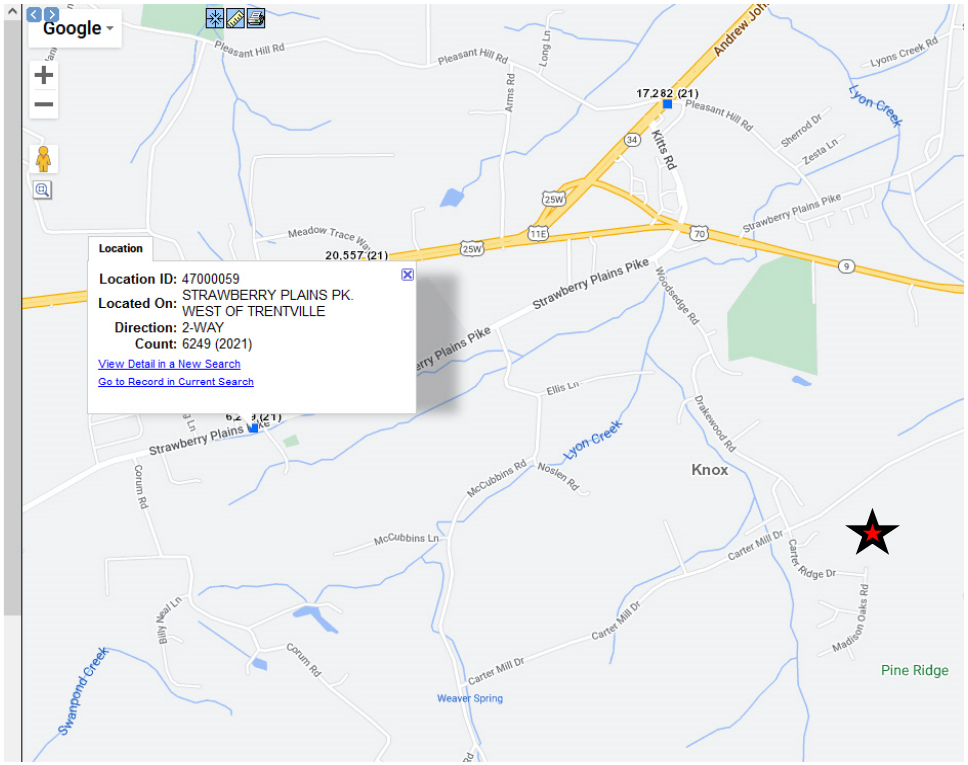
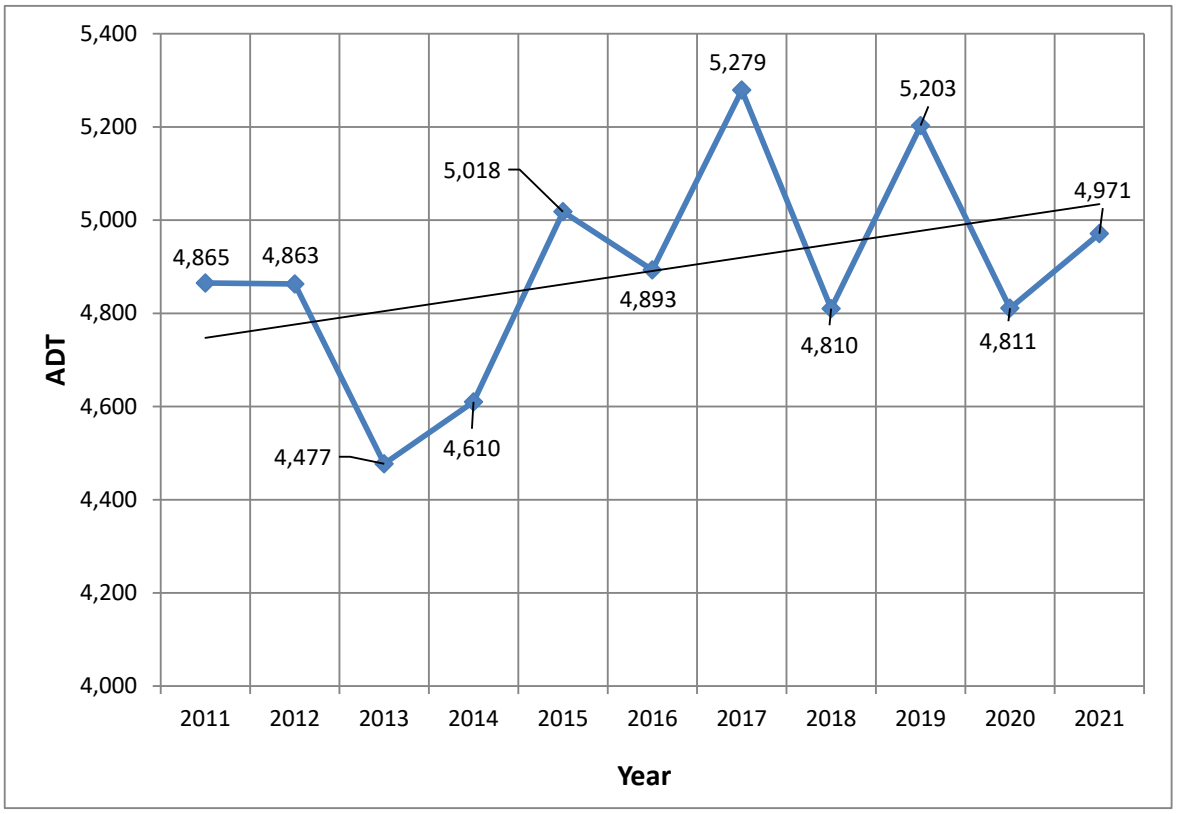


Historical Traffic Counts

Organization: TDOT
Station ID #: 47000062
Location: Asheville Highway - Near Jefferson County Line

YEAR	ADT
2011	4,865
2012	4,863
2013	4,477
2014	4,610
2015	5,018
2016	4,893
2017	5,279
2018	4,810
2019	5,203
2020	4,811
2021	4,971

Trendline



2011 - 2021 Growth Rate = 2.2%
Average Annual Growth Rate = 0.2%

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List View | All DIRs

Record ⏮ ◀ 7164 ▶ ⏭ of 15616 Goto Record [ ] go

Location ID	47000062	MPO ID	
Type	SPOT	HPMS ID	
On NHS		On HPMS	
LRS ID	47SR009001	LRS Loc Pt.	14.582
SF Group	Rural Other	Route Type	
AF Group	07	Route	
GF Group	Knox	Active	Yes
Class Dist Grp	07	Category	CC
Seas Clss Grp			
WIM Group			
QC Group	Default		
Fnct'l Class	Major Collector	Milepost	
Located On	ASHEVILLE HWY.		
Loc On Alias			
	NEAR JEFFERSON CO LINE		
More Detail ▶			

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2021	4,971	445	9	65	4,741 (95%)	230 (5%)	
	2020	4,811	694	14	65	4,571 (95%)	240 (5%)	
	2019	5,203[2]		12	65			
	2018	4,810		10	65			
	2017	5,279[2]						

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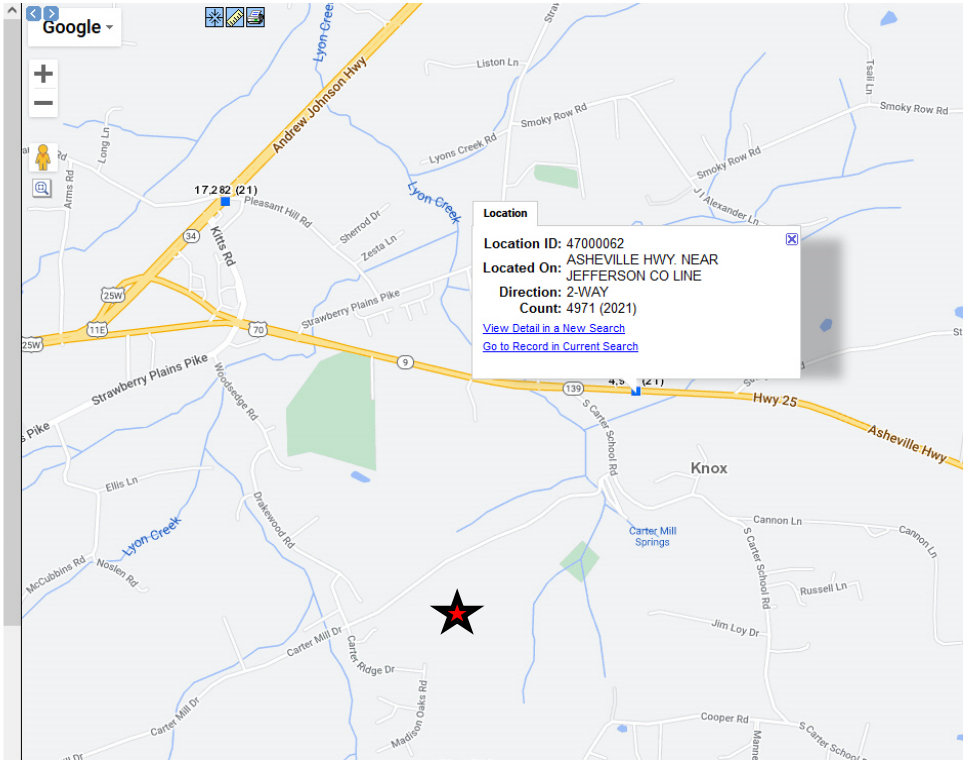
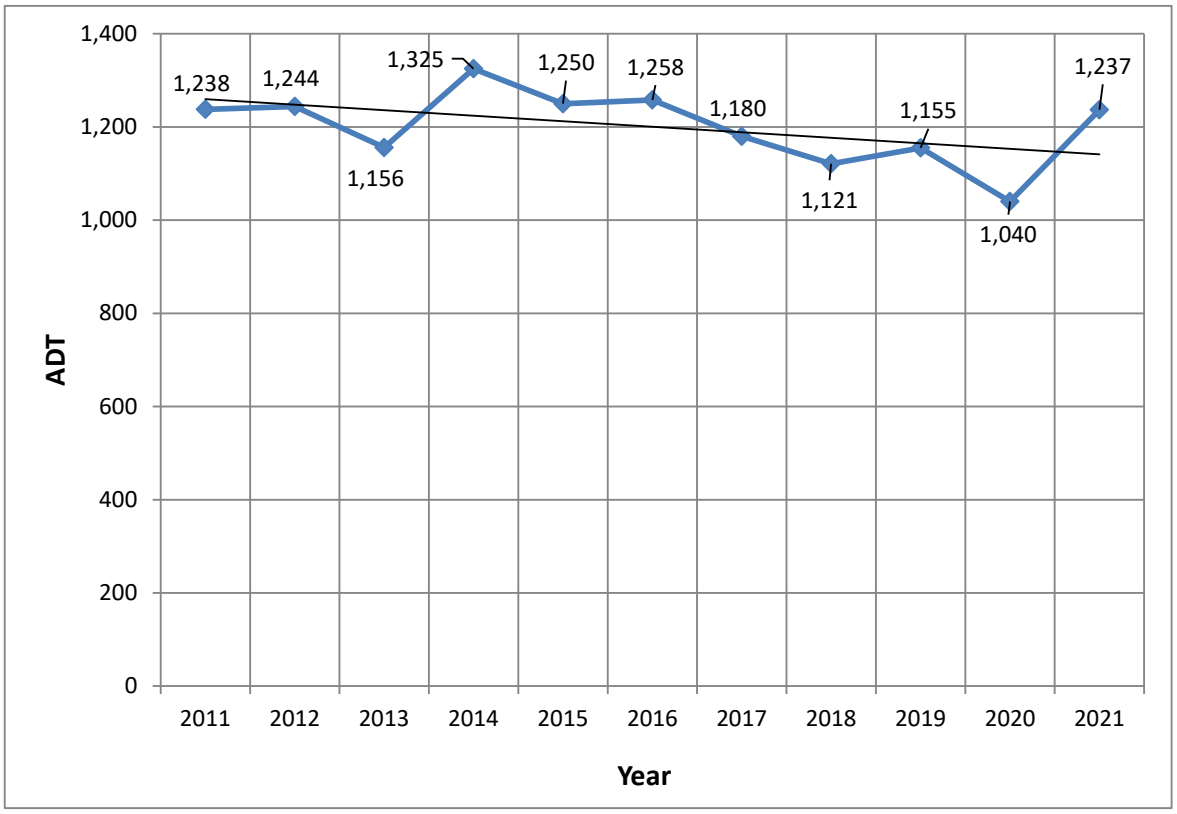


Historical Traffic Counts

Organization: TDOT
Station ID #: 47000063
Location: South Carter School Road, North of Thorngrove Pike

YEAR	ADT
2011	1,238
2012	1,244
2013	1,156
2014	1,325
2015	1,250
2016	1,258
2017	1,180
2018	1,121
2019	1,155
2020	1,040
2021	1,237

Trendline



2011 - 2021 Growth Rate = -0.1%
Average Annual Growth Rate = 0.0%

TN TDOT Department of Transportation

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Transportation Data Management System

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Auto-Locate OFF

List View | All DIRs

Record ⏮ ◀ 7165 ▶ ⏭ of 15616 Goto Record [ ] go

Location ID	47000063	MPO ID	
Type	SPOT	HPMS ID	
On NHS		On HPMS	
LRS ID	4702426001	LRS Loc Pt.	0.3
SF Group	Rural Other	Route Type	
AF Group	08	Route	
GF Group	Knox	Active	Yes
Class Dist Grp	08	Category	CC
Seas Clss Grp			
WIM Group			
QC Group	Default		
Fnct'l Class	Minor Collector	Milepost	
Located On	S. CARTER SCHOOL RD.		
Loc On Alias			
	SCHOOL RD-NEAR JEFFERSON CO LINE		
More Detail ▶			

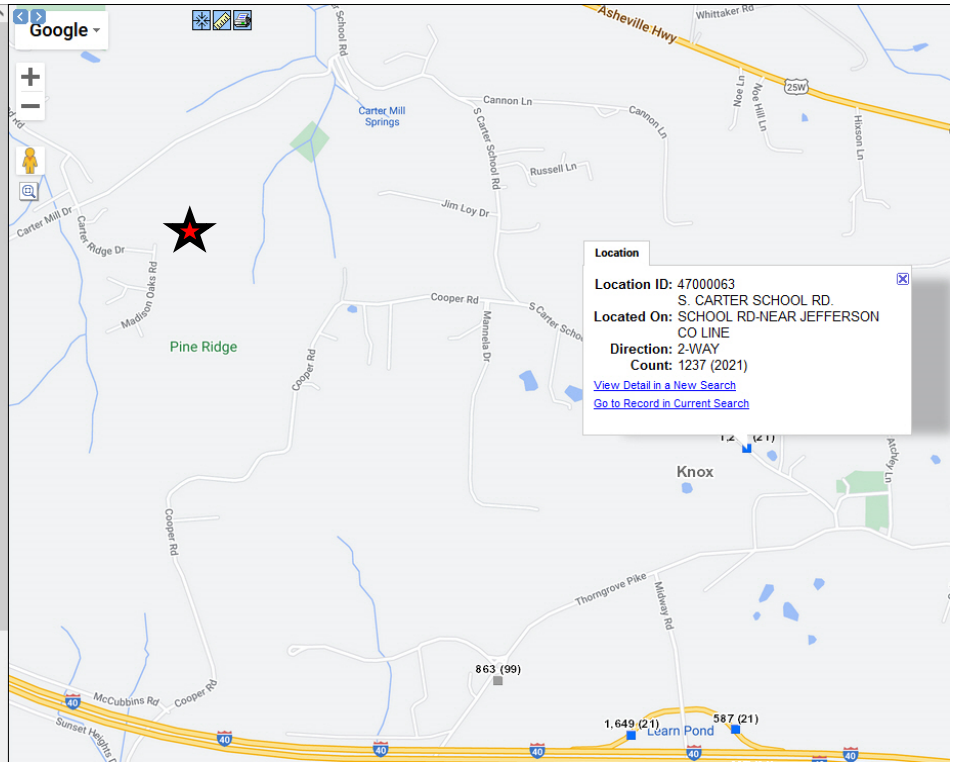
STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2021	1,237	107	9	65	1,199 (97%)	38 (3%)	
	2020	1,040	111	11	65	1,004 (97%)	36 (3%)	
	2019	1,155[2]		12	65			
	2018	1,121		10	65			
	2017	1,180		9	65			

|<< < > >>| 1-5 of 37

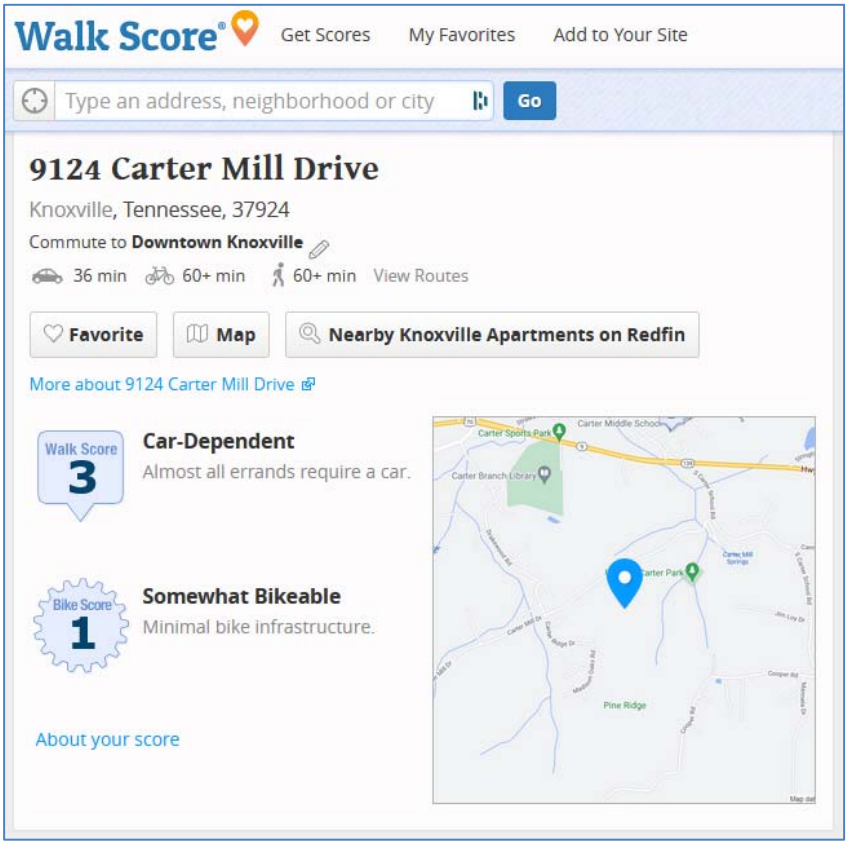


APPENDIX B

WALK SCORE

WALKSCORE

(from walkscore.com)



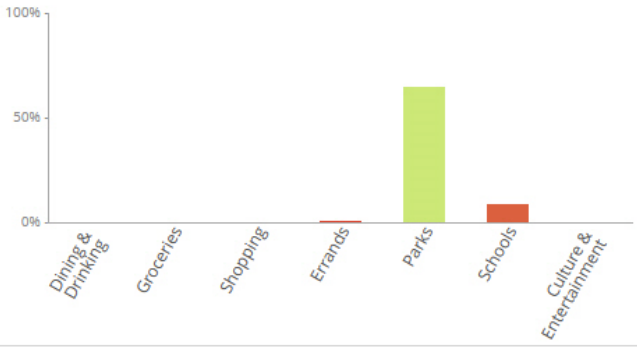
Scores for 9124 Carter Mill Drive

Walk Score 3 | Bike Score 1

Walk Score | **Transit Score** | **Bike Score**

Score Details | **What is Walk Score**

The Walk Score for 9124 Carter Mill Drive is based on the following categories.



Scores for 9124 Carter Mill Drive

Walk Score 3 | Bike Score 1

Walk Score | **Transit Score** | **Bike Score**

Transit Score measures how well a location is served by public transit based on the distance and type of nearby transit lines.

90–100	**Rider's Paradise** World-class public transportation
70–89	**Excellent Transit** Transit is convenient for most trips
50–69	**Good Transit** Many nearby public transportation options
25–49	**Some Transit** A few nearby public transportation options
0–24	**Minimal Transit** It is possible to get on a bus

Scores for 9124 Carter Mill Drive

Walk Score	Transit Score	Bike Score

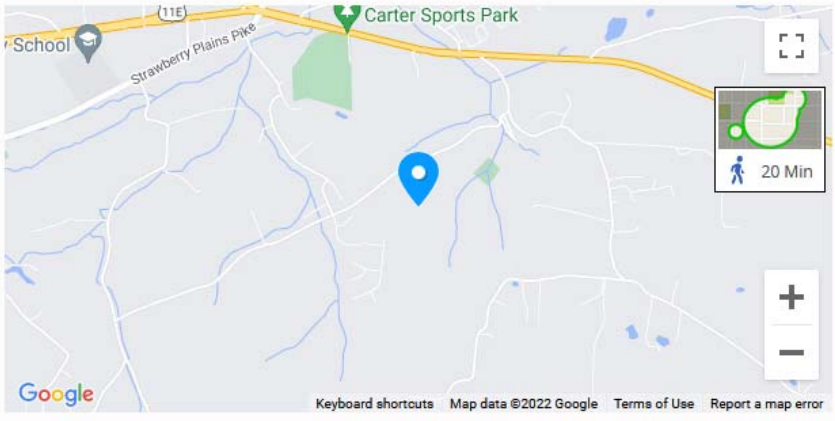
Bike Score measures whether an area is good for biking based on bike lanes and trails, hills, road connectivity, and destinations.

90–100	**Biker's Paradise** Daily errands can be accomplished on a bike
70–89	**Very Bikeable** Biking is convenient for most trips
50–69	**Bikeable** Some bike infrastructure
0–49	**Somewhat Bikeable** Minimal bike infrastructure

Travel Time Map

Add to your site

Explore how far you can travel by car, bus, bike and foot from 9124 Carter Mill Drive.



What's Nearby

Restaurants:
Pizza Plus 1.1mi

Coffee:
Green Mountain Coffee Roast... 7.7mi

Bars:

Groceries:
MC's Wine and Liquor 3mi

Parks:
Carter Community Park .4mi

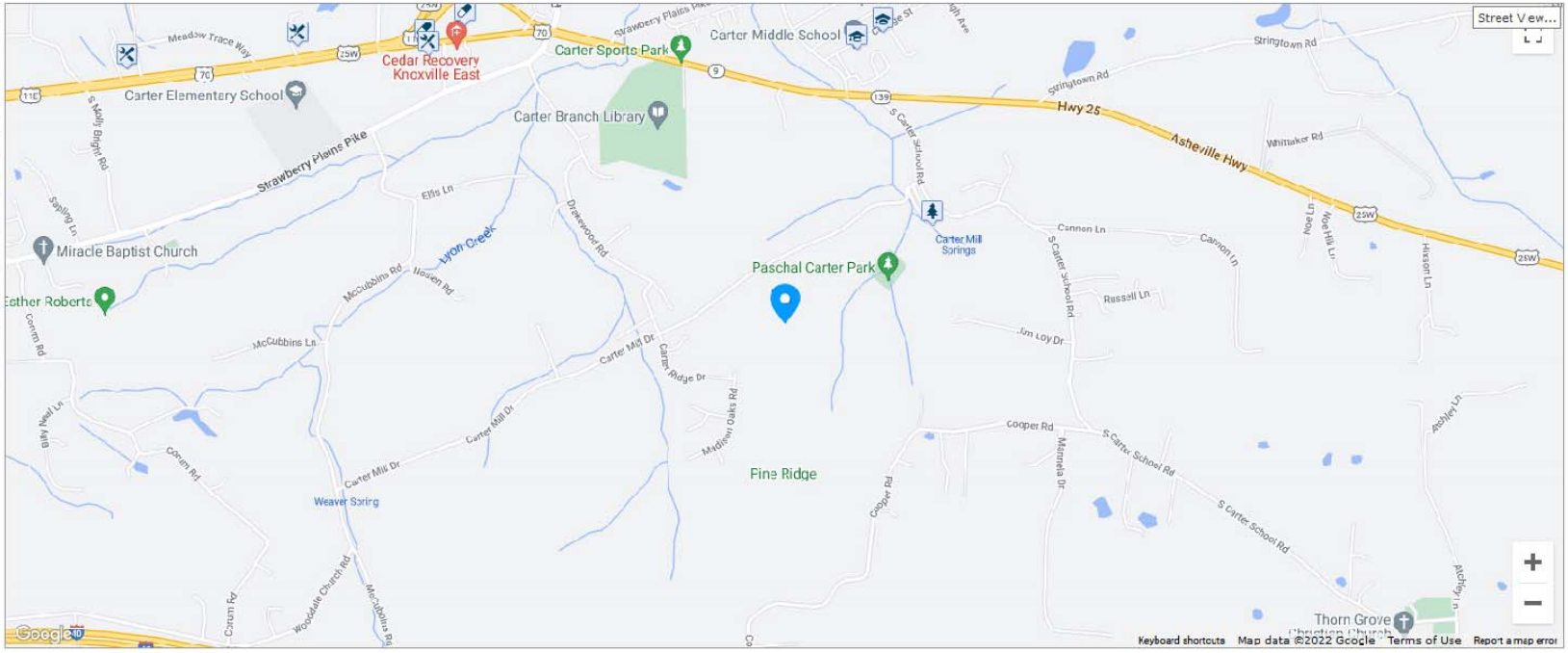
Schools:
Carter Middle School .6mi

Shopping:
Dollar General 1.1mi

Entertainment:
Ramsey House Plantation 6.7mi

Errands:
Four Way Prescription Shop 1mi

Search Nearby:



APPENDIX C

KNOXVILLE AREA TRANSIT MAP AND INFORMATION

Knoxville City Center

Legend

- Transfer Point
- Lift Service Area Boundary

Points of Interest

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

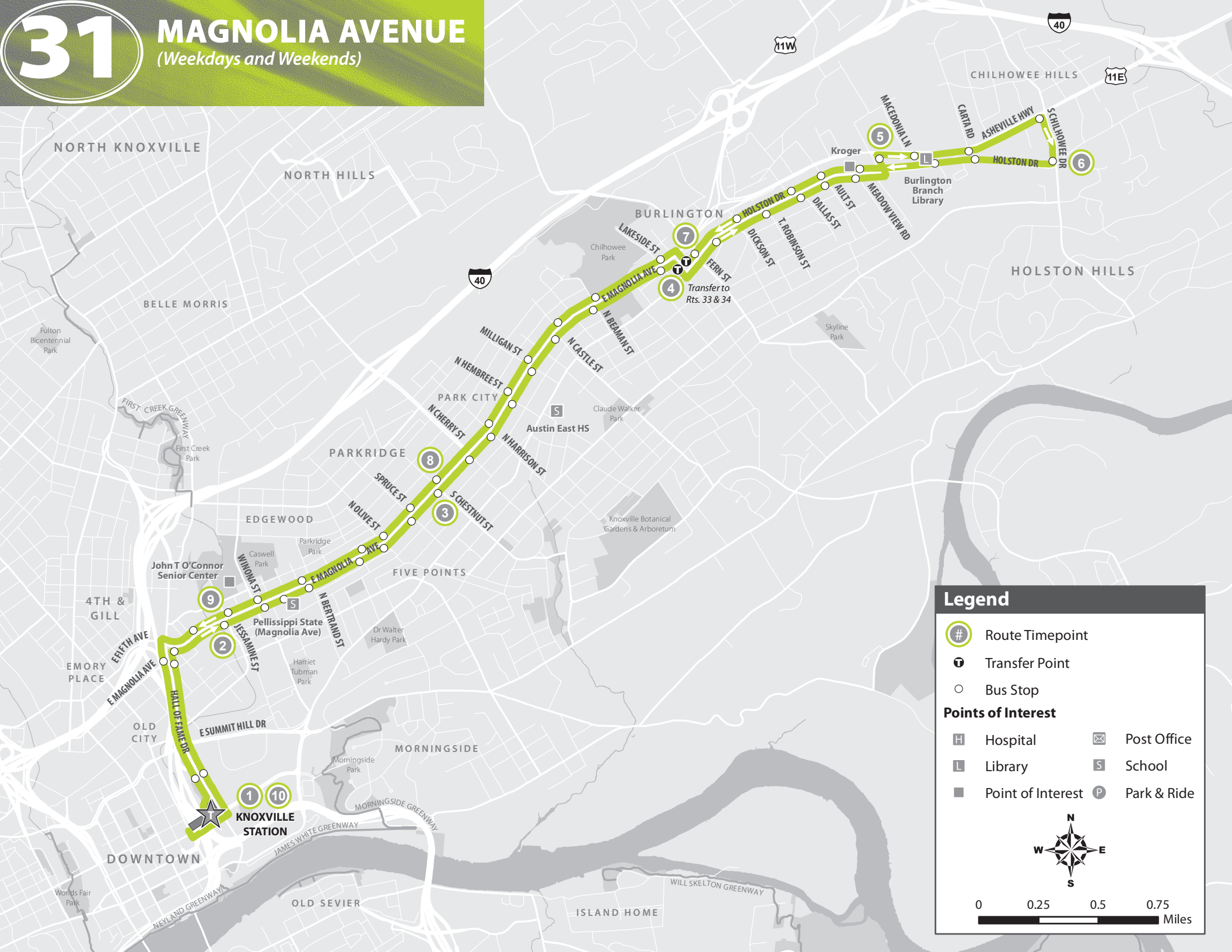
Distances

- 0 5 10 Minutes Walking
- 0 5 10 Minutes Biking
- 0 0.5 1 Map Scale in Miles

NORTH

31 MAGNOLIA AVENUE

(Weekdays and Weekends)



Legend

- Route Timepoint
- Transfer Point
- Bus Stop

Points of Interest

- Hospital
- Library
- Point of Interest
- Post Office
- School
- Park & Ride

N W E S

0 0.25 0.5 0.75 Miles

Route 31 - Magnolia: Weekdays

Going away from downtown					*Going toward downtown*				
Knoxville Station Bay F	Magnolia @ Jessamine	Magnolia @ Chestnut	Kirkwood St. Superstop	Burns @ Asheville Hwy	Chilhowee @ Holston	Kirkwood St. Superstop	Magnolia @ Chestnut	Magnolia @ Jessamine	Knoxville Station Bay F
1	2	3	4	5	6	7	8	9	10
				5:38 AM	5:43 AM	5:53 AM	5:59 AM	6:04 AM	6:10 AM
				6:08 AM	6:13 AM	6:23 AM	6:29 AM	6:34 AM	6:40 AM
6:15 AM	6:19 AM	6:25 AM	6:33 AM	6:38 AM	6:43 AM	6:53 AM	6:59 AM	7:04 AM	7:10 AM
6:45 AM	6:49 AM	6:55 AM	7:03 AM	7:08 AM	7:13 AM	7:23 AM	7:29 AM	7:34 AM	7:40 AM
7:15 AM	7:19 AM	7:25 AM	7:33 AM	7:38 AM	7:43 AM	7:53 AM	7:59 AM	8:04 AM	8:10 AM
7:45 AM	7:49 AM	7:55 AM	8:03 AM	8:08 AM	8:13 AM	8:23 AM	8:29 AM	8:34 AM	8:40 AM
8:15 AM	8:19 AM	8:25 AM	8:33 AM	8:38 AM	8:43 AM	8:53 AM	8:59 AM	9:04 AM	9:10 AM
8:45 AM	8:49 AM	8:55 AM	9:03 AM	9:08 AM	9:13 AM	9:23 AM	9:29 AM	9:34 AM	9:40 AM
9:15 AM	9:19 AM	9:25 AM	9:33 AM	9:38 AM	9:43 AM	9:53 AM	9:59 AM	10:04 AM	10:10 AM
9:45 AM	9:49 AM	9:55 AM	10:03 AM	10:08 AM	10:13 AM	10:23 AM	10:29 AM	10:34 AM	10:40 AM
10:15 AM	10:19 AM	10:25 AM	10:33 AM	10:38 AM	10:43 AM	10:53 AM	10:59 AM	11:04 AM	11:10 AM
10:45 AM	10:49 AM	10:55 AM	11:03 AM	11:08 AM	11:13 AM	11:23 AM	11:29 AM	11:34 AM	11:40 AM
11:15 AM	11:19 AM	11:25 AM	11:33 AM	11:38 AM	11:43 AM	11:53 AM	11:59 AM	12:04 PM	12:10 PM
11:45 AM	11:49 AM	11:55 AM	12:03 PM	12:08 PM	12:13 PM	12:23 PM	12:29 PM	12:34 PM	12:40 PM
12:15 PM	12:19 PM	12:25 PM	12:33 PM	12:38 PM	12:43 PM	12:53 PM	12:59 PM	1:04 PM	1:10 PM
12:45 PM	12:49 PM	12:55 PM	1:03 PM	1:08 PM	1:13 PM	1:23 PM	1:29 PM	1:34 PM	1:40 PM
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1:45 PM	1:49 PM	1:55 PM	2:03 PM	2:08 PM	2:13 PM	2:23 PM	2:29 PM	2:34 PM	2:40 PM
2:15 PM	2:19 PM	2:25 PM	2:33 PM	2:38 PM	2:43 PM	2:53 PM	2:59 PM	3:04 PM	3:10 PM
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3:15 PM	3:19 PM	3:25 PM	3:33 PM	3:38 PM	3:43 PM	3:53 PM	3:59 PM	4:04 PM	4:10 PM
3:45 PM	3:49 PM	3:55 PM	4:03 PM	4:08 PM	4:13 PM	4:23 PM	4:29 PM	4:34 PM	4:40 PM
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6:15 PM	6:19 PM	6:25 PM	6:33 PM	6:38 PM	6:43 PM	6:53 PM	6:59 PM	7:04 PM	7:10 PM
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7:15 PM	7:19 PM	7:25 PM	7:33 PM	7:38 PM	7:43 PM	7:53 PM	7:59 PM	8:04 PM	8:10 PM
7:45 PM	7:49 PM	7:55 PM	8:03 PM	8:08 PM	8:13 PM	8:23 PM	8:29 PM	8:34 PM	8:40 PM
8:15 PM	8:19 PM	8:25 PM	8:33 PM	8:38 PM	8:43 PM	8:53 PM	8:59 PM	9:04 PM	9:10 PM
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9:15 PM	9:19 PM	9:25 PM	9:33 PM	9:38 PM	9:43 PM	9:53 PM	9:59 PM	10:04 PM	10:10 PM
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10:15 PM	10:19 PM	10:25 PM	10:33 PM	10:38 PM	10:43 PM	10:53 PM	10:59 PM	11:04 PM	11:10 PM
11:15 PM	11:19 PM	11:25 PM	11:33 PM	11:38 PM	11:43 PM	11:53 PM	11:59 PM	12:04 AM	

Route 31 - Magnolia: SATURDAYS

Going away from downtown					*Going toward downtown*				
Knoxville Station Bay F	Magnolia @ Jessamine	Magnolia @ Chestnut	Kirkwood St. Superstop	Burns @ Asheville Hwy	Chilhowee @ Holston	Kirkwood St. Superstop	Magnolia @ Chestnut	Magnolia @ Jessamine	Knoxville Station Bay F
1	2	3	4	5	6	7	8	9	10
				6:38 AM	6:43 AM	6:53 AM	6:59 AM	7:04 AM	7:10 AM
7:15 AM	7:19 AM	7:25 AM	7:33 AM	7:08 AM	7:13 AM	7:23 AM	7:29 AM	7:34 AM	7:40 AM
7:45 AM	7:49 AM	7:55 AM	8:03 AM	7:38 AM	7:43 AM	7:53 AM	7:59 AM	8:04 AM	8:10 AM
8:15 AM	8:19 AM	8:25 AM	8:33 AM	8:08 AM	8:13 AM	8:23 AM	8:29 AM	8:34 AM	8:40 AM
8:45 AM	8:49 AM	8:55 AM	9:03 AM	8:38 AM	8:43 AM	8:53 AM	8:59 AM	9:04 AM	9:10 AM
9:15 AM	9:19 AM	9:25 AM	9:33 AM	9:08 AM	9:13 AM	9:23 AM	9:29 AM	9:34 AM	9:40 AM
9:45 AM	9:49 AM	9:55 AM	10:03 AM	9:38 AM	9:43 AM	9:53 AM	9:59 AM	10:04 AM	10:10 AM
10:15 AM	10:19 AM	10:25 AM	10:33 AM	10:08 AM	10:13 AM	10:23 AM	10:29 AM	10:34 AM	10:40 AM
10:45 AM	10:49 AM	10:55 AM	11:03 AM	10:38 AM	10:43 AM	10:53 AM	10:59 AM	11:04 AM	11:10 AM
11:15 AM	11:19 AM	11:25 AM	11:33 AM	11:08 AM	11:13 AM	11:23 AM	11:29 AM	11:34 AM	11:40 AM
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11:15 PM	11:19 PM	11:25 PM	11:33 PM	10:38 PM	10:43 PM	10:53 PM	10:59 PM	11:04 PM	11:10 PM
				11:38 PM	11:43 PM	11:53 PM	11:59 PM	12:04 AM	

Route 31 - Magnolia: SUNDAYS

Going away from downtown					*Going toward downtown*				
Knoxville Station Bay F	Magnolia @ Jessamine	Magnolia @ Chestnut	Kirkwood St. Superstop	Burns at Asheville Hwy	Chilhowee @ Holston	Kirkwood St. Superstop	Magnolia @ Chestnut	Magnolia @ Jessamine	Knoxville Station Bay F
1	2	3	4	5	6	7	8	9	10
8:15 AM	8:19 AM	8:25 AM	8:33 AM	8:38 AM	8:43 AM	8:53 AM	8:59 AM	9:04 AM	9:10 AM
9:15 AM	9:19 AM	9:25 AM	9:33 AM	9:38 AM	9:43 AM	9:53 AM	9:59 AM	10:04 AM	10:10 AM
10:15 AM	10:19 AM	10:25 AM	10:33 AM	10:38 AM	10:43 AM	10:53 AM	10:59 AM	11:04 AM	11:10 AM
11:15 AM	11:19 AM	11:25 AM	11:33 AM	11:38 AM	11:43 AM	11:53 AM	11:59 AM	12:04 PM	12:10 PM
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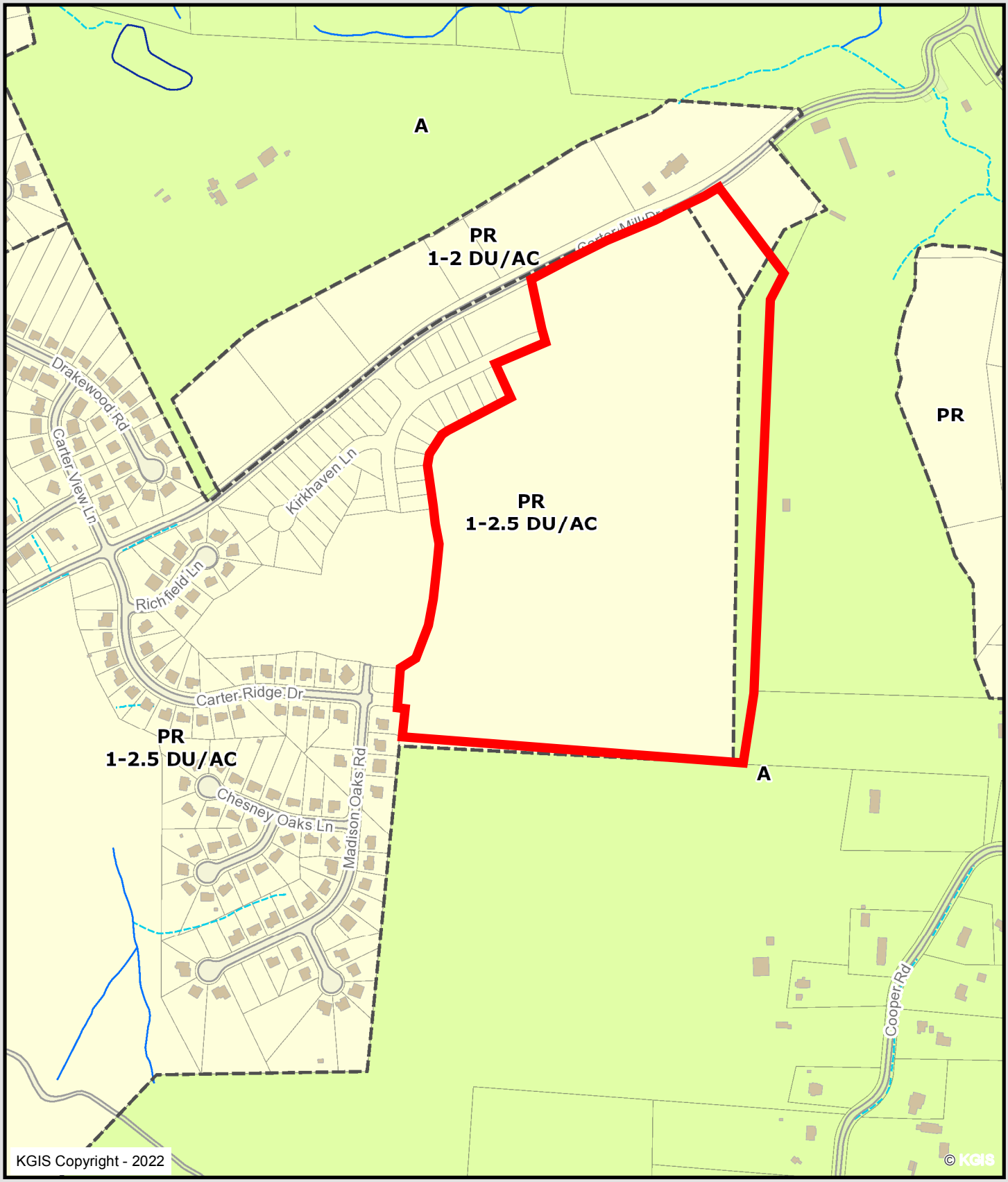
APPENDIX D

ZONING MAP



Zoning Map for Carter Ridge Phases VI - VIII

as of 11.13.22

Knoxville - Knox County - KUB Geographic Information System

Printed: 11/13/2022 at 11:31:04 AM

0 250 500 1,000

ft

APPENDIX E

MANUAL TRAFFIC COUNT DATA

TRAFFIC COUNT DATA

Major Street: Carter Mill Drive (EB and WB)
Minor Street: Carter Ridge Drive (NB) / Carter View Lane (SB)
Traffic Control: Stop Sign on Carter Ridge Drive and Carter View Lane

11/9/2022 (Wednesday)
Sunny, Warm
Conducted by: Ajax Engineering

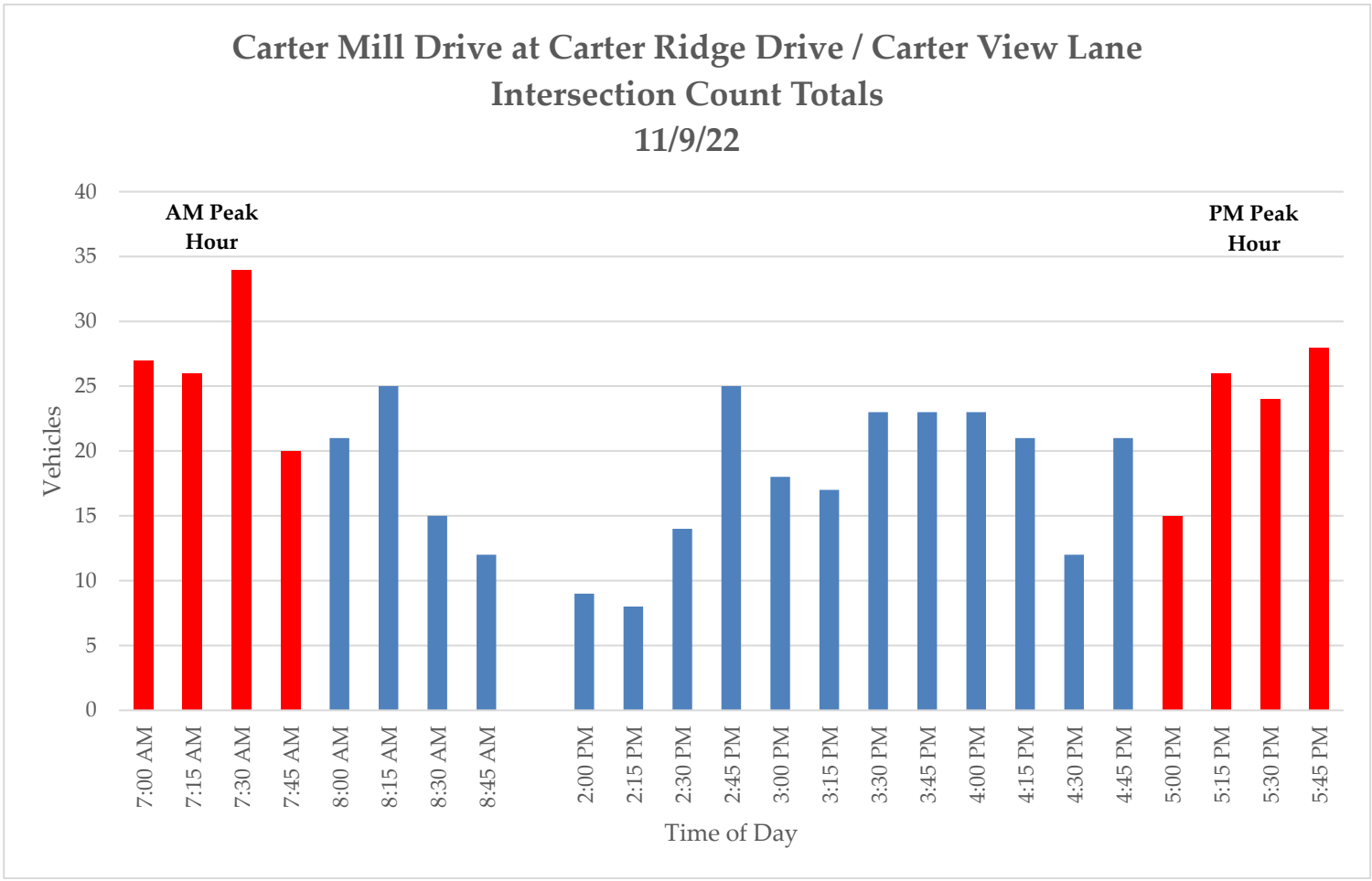
	Carter View Lane			Carter Mill Drive			Carter Ridge Drive			Carter Mill Drive				
TIME	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND			VEHICLE	PEAK
BEGIN	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	TOTAL	HOUR
7:00 AM	2	0	4	1	0	0	12	5	3	0	0	0	27	**7:00 AM - 8:00 AM**
7:15 AM	1	2	0	0	0	0	2	10	4	1	5	1	26	
7:30 AM	2	7	4	0	0	1	5	9	2	1	3	0	34	
7:45 AM	4	2	0	0	0	1	4	5	2	0	1	1	20	
8:00 AM	2	2	2	0	2	1	3	4	2	0	1	2	21	
8:15 AM	3	1	0	4	1	1	3	1	7	1	2	1	25	
8:30 AM	0	1	0	2	1	0	3	1	3	0	2	2	15	
8:45 AM	2	0	0	2	1	0	2	1	3	0	0	1	12	
TOTAL	16	15	10	9	5	4	34	36	26	3	14	8	180	
2:00 PM	1	1	0	2	0	0	0	0	0	1	2	2	9	
2:15 PM	1	2	0	0	1	1	0	2	0	0	0	1	8	
2:30 PM	1	0	0	2	1	0	3	3	1	0	3	0	14	
2:45 PM	2	4	0	1	2	1	2	4	1	2	1	5	25	
3:00 PM	1	6	1	2	0	0	0	0	7	0	0	1	18	
3:15 PM	1	2	1	0	2	1	0	1	4	1	3	1	17	
3:30 PM	2	5	1	7	3	0	1	0	1	0	1	2	23	
3:45 PM	1	2	0	6	1	3	0	2	4	0	0	4	23	
4:00 PM	0	3	0	4	4	3	4	0	1	2	0	2	23	
4:15 PM	0	2	0	6	1	0	3	4	2	0	1	2	21	
4:30 PM	0	1	0	1	0	2	1	3	2	1	0	1	12	
4:45 PM	0	6	0	4	2	1	2	2	2	0	0	2	21	
5:00 PM	0	2	1	3	1	0	3	2	0	1	1	1	15	**5:00 PM - 6:00 PM**
5:15 PM	0	5	0	6	0	2	1	3	2	3	0	4	26	
5:30 PM	2	5	1	2	3	2	2	2	1	0	0	4	24	
5:45 PM	2	1	1	5	1	3	3	1	4	1	1	5	28	
TOTAL	14	47	6	51	22	19	25	29	32	12	13	37	307	

2022 AM Peak Hour **7:00 AM - 8:00 AM**

	Carter View Lane			Carter Mill Drive			Carter Ridge Drive			Carter Mill Drive		
TIME	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND		
BEGIN	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT
7:00 AM	2	0	4	1	0	0	12	5	3	0	0	0
7:15 AM	1	2	0	0	0	0	2	10	4	1	5	1
7:30 AM	2	7	4	0	0	1	5	9	2	1	3	0
7:45 AM	4	2	0	0	0	1	4	5	2	0	1	1
TOTAL	**9**	**11**	**8**	**1**	**0**	**2**	**23**	**29**	**11**	**2**	**9**	**2**
PHF	**0.56**	**0.39**	**0.50**	**0.25**	**-**	**0.50**	**0.48**	**0.73**	**0.69**	**0.50**	**0.45**	**0.50**
TRUCK %	**11.1%**	**9.1%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**3.4%**	**0.0%**	**50.0%**	**0.0%**	**0.0%**

2022 PM Peak Hour **5:00 PM - 6:00 PM**

	Carter View Lane			Carter Mill Drive			Carter Ridge Drive			Carter Mill Drive		
TIME	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND		
BEGIN	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT
5:00 PM	0	2	1	3	1	0	3	2	0	1	1	1
5:15 PM	0	5	0	6	0	2	1	3	2	3	0	4
5:30 PM	2	5	1	2	3	2	2	2	1	0	0	4
5:45 PM	2	1	1	5	1	3	3	1	4	1	1	5
TOTAL	**4**	**13**	**3**	**16**	**5**	**7**	**9**	**8**	**7**	**5**	**2**	**14**
PHF	**0.50**	**0.65**	**0.75**	**0.67**	**0.42**	**0.58**	**0.75**	**0.67**	**0.44**	**0.42**	**0.50**	**0.70**


Carter Mill Drive at Carter Ridge Drive / Carter View Lane
Intersection Count Totals
11/9/22
AM Peak Hour
PM Peak Hour
Vehicles
40
35
30
25
20
15
10
5
0
7:00 AM
7:15 AM
7:30 AM
7:45 AM
8:00 AM
8:15 AM
8:30 AM
8:45 AM
2:00 PM
2:15 PM
2:30 PM
2:45 PM
3:00 PM
3:15 PM
3:30 PM
3:45 PM
4:00 PM
4:15 PM
4:30 PM
4:45 PM
5:00 PM
5:15 PM
5:30 PM
5:45 PM
Time of Day

APPENDIX F

CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 11)

EXISTING CONDITIONS

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	9	2	1	0	2	23	29	11	9	11	8
Future Vol, veh/h	2	9	2	1	0	2	23	29	11	9	11	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-4	-	-	5	-
Peak Hour Factor	50	45	50	25	90	50	48	73	69	56	39	50
Heavy Vehicles, %	50	0	0	0	0	0	0	3	0	11	9	0
Mvmt Flow	4	20	4	4	0	4	48	40	16	16	28	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	4	0	0	24	0	0	62	42	22	68	42	2
Stage 1	-	-	-	-	-	-	30	30	-	10	10	-
Stage 2	-	-	-	-	-	-	32	12	-	58	32	-
Critical Hdwy	4.6	-	-	4.1	-	-	6.3	5.73	5.8	8.21	7.59	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.73	-	7.21	6.59	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.73	-	7.21	6.59	-
Follow-up Hdwy	2.65	-	-	2.2	-	-	3.5	4.027	3.3	3.599	4.081	3.3
Pot Cap-1 Maneuver	1354	-	-	1604	-	-	951	856	1064	886	827	1088
Stage 1	-	-	-	-	-	-	999	874	-	985	871	-
Stage 2	-	-	-	-	-	-	997	886	-	917	847	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1354	-	-	1604	-	-	908	851	1064	838	822	1088
Mov Cap-2 Maneuver	-	-	-	-	-	-	908	851	-	838	822	-
Stage 1	-	-	-	-	-	-	996	871	-	982	868	-
Stage 2	-	-	-	-	-	-	948	883	-	859	844	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	3.6	9.5	9.4
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	905	1354	-	-	1604	-	-	884
HCM Lane V/C Ratio	0.114	0.003	-	-	0.002	-	-	0.068
HCM Control Delay (s)	9.5	7.7	0	-	7.2	0	-	9.4
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	2	14	16	5	7	9	8	7	4	13	3
Future Vol, veh/h	5	2	14	16	5	7	9	8	7	4	13	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-4	-	-	5	-
Peak Hour Factor	42	50	70	67	42	58	75	67	44	50	65	75
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	12	4	20	24	12	12	12	12	16	8	20	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	24	0	0	24	0	0	116	110	14	118	114	18
Stage 1	-	-	-	-	-	-	38	38	-	66	66	-
Stage 2	-	-	-	-	-	-	78	72	-	52	48	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.3	5.7	5.8	8.1	7.5	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.7	-	7.1	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.7	-	7.1	6.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1604	-	-	1604	-	-	888	803	1073	835	756	1064
Stage 1	-	-	-	-	-	-	991	875	-	932	829	-
Stage 2	-	-	-	-	-	-	952	852	-	952	847	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1604	-	-	1604	-	-	852	785	1073	799	739	1064
Mov Cap-2 Maneuver	-	-	-	-	-	-	852	785	-	799	739	-
Stage 1	-	-	-	-	-	-	983	868	-	925	817	-
Stage 2	-	-	-	-	-	-	911	839	-	918	840	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.4	3.6	9.2	9.8
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	903	1604	-	-	1604	-	-	784
HCM Lane V/C Ratio	0.044	0.007	-	-	0.015	-	-	0.041
HCM Control Delay (s)	9.2	7.3	0	-	7.3	0	-	9.8
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

PROJECTED CONDITIONS (WITHOUT THE PROJECT)

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	10	2	1	0	2	24	31	12	10	12	8
Future Vol, veh/h	2	10	2	1	0	2	24	31	12	10	12	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-4	-	-	5	-
Peak Hour Factor	50	45	50	25	90	50	48	73	69	56	39	50
Heavy Vehicles, %	50	0	0	0	0	0	0	3	0	11	9	0
Mvmt Flow	4	22	4	4	0	4	50	42	17	18	31	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	4	0	0	26	0	0	66	44	24	72	44	2
Stage 1	-	-	-	-	-	-	32	32	-	10	10	-
Stage 2	-	-	-	-	-	-	34	12	-	62	34	-
Critical Hdwy	4.6	-	-	4.1	-	-	6.3	5.73	5.8	8.21	7.59	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.73	-	7.21	6.59	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.73	-	7.21	6.59	-
Follow-up Hdwy	2.65	-	-	2.2	-	-	3.5	4.027	3.3	3.599	4.081	3.3
Pot Cap-1 Maneuver	1354	-	-	1601	-	-	946	854	1061	880	824	1088
Stage 1	-	-	-	-	-	-	997	873	-	985	871	-
Stage 2	-	-	-	-	-	-	995	886	-	911	845	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1354	-	-	1601	-	-	902	849	1061	829	819	1088
Mov Cap-2 Maneuver	-	-	-	-	-	-	902	849	-	829	819	-
Stage 1	-	-	-	-	-	-	994	870	-	982	868	-
Stage 2	-	-	-	-	-	-	943	883	-	850	842	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	3.6	9.5	9.4
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	902	1354	-	-	1601	-	-	876
HCM Lane V/C Ratio	0.122	0.003	-	-	0.002	-	-	0.074
HCM Control Delay (s)	9.5	7.7	0	-	7.3	0	-	9.4
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	2	15	17	5	7	10	8	7	4	14	3
Future Vol, veh/h	5	2	15	17	5	7	10	8	7	4	14	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-4	-	-	5	-
Peak Hour Factor	42	50	70	67	42	58	75	67	44	50	65	75
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	12	4	21	25	12	12	13	12	16	8	22	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	24	0	0	25	0	0	120	113	15	121	117	18
Stage 1	-	-	-	-	-	-	39	39	-	68	68	-
Stage 2	-	-	-	-	-	-	81	74	-	53	49	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.3	5.7	5.8	8.1	7.5	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.7	-	7.1	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.7	-	7.1	6.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1604	-	-	1603	-	-	883	801	1072	830	752	1064
Stage 1	-	-	-	-	-	-	990	874	-	930	826	-
Stage 2	-	-	-	-	-	-	949	851	-	951	846	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1604	-	-	1603	-	-	844	782	1072	793	734	1064
Mov Cap-2 Maneuver	-	-	-	-	-	-	844	782	-	793	734	-
Stage 1	-	-	-	-	-	-	982	867	-	923	813	-
Stage 2	-	-	-	-	-	-	906	837	-	917	839	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.3	3.7	9.2	9.8
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	897	1604	-	-	1603	-	-	777
HCM Lane V/C Ratio	0.046	0.007	-	-	0.016	-	-	0.043
HCM Control Delay (s)	9.2	7.3	0	-	7.3	0	-	9.8
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	10	2	1	0	2	25	32	12	10	12	9
Future Vol, veh/h	2	10	2	1	0	2	25	32	12	10	12	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-4	-	-	5	-
Peak Hour Factor	50	45	50	25	90	50	48	73	69	56	39	50
Heavy Vehicles, %	50	0	0	0	0	0	0	3	0	11	9	0
Mvmt Flow	4	22	4	4	0	4	52	44	17	18	31	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	4	0	0	26	0	0	67	44	24	73	44	2
Stage 1	-	-	-	-	-	-	32	32	-	10	10	-
Stage 2	-	-	-	-	-	-	35	12	-	63	34	-
Critical Hdwy	4.6	-	-	4.1	-	-	6.3	5.73	5.8	8.21	7.59	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.73	-	7.21	6.59	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.73	-	7.21	6.59	-
Follow-up Hdwy	2.65	-	-	2.2	-	-	3.5	4.027	3.3	3.599	4.081	3.3
Pot Cap-1 Maneuver	1354	-	-	1601	-	-	945	854	1061	878	824	1088
Stage 1	-	-	-	-	-	-	997	873	-	985	871	-
Stage 2	-	-	-	-	-	-	994	886	-	910	845	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1354	-	-	1601	-	-	899	849	1061	826	819	1088
Mov Cap-2 Maneuver	-	-	-	-	-	-	899	849	-	826	819	-
Stage 1	-	-	-	-	-	-	994	870	-	982	868	-
Stage 2	-	-	-	-	-	-	940	883	-	847	842	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	3.6	9.6	9.4
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	900	1354	-	-	1601	-	-	880
HCM Lane V/C Ratio	0.126	0.003	-	-	0.002	-	-	0.076
HCM Control Delay (s)	9.6	7.7	0	-	7.3	0	-	9.4
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	6	2	15	18	6	8	10	9	8	4	14	3
Future Vol, veh/h	6	2	15	18	6	8	10	9	8	4	14	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-4	-	-	5	-
Peak Hour Factor	42	50	70	67	42	58	75	67	44	50	65	75
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	14	4	21	27	14	14	13	13	18	8	22	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	28	0	0	25	0	0	131	125	15	133	128	21
Stage 1	-	-	-	-	-	-	43	43	-	75	75	-
Stage 2	-	-	-	-	-	-	88	82	-	58	53	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.3	5.7	5.8	8.1	7.5	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.7	-	7.1	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.7	-	7.1	6.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1599	-	-	1603	-	-	871	791	1072	813	740	1059
Stage 1	-	-	-	-	-	-	986	871	-	920	819	-
Stage 2	-	-	-	-	-	-	943	846	-	944	842	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1599	-	-	1603	-	-	831	770	1072	773	721	1059
Mov Cap-2 Maneuver	-	-	-	-	-	-	831	770	-	773	721	-
Stage 1	-	-	-	-	-	-	977	863	-	912	805	-
Stage 2	-	-	-	-	-	-	899	832	-	905	834	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.6	3.6	9.3	9.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	891	1599	-	-	1603	-	-	762
HCM Lane V/C Ratio	0.05	0.009	-	-	0.017	-	-	0.044
HCM Control Delay (s)	9.3	7.3	0	-	7.3	0	-	9.9
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	10	2	1	0	2	26	32	12	10	12	9
Future Vol, veh/h	2	10	2	1	0	2	26	32	12	10	12	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-4	-	-	5	-
Peak Hour Factor	50	45	50	25	90	50	48	73	69	56	39	50
Heavy Vehicles, %	50	0	0	0	0	0	0	3	0	11	9	0
Mvmt Flow	4	22	4	4	0	4	54	44	17	18	31	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	4	0	0	26	0	0	67	44	24	73	44	2
Stage 1	-	-	-	-	-	-	32	32	-	10	10	-
Stage 2	-	-	-	-	-	-	35	12	-	63	34	-
Critical Hdwy	4.6	-	-	4.1	-	-	6.3	5.73	5.8	8.21	7.59	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.73	-	7.21	6.59	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.73	-	7.21	6.59	-
Follow-up Hdwy	2.65	-	-	2.2	-	-	3.5	4.027	3.3	3.599	4.081	3.3
Pot Cap-1 Maneuver	1354	-	-	1601	-	-	945	854	1061	878	824	1088
Stage 1	-	-	-	-	-	-	997	873	-	985	871	-
Stage 2	-	-	-	-	-	-	994	886	-	910	845	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1354	-	-	1601	-	-	899	849	1061	826	819	1088
Mov Cap-2 Maneuver	-	-	-	-	-	-	899	849	-	826	819	-
Stage 1	-	-	-	-	-	-	994	870	-	982	868	-
Stage 2	-	-	-	-	-	-	940	883	-	847	842	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	3.6	9.6	9.4
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	900	1354	-	-	1601	-	-	880
HCM Lane V/C Ratio	0.128	0.003	-	-	0.002	-	-	0.076
HCM Control Delay (s)	9.6	7.7	0	-	7.3	0	-	9.4
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	6	2	16	18	6	8	10	9	8	4	15	3
Future Vol, veh/h	6	2	16	18	6	8	10	9	8	4	15	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-4	-	-	5	-
Peak Hour Factor	42	50	70	67	42	58	75	67	44	50	65	75
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	14	4	23	27	14	14	13	13	18	8	23	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	28	0	0	27	0	0	133	126	16	134	130	21
Stage 1	-	-	-	-	-	-	44	44	-	75	75	-
Stage 2	-	-	-	-	-	-	89	82	-	59	55	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.3	5.7	5.8	8.1	7.5	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.7	-	7.1	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.7	-	7.1	6.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1599	-	-	1600	-	-	869	790	1071	811	737	1059
Stage 1	-	-	-	-	-	-	985	871	-	920	819	-
Stage 2	-	-	-	-	-	-	942	846	-	942	840	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1599	-	-	1600	-	-	828	769	1071	771	718	1059
Mov Cap-2 Maneuver	-	-	-	-	-	-	828	769	-	771	718	-
Stage 1	-	-	-	-	-	-	976	863	-	912	805	-
Stage 2	-	-	-	-	-	-	896	832	-	903	832	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.5	3.6	9.3	10
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	889	1599	-	-	1600	-	-	758
HCM Lane V/C Ratio	0.051	0.009	-	-	0.017	-	-	0.046
HCM Control Delay (s)	9.3	7.3	0	-	7.3	0	-	10
HCM Lane LOS	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.1

PROJECTED CONDITIONS (WITH THE PROJECT)

Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	13	2	1	9	22	24	31	12	17	12	8
Future Vol, veh/h	2	13	2	1	9	22	24	31	12	17	12	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-4	-	-	5	-
Peak Hour Factor	50	45	50	25	90	50	48	73	69	56	39	50
Heavy Vehicles, %	50	0	0	0	0	0	0	3	0	11	9	0
Mvmt Flow	4	29	4	4	10	44	50	42	17	30	31	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	54	0	0	33	0	0	103	101	31	109	81	32
Stage 1	-	-	-	-	-	-	39	39	-	40	40	-
Stage 2	-	-	-	-	-	-	64	62	-	69	41	-
Critical Hdwy	4.6	-	-	4.1	-	-	6.3	5.73	5.8	8.21	7.59	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.73	-	7.21	6.59	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.73	-	7.21	6.59	-
Follow-up Hdwy	2.65	-	-	2.2	-	-	3.5	4.027	3.3	3.599	4.081	3.3
Pot Cap-1 Maneuver	1293	-	-	1592	-	-	903	805	1053	823	778	1043
Stage 1	-	-	-	-	-	-	990	868	-	942	839	-
Stage 2	-	-	-	-	-	-	966	853	-	902	838	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1293	-	-	1592	-	-	858	800	1053	773	773	1043
Mov Cap-2 Maneuver	-	-	-	-	-	-	858	800	-	773	773	-
Stage 1	-	-	-	-	-	-	987	865	-	939	836	-
Stage 2	-	-	-	-	-	-	913	850	-	841	835	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.5	9.8	9.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	859	1293	-	-	1592	-	-	817
HCM Lane V/C Ratio	0.128	0.003	-	-	0.003	-	-	0.094
HCM Control Delay (s)	9.8	7.8	0	-	7.3	0	-	9.9
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	4.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	32	10	5	3	29	13
Future Vol, veh/h	32	10	5	3	29	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	3	-5	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	36	11	6	3	32	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	47	0	57	42
Stage 1	-	-	-	-	42	-
Stage 2	-	-	-	-	15	-
Critical Hdwy	-	-	4.1	-	5.4	5.7
Critical Hdwy Stg 1	-	-	-	-	4.4	-
Critical Hdwy Stg 2	-	-	-	-	4.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1573	-	971	1040
Stage 1	-	-	-	-	997	-
Stage 2	-	-	-	-	1017	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1573	-	967	1040
Mov Cap-2 Maneuver	-	-	-	-	967	-
Stage 1	-	-	-	-	997	-
Stage 2	-	-	-	-	1013	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.6	8.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	988	-	-	1573	-
HCM Lane V/C Ratio	0.047	-	-	0.004	-
HCM Control Delay (s)	8.8	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	12	15	17	11	21	10	8	7	27	14	3
Future Vol, veh/h	5	12	15	17	11	21	10	8	7	27	14	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-4	-	-	5	-
Peak Hour Factor	42	50	70	67	42	58	75	67	44	50	65	75
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	12	24	21	25	26	36	13	12	16	54	22	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	62	0	0	45	0	0	166	171	35	167	163	44
Stage 1	-	-	-	-	-	-	59	59	-	94	94	-
Stage 2	-	-	-	-	-	-	107	112	-	73	69	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.3	5.7	5.8	8.1	7.5	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.7	-	7.1	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.7	-	7.1	6.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1554	-	-	1576	-	-	833	754	1048	765	701	1026
Stage 1	-	-	-	-	-	-	970	861	-	894	800	-
Stage 2	-	-	-	-	-	-	925	827	-	923	825	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1554	-	-	1576	-	-	795	735	1048	730	683	1026
Mov Cap-2 Maneuver	-	-	-	-	-	-	795	735	-	730	683	-
Stage 1	-	-	-	-	-	-	962	854	-	887	786	-
Stage 2	-	-	-	-	-	-	881	813	-	889	818	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.5	2.1	9.4	10.6
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	854	1554	-	-	1576	-	-	727
HCM Lane V/C Ratio	0.048	0.008	-	-	0.016	-	-	0.109
HCM Control Delay (s)	9.4	7.3	0	-	7.3	0	-	10.6
HCM Lane LOS	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.4

Intersection	
Int Delay, s/veh	3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	13	33	14	29	20	8
Future Vol, veh/h	13	33	14	29	20	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	3	-5	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	14	37	16	32	22	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	51	0	97	33
Stage 1	-	-	-	-	33	-
Stage 2	-	-	-	-	64	-
Critical Hdwy	-	-	4.1	-	5.4	5.7
Critical Hdwy Stg 1	-	-	-	-	4.4	-
Critical Hdwy Stg 2	-	-	-	-	4.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1568	-	932	1051
Stage 1	-	-	-	-	1004	-
Stage 2	-	-	-	-	981	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1568	-	923	1051
Mov Cap-2 Maneuver	-	-	-	-	923	-
Stage 1	-	-	-	-	1004	-
Stage 2	-	-	-	-	971	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.4	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	956	-	-	1568	-
HCM Lane V/C Ratio	0.033	-	-	0.01	-
HCM Control Delay (s)	8.9	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	7.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	13	7	1	9	22	40	52	12	17	19	9
Future Vol, veh/h	2	13	7	1	9	22	40	52	12	17	19	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-4	-	-	5	-
Peak Hour Factor	50	45	50	25	90	50	48	73	69	56	39	50
Heavy Vehicles, %	50	0	0	0	0	0	0	3	0	11	9	0
Mvmt Flow	4	29	14	4	10	44	83	71	17	30	49	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	54	0	0	43	0	0	118	106	36	128	91	32
Stage 1	-	-	-	-	-	-	44	44	-	40	40	-
Stage 2	-	-	-	-	-	-	74	62	-	88	51	-
Critical Hdwy	4.6	-	-	4.1	-	-	6.3	5.73	5.8	8.21	7.59	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.73	-	7.21	6.59	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.73	-	7.21	6.59	-
Follow-up Hdwy	2.65	-	-	2.2	-	-	3.5	4.027	3.3	3.599	4.081	3.3
Pot Cap-1 Maneuver	1293	-	-	1579	-	-	886	801	1047	796	766	1043
Stage 1	-	-	-	-	-	-	985	865	-	942	839	-
Stage 2	-	-	-	-	-	-	956	853	-	876	827	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1293	-	-	1579	-	-	824	796	1047	726	761	1043
Mov Cap-2 Maneuver	-	-	-	-	-	-	824	796	-	726	761	-
Stage 1	-	-	-	-	-	-	982	862	-	939	836	-
Stage 2	-	-	-	-	-	-	882	850	-	788	825	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.5	10.5	10.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	830	1293	-	-	1579	-	-	789
HCM Lane V/C Ratio	0.207	0.003	-	-	0.003	-	-	0.123
HCM Control Delay (s)	10.5	7.8	0	-	7.3	0	-	10.2
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.8	0	-	-	0	-	-	0.4

Intersection	
Int Delay, s/veh	5.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	32	10	10	3	29	28
Future Vol, veh/h	32	10	10	3	29	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	3	-5	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	36	11	11	3	32	31

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	47	0	67	42
Stage 1	-	-	-	-	42	-
Stage 2	-	-	-	-	25	-
Critical Hdwy	-	-	4.1	-	5.4	5.7
Critical Hdwy Stg 1	-	-	-	-	4.4	-
Critical Hdwy Stg 2	-	-	-	-	4.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1573	-	961	1040
Stage 1	-	-	-	-	997	-
Stage 2	-	-	-	-	1010	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1573	-	954	1040
Mov Cap-2 Maneuver	-	-	-	-	954	-
Stage 1	-	-	-	-	997	-
Stage 2	-	-	-	-	1003	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.6	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	994	-	-	1573	-
HCM Lane V/C Ratio	0.064	-	-	0.007	-
HCM Control Delay (s)	8.9	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	6	12	32	18	12	22	20	22	8	27	36	3
Future Vol, veh/h	6	12	32	18	12	22	20	22	8	27	36	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-4	-	-	5	-
Peak Hour Factor	42	50	70	67	42	58	75	67	44	50	65	75
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	14	24	46	27	29	38	27	33	18	54	55	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	67	0	0	70	0	0	207	196	47	203	200	48
Stage 1	-	-	-	-	-	-	75	75	-	102	102	-
Stage 2	-	-	-	-	-	-	132	121	-	101	98	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.3	5.7	5.8	8.1	7.5	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.7	-	7.1	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.7	-	7.1	6.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1547	-	-	1544	-	-	790	734	1033	718	662	1020
Stage 1	-	-	-	-	-	-	955	851	-	884	792	-
Stage 2	-	-	-	-	-	-	902	821	-	885	796	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1547	-	-	1544	-	-	720	714	1033	667	644	1020
Mov Cap-2 Maneuver	-	-	-	-	-	-	720	714	-	667	644	-
Stage 1	-	-	-	-	-	-	946	843	-	876	778	-
Stage 2	-	-	-	-	-	-	819	806	-	828	789	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	2.1	10.2	11.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	772	1547	-	-	1544	-	-	664
HCM Lane V/C Ratio	0.101	0.009	-	-	0.017	-	-	0.171
HCM Control Delay (s)	10.2	7.3	0	-	7.4	0	-	11.5
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.6

Intersection	
Int Delay, s/veh	3.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	14	33	31	32	20	18
Future Vol, veh/h	14	33	31	32	20	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	3	-5	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	16	37	34	36	22	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	53	0	139	35
Stage 1	-	-	-	-	35	-
Stage 2	-	-	-	-	104	-
Critical Hdwy	-	-	4.1	-	5.4	5.7
Critical Hdwy Stg 1	-	-	-	-	4.4	-
Critical Hdwy Stg 2	-	-	-	-	4.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1566	-	893	1049
Stage 1	-	-	-	-	1002	-
Stage 2	-	-	-	-	952	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1566	-	873	1049
Mov Cap-2 Maneuver	-	-	-	-	873	-
Stage 1	-	-	-	-	1002	-
Stage 2	-	-	-	-	931	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.6	9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	948	-	-	1566	-
HCM Lane V/C Ratio	0.045	-	-	0.022	-
HCM Control Delay (s)	9	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	7.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	16	7	1	16	32	41	52	12	20	19	9
Future Vol, veh/h	2	16	7	1	16	32	41	52	12	20	19	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-4	-	-	5	-
Peak Hour Factor	50	45	50	25	90	50	48	73	69	56	39	50
Heavy Vehicles, %	50	0	0	0	0	0	0	3	0	11	9	0
Mvmt Flow	4	36	14	4	18	64	85	71	17	36	49	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	82	0	0	50	0	0	143	141	43	153	116	50
Stage 1	-	-	-	-	-	-	51	51	-	58	58	-
Stage 2	-	-	-	-	-	-	92	90	-	95	58	-
Critical Hdwy	4.6	-	-	4.1	-	-	6.3	5.73	5.8	8.21	7.59	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.73	-	7.21	6.59	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.73	-	7.21	6.59	-
Follow-up Hdwy	2.65	-	-	2.2	-	-	3.5	4.027	3.3	3.599	4.081	3.3
Pot Cap-1 Maneuver	1261	-	-	1570	-	-	858	772	1038	761	737	1017
Stage 1	-	-	-	-	-	-	978	860	-	917	820	-
Stage 2	-	-	-	-	-	-	939	835	-	867	820	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1261	-	-	1570	-	-	796	767	1038	692	733	1017
Mov Cap-2 Maneuver	-	-	-	-	-	-	796	767	-	692	733	-
Stage 1	-	-	-	-	-	-	975	857	-	914	818	-
Stage 2	-	-	-	-	-	-	865	832	-	779	818	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.3	10.7	10.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	802	1261	-	-	1570	-	-	754
HCM Lane V/C Ratio	0.217	0.003	-	-	0.003	-	-	0.136
HCM Control Delay (s)	10.7	7.9	0	-	7.3	0	-	10.5
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.8	0	-	-	0	-	-	0.5

Intersection	
Int Delay, s/veh	4.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	38	10	10	20	29	28
Future Vol, veh/h	38	10	10	20	29	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	3	-5	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	42	11	11	22	32	31

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	53	0	92	48
Stage 1	-	-	-	-	48	-
Stage 2	-	-	-	-	44	-
Critical Hdwy	-	-	4.1	-	5.4	5.7
Critical Hdwy Stg 1	-	-	-	-	4.4	-
Critical Hdwy Stg 2	-	-	-	-	4.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1566	-	937	1033
Stage 1	-	-	-	-	993	-
Stage 2	-	-	-	-	996	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1566	-	930	1033
Mov Cap-2 Maneuver	-	-	-	-	930	-
Stage 1	-	-	-	-	993	-
Stage 2	-	-	-	-	989	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.4	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	978	-	-	1566	-
HCM Lane V/C Ratio	0.065	-	-	0.007	-
HCM Control Delay (s)	8.9	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	60	6	2	13	17	7
Future Vol, veh/h	60	6	2	13	17	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	3	-	-	7	-5	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	67	7	2	14	19	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	74	0	89	71
Stage 1	-	-	-	-	71	-
Stage 2	-	-	-	-	18	-
Critical Hdwy	-	-	4.1	-	5.4	5.7
Critical Hdwy Stg 1	-	-	-	-	4.4	-
Critical Hdwy Stg 2	-	-	-	-	4.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1538	-	940	1007
Stage 1	-	-	-	-	976	-
Stage 2	-	-	-	-	1015	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1538	-	939	1007
Mov Cap-2 Maneuver	-	-	-	-	939	-
Stage 1	-	-	-	-	976	-
Stage 2	-	-	-	-	1014	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	958	-	-	1538	-
HCM Lane V/C Ratio	0.028	-	-	0.001	-
HCM Control Delay (s)	8.9	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	6	20	33	18	17	28	20	22	8	37	37	3
Future Vol, veh/h	6	20	33	18	17	28	20	22	8	37	37	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-4	-	-	5	-
Peak Hour Factor	42	50	70	67	42	58	75	67	44	50	65	75
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	14	40	47	27	40	48	27	33	18	74	57	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	88	0	0	87	0	0	241	234	64	235	233	64
Stage 1	-	-	-	-	-	-	92	92	-	118	118	-
Stage 2	-	-	-	-	-	-	149	142	-	117	115	-
Critical Hdwy	4.1	-	-	4.1	-	-	6.3	5.7	5.8	8.1	7.5	6.7
Critical Hdwy Stg 1	-	-	-	-	-	-	5.3	4.7	-	7.1	6.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.3	4.7	-	7.1	6.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1520	-	-	1522	-	-	757	706	1013	678	629	997
Stage 1	-	-	-	-	-	-	939	840	-	863	776	-
Stage 2	-	-	-	-	-	-	887	808	-	864	779	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1520	-	-	1522	-	-	685	686	1013	628	611	997
Mov Cap-2 Maneuver	-	-	-	-	-	-	685	686	-	628	611	-
Stage 1	-	-	-	-	-	-	930	832	-	854	761	-
Stage 2	-	-	-	-	-	-	802	793	-	807	771	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	1.7	10.4	12.3
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	742	1520	-	-	1522	-	-	628
HCM Lane V/C Ratio	0.105	0.009	-	-	0.018	-	-	0.215
HCM Control Delay (s)	10.4	7.4	0	-	7.4	0	-	12.3
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.8

Intersection	
Int Delay, s/veh	3.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	32	33	31	43	20	18
Future Vol, veh/h	32	33	31	43	20	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-6	-	-	3	-5	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	36	37	34	48	22	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	73	0	171	55
Stage 1	-	-	-	-	55	-
Stage 2	-	-	-	-	116	-
Critical Hdwy	-	-	4.1	-	5.4	5.7
Critical Hdwy Stg 1	-	-	-	-	4.4	-
Critical Hdwy Stg 2	-	-	-	-	4.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1540	-	864	1025
Stage 1	-	-	-	-	988	-
Stage 2	-	-	-	-	944	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1540	-	844	1025
Mov Cap-2 Maneuver	-	-	-	-	844	-
Stage 1	-	-	-	-	988	-
Stage 2	-	-	-	-	922	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.1	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	921	-	-	1540	-
HCM Lane V/C Ratio	0.046	-	-	0.022	-
HCM Control Delay (s)	9.1	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	32	18	8	63	11	4
Future Vol, veh/h	32	18	8	63	11	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	3	-	-	7	-5	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	36	20	9	70	12	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	56	0	134	46
Stage 1	-	-	-	-	46	-
Stage 2	-	-	-	-	88	-
Critical Hdwy	-	-	4.1	-	5.4	5.7
Critical Hdwy Stg 1	-	-	-	-	4.4	-
Critical Hdwy Stg 2	-	-	-	-	4.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1562	-	897	1036
Stage 1	-	-	-	-	994	-
Stage 2	-	-	-	-	964	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1562	-	892	1036
Mov Cap-2 Maneuver	-	-	-	-	892	-
Stage 1	-	-	-	-	994	-
Stage 2	-	-	-	-	958	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	926	-	-	1562	-
HCM Lane V/C Ratio	0.018	-	-	0.006	-
HCM Control Delay (s)	9	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

APPENDIX G

ITE TRIP GENERATION RATES

Land Use: 210
Single-Family Detached Housing

Description

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

Specialized Land Use

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

Additional Data

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

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

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

Source Numbers

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

Single-Family Detached Housing
(210)

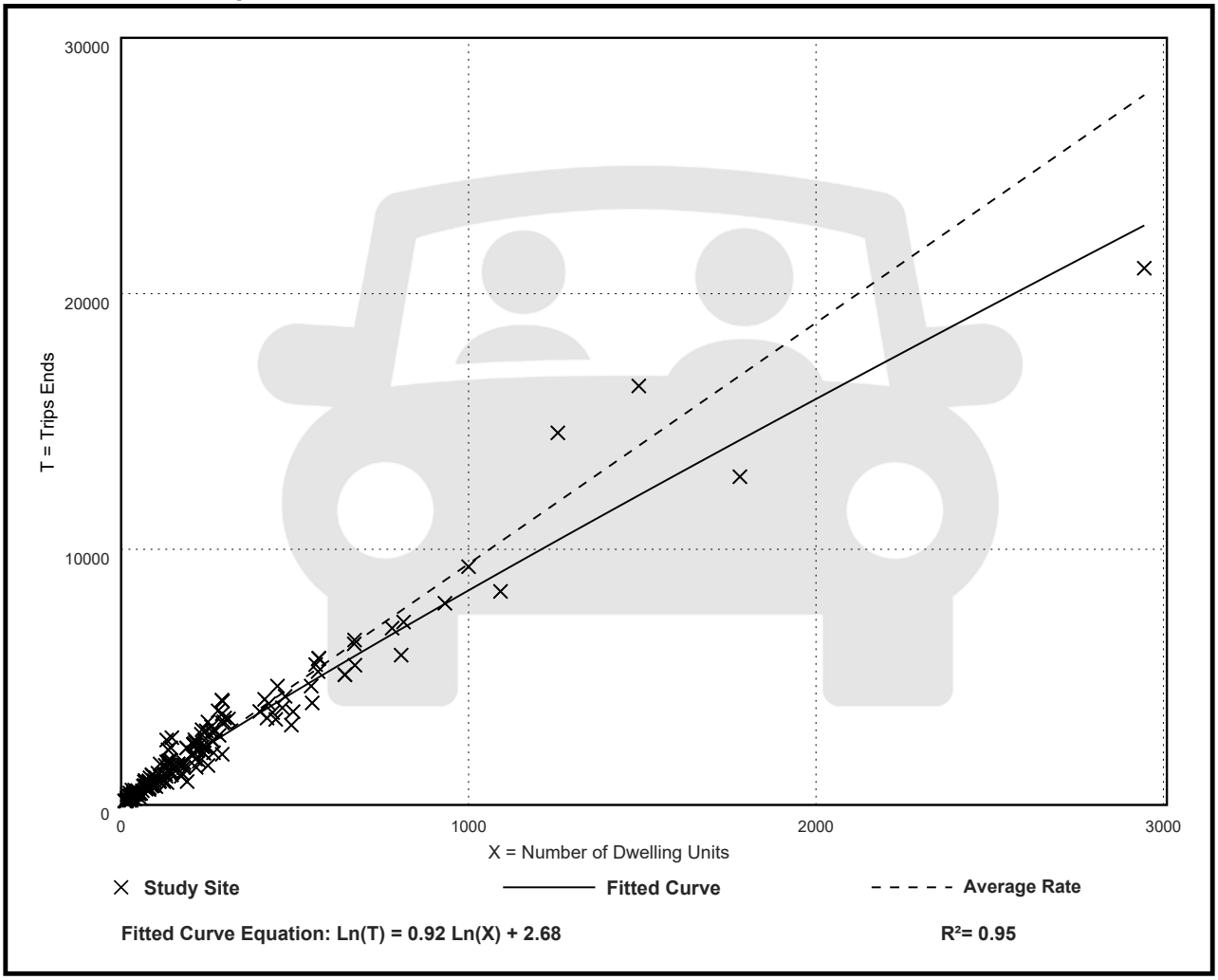
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 174
Avg. Num. of Dwelling Units: 246
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.68

R^2= 0.95

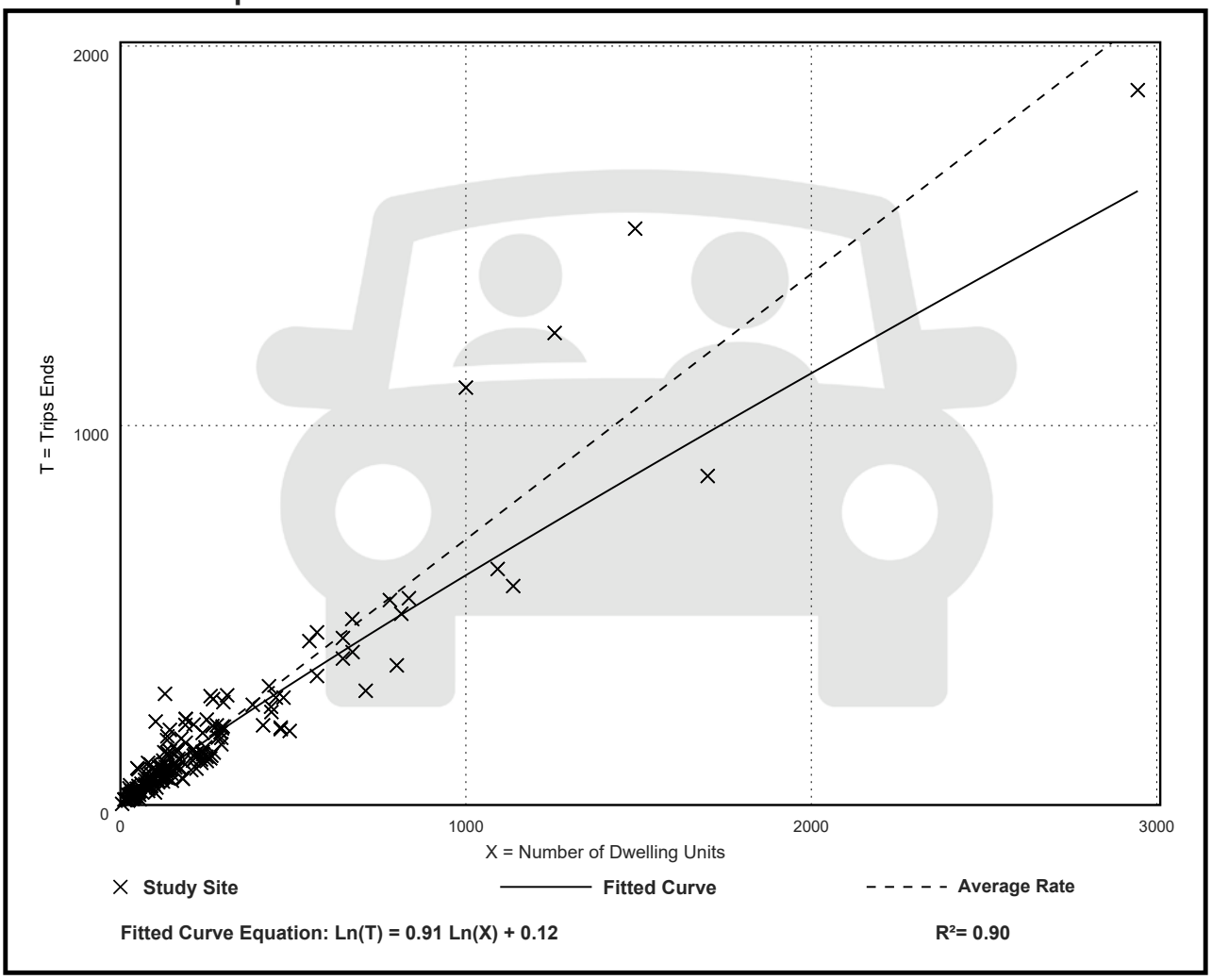
Single-Family Detached Housing
(210)

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



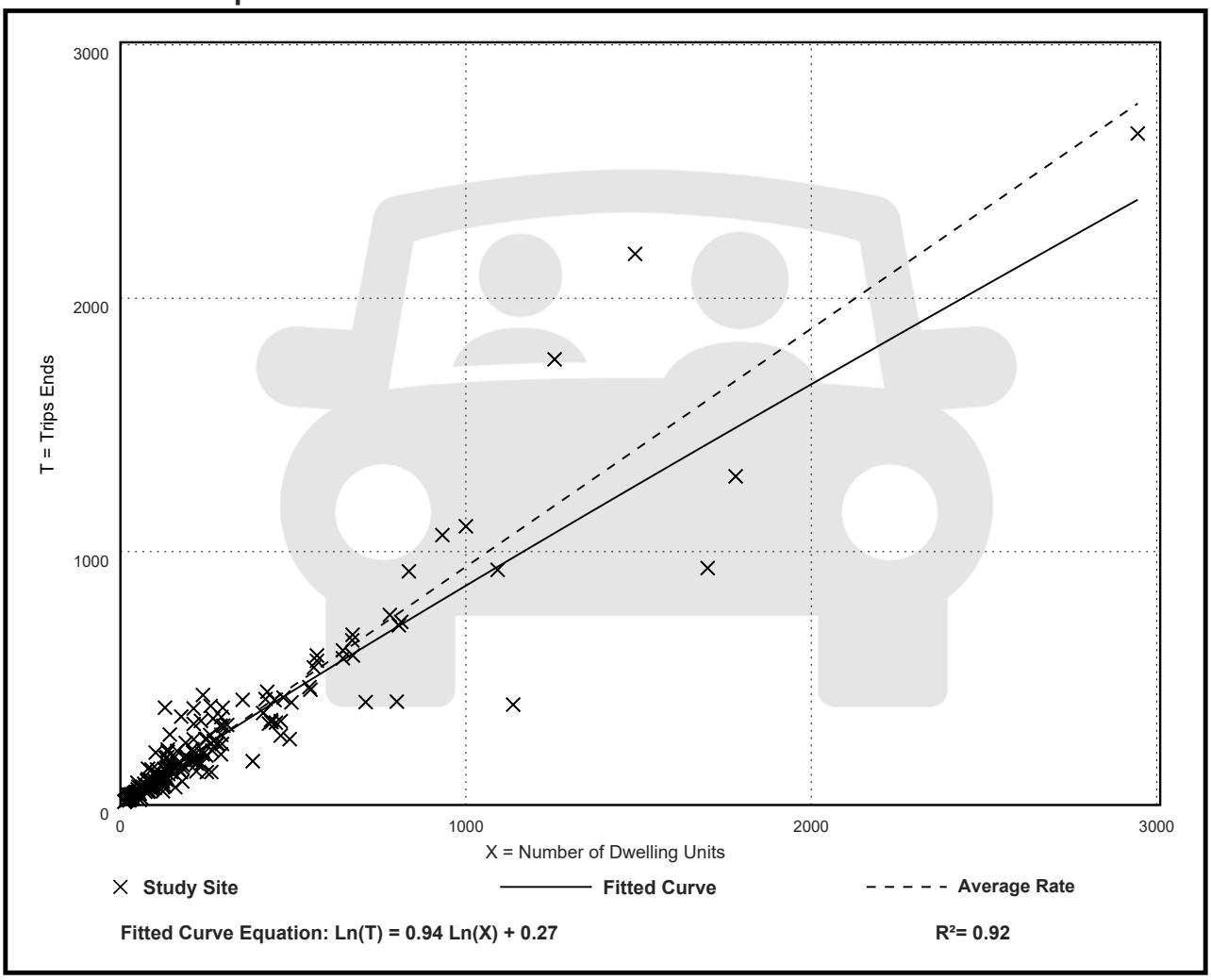
Single-Family Detached Housing
(210)

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 CARTER RIDGE PHASES IV - VIII

202 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	Phase IV & V 74 Houses	765	26%	74%		63%	37%	
				15	42	57	47	28	75
#210	Single-Family Detached Housing	Phase VI & VII 89 Houses	907	26%	74%		63%	37%	
				17	50	67	56	33	89
#210	Single-Family Detached Housing	Phase VIII 39 Houses	425	26%	74%		63%	37%	
				8	24	32	26	15	41
Total New Volume Site Trips		**202 Houses**	**2,097**	**40**	**116**	**156**	**129**	**76**	**205**

ITE Trip Generation Manual, 11th Edition

Trips calculated by using Fitted Curve Equation

TRIP GENERATION FOR CARTER RIDGE PHASES IV & V

74 Single-Family Detached Houses

74 Residential Houses = X

Weekday:

Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.68

Ln(T) =	0.92	*	4.30	+	2.68
Ln(T) =	6.64				
T =	**765 trips**				

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: Ln(T) = 0.91 Ln(X) + 0.12

T =	0.91	*	4	+	0.12
Ln(T) =	4.04				
T =	**57 trips**				

Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: Ln(T) = 0.94 Ln(X) + 0.27

Ln(T) =	0.94	*	4.30	+	0.27
Ln(T) =	4.32				
T =	**75 trips**				

TRIP GENERATION FOR CARTER RIDGE PHASES VI & VII

89 Single-Family Detached Houses

89 Residential Houses = X

Weekday:

Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.68

Ln(T) =	0.92	*	4.49	+	2.68
Ln(T) =	6.81				
T =	**907 trips**				

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: Ln(T) = 0.91 Ln(X) + 0.12

T =	0.91	*	4	+	0.12
Ln(T) =	4.20				
T =	**67 trips**				

Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: Ln(T) = 0.94 Ln(X) + 0.27

Ln(T) =	0.94	*	4.49	+	0.27
Ln(T) =	4.49				
T =	**89 trips**				

TRIP GENERATION FOR CARTER RIDGE PHASES VIII

39 Single-Family Detached Houses

39 Residential Houses = X

Weekday:

Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.68

Ln(T) =	0.92	*	3.66	+	2.68
Ln(T) =	6.05				
T =	**425 trips**				

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: Ln(T) = 0.91 Ln(X) + 0.12

T =	0.91	*	4	+	0.12
Ln(T) =	3.45				
T =	**32 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	*	3.66	+	0.27
Ln(T) =	3.71				
T =	**41 trips**				

APPENDIX H

2019 CENSUS BUREAU DATA

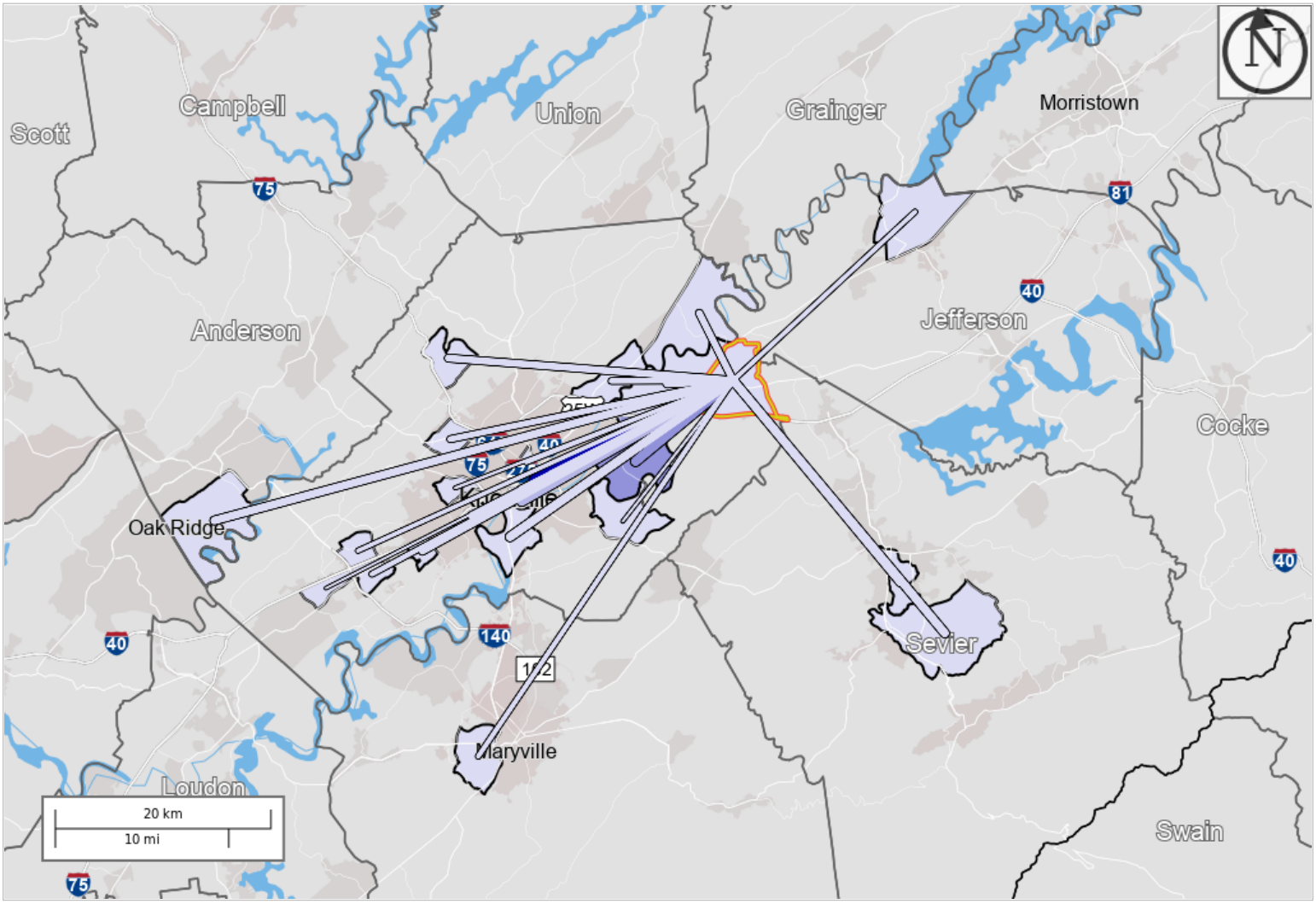
Work Destination Report - Home Selection Area to Work Census Tracts

All Jobs for All Workers in 2019

Created by the U.S. Census Bureau's OnTheMap https://onthemap.ces.census.gov on 11/11/2022

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

All Workers



Map Legend

Job Count
- 169 - 193
- 144 - 168
- 119 - 143
- 94 - 118
- 69 - 93
- 44 - 68
- 18 - 43

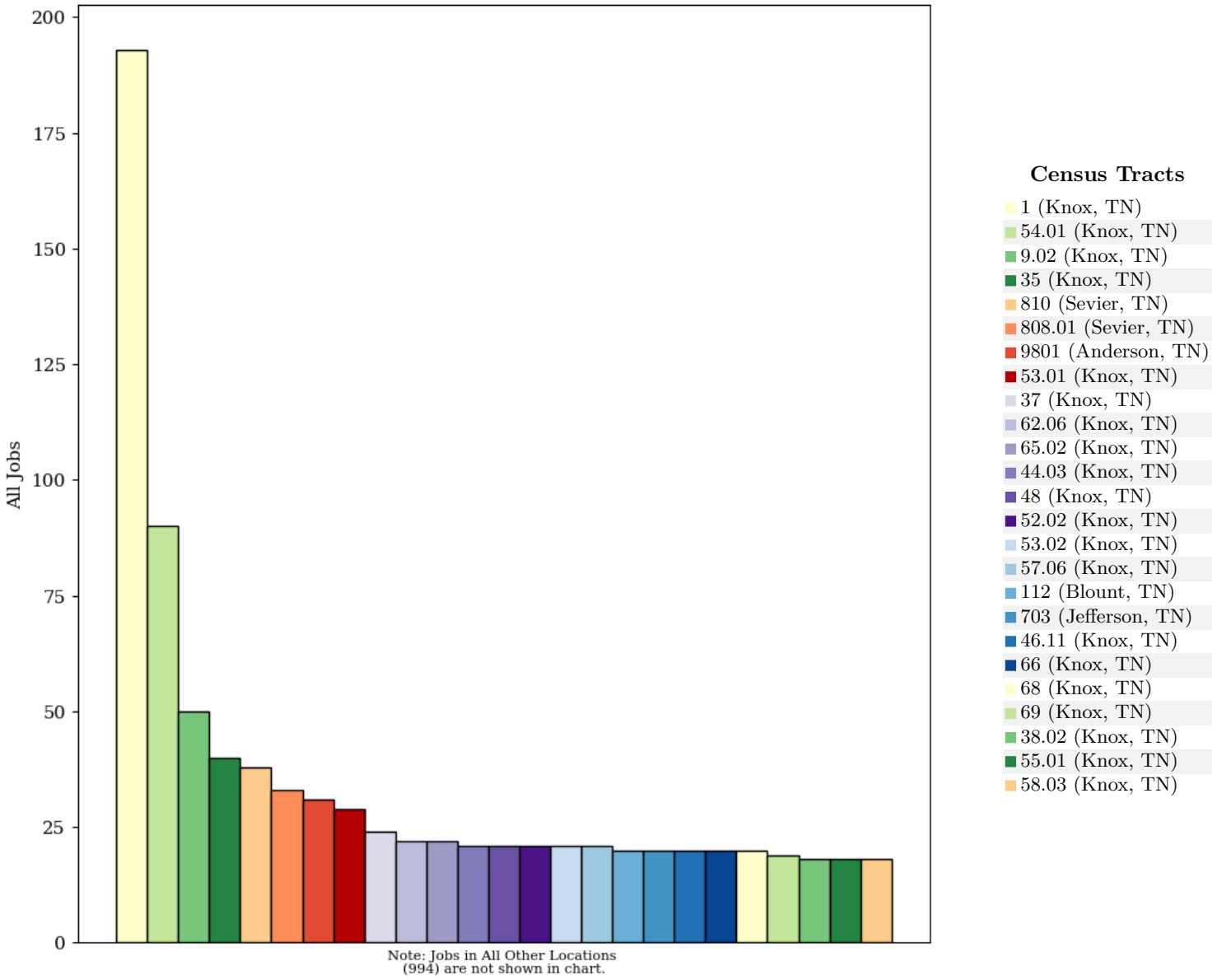
Selection Areas
- Analysis Selection

Job Count
- 169 - 193
- 144 - 168
- 119 - 143
- 94 - 118
- 69 - 93
- 44 - 68
- 18 - 43

United States Census Bureau

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

All Workers



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

All Workers

Census Tracts as Work Destination Area	2019 Count	2019 Share
All Census Tracts	1,844	100.0
1 (Knox, TN)	193	10.5
54.01 (Knox, TN)	90	4.9
9.02 (Knox, TN)	50	2.7
35 (Knox, TN)	40	2.2
810 (Sevier, TN)	38	2.1
808.01 (Sevier, TN)	33	1.8
9801 (Anderson, TN)	31	1.7
53.01 (Knox, TN)	29	1.6
37 (Knox, TN)	24	1.3
62.06 (Knox, TN)	22	1.2

Census Tracts as Work Destination Area	2019 Count	Share
65.02 (Knox, TN)	22	1.2
44.03 (Knox, TN)	21	1.1
48 (Knox, TN)	21	1.1
52.02 (Knox, TN)	21	1.1
53.02 (Knox, TN)	21	1.1
57.06 (Knox, TN)	21	1.1
112 (Blount, TN)	20	1.1
703 (Jefferson, TN)	20	1.1
46.11 (Knox, TN)	20	1.1
66 (Knox, TN)	20	1.1
68 (Knox, TN)	20	1.1
69 (Knox, TN)	19	1.0
38.02 (Knox, TN)	18	1.0
55.01 (Knox, TN)	18	1.0
58.03 (Knox, TN)	18	1.0
All Other Locations	994	53.9

Additional Information

Analysis Settings

Analysis Type	Destination
Destination Type	Census Tracts
Selection area as	Home
Year(s)	2019
Job Type	All Jobs
Selection Area	53.02 (Knox, TN) from Census Tracts
Selected Census Blocks	126
Analysis Generation Date	11/11/2022 17:59 - OnTheMap 6.8.1
Code Revision	f9358819d46a60bb89052036516a1c8fe8bbbeac
LODES Data Version	20211018_1647

Data Sources

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

Notes

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

APPENDIX I

KNOX COUNTY TURN LANE VOLUME THRESHOLD WORKSHEETS

TABLE 4A

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

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

16 + 32 = 48

48

2 + 16 + 7 =26

25

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

Carter Mill Drive at
Carter Ridge Drive /
Carter View Lane

2028 Projected AM
WB Left Turns = 1

WB Left-Turn Lane NOT
Warranted

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

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

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

2 + 16 = 18

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

Carter Mill Drive at Carter Ridge Drive / Carter View Lane

2028 Projected AM EB Right Turns = 7

EB 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
100 - 149 150 - 199			 Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	 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 4A

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

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

17 + 28 = 45

45

6 + 20 + 33 = 59

59

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

Carter Mill Drive at
Carter Ridge Drive /
Carter View Lane

2028 Projected PM
WB Left Turns = 18

WB Left-Turn Lane NOT
Warranted

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

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

TABLE 4B

RIGHT-TURN LANE VOLUME THRESHOLDS

FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

6 + 20 = 26

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25						
33 25 - 49						
50 - 99						
100 - 149						
150 - 199						
200 - 249						
250 - 299						Yes
300 - 349					Yes	Yes
350 - 399				Yes	Yes	Yes
400 - 449				Yes	Yes	Yes
450 - 499			Yes	Yes	Yes	Yes
500 - 549		Yes	Yes	Yes	Yes	Yes
550 - 599		Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

Carter Mill Drive at Carter Ridge Drive / Carter View Lane

2028 Projected PM EB Right Turns = 33

EB Right-Turn Lane NOT Warranted

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

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

TABLE 4A

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

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

20

20

38 + 10 = 48

48

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

Carter Mill Drive at Oglethrope Road

2028 Projected AM WB Left Turns = 10

WB Left-Turn Lane NOT Warranted

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

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

TABLE 4B

RIGHT-TURN LANE VOLUME THRESHOLDS

FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

38

10

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

Carter Mill Drive at Oglethrope Road

2028 Projected AM EB Right Turns = 10

EB 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
100 - 149 150 - 199			Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	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 4A

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

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

43

43

32 + 33 = 65

65

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

Carter Mill Drive at Oglethrope Road

2028 Projected PM WB Left Turns = 31

WB Left-Turn Lane NOT Warranted

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

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

TABLE 4B

RIGHT-TURN LANE VOLUME THRESHOLDS

FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

32

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25						
33 25 - 49						
50 - 99						
100 - 149						
150 - 199						
200 - 249						
250 - 299						Yes
300 - 349					Yes	Yes
350 - 399				Yes	Yes	Yes
400 - 449			Yes	Yes	Yes	Yes
450 - 499			Yes	Yes	Yes	Yes
500 - 549		Yes	Yes	Yes	Yes	Yes
550 - 599		Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

Carter Mill Drive at Oglethrope Road

2028 Projected PM EB Right Turns = 33

EB Right-Turn Lane NOT Warranted

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

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

TABLE 4A

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

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

13

13

60 + 6 = 66

66

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

Carter Mill Drive at Madison Oaks Road

2028 Projected AM WB Left Turns = 2

WB Left-Turn Lane NOT Warranted

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

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

TABLE 4B

RIGHT-TURN LANE VOLUME THRESHOLDS

FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

60

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

Carter Mill Drive at Madison Oaks Road

2028 Projected AM EB Right Turns = 6

EB 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
100 - 149 150 - 199			 Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	 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 4A

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

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

63

63

32 + 18 = 50

50

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

Carter Mill Drive at Madison Oaks Road

2028 Projected PM WB Left Turns = 8

WB Left-Turn Lane NOT Warranted

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

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

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

32

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

Carter Mill Drive at
Madison Oaks Road

2028 Projected PM
EB Right Turns = 18

EB 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
100 - 149 150 - 199			 Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	 Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

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

APPENDIX J

RESPONSE LETTER TO ADDRESS COMMENTS

AJAX ENGINEERING
CIVIL ENGINEERING / TRAFFIC ENGINEERING

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

December 12, 2022

PROJECT NAME: Carter Ridge Phases VI - VIII

TO: Knoxville-Knox County Planning

SUBJECT: Response Document for Carter Ridge Phases VI - VIII TIS Review Comments

Knoxville-Knox County Planning and Knox County Engineering Staff:

The following response document addresses the comment in an email from Mike Conger, PE, dated December 9, 2022. This letter is added to the end of the revised report in Appendix J.

1. **On page 33 - the trip generation summary of Table 5 indicates 129 dwelling units in Phases VI-VIII, but the study proposes 128 dwelling units in other places. Please clarify.**

   Response: The correct number of dwelling units in Phase VIII is 39 houses (instead of 40), resulting in a total of 128 dwelling units in Phases VI – VIII. This correction resulted in changes to the following:

   a) Page 1, first paragraph: updated discussion to denote a total of 202 houses in Phases IV – VIII
   b) Page 1, first bullet point: updated trip generation results
   c) Page 33, first paragraph: updated discussion to denote a total of 202 houses in Phases IV – VIII
   d) Page 33: revised Table 5 and trip generation number discussion in the last paragraph
   e) Page 42, Figure 7c: updated table and volumes at the intersection of Carter Mill Drive at Madison Oak Road
   f) Page 46, Figure 8c: updated volumes at the intersection of Carter Mill Drive at Madison Oak Road
   g) Page 48: updated results in Table 6c for the 2028 PM Peak Hour at the intersection of Carter Mill Drive at Madison Oak Road

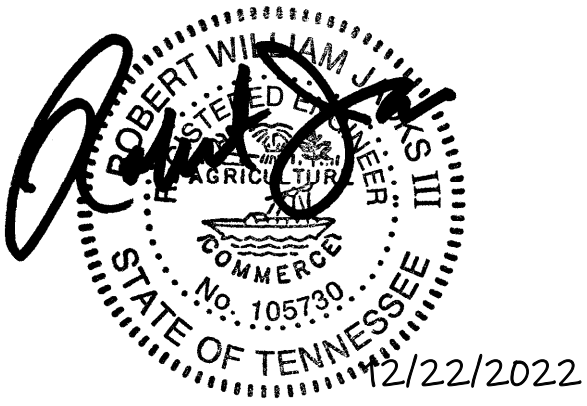
In addition to the revisions listed above, other changes in the report include the following:

- Updated Title Page
- Updated Table of Contents
- Updated Page Footers
- A couple of minor grammatical updates
- Updated Appendix F – Synchro results for 2028 PM Peak Hour
- Updated Appendix G – Trip Generation numbers and calculations
- Added Appendix J to include this response letter

If you have any questions or further comments, please feel free to contact me. I look forward to your review and approval.

Sincerely,

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



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