

Addendum to:

12-SC-22-C / 12-C-22-DP

TIS Version 2

Addendum Date: 1/30/2023

Original TIS Version 2 Date: 11/15/2022



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January 30, 2023

PROJECT NAME: The Preserve at Whites Creek

TO: Knoxville-Knox County Planning

SUBJECT: Memo for The Preserve at Whites Creek Transportation Impact Study (TIS)
(12-SC-22-C/12-C-22-DP)

Knoxville-Knox County Planning, Knox County Engineering, & City of Knoxville Staff:

An email from Mike Conger, PE, dated January 30th, 2023, requested a response to address the number of proposed dwelling units and types being revised in The Preserve at Whites Creek development site plan.

The final TIS submitted on November 15th, 2022, for this development was based on trip generation calculations for 120 single-family detached houses and 75 multi-family attached townhouses in The Preserve at Whites Creek. The following table was included in this report:

TABLE 5
TRIP GENERATION FOR THE PRESERVE AT WHITES CREEK
120 Single-Family Detached Homes & 75 Multi-Family Attached Townhouses

ITE LAND USE CODE	LAND USE DESCRIPTION	# OF UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	120	1,193	26%	74%		63%	37%	
				23	65	88	74	44	118
Local Trip Rate	Multi-Family Attached Townhouses	75	737	22%	78%		55%	45%	
				9	32	41	33	27	60
Total New Volume Site Trips			1,930	32	97	129	107	71	178

ITE Trip Generation Manual, 11th Edition and Local Trip Rates

Trips calculated by using Fitted Curve Equations

Since the final TIS submittal, the site plan designed by W. Scott Williams has been revised and includes a different mixture of residential types. The new site plan includes 86 single-family detached houses and 110 multi-family attached townhouses. The updated trip generation is presented in the following table, and the calculations are attached to the end of this memo:

UPDATED TRIP GENERATION FOR THE PRESERVE AT WHITES CREEK - 1/30/2023

86 Single-Family Detached Homes & 110 Multi-Family Attached Townhouses

ITE LAND USE CODE	LAND USE DESCRIPTION	# OF UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	86	878	26%	74%		63%	37%	
				17	48	65	54	32	86
Local Trip Rate	Multi-Family Attached Townhouses	110	1,040	22%	78%		55%	45%	
				13	45	58	46	38	84
Total New Volume Site Trips			1,918	30	93	123	100	70	170

ITE Trip Generation Manual, 11th Edition and Local Trip Rates

Trips calculated by using Fitted Curve Equations

Comparing the before and after shows that the updated total number of trips generated results in a slight reduction, as shown below:

REDUCTION IN NUMBER OF GENERATED TRIPS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
		ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
Total New Volume Site Trips	-12	-2	-4	-6	-7	-1	-8

Since the change in residential types resulted in an overall reduction of projected generated trips, the site plan revision does not alter the recommendations presented in the final TIS submitted on November 15th, 2022.

If you have any questions or further comments, please feel free to contact me.

Sincerely,

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

UPDATED TRIP GENERATION FOR THE PRESERVE AT WHITES CREEK - 1/30/2023
86 Single-Family Detached Houses

86 Residential Houses = X

Weekday:

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

$$\ln(T) = 0.92 * 4.45 + 2.68$$

$$\ln(T) = 6.78$$

$$\underline{\underline{T = 878 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 7 and 9 am:

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

$$T = 0.91 * 4 + 0.12$$

$$\ln(T) = 4.17$$

$$\underline{\underline{T = 65 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 4 and 6 pm:

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

$$\ln(T) = 0.94 * 4.45 + 0.27$$

$$\ln(T) = 4.46$$

$$\underline{\underline{T = 86 \text{ trips}}}$$

UPDATED TRIP GENERATION FOR THE PRESERVE AT WHITES CREEK - 1/30/2023
110 Multi-Family Attached Townhouses

110 Residential Houses = X

Weekday:

Fitted Curve Equation: $T = 15.193(X)^{0.899}$

$$T = 15 * 68.42$$
$$\underline{\underline{T = 1,040 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: $T = 0.758(X)^{0.924}$

$$T = 0.758 * 77$$
$$\underline{\underline{T = 58 \text{ trips}}}$$

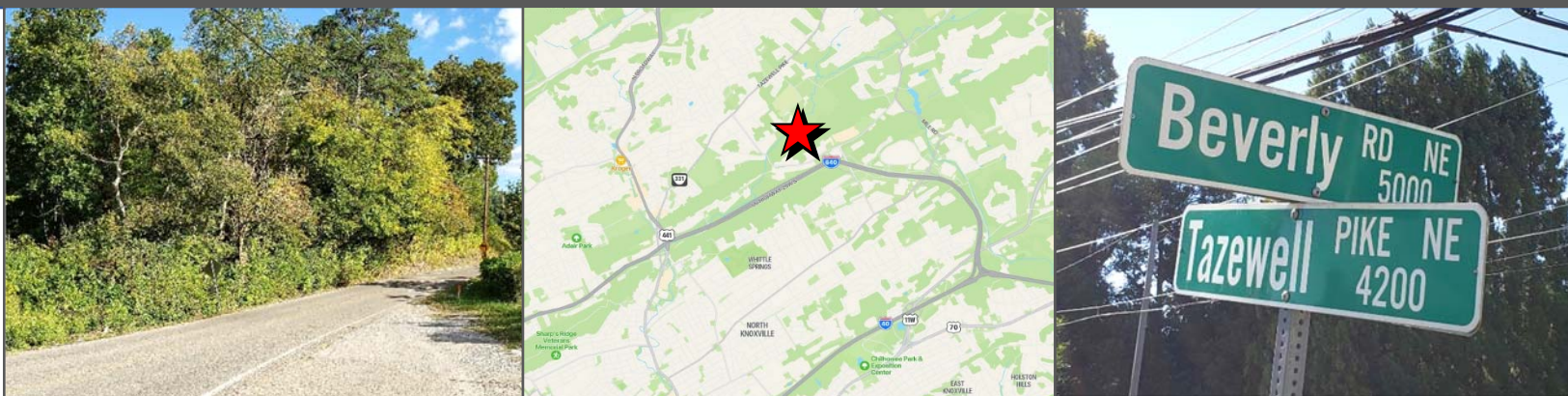
Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: $T = 0.669(X)+10.069$

$$T = 0.669 * 110 + 10.07$$
$$\underline{\underline{T = 84 \text{ trips}}}$$

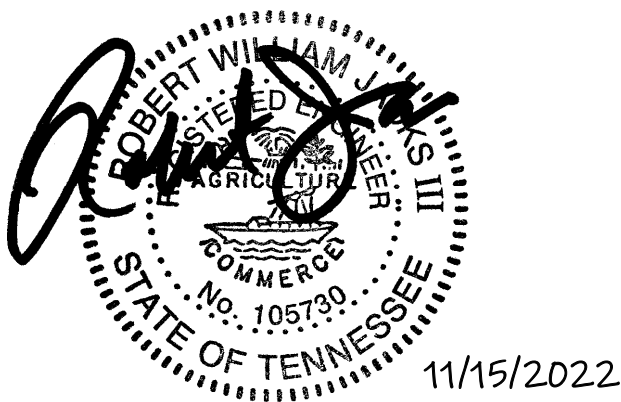


Transportation Impact Study The Preserve at Whites Creek Knox County, Tennessee



Revised November 2022

Prepared for:
Café International, LLC
Attn: Randy Guignard
5408 Fountain Gate Road
Knoxville, TN 37918



12-SC-22-C / 12-C-22-DP
TIS Version 2
11/15/2022

TABLE OF CONTENTS

SECTION	PAGE
EXECUTIVE SUMMARY.....	1
DESCRIPTION OF EXISTING CONDITIONS	4
STUDY AREA	4
EXISTING ROADWAYS	6
PHOTO EXHIBITS.....	10
EXISTING TRANSPORTATION VOLUMES PER MODE	14
ON-STREET PARKING.....	15
PEDESTRIAN AND BICYCLE FACILITIES	15
WALK SCORE	17
TRANSIT SERVICES.....	18
ADJACENT RAILROAD SYSTEM.....	18
PROJECT DESCRIPTION	20
LOCATION AND SITE PLAN.....	20
PROPOSED USES AND ZONING REQUIREMENTS.....	22
DEVELOPMENT DENSITY.....	23
ON-SITE CIRCULATION	23
SERVICE AND DELIVERY VEHICLE ACCESS AND CIRCULATION.....	24
ANALYSIS OF EXISTING AND PROJECTED CONDITIONS	25
EXISTING TRAFFIC CONDITIONS.....	25
PROJECTED TRAFFIC CONDITIONS (WITHOUT THE PROJECT)	31
TRIP GENERATION.....	34
TRIP DISTRIBUTION AND ASSIGNMENT	36
PROJECTED TRAFFIC CONDITIONS (WITH THE PROJECT)	41
POTENTIAL TRANSPORTATION SAFETY ISSUES	44
CONCLUSIONS & RECOMMENDATIONS	48
TAZEWELL PIKE AT BEVERLY ROAD	48
BEVERLY ROAD AT PROPOSED ENTRANCE	50
THE PRESERVE AT WHITES CREEK SUBDIVISION INTERNAL ROADS.....	52
OTHER TRANSPORTATION CONSIDERATIONS.....	54
APPENDIX	

APPENDIX

APPENDIX A -	HISTORICAL TRAFFIC COUNT DATA
APPENDIX B -	WALK SCORE
APPENDIX C -	KNOXVILLE AREA TRANSIT MAP AND INFORMATION
APPENDIX D -	RAILROAD INVENTORY DATA
APPENDIX E -	ZONING MAP
APPENDIX F -	MANUAL TRAFFIC COUNT DATA
APPENDIX G -	CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 11)
APPENDIX H -	ITE AND LOCAL STUDY TRIP GENERATION RATES
APPENDIX I -	2019 CENSUS BUREAU DATA
APPENDIX J -	KNOX COUNTY TURN LANE VOLUME THRESHOLD WORKSHEETS
APPENDIX K -	SIMTRAFFIC VEHICLE QUEUE WORKSHEETS
APPENDIX L -	RESPONSE LETTER TO ADDRESS REVIEW COMMENTS

LIST OF FIGURES

FIGURE	PAGE
1. LOCATION MAP	5
2. TRAFFIC COUNT LOCATIONS, TRAFFIC SIGNAGE & EXISTING LANE CONFIGURATIONS	9
3. PROPOSED PLAN LAYOUT – THE PRESERVE AT WHITES CREEK	21
4. 2022 PEAK HOUR TRAFFIC VOLUMES – EXISTING TRAFFIC CONDITIONS.....	27
5. 2027 PEAK HOUR TRAFFIC VOLUMES – PROJECTED TRAFFIC CONDITIONS (WITHOUT THE PROJECT)	33
6. DIRECTIONAL DISTRIBUTION OF GENERATED TRAFFIC DURING AM AND PM PEAK HOUR	39
7. TRAFFIC ASSIGNMENT OF GENERATED TRAFFIC DURING AM AND PM PEAK HOUR	40
8. 2027 PEAK HOUR TRAFFIC VOLUMES – PROJECTED TRAFFIC CONDITIONS (WITH THE PROJECT)	42

LIST OF TABLES

TABLE	PAGE
1. STUDY CORRIDOR CHARACTERISTICS	6
2. LEVEL OF SERVICE AND DELAY FOR UNSIGNALIZED INTERSECTIONS	29
3. 2022 INTERSECTION CAPACITY ANALYSIS RESULTS – EXISTING TRAFFIC CONDITIONS	30
4. 2027 INTERSECTION CAPACITY ANALYSIS RESULTS – PROJECTED TRAFFIC CONDITIONS (WITHOUT THE PROJECT).....	32
5. TRIP GENERATION FOR THE PRESERVE AT WHITES CREEK.....	34
6. 2027 INTERSECTION CAPACITY ANALYSIS RESULTS – PROJECTED TRAFFIC CONDITIONS (WITH THE PROJECT).....	43
7. VEHICLE QUEUE RESULTS SUMMARY – TAZEWELL PIKE AT BEVERLY ROAD	47
8. VEHICLE QUEUE RESULTS SUMMARY – BEVERLY ROAD AT PROPOSED ENTRANCE.....	47
9. 2027 INTERSECTION CAPACITY ANALYSIS RESULTS – PROJECTED TRAFFIC CONDITIONS (WITH THE PROJECT) AND TRAFFIC SIGNAL	49

EXECUTIVE SUMMARY

Preface:

Café International, LLC is proposing a residential development off Beverly Road just outside the City of Knoxville limits in Northeast Knox County, TN. The proposed development will include 120 single-family detached houses and 75 multi-family attached townhouses on 84.56 +/- acres and is referenced in this study as “The Preserve at Whites Creek”. The development is anticipated to be fully built and occupied by 2027. The development proposes one entrance on Beverly Road, between Oakland Drive and Greenway Drive.

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 Preserve at Whites Creek development, with a total of 120 single-family detached houses and 75 multi-family attached townhouses, is estimated to generate 1,930 trips at full build-out and occupancy on an average weekday. Of these daily trips, 129 are estimated to occur during the AM peak hour and 178 in the PM peak hour in 2027.
- The existing intersection of Tazewell Pike at Beverly Road currently operates with very high vehicle delays and long queues in the peak hours. The Beverly Road approach at this intersection currently experiences vehicle queue lengths in excess of 1,000 feet, encouraging cut-thru traffic on adjacent roadways.
- The intersection of the development’s Proposed Entrance at Beverly Road is expected to operate with very reasonable vehicle delays in the projected AM and PM peak hours. The addition of the Proposed Entrance approach on Beverly Road will operate well in 2027 with respect to vehicle capacity.
- The projected 2027 traffic volumes do not warrant the construction of separate entering left and right-turn lanes on Beverly Road at the Proposed Entrance. A single exiting lane for the development entrance at Beverly Road will be sufficient.

Recommendations:

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

- * • It is highly recommended that the intersection of Tazewell Pike at Beverly Road be converted to a traffic signal as soon as feasible. In addition to installing a traffic signal, turn lanes on the approaches at the t-intersection will need to be constructed to remediate the vehicle delays and queues fully. Overall, the existing vehicle delays and queues are not acceptable and are projected to worsen in the future, even without The Preserve at Whites Creek development being constructed.
- * • In the interim, before a traffic signal is installed at the intersection of Tazewell Pike at Beverly Road, to reduce the possibility of vehicles clipping each other at the intersection, it is recommended that a 24" white stop bar be installed on Beverly Road and the yellow double centerline on the westbound approach of Tazewell Pike be extended further west. It is believed that these pavement markings would provide a better visual target to designate the appropriate location and turning path for westbound left-turn motorists turning onto Beverly Road and reduce the number of "short-turns".
- It is recommended that a Stop Sign (R1-1) be installed, and a 24" white stop bar be applied to the Proposed Entrance approach at Beverly Road. The stop bar should be applied a minimum of 4 feet away from the edge of Beverly Road and placed at the desired stopping point that maximizes the sight distance.
- Sight distances at the Proposed Entrance approach at Beverly Road must not be impacted by future landscaping, signage, or existing vegetation. Based on a posted speed limit of 30-mph on Beverly Road, the required intersection sight distance is 335 feet looking in each direction at the entrance. The required stopping sight distance is 200 feet looking to the north and 220 feet to the south at the Proposed Entrance location on Beverly Road. A visual inspection determined that the intersection and stopping sight distances are available at the Proposed Entrance location. The site designer must ensure that these sight distances are accounted for and provided in the design plans. It is recommended that a licensed

land surveyor measure the available sight distances at the Proposed Entrance location to the north and south on Beverly Road.

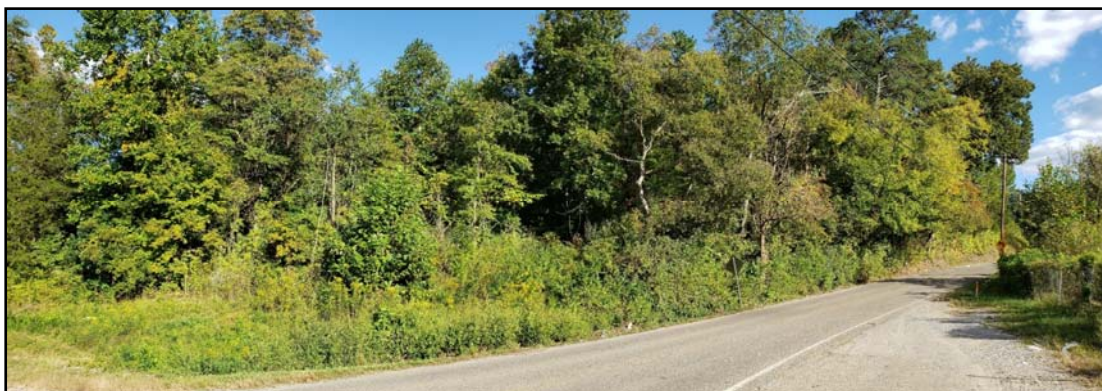
- A 25-mph Speed Limit Sign (R2-1) is recommended to be posted near the beginning of the development entrance off Beverly Road. It is recommended that a “No Outlet” Sign (W14-2a) be installed at the front of the development at Beverly Road. This sign can be installed above or below the street name sign.
- As shown in the report, Stop Signs (R1-1) and 24” white stop bars are recommended on the new internal roadways. End of roadway signage (OM4-1) should be installed at the eastern end of Road “A” if a stub road is constructed.
- Sight distance at the new internal road intersections must not be impacted by new signage, parked cars, or future landscaping. With a proposed speed limit of 25-mph in the development, the internal intersection sight distance is 250 feet. The required stopping sight distance is 155 feet for a level road grade. The site designer should ensure that these internal sight distance lengths are met.
- All drainage grates and covers for the residential development must be pedestrian and bicycle safe.
- The site designer should include a parking area and a centralized mail delivery center within the development if directed by the local post office.
- The subdivision entrance is recommended to be designed and constructed with a boulevard roadway section. Typically, a boulevard road section is designed and constructed to the first intersecting street within the development, which would be Road “B” in this case. At a minimum, the boulevard section should have a 10-foot median with 2 – 18-foot lanes within 60 feet of right-of-way.
- All road grade and intersection elements should be designed to AASHTO, TDOT, the City of Knoxville, and Knox County specifications and guidelines to ensure proper operation.
- It is recommended that a “Do Not Stop on Tracks” (R8-8) sign be installed on the right-hand side of Beverly Road on the near side (north side) of the railroad grade crossing facing southbound traffic.
- * • According to Google Street Maps, as recently as February 2019, a “Narrow Bridge” (W5-2) sign was installed for southbound traffic on Beverly Road just north of the railroad crossing and south of the intersection with Oakland Drive. This sign is no longer installed. To match the existing warning sign for northbound traffic on Beverly Road before the bridge and to provide advanced warning, this signage should be reinstalled.

DESCRIPTION OF EXISTING CONDITIONS

▪ STUDY AREA:

The proposed location of this new residential development is shown on a map in Figure 1. This proposed development will be located off Beverly Road, between Oakland Drive and Greenway Drive in Northeast Knox County, TN. The development site is 0.6 miles southeast of Tazewell Pike and just under a mile from Washington Pike on the northern side of Interstate 640. The proposed access point for the development is also just southeast of a railroad and bridge creek crossing on Beverly Road. The development will have a single entrance on Beverly Road. The development property is in Knox County; however, Beverly Road and the adjoining right-of-way are in the City of Knoxville.

As Knoxville/Knox County Planning requested, transportation impacts associated with the proposed development were analyzed at the future intersection of Beverly Road at the Proposed Entrance, where the proposed development will have singular road access to and from outside destinations. The scope of work also requested a before and after analysis of the existing unsignalized t-intersection of Tazewell Pike at Beverly Road. In the past, this intersection has been reviewed and determined to meet traffic signal warrants.



**View of Development Site at Proposed Entrance Location on Beverly Road
(Looking East from Beverly Road)**

The proposed development property is in a suburbanized area with highly variable land uses. In the immediate vicinity, the land uses include residential, industrial, agricultural, and commercial uses. The development property is currently undeveloped and completely forested. The development property has just over 400 feet of road frontage along the property's western edge and the eastern side of Beverly Road. The City of Knoxville limit lines the eastern edge of Beverly Road. Whites Creek runs along the property's northern edge and is in a flood zone.

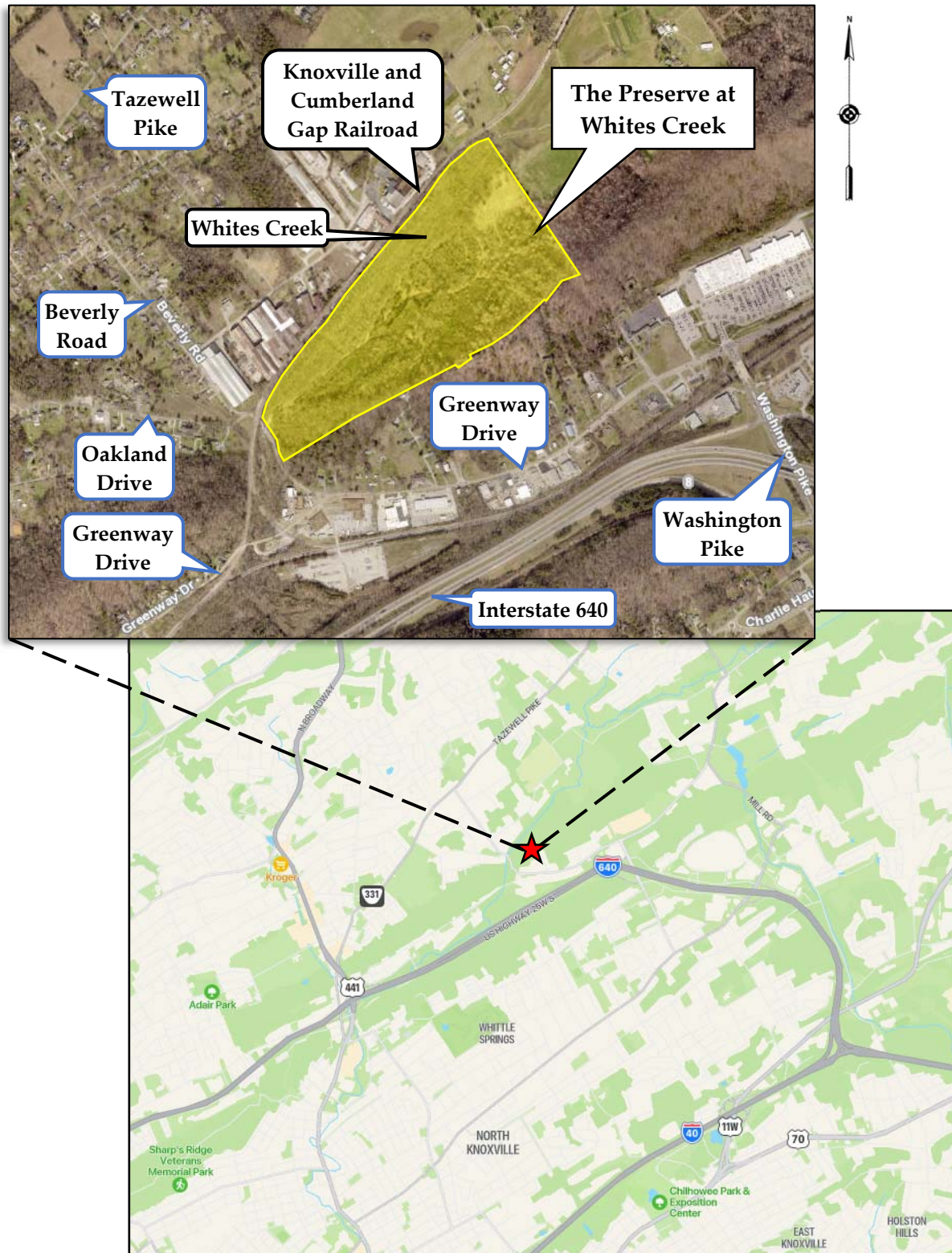


Figure 1
Location Map

▪ **EXISTING ROADWAYS:**

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

TABLE 1
STUDY CORRIDOR CHARACTERISTICS

NAME	CLASSIFICATION ¹	SPEED LIMIT	LANES	ROAD WIDTH ²	TRANSIT ³	PEDESTRIAN FACILITIES	BICYCLE FACILITIES
Tazewell Pike (SR 331)	Minor Arterial	40 mph	2 undivided	24 feet	None	No sidewalks along roadway	No bike lanes
Beverly Road	Major Collector	30 mph	2 undivided	20-26 feet	None	No sidewalks along roadway	No bike lanes

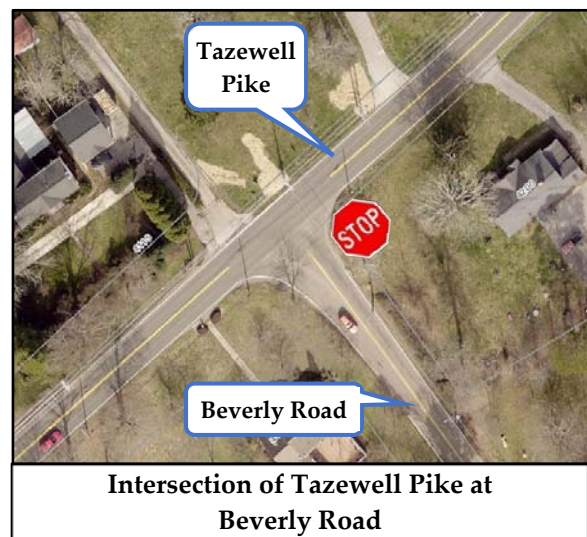
¹ 2018 Major Road Plan by Knoxville/Knox County Planning

² From edges of pavement or face of curbs

³ According to Knoxville Area Transit (KAT) System Map

Tazewell Pike (State Route 331) is classified as a Minor Arterial from Old Broadway to the Union County, TN line. The Tennessee Department of Transportation (TDOT) maintains this roadway, traversing in a generally southwest-northeast direction over its entire length. On the southwest end, Tazewell Pike begins at a signalized intersection in the Fountain City area of Knoxville and continues to Luttrell, TN, for a total length of 17.6 miles. Several miles to the northeast of Beverly Road, in the Gibbs community, Tazewell Pike and East Emory Road intersect at a signalized intersection. SR 331 continues east on East Emory Road, and Tazewell Pike continues to the northeast as SR 131 to Luttrell, TN.

In the vicinity of Beverly Road, Tazewell Pike is primarily occupied by single-family houses with individual driveways, churches, and a large cemetery. To the southwest and closer to Knoxville, Tazewell Pike is more developed with commercial developments as it approaches the Fountain City and Broadway area. Several single-family subdivisions are off Tazewell Pike to the northeast of Beverly Road.



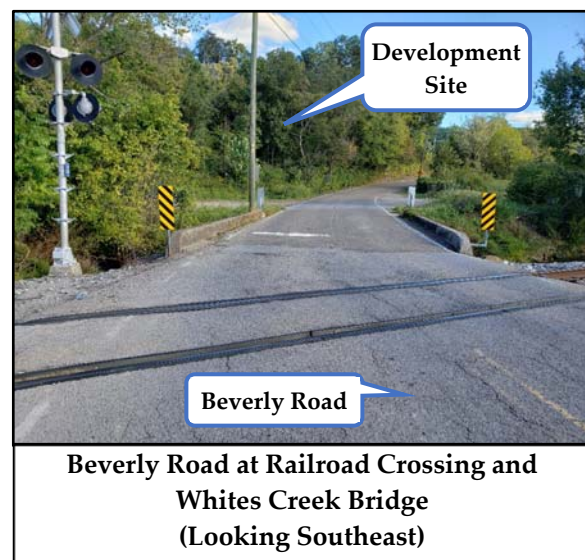
At the unsignalized t-intersection of Tazewell Pike at Beverly Road, each approach has a single lane, the Beverly Road approach is controlled by a Stop Sign (R1-1), and the Tazewell Pike approaches operate freely. This intersection is located in the City of Knoxville.

Tazewell Pike, near Beverly Road, currently consists of a 2-lane pavement section with 11.5-foot lanes and a total pavement width of 24 feet. The roadway is striped with white edge lines and a double yellow center line. Outside the white edge lines, the pavement edge extends only a few inches on each side. The posted speed limit on Tazewell Pike is 40-mph, and sidewalks are not provided along the roadway. A utility streetlight is located on the north side of Tazewell Pike at the intersection with Beverly Road.

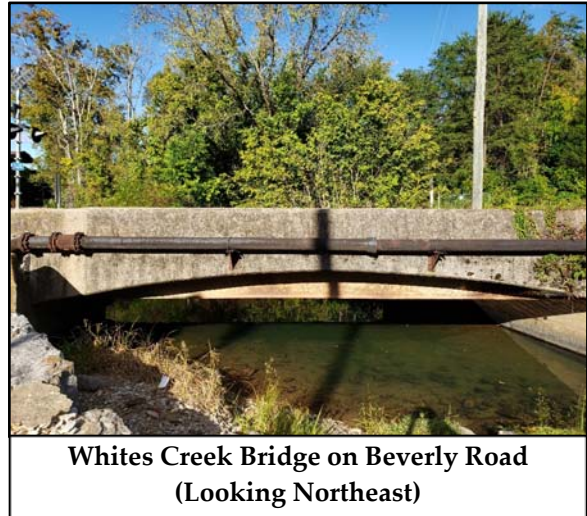


Beverly Road is classified as a Major Collector and traverses from Tazewell Pike on the north side to Greenway Drive on the south side with a total length of 0.8 miles. Beverly Road transitions to Greenway Drive at a three-way forked intersection on its south side. Beverly Road is occupied with residential homes on a majority of its length, but on its southern side is occupied by the Triple-S Steel Supply Company, a structural steel supplier, and undeveloped property, including the proposed development property.

Adjacent to the development property, Beverly Road has an s-curve horizontal road alignment crossed by a railroad track and a bridge creek crossing. Just north of the proposed development property, Beverly Road crosses the single railroad line owned by R.J. Corman Railroad.

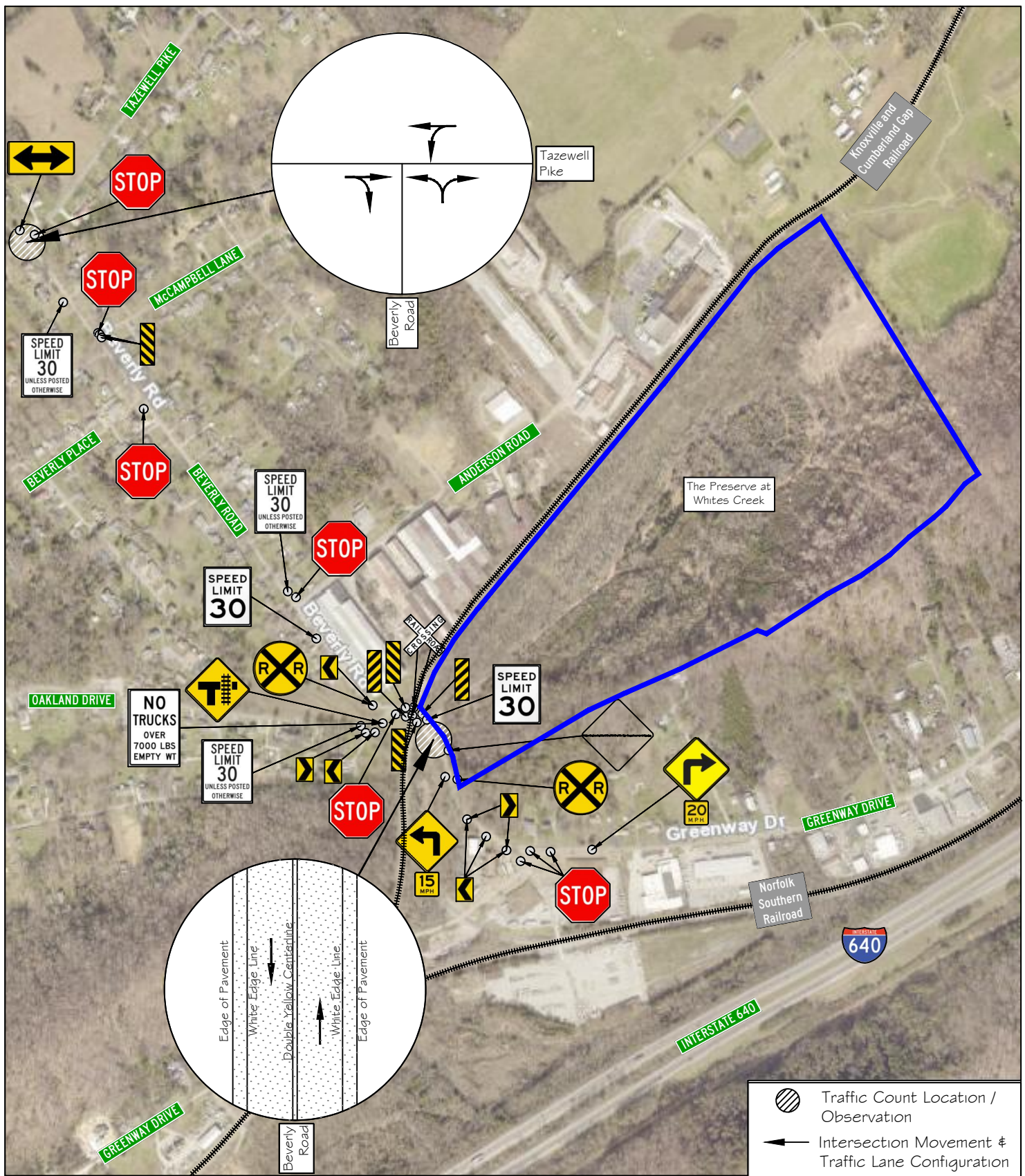


A bridge is provided to cross Whites Creek just south of the railroad crossing on Beverly Road. In addition to vehicles, the bridge also cradles a water line on the concrete barrier on its western side. The total pavement width of the road between the concrete barriers on the bridge was measured to be 20.3 feet. On the north side of the railroad crossing and stream crossing on Beverly Road, the pavement width was measured to be 26 feet. The pavement width of Beverly Road was measured to be just under 24 feet to the south side and adjacent to where the Proposed Entrance will be located.



Beverly Road has several intersecting roadways that provide alternate routes to Tazewell Pike to the north. These roads include Beverly Place, Oakland Drive, and Anderson Road. These roadways do not provide as direct access as Beverly Road does, but they do provide alternative road access to Tazewell Pike east and west of the intersection of Tazewell Pike at Beverly Road. Due to the vehicle delays on Beverly Road at Tazewell Pike, Beverly Place is used as a cut-thru route. As a result of this cut-thru activity and vehicle speeds, the City of Knoxville recently installed speed humps along Beverly Place.

Figure 2 shows the existing lane configurations of the intersection and location where traffic counts were 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

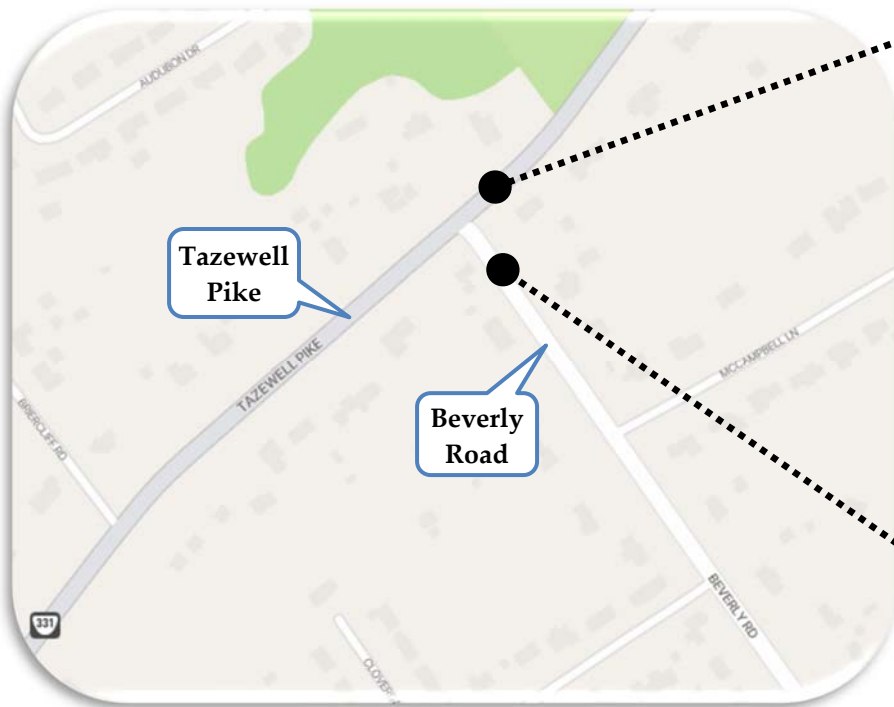


FIGURE 2

The Preserve at Whites Creek

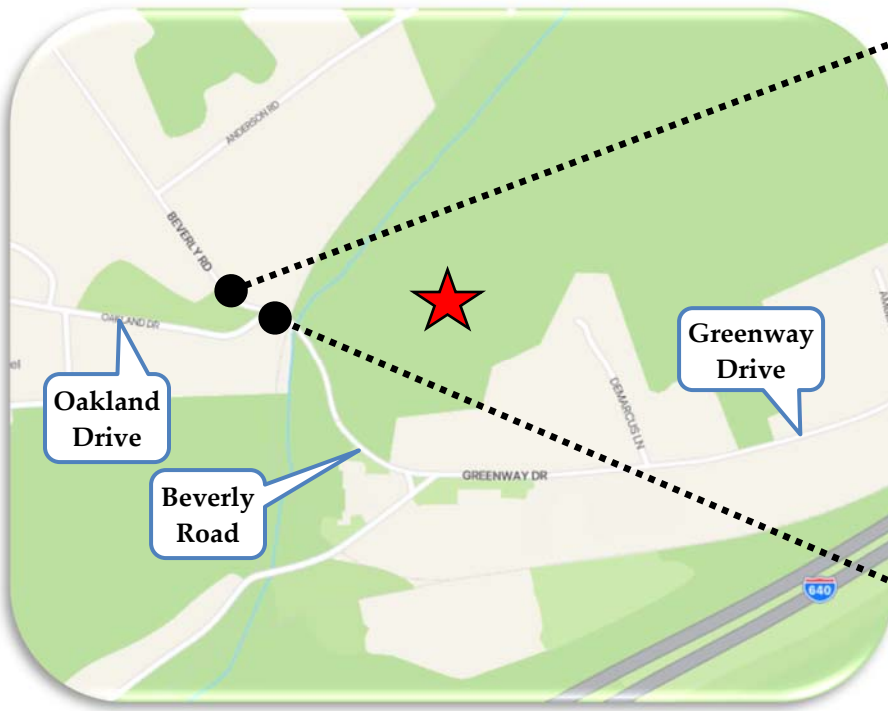
Traffic Count Locations, Traffic Signage & Existing Lane Configurations

PHOTO EXHIBITS



Tazewell Pike at Beverly Road





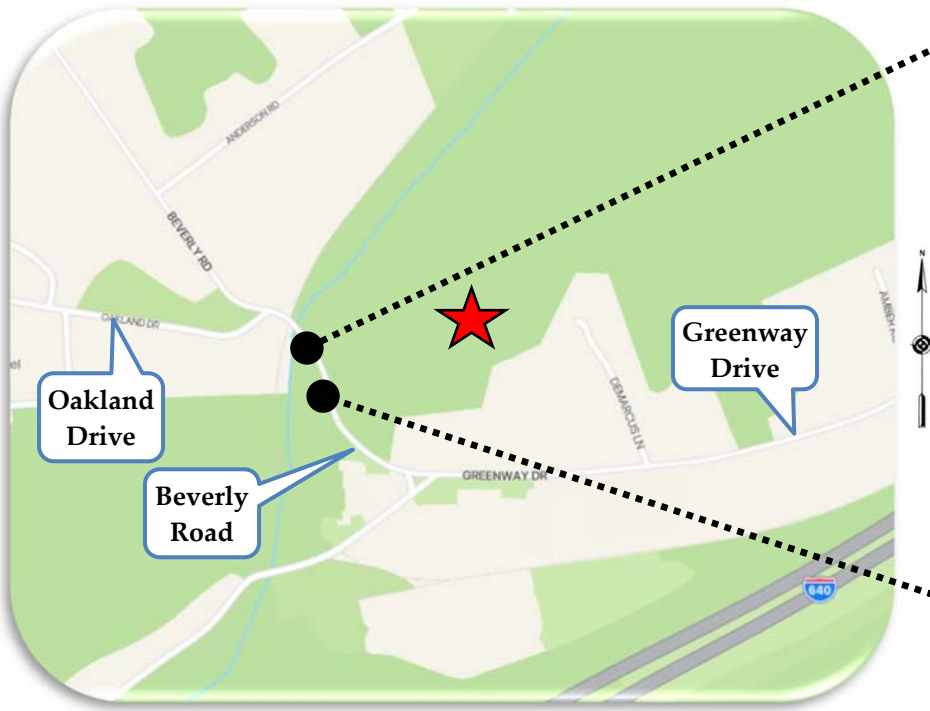
Beverly Road near Development Site



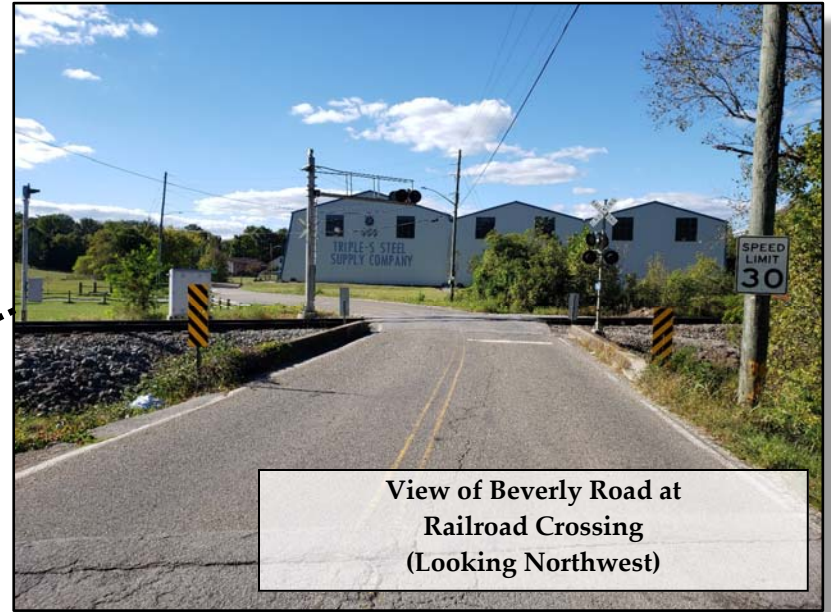
View of Beverly Road at
Oakland Drive
(Looking Southeast)



View of Beverly Road at
Railroad Crossing
(Looking Southeast)



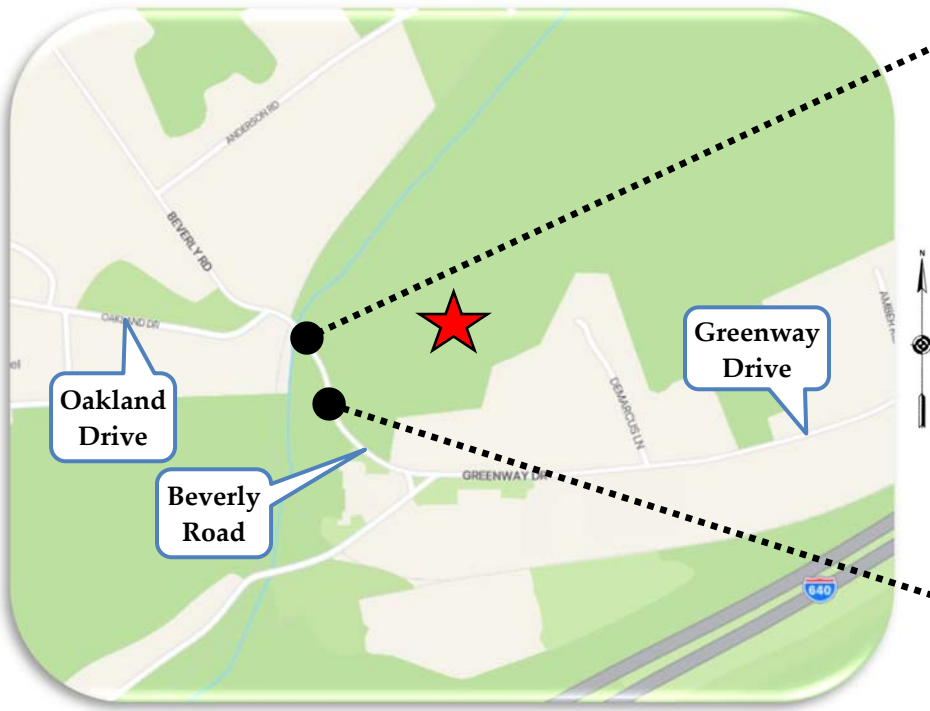
Beverly Road near Development Site



View of Beverly Road at
Railroad Crossing
(Looking Northwest)



View of Beverly Road near
Proposed Entrance Location
(Looking Northwest)



Beverly Road near Development Site



View of Existing Development Site near Proposed Entrance Location (Looking East)



View of Beverly Road near Proposed Entrance Location (Looking Southeast)

▪ **EXISTING TRANSPORTATION VOLUMES PER MODE:**

Two annual vehicular traffic count locations exist near the study area, and the Tennessee Department of Transportation (TDOT) conducts these counts. The count location 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 Greenway Drive, just east of the intersection with Beverly Road and the development site, at 6,191 vehicles per day in 2021. From 2011 to 2021, this count station has indicated a +1.7% average annual traffic growth rate.
 - TDOT reported an Average Daily Traffic (ADT) on Tazewell Pike, northeast of Jacksboro Pike and west of the development site, at 15,302 vehicles per day in 2021. From 2011 to 2021, this count station has indicated a +0.1% average annual traffic growth rate.

- Existing bicycle and pedestrian volumes:

The average daily pedestrian and bicycle traffic is unknown along the studied roadways. Due to the lack of facilities and nearby amenities, there is assumed to be minimal pedestrian and bicyclist activity on these roads in the study area. During the traffic counts for this project, only one pedestrian was observed over 6 hours.

An online website, [strava.com](https://www.strava.com), provides “heat” maps detailing exercise routes taken by pedestrians, joggers, and bicyclists. The provided heat maps show the last two years of data, are updated monthly, and are gathered from individuals allowing their smart devices to track and compile their routes (millions of users). The activities in the maps are shown on the roads with color intensities with lighter colors signifying higher activity. The Strava heat maps show some bicycle and pedestrian activity in the study area. Higher pedestrian activity is shown on Oakland Drive and Anderson Road and in the existing adjacent residential subdivisions. Overall, lower bicycle traffic is shown on the surrounding roadways, but bicyclists have a more significant presence than pedestrians on Beverly Road adjacent to the development site, according to the heat maps.



Strava Heat Map for Pedestrian and Joggers



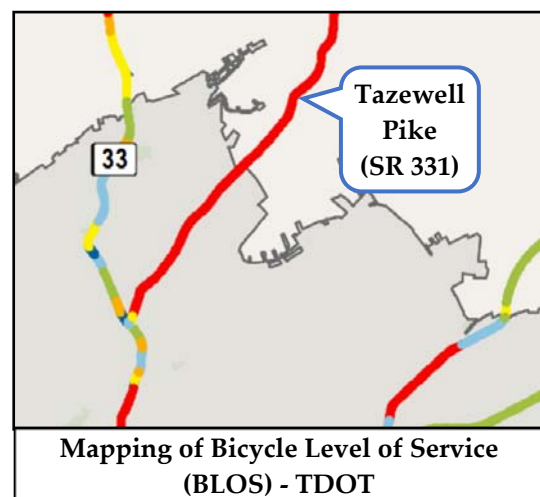
Strava Heat Map for Bicyclists

▪ **ON-STREET PARKING:**

On-street parking was not observed during the site review and is not allowed on Tazewell Pike or Beverly Road adjacent to the project site. Off-street parking was observed along Beverly Road at Triple-S Steel Supply Company. The vehicles at this company directly pull in and back onto Beverly Road from a parking lot. These parking spaces are along Beverly Road and line the company's building.

▪ **PEDESTRIAN AND BICYCLE FACILITIES:**

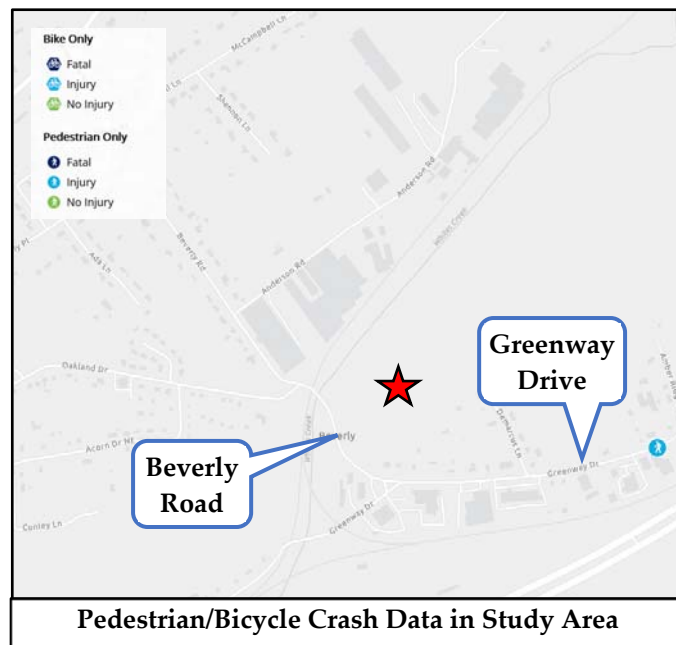
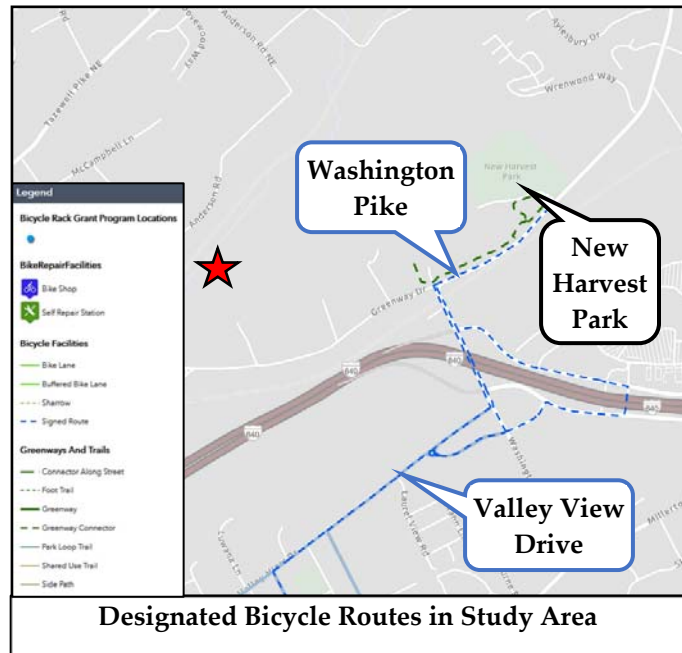
Bicycle facilities (lanes) are not available within the project site study area. Sidewalks are not provided either. Even though bicycle facilities are not provided on Tazewell Pike (SR 331), TDOT has published mapping illustrating the Bicycle Level of Service (BLOS) for state routes in Knox County. BLOS is a nationally used measure of bicyclist comfort based on a roadway's geometry and traffic conditions. BLOS A designates the route as most suitable for bicyclists and BLOS F as the least suitable. The BLOS for Tazewell Pike (SR 331) at Beverly Road shows F grades.



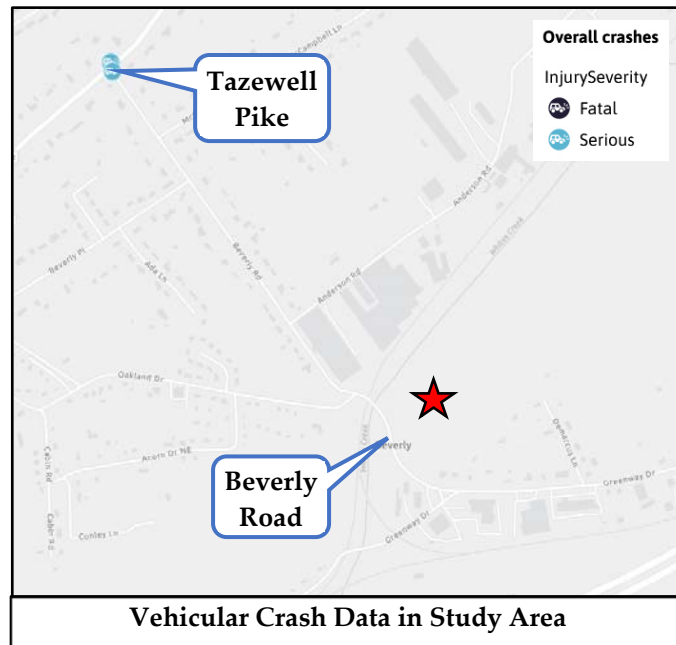
Mapping of Bicycle Level of Service (BLOS) - TDOT

Bicycle lanes are not provided on Beverly Road or other roadways adjacent to the development site, but a designated bicycle route is located just east of the development site along Washington Pike and Valley View Drive. This route along Washington Pike and Valley View Drive is designated as a “Comfortable Route” in the KGIS mapping. A “Comfortable Route” is defined as a route “based on low to medium traffic speeds and volumes along with other criteria”. In addition to a nearby designated bicycle route, a paved greenway path is provided in front of the

Target shopping center and New Harvest Park, north of Washington Pike. New Harvest Park has a new community building, a picnic pavilion/amphitheater, a splash pad, a playground, and a 0.25-mile trail. In addition to these amenities, the park also hosts a Farmer’s Market from April to September.



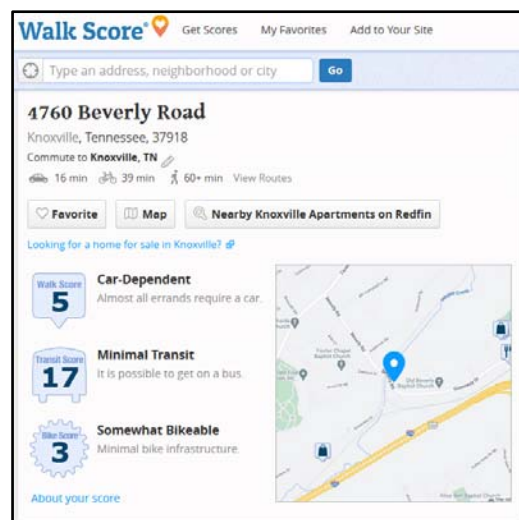
The Knoxville Transportation Planning Organization (TPO) provided a 2020 update to bicycle and pedestrian crash data for Knox County and other surrounding counties. According to the data, none of these incidents occurred near the development site in the past couple of years. The closest incident occurred on Greenway Drive, south and east of the development site, on March 5th, 2008. Details regarding the cause of the crash were not provided other than that an injury occurred.



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 the past couple of years. However, two crashes occurred at the intersection of Tazewell Pike at Beverly Road. Of these incidents, one is listed as involving a senior driver, the other as a teen driver, and both are listed as “Serious”.

▪ 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.

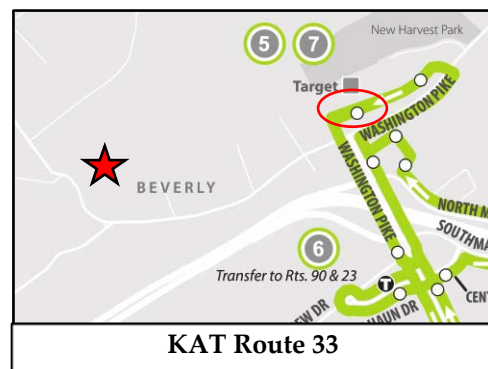
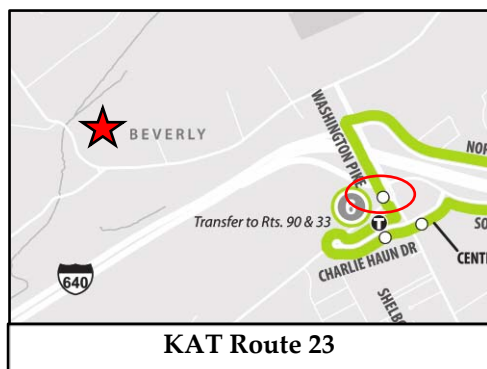


Appendix B shows maps and other information for the Walk Score, Bike Score, and Transit Score at the development property at 4760 Beverly Road (development property address). The project site location is graded with a Walk Score of 5. This Walk Score indicates that the site is car-dependent and that almost all errands currently require a vehicle for travel to and from the development property. The site is graded with a Bike Score of 3, which means there is minimal bike infrastructure. The site is given a Transit Score of 17 since public transportation is 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 nearby in the study area, and the overall KAT bus system map is provided in Appendix C.

The closest public transit bus stops are over a mile away by roadway from the development's Proposed Entrance. These bus stops are located on Washington Pike near Valley View Drive and in the Target parking lot off Washington Pike. The bus stop on Washington Pike near Valley View Drive is on KAT Bus Route 23. Route 23 is designated as "Millertown Pike". The bus stop in the Target parking lot off Washington Pike is on KAT Bus Route 33. Route 33 is designated as "MLK Jr. Avenue". These routes operate on weekdays and weekends. Recently, KAT had to reduce its service schedule due to workforce shortages. These changes took place on August 29th, 2022, and the reduced schedules for these routes are included in Appendix C. The route maps are 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.



▪ **ADJACENT RAILROAD SYSTEM:**

R.J. Corman Railroad Company recently acquired the single railroad track just northwest of the Proposed Entrance location for the development on Beverly Road. This railroad line is named the Knoxville and Cumberland Gap Railroad (KXCG). Their recent online press release states, "The newly established KXCG is comprised of two branches. First, a 59-mile branch runs between Clinton, TN, and Clairfield, TN. Secondly, a branch of 72 miles operates between Beverly, TN, crossing the iconic Cumberland Gap and connecting to Middlesboro, KY. The branches, previously owned by Norfolk Southern, were historically part of the Southern

Railway.”

The railroad crossing is marked and signed as #730476N. During the traffic count observations, no train crossing events were recorded. The centerline of the rail track to the center of the Proposed Entrance location for the residential development on Beverly Road is approximately 250 feet. The railroad crossing has Grade Crossing Advance Warning signs (W10-1) and railroad crossing signals for southbound and northbound traffic at the track but does not have crossing gates. The advance railroad pavement markings are fading at both approaches on Beverly Road to the railroad crossing.

Appendix D includes the U.S. DOT Crossing Inventory Form from the Federal Railroad Administration for this railroad crossing. According to the railroad form dated February 28, 2022, the estimated number of daily train movements includes one “Total Day Thru Trains”, zero “Total Night Thru Trains, and one “Total Switching Trains”. According to the Bureau of Transportation Statistics dictionary, “A *switching* and terminal railroad is a freight railroad company whose primary purpose is to perform local switching services or to own and operate a terminal facility. Switching is a type of operation done within the limits of a yard. It generally consists of making up and breaking up trains, storing and classifying cars, serving industries within yard limits, and other related purposes. These movements are made at slow speed under special yard rules.”

The maximum track speed is 30 mph for freight trains on this track, but the typical speed is 5 to 15 mph, according to the inventory report. Accident reports were not available for this crossing, and it is assumed that this indicates that no reported accidents have occurred. A request was made to the railroad company to gather more details about the track, but there was no response from the company.

PROJECT DESCRIPTION

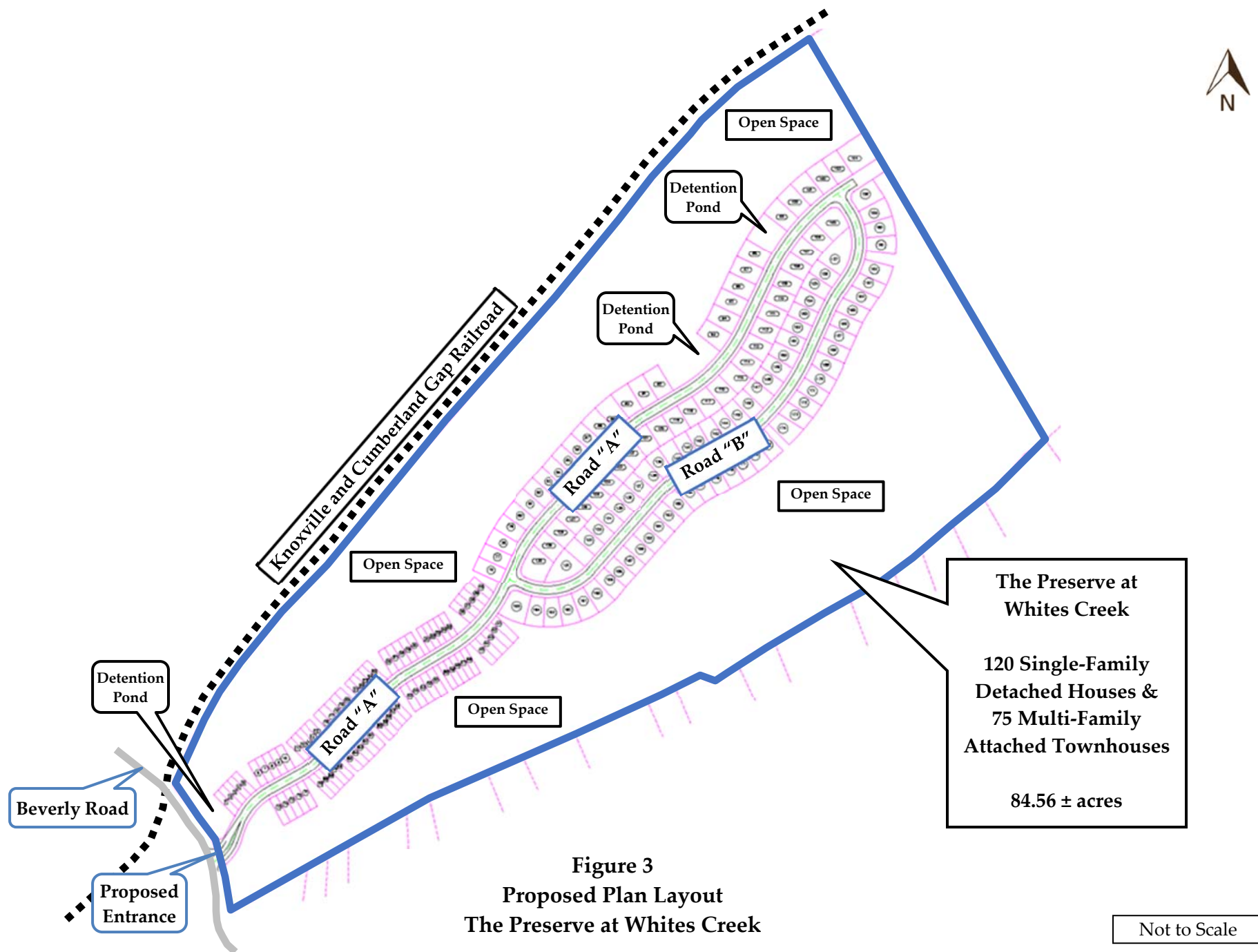
▪ LOCATION AND SITE PLAN:

The proposed plan layout with 120 single-family detached houses and 75 multi-family attached townhouses on 84.56 +/- acres is designed by W. Scott Williams and Associates and is shown in Figure 3. The design shows two new streets for the residential development, Road "A" and "B". Road "A" is the street that will intersect Beverly Road and provide access for the residents to and from outside destinations. The current site plan shows separate exiting lanes on Road "A" for left and right turns at Beverly Road.

The 84.56-acre residential development will include two extensive common areas on either side of the housing units with a combined size of 58.97 acres that will remain undeveloped. The proposed lot widths will vary from 22 to 60 feet, with depths between 80 and 100 feet. The single-family detached houses will be located to the property's rear (east side), with the townhouses closer to the front (west side). The single-family detached housing lots will be larger in area than the townhouse lots. Each housing unit will have a 2-car garage and driveway. Internal sidewalks are proposed for this development along one side of each road. Three detention ponds are proposed on the site to control stormwater discharges.

While not shown in Figure 3, the developer plans to construct a community building with pickleball courts and walking trails around the property's perimeter for the residents. The developer also plans to donate 16 acres of the development site to the Legacy Parks Foundation. Details regarding this donation and the timeframe are unknown at this time. However, the donated area would be the northern portion of the development property within the floodplain and adjacent to the railroad line.

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. Currently, the real estate market in the area is experiencing large amounts of activity and growth. This study assumed that the total construction build-out of the development and full occupancy would occur within the next five years (2027).

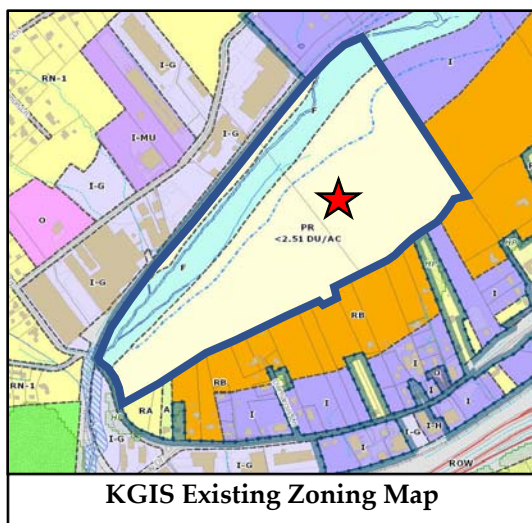


▪ **PROPOSED USES AND ZONING REQUIREMENTS:**

The two existing parcels comprising The Preserve at Whites Creek development property were recently rezoned to Planned Residential (PR) and Floodway (F) from Industrial (I), General Residential (RB), and Floodway (F) within Knox County, TN. The development property was requested to be rezoned to the Planned Residential (PR) zone with up to 2.51 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 E. While the development property is within Knox County - Beverly Road and the areas to the north, west, and south surrounding the development property are all located within the City of Knoxville. The existing adjacent surrounding zoning and land uses are the following:

- To the north and northwest of the development site and across the railroad and Whites Creek, seven parcels are zoned as General Industrial (I-G), and two parcels are zoned as Industrial (I) in the City of Knoxville. These parcels contain Triple-S Steel Supply, Beverly Steel, and other large industrial buildings and smaller buildings that abut the railroad. These parcels have access to Anderson Road, and Triple-S Steel Supply also has road access to Beverly Road.
- One large parcel to the northeast and east is zoned as Agricultural (A) and is occupied by farmland and forested areas. This property has access to Anderson Road and McCampbell Drive to the north.
- Eighteen parcels abut to the southeast and south of the proposed development property. One of these parcels is in the City of Knoxville; the rest are located outside the City and in Knox County. Most of these parcels are zoned as General Residential (RB). Two parcels are zoned as Low Density Residential (RA), one in the Agricultural (A) zone, one in the Industrial (I) zone, and the parcel in the City of Knoxville is zoned as Single-Family Residential Neighborhood (RN-1). Single-family detached houses occupy nearly all these parcels, with the rear of the parcels ending at the mountain ridge that borders the southern portion of the development property. One of the parcels near the top of the ridge contains a telecommunication tower. These parcels have road access to the south to Beverly Road or Greenway Drive. Some parcels have initial road access to Demarcus Lane, Amber Ridge Way, and New Beverly Baptist Church Road, with these roadways intersecting Greenway Drive to the south.

- The property across Beverly Road to the southwest and west is in the City of Knoxville and zoned as General Industrial (I-G) and Floodway (F). Other property to the west includes the railroad property and is designated as Right-of-Way (ROW). The property immediately across Beverly Road from the development property is undeveloped with scrub brush and some trees. Some construction items (concrete barriers) are present along the Beverly Road frontage on this property. The immediate area on the other side of Beverly Road has a makeshift vehicle pull-over area: part pavement and part gravel. It is unknown how often this pull-over area is used, but it appears to be well used.



■ DEVELOPMENT DENSITY:

The Preserve at Whites Creek development's proposed density is based on a maximum of 195 dwelling units on 84.56 acres. One hundred ninety-five dwelling units on 84.56 acres compute to 2.31 dwelling units per acre, slightly less than allowed for this property with a density of 2.51 units per acre in the Planned Residential (PR) zone.

■ ON-SITE CIRCULATION:

The total length of the two new streets within the development will be 4,885 feet (0.93 miles), designed and constructed to the Knox County, TN specifications. The development 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 the development will be 50 feet. Sidewalks are proposed on one side of both internal roads. Knox

County will maintain the streets in the development after construction, and these will be dedicated public roads. A stub road is shown in the layout plan at the end of Road "A". According to the site designer, this stub may be required by Planning to be used for a further road extension into the adjacent property; however, this extension is estimated to have little chance of occurring.

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

Besides residential passenger vehicles, the internal roadways will provide access to service, delivery, maintenance, and fire protection/rescue vehicles. None of these vehicle types will impact roadway operations other than when they occasionally enter and exit the development. It is expected that curbside private garbage collection services will be available for this residential development.

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, school buses, trash collection trucks, and single-unit delivery trucks. The development's internal drives will accommodate the larger vehicle types and residents' standard passenger vehicles.

ANALYSIS OF EXISTING AND PROJECTED CONDITIONS

▪ EXISTING TRAFFIC CONDITIONS:

This study conducted a 6-hour traffic count at the unsignalized t-intersection of Tazewell Pike at Beverly Road and on Beverly Road adjacent to the development site on Thursday, September 29th, 2022. The manual traffic counts were conducted to tabulate the morning and afternoon peak period volumes and travel directions near the proposed development site. Based on the traffic volumes collected at the intersection of Tazewell Pike at Beverly Road, the AM and PM peak hours were observed at 7:15 – 8:15 am and 4:45 – 5:45 pm. Adjacent and closer to the development site on Beverly Road, the AM and PM peak hours were observed at 7:15 – 8:15 am and 4:15 – 5:15 pm.

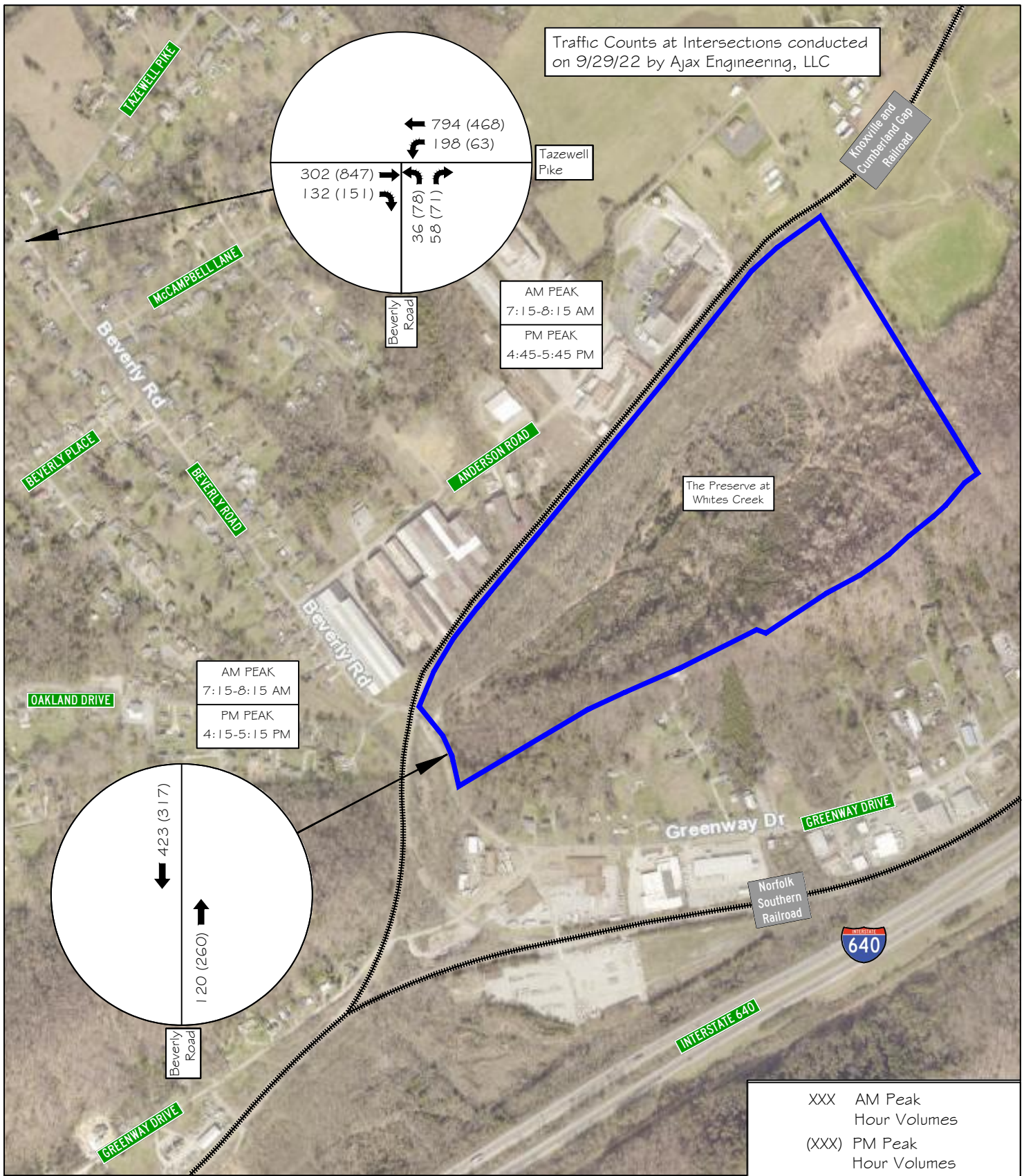
The manual tabulated traffic counts can be reviewed in Figure 4 and Appendix F, and some observations from the counts are listed below.

- Only one pedestrian and no bicyclists were observed during the traffic counts. During the traffic count adjacent to the development site at Beverly Road, the lone observed pedestrian walked northbound on Beverly Road and continued onto Oakland Drive. School bus stops were observed just north of the development site at the intersection of Beverly Road at Oakland Drive. In the morning and afternoon, school buses stopped at this intersection and picked up and dropped off children that live further to the west along Oakland Drive. All the buses traveled on Beverly Road, and none were observed traveling on Oakland Drive.
- Most of the observed traffic was passenger vehicles, but the traffic stream on Beverly Road and Tazewell Pike included public school buses, dump trucks, and larger single-unit trucks. Several semi-tractor trailers were observed during the traffic count. At the railroad crossing adjacent to the development site, all the school buses and several larger trucks stopped at the track before proceeding. Some of these stops occurred due to laws and regulations - a few occurred due to the drivers' not feeling comfortable crossing the bridge over Whites Creek simultaneously with oncoming traffic. While the bridge width is adequate, the bridge structure combined with Beverly Road's s-curve horizontal alignment contributes to some drivers' unease of crossing simultaneously.
- Due to the high vehicle delays and queues experienced on the Beverly Road approach at Tazewell Pike, a lot of courteous activity was observed by fellow motorists allowing other motorists to turn at the intersection. The most often observed courteous activity involved

westbound left-turning motorists on Tazewell Pike allowing northbound left-turning motorists to turn in front of them onto Tazewell Pike. While helpful to motorists on Beverly Road, this increased vehicle delays on Tazewell Pike.

- The existing northbound approach of Beverly Road is a single lane for left and right turns onto Tazewell Pike. However, the travel lane and the grassed shoulder on Beverly Road provide just enough width to simultaneously allow compact, smaller vehicles to be side-by-side for both left and right turns. A few times, when a left-turning motorist on Beverly Road had significant delays due to heavy traffic on Tazewell Pike, a right-turning motorist in a compact vehicle was observed driving on the grassed shoulder alongside the stopped left-turning vehicle. This maneuver was taken to avoid the vehicle queue and to complete their turn to the right without further waiting. This maneuver occurred three times during the traffic counts. It is assumed that this would occur more often if more space were alongside the road's edge. Larger vehicles are restricted from doing this due to the adjacent street signpost location and lack of shoulder.
- One observed turning characteristic at the intersection of Tazewell Pike at Beverly Road was westbound left-turning vehicles on Tazewell Pike consistently “short-turning” onto Beverly Road. This maneuver typically occurred when vehicles were not present and stopped on Beverly Road. However, a few times, this occurred when a vehicle on Beverly Road was approaching the intersection and nearly clipped by this “short turning”. This “short-turning” also occurred even when oncoming eastbound traffic on Tazewell Pike was not present.
- Long vehicle queues were regularly observed on the northbound approach of Beverly Road at Tazewell Pike, even during off-peak hours. During the AM and PM peak hours, substantial queues formed on Beverly Road, some approaching 1,000 feet in length. The observed queues were most significant during the PM peak hour and backed up past McCampbell Lane and nearly to Beverly Place. While it cannot be stated for certain, observed increased turning activity onto Beverly Place from Beverly Road during times of significant vehicle queues suggested some motorists were cutting thru to avoid the long queues at the intersection.





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FIGURE 4

The Preserve at Whites Creek

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 Tazewell Pike at Beverly Road. 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.

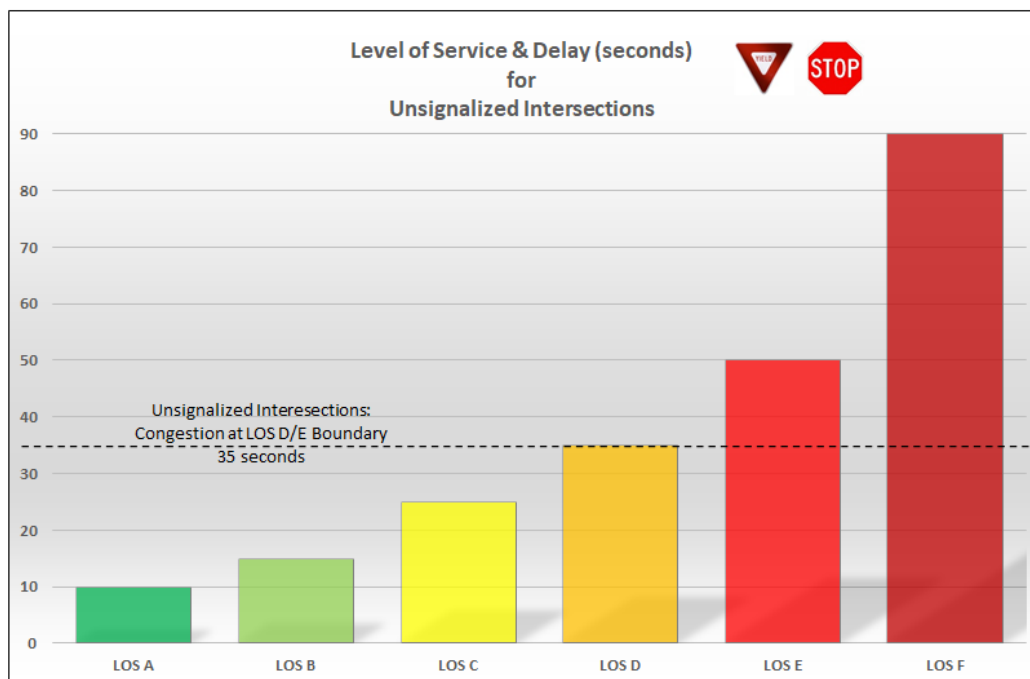
TABLE 2

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 G includes the worksheets for the existing 2022 peak hour capacity analyses.

As shown in Table 3, the northbound approach of Beverly Road at Tazewell Pike is calculated to operate with very poor LOS and high vehicle delays during the peak hours in the existing 2022 conditions. The northbound approach of Beverly Road is calculated to operate overcapacity in the existing conditions during both the AM and PM peak hours. The calculated length of the vehicle queues is presented later in the report, and these queue results closely matched the observed queue lengths on Beverly Road.

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
Tazewell Pike (EB & WB) at Beverly Road (NB)	 Unsignalized	Northbound Left/Right	F	1531.8	3.897	F	501.5	1.877
		Westbound Left	A	9.8	0.299	B	11.5	0.126

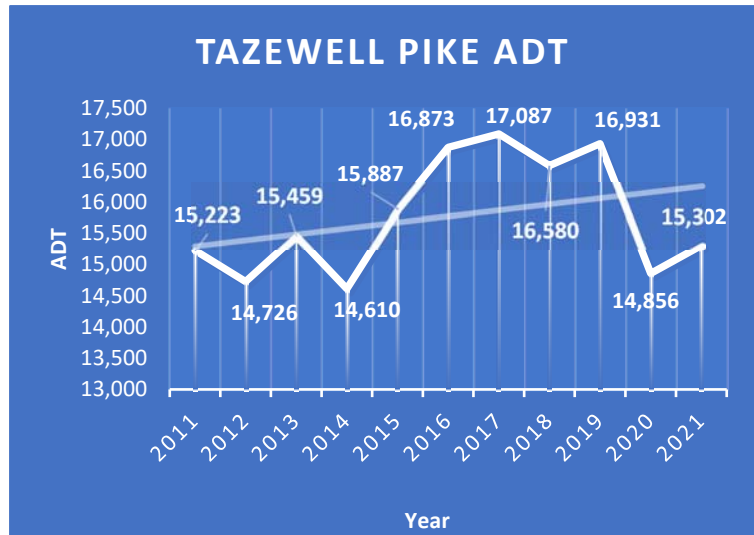
Note: All analyses were calculated in Synchro 11 software and reported using HCM 2010 intersection methodology

^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 build-out and full occupancy for this proposed development is assumed to occur by 2027.

Vehicular traffic in the study area has shown both low and modest growth over the past ten years, according to the TDOT count stations. As shown in Appendix A, Tazewell Pike has experienced annual growth of +0.1% over the past ten years, and Greenway Drive (just east of Beverly Road) has seen a +1.7% growth rate over the past ten years. The ADT on Tazewell Pike has fluctuated regularly over the past ten years.




Annual growth rates were assumed and applied to the existing 2022 volumes obtained at the intersection and at Beverly Road adjacent to the site to calculate the future volumes in the horizon year of 2027 without the potential development traffic.

A growth rate of 3% was used for Beverly Road, and 2% was assumed for Tazewell Pike. Higher rates were used to provide a conservative analysis and consider the possibility of increased growth due to the construction of other developments. These conservative rates would take into account the opening of the Amazon Fulfillment Warehouse at the former Knoxville Center Mall to the south and east of the proposed residential development. This warehouse is essentially completed, but the anticipated opening date was recently announced to be flexible due to changes in the retail and financial markets. Amazon previously said the warehouse facility would open sometime in 2022.

Capacity analyses were undertaken to determine the projected LOS in 2027 without the project at the intersection of Tazewell Pike at Beverly Road. The results are shown in Table 4, and Appendix G includes the capacity analysis worksheets. The results in Table 4 are similar to the existing 2022 results shown in Table 3, but with much higher vehicle delays on the northbound

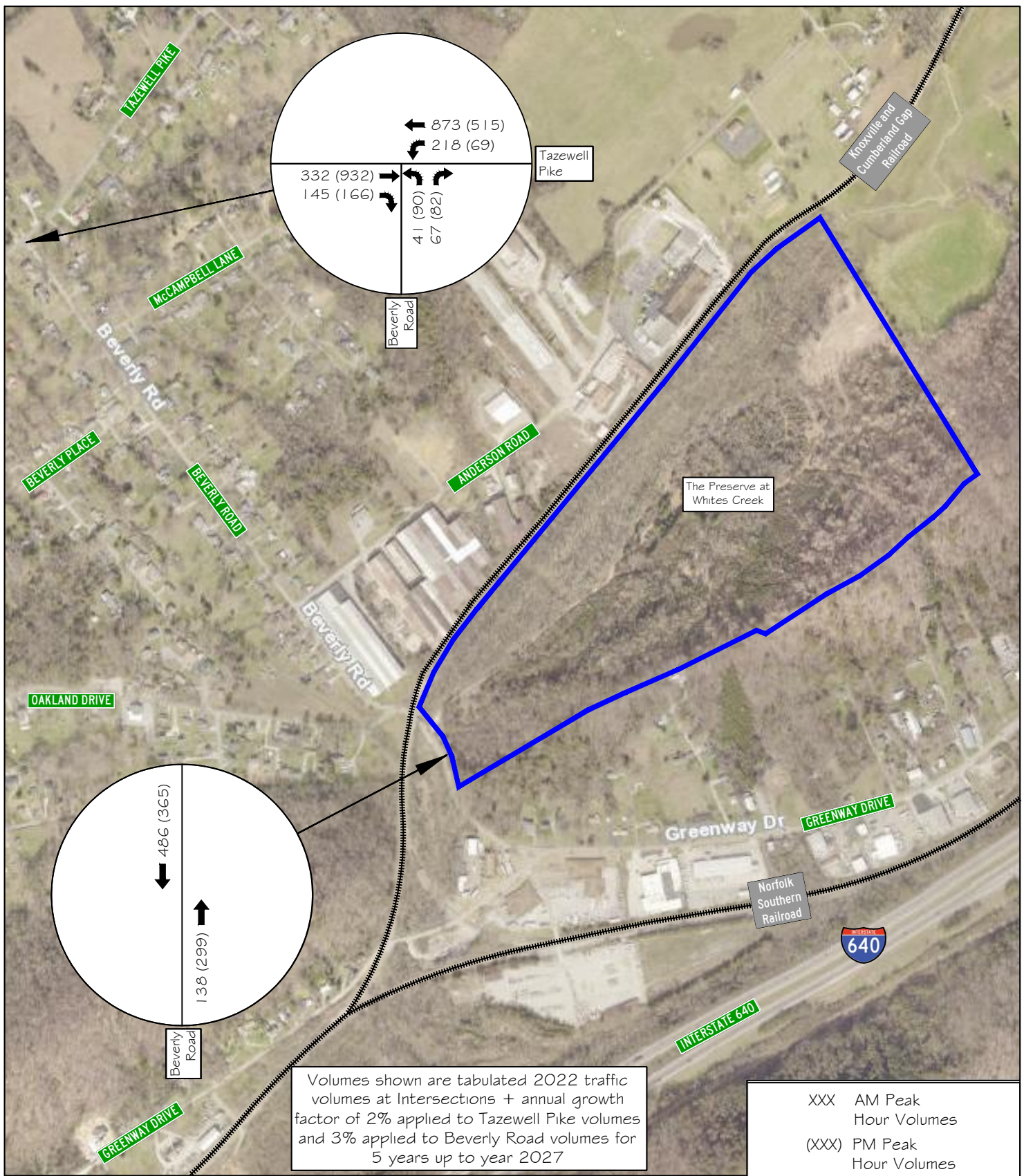
approach of Beverly Road. The northbound approach of Beverly Road is calculated to operate overcapacity in the projected 2027 conditions, even without the project. Figure 5 shows the projected 2027 traffic volumes without the project at the intersection and on Beverly Road adjacent to the development site during the AM and PM peak hours.

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

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS ^a	DELAY ^b (seconds)	v/c ^c	LOS ^a	DELAY ^b (seconds)	v/c ^c
Tazwell Pike (EB & WB) at Beverly Road (NB)		Northbound Left/Right	F	7531.7	16.116	F	970.7	2.888
		Westbound Left	B	10.4	0.344	B	12.4	0.152

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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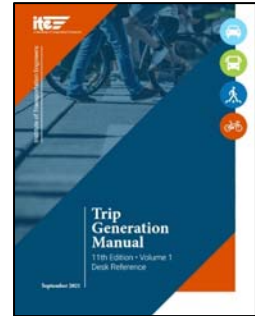
FIGURE 5

The Preserve at Whites Creek

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

▪ **TRIP GENERATION:**

A generated trip is a single or one-direction vehicle movement entering or exiting the study site. The estimated amount of traffic that the 120 single-family detached houses will generate was calculated based on rates and equations provided by the Trip Generation Manual, 11th Edition, a publication of the Institute of Transportation Engineers (ITE). The Trip Generation Manual is the traditional and most popular resource for determining trip generation rates when transportation impact studies are produced. The trip rate for the 75 multi-family attached townhouses was based upon equations provided by Knoxville-Knox County Planning. These equations were developed from an extensive local study to estimate townhouse (and apartment) trip generation in the surrounding area and were published in December 1999. For Knox County, this is the preferred rate to use for apartments and townhouses. This local rate calculates higher trip rates than the similar ITE land use.



The data and calculations from ITE and the local study for the proposed land uses are shown in Appendix H. A summary of this information is presented in the following table:

TABLE 5
TRIP GENERATION FOR THE PRESERVE AT WHITES CREEK
120 Single-Family Detached Homes & 75 Multi-Family Attached Townhouses

ITE LAND USE CODE	LAND USE DESCRIPTION	# OF UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	120	1,193	26%	74%		63%	37%	
				23	65	88	74	44	118
Local Trip Rate	Multi-Family Attached Townhouses	75	737	22%	78%		55%	45%	
				9	32	41	33	27	60
Total New Volume Site Trips			1,930	32	97	129	107	71	178

ITE Trip Generation Manual, 11th Edition and Local Trip Rates
Trips calculated by using Fitted Curve Equations

For the proposed residential development, it is estimated that 32 vehicles will enter and 97 will exit, for a total of 129 generated trips during the AM peak hour in the year 2027. Similarly, it is estimated that 107 vehicles will enter and 71 will exit, for a total of 178 generated trips during the

PM peak hour in the year 2027. The calculated trips generated for an average weekday are estimated to be 1,930 vehicles for the proposed development. No vehicle trip reductions were included in the calculations or analysis.

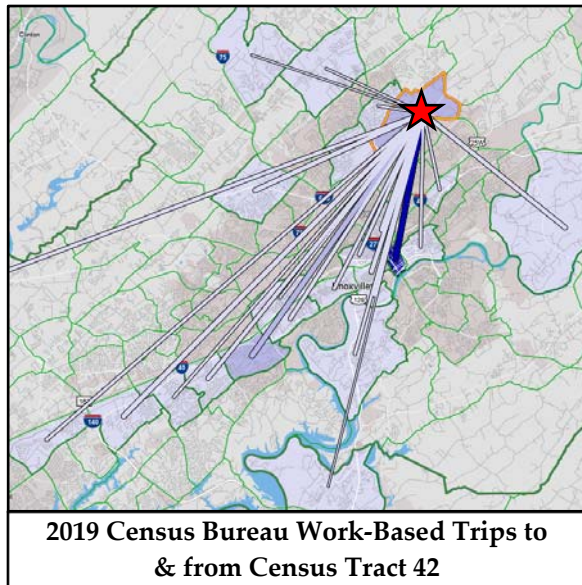
▪ **TRIP DISTRIBUTION AND ASSIGNMENT:**

The projected trip distribution and assignment for The Preserve at Whites Creek development 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 Tazewell Pike at Beverly Road, Beverly Road adjacent to the proposed development site, and an auxiliary, abbreviated traffic count at the intersection of Beverly Road at McCampbell Lane. This auxiliary count was located 600 feet southeast of the intersection of Tazewell Pike at Beverly Road. McCampbell Lane provides the sole outside road access for 38 single-family detached houses. These houses are located on McCampbell Lane and Shannon Lane. The results of this additional count are shown in Appendix F.

The auxiliary counts shown in Appendix F are a tabulation of the residents on McCampbell Lane and Shannon Lane entering and exiting to and from Beverly Road. Overall, it was determined that these residents traveled in the following percentages in the AM and PM peak hours:

Beverly Road at McCampbell Lane	
AM PEAK HOUR	
Enter from North	100%
Enter from South	0%
Exit to South	40%
Exit to North	60%
PM PEAK HOUR	
Enter from North	47%
Enter from South	53%
Exit to South	50%
Exit to North	50%

During the traffic counts, significant splits were observed on Beverly Road adjacent to the development site during the morning peak hours. In the AM peak hour, over 75% of thru traffic was observed traveling south towards Greenway Drive and 25% north. In the PM peak hour, the splits were more even, with 55% heading south and 45% traveling north on Beverly Road. Similar northbound and southbound directional movements (the turning movements at the intersection) were observed at the Tazewell Pike and Beverly Road intersection. The thru movements on Tazewell Pike showed a heavy directional flow, with nearly 2/3 heading west in the AM peak hour (towards Knoxville) and 2/3 heading east in the PM peak hour (away from Knoxville).

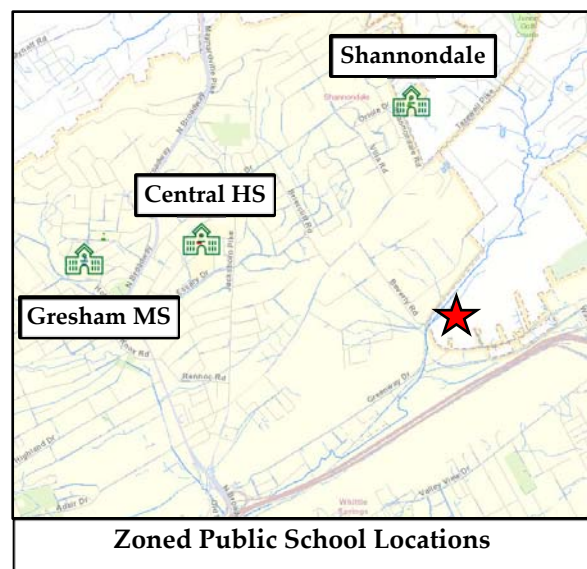


The second source for determining the projected trip distribution is based on work-related trips in the local area. Work-based trips will be a significant impetus for generated trips by the development, and these trips are more likely to travel to and from the south and southwest. This assertion is based on data from the United States Bureau website for Census Tract 42, where the development property is located. Based on 2019 (latest available) census data and as shown in Appendix I, most work-based trips in the surrounding area correspond to downtown Knoxville, the city center, the University of

Tennessee area, and areas of West Knoxville. Some work-based trips will also be drawn to and from Oak Ridge, the Forks of the River Industrial areas, and some closer to the development site in the Fountain City area. As described earlier, if and when the Amazon fulfillment center is opened at the former Knoxville Center Mall, it can be expected that this proposed residential development will see some travel to and from this distribution warehouse.

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 Shannondale Elementary, Gresham Middle, and Central High School.

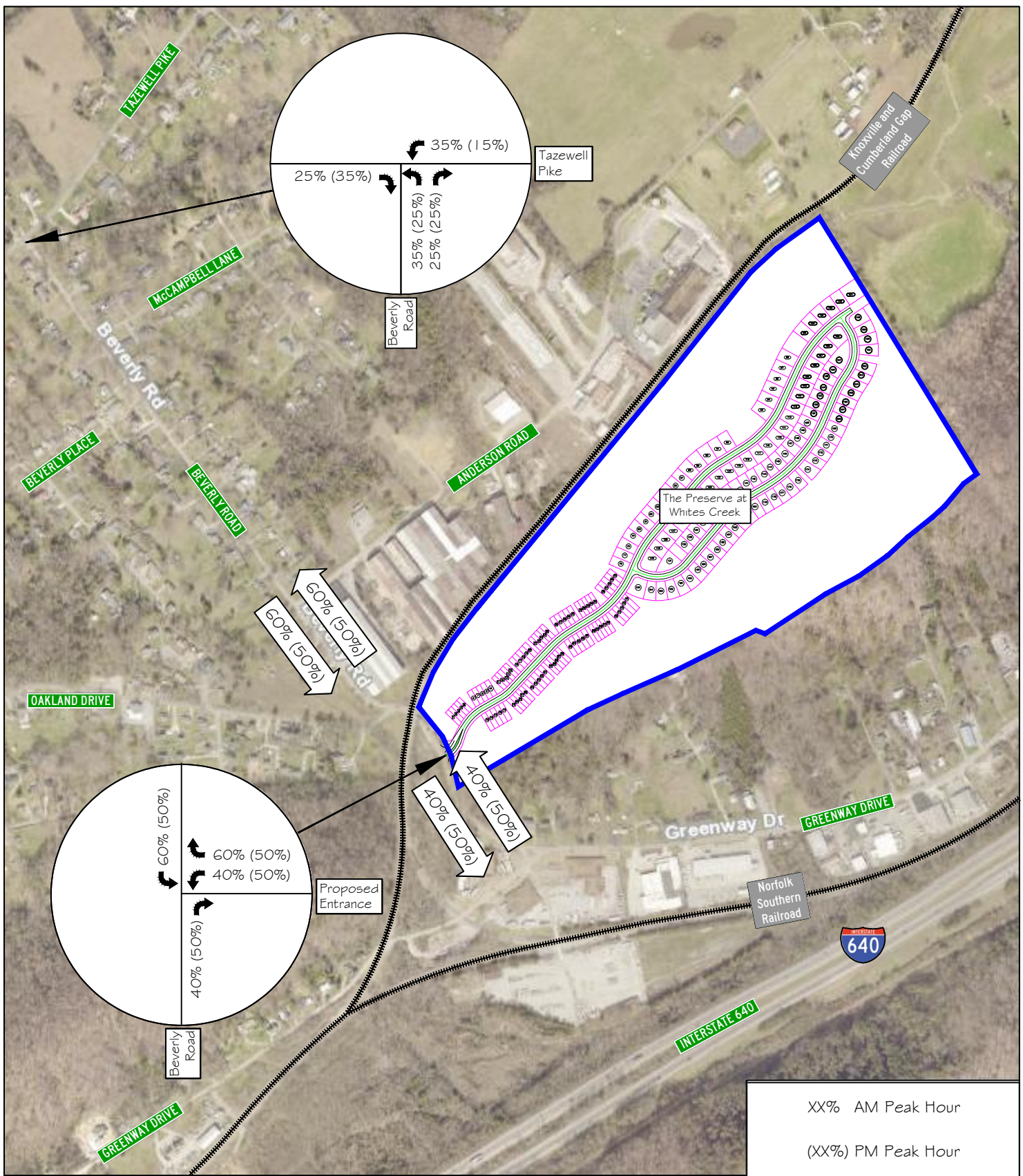
Shannondale Elementary is 1.6 miles away by roadway north of the development site. The most direct route to Shannondale Elementary will be north on Beverly Road and east on Tazewell Pike. Gresham Middle School is 2.7 miles away by roadway, west and on the other side of Broadway, with the most direct route to the north on Beverly Road and west on Tazewell Pike. Central High School is 1.8 miles away by roadway north and west, and the most direct route to Central High School will be similar to the initial path to Gresham Middle School.



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

Figure 6 shows the projected distribution of traffic entering and exiting the development at the Proposed Entrance on Beverly Road. The percentages shown in the figure only pertain to the trips generated by the proposed dwellings in the development calculated from the ITE and local trip rates. Ultimately, the projected trip distribution was heavily based on the observed traffic at the intersection of Beverly Road at McCampbell Lane and the traffic flows adjacent to the site on Beverly Road. Furthermore, the assumed distribution of vehicles entering from the north (southbound left turns) in the PM peak hour was weighted heavier than would otherwise. This weighting was done to account for the nearby railroad crossing and analyze a worst-case scenario of whether vehicle queues at the Proposed Entrance could back up to the railroad track.

Figure 7 shows the traffic assignment of the computed trips generated by the development and is based on the assumed distribution of trips shown in Figure 6. The trips and percentages shown in Figures 6 and 7 at the intersection of Tazewell Pike at Beverly Road assume that all the trips generated by the proposed development to and from the north will travel through this intersection. However, the possibility exists that some of these trips will travel via Oakland Drive, Beverly Place, or Anderson Road instead and bypass this intersection.



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

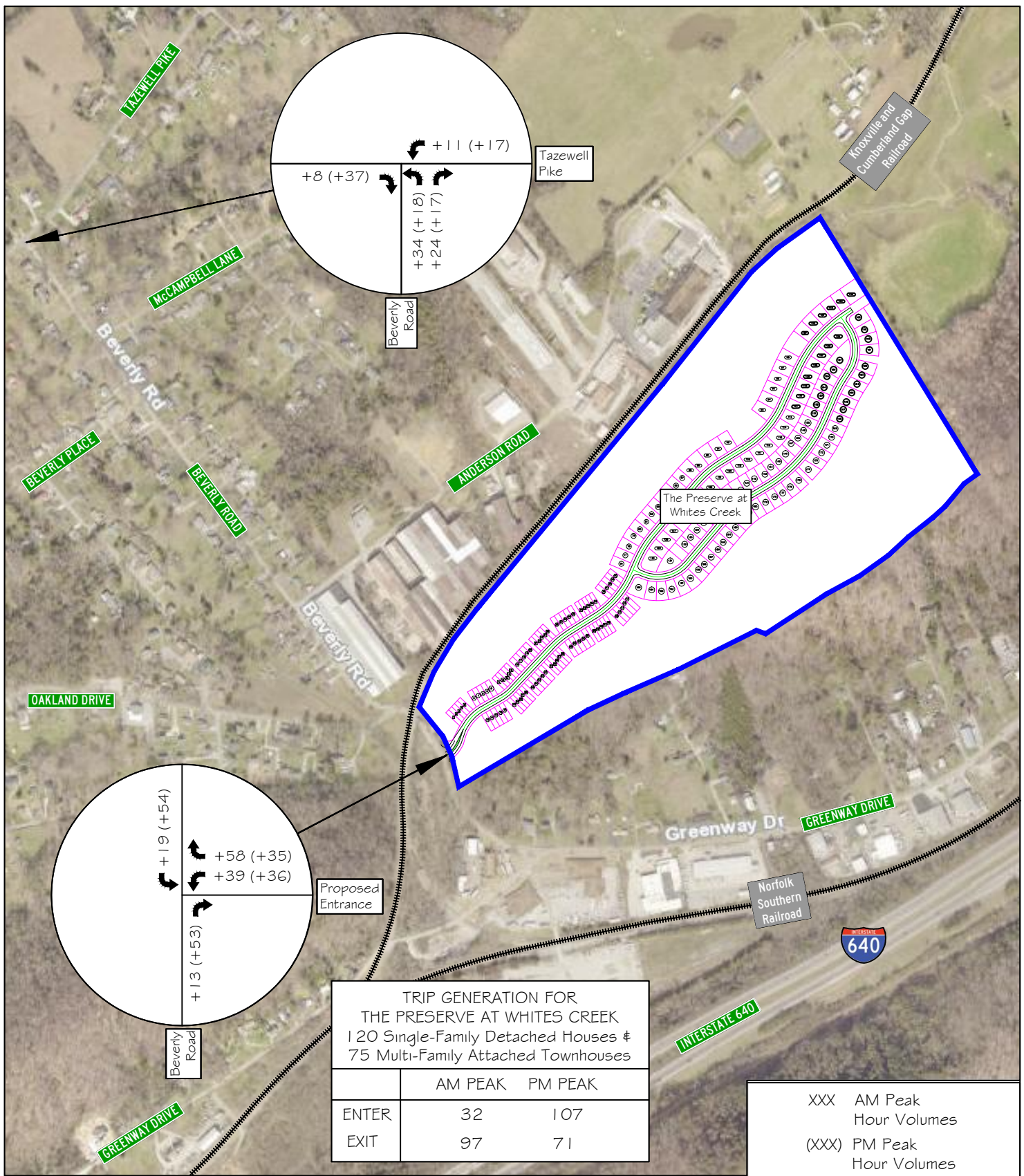
NOT TO SCALE



FIGURE 6

The Preserve at Whites Creek

Directional Distribution of Generated Traffic during AM and PM Peak Hour



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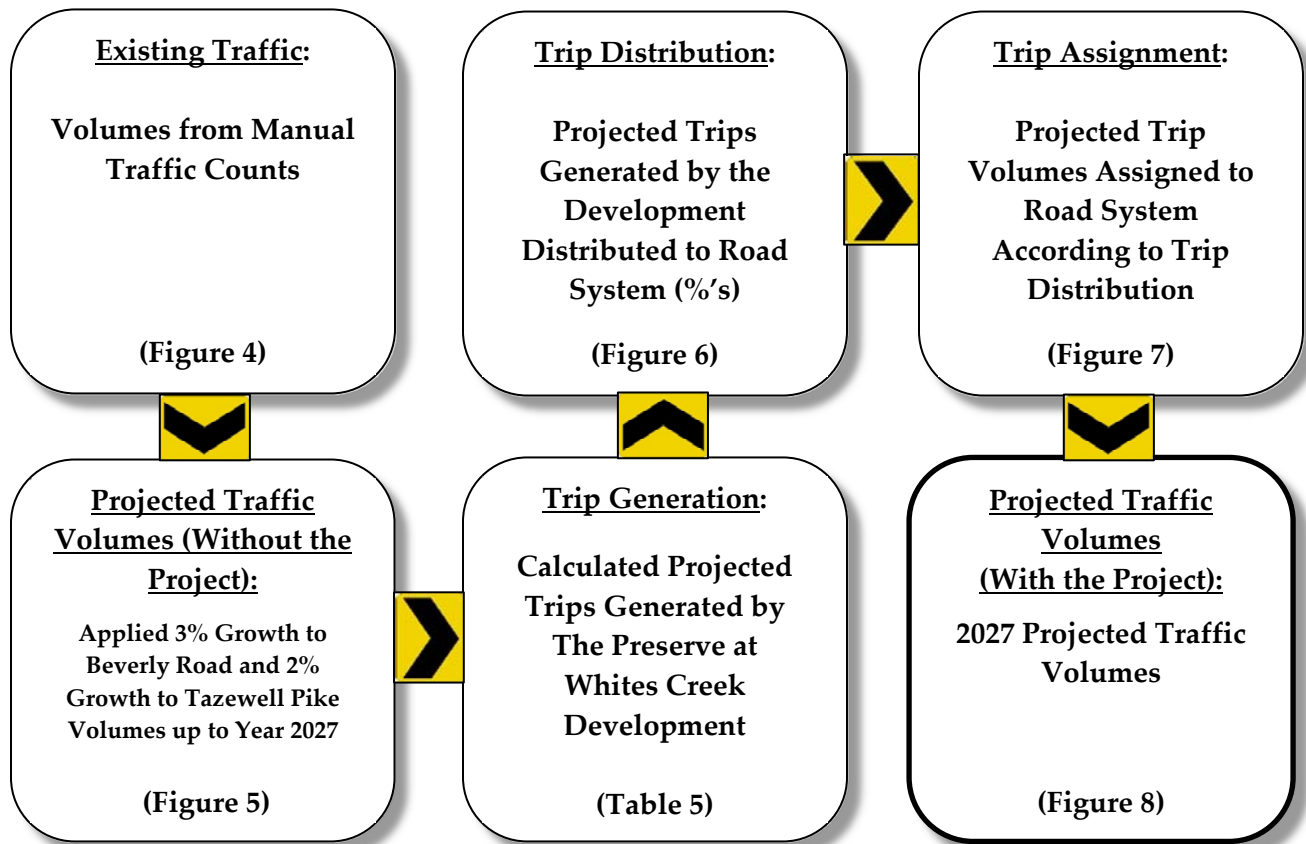
FIGURE 7

The Preserve at Whites Creek

Traffic Assignment of Generated Traffic
 during AM and PM Peak Hour

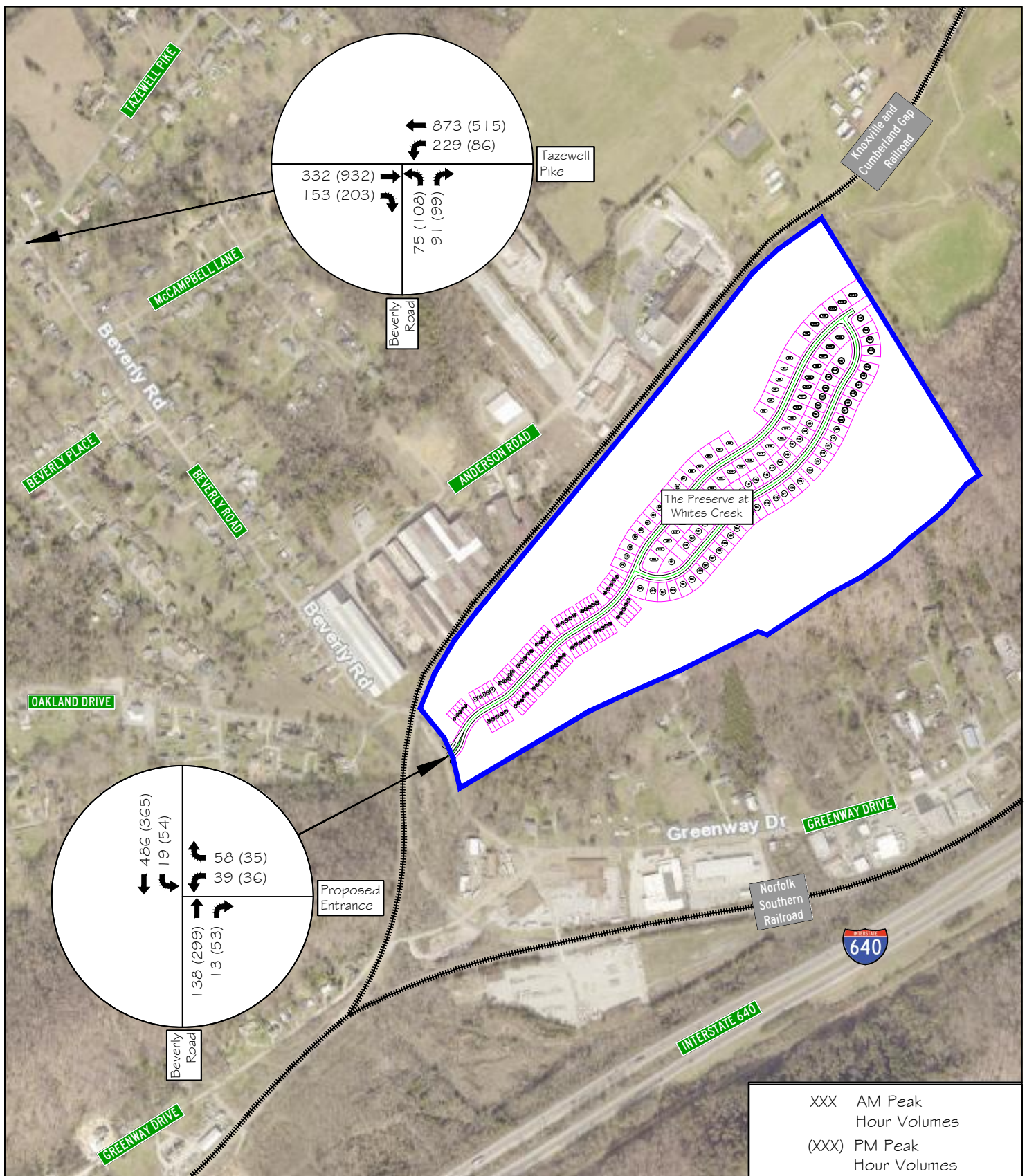
▪ **PROJECTED TRAFFIC CONDITIONS (WITH THE PROJECT):**

Overall, several additive steps were taken to estimate the total projected traffic volumes at the Tazewell Pike at Beverly Road intersection and the Proposed Entrance at Beverly Road when The Preserve at Whites Creek development is constructed and occupied in 2027. The steps are illustrated below for clarity and review:



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

The volumes shown in Figure 8 at the intersection of Tazewell Pike at Beverly Road assume that all the trips generated by the proposed development will travel through this intersection. However, the possibility exists that some of these trips will travel via Oakland Drive, Beverly Place, or Anderson Road instead and bypass this intersection.



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NOT TO SCALE





FIGURE 8

The Preserve at Whites Creek

2027 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 2027. The projected 2027 peak hour calculations with the project resulted in average to good LOS with low vehicle delays for the Proposed Entrance intersection at Beverly Road, as shown in Table 6. The intersection of Tazewell Pike at Beverly Road in the projected 2027 conditions is calculated to operate with intolerable vehicle delays for the Beverly Road approach in the peak hours. The northbound approach of Beverly Road is calculated to operate overcapacity in the projected 2027 conditions, several times over. Appendix G includes the worksheets for these capacity analyses.

TABLE 6
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
Tazewell Pike (EB & WB) at Beverly Road (NB)	 Unsignalized	Northbound Left/Right	F	29361.8	62.268	F	1545.9	4.138
		Westbound Left	B	10.6	0.365	B	13.1	0.197
Beverly Road (SB & NB) at Proposed Entrance (WB)	 Unsignalized	Westbound Left/Right	B	14.2	0.216	C	16.1	0.196
		Southbound Left	A	7.6	0.015	A	8.2	0.051

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.

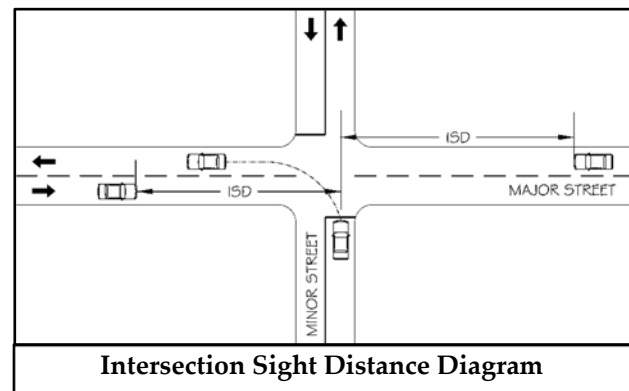
➤ **EVALUATION OF SIGHT DISTANCE**

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.



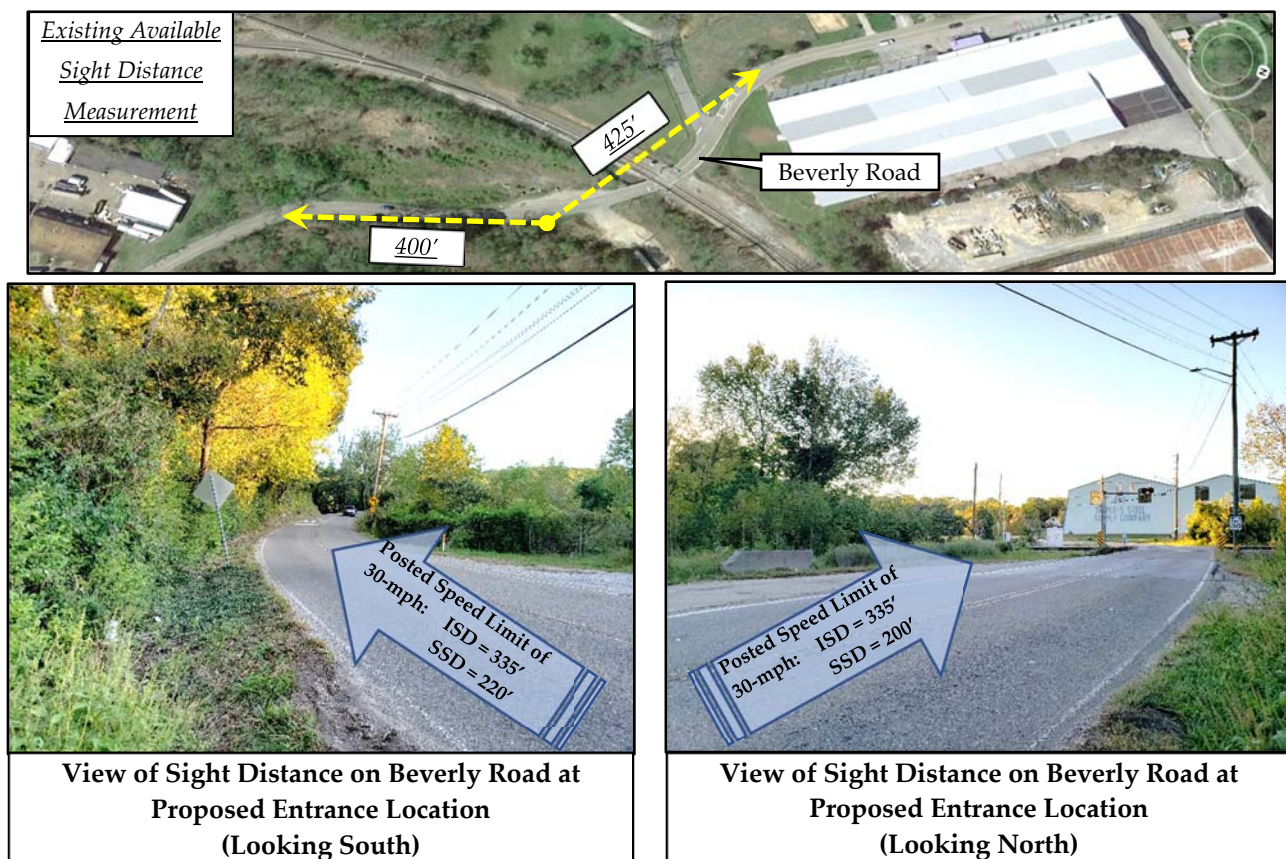
Three traffic maneuvers are available for vehicles stopped on a minor street at a 4-way intersection: (1) left-turn, (2) right-turn, (3) or a crossing maneuver across the major street. For turns from the minor street, ISD is needed to allow a stopped motorist to turn onto a major street without being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

With a posted speed limit of 30-mph on Beverly Road at the Proposed Entrance, the ISD is 335 feet calculated based on AASHTO's (American Association of State Highway Transportation Officials) guidance.

Beverly Road has a 7% road grade downhill to the north at the Proposed Entrance location on the southern side and 0.5% on the northern side (the difference is due to the entrance's location on a vertical curve). Based on the posted speed limit of 30-mph on Beverly Road and the existing road grades, the SSD is calculated to be 200 feet looking to the north and 220 feet to the south.

Visual observations of the sight distances at the Proposed Entrance location on Beverly Road were undertaken. Using a Nikon Laser Rangefinder at the Proposed Entrance location, the available sight distance was visually estimated to be 425' feet to the north (towards Tazewell Pike) and 400' feet to the south. Based on visual observation, the available sight distances from the Proposed Entrance on Beverly Road will be adequate.

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



➤ EVALUATION OF TURN LANE THRESHOLDS

An evaluation of the need for separate entering turn lanes into the development in the projected 2027 conditions was conducted for the Proposed Entrance at Beverly Road.

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 a posted speed limit of 30-mph on Beverly Road, separate left and right-turn entering lanes are not warranted at the Proposed Entrance based on the projected 2027 AM and PM peak hour traffic volumes. The worksheets for these evaluations are provided in Appendix J.

➤ PROJECTED VEHICLE QUEUES

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

The 95th percentile vehicle queue is the recognized measurement in the traffic engineering profession as the design standard used when considering vehicle queue lengths. A 95th percentile vehicle queue length means 95% certainty that the vehicle queue will not extend beyond that point. The calculated vehicle queue results were based on averaging the outcome obtained during ten traffic simulations. The 95th percentile vehicle queue lengths at the intersection of Tazewell Pike at Beverly Road are shown in Table 7 for the existing 2022 conditions, projected 2027 conditions without the project, and the projected 2027 conditions with the project. The calculated vehicle queue lengths for the Proposed Entrance at Beverly Road are shown in Table 8. The vehicle queue worksheet results from the SimTraffic software are in Appendix K.

TABLE 7
VEHICLE QUEUE RESULTS SUMMARY -
TAZEWELL PIKE AT BEVERLY ROAD

INTERSECTION	APPROACH/ MOVEMENT	SIMTRAFFIC 95 th PERCENTILE QUEUE LENGTH (ft)					
		EXISTING 2022 CONDITIONS		PROJECTED 2027 CONDITIONS (WITHOUT THE PROJECT)		PROJECTED 2027 CONDITIONS (WITH THE PROJECT)	
		AM PEAK HOUR	PM PEAK HOUR	AM PEAK HOUR	PM PEAK HOUR	AM PEAK HOUR	PM PEAK HOUR
Tazwell Pike (EB & WB) at Beverly Road (NB)	Eastbound Thru/Right	14	18	16	16	13	20
	Westbound Left/Thru/Right	301	318	426	485	463	668
	Northbound Left/Right	292	967	832	2039	1965	2051

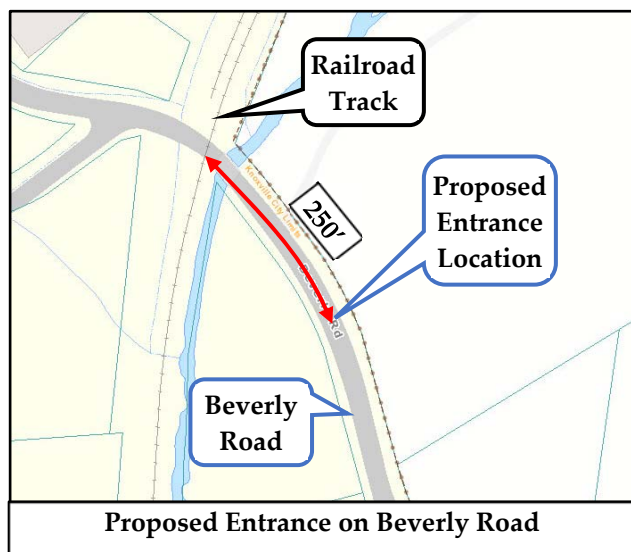
Note: 95th percentile queues were calculated in SimTraffic 11 software

TABLE 8
VEHICLE QUEUE RESULTS SUMMARY -
BEVERLY ROAD AT PROPOSED ENTRANCE

INTERSECTION	APPROACH/ MOVEMENT	SIMTRAFFIC 95 th PERCENTILE QUEUE LENGTH (ft)	
		PROJECTED 2027 CONDITIONS (WITH THE PROJECT)	
		AM PEAK HOUR	PM PEAK HOUR
Beverly Road (SB & NB) at Proposed Entrance (WB)	Westbound Left/Right	59	55
	Southbound Left/Thru	23	61

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

Table 7 shows that the projected vehicle queues on Beverly Road at the intersection with Tazewell Pike will be intolerable and has existing and projected unreasonable vehicle queue lengths on the Tazewell Pike approaches as well.



The Proposed Entrance on Beverly Road will be located approximately 250 feet from the railway (centerline to centerline). Based on the calculations, the longest southbound vehicle queue in the projected 2027 conditions at the Proposed Entrance is 61 feet in the PM peak hour, as shown in Table 8. This queue calculation suggests that the Proposed Entrance location will be located far enough away from the railroad to ensure that vehicle queues do not back up onto the railroad track.

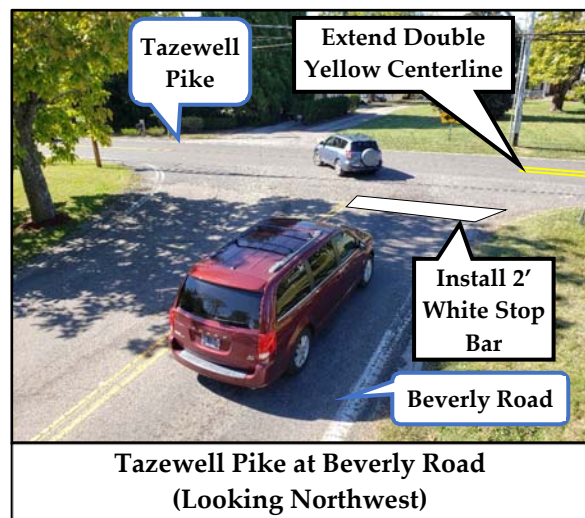
CONCLUSIONS & RECOMMENDATIONS

The following is an overview of recommendations to minimize the transportation impacts of The Preserve at Whites Creek on the adjacent transportation system while attempting to achieve an acceptable traffic flow and safety level.



Tazewell Pike at Beverly Road: The existing and projected 2027 level of service calculations for this intersection resulted in very poor LOS and massively long queues on Beverly Road during peak hours. These poor operations will increase cut-thru traffic on adjacent roadways if remediation is not carried out. These side roads are primarily residential and are not constructed to handle a large influx of vehicles or vehicles speeding to compensate for the perceived lost time due to the longer travel distances to and from Tazewell Pike. The recent placement of speed humps on Beverly Place attests to the traffic volumes spilling from Beverly Road.


In the interim, to reduce the possibility of vehicles clipping each other at the intersection, it is recommended that a 24" white stop bar be installed on Beverly Road and the yellow double centerline on the westbound approach of Tazewell Pike be extended further west. It is believed that these pavement markings would provide a better visual target to designate the appropriate location and turning path for westbound left-turn motorists on Tazewell Pike turning onto Beverly Road and reduce the number of "short-turns".



There was a study in the past that determined that this intersection met warrants for traffic signalization. Though traffic signal warrants were met in the past, it is not known by the analyst why this intersection was not remediated with a traffic signal. It is highly recommended that this intersection be converted to a traffic signal as soon as feasible. In addition to installing a traffic signal, turn lanes on the approaches at the t-intersection will need to be constructed to remediate the vehicle delays and queues fully. Overall, the existing vehicle delays and queues are not acceptable and are projected to worsen in the future, even without The Preserve at Whites Creek being developed.

As a further investigation into potential remediation for this intersection in the projected 2027 conditions, the intersection was analyzed with a traffic signal to provide some general recommendations based on the results of this study. The traffic signal timing at the intersection was optimized in Synchro software. The intersection was designed to fully contain the projected 95th percentile vehicle queue lengths and result in reasonable LOS. The results of this additional analysis are included in Appendix G, and the results are shown in Table 9.

TABLE 9
2027 INTERSECTION CAPACITY ANALYSIS RESULTS -
PROJECTED TRAFFIC CONDITIONS (WITH THE PROJECT) AND TRAFFIC SIGNAL

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
Tazewell Pike (EB & WB) at Beverly Road (NB)	 Signalized	Eastbound	A	5.9	0.730	C	30.2	0.780
		Westbound	B	17.6		B	10.5	
		Northbound	C	25.1		C	28.6	
		Summary	B	15.5	0.730	C	24.1	0.780

Note: All analyses were calculated in Synchro 11 software and reported using HCM 2000 intersection methodology

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

The analysis with a traffic signal and the results shown in Table 9 included additional lanes at the intersection. These lanes included a new eastbound right-turn lane on Tazewell Pike with a storage length of 75 feet, a new westbound left-turn lane on Tazewell Pike with a storage length of 100 feet, and a northbound right-turn lane on Beverly Road with a storage length of 125 feet. Compared to the results in Table 6, with the intersection operating as-is with stop conditions on Beverly Road, the vehicle delays for the northbound approach are incredibly reduced with a traffic signal and additional lanes.





Beverly Road at Proposed Entrance: The projected 2027 level of service calculations for the Proposed Entrance intersection at Beverly Road resulted in low vehicle delays. The construction of left and right-turn lanes on Beverly Road for entering traffic is not warranted at the Proposed Entrance. Dual exiting lanes are shown in the layout plan, but a single exiting lane for the development entrance will be sufficient.

- 2a) It is recommended that a Stop Sign (R1-1) be installed, and a 24" white stop bar be applied to the Proposed Entrance approach at Beverly Road. The stop bar should be applied a minimum of 4 feet away from the edge of Beverly Road and placed at the desired stopping point that maximizes the sight distance.
- 2b) Sight distances at the Proposed Entrance approach at Beverly Road must not be impacted by future landscaping, signage, or existing vegetation. Based on a posted speed limit of 30-mph on Beverly Road, the required intersection sight distance is 335 feet looking in each direction at the entrance. The stopping sight distance is 200 feet looking to the north and 220 feet to the south at the Proposed Entrance location on Beverly Road. A visual inspection determined that the intersection and stopping sight distances are available at the Proposed Entrance location. The site designer must ensure that these sight distances are accounted for and provided in the design plans.

Since there is existing vegetation and a sharp horizontal curve to the south of the Proposed Entrance on Beverly Road, it is recommended that a registered land surveyor make measurements to determine the available sight distance. Likewise, while the sight distance to the north appears to be more than what is required, it is recommended that the registered land surveyor measure the sight distance to the north as well. The horizontal s-curve alignment of Beverly Road, the railroad structures, and the vegetation along the railroad hinders full sight distance availability.

- 2c) The 95th percentile vehicle queue calculations for the southbound approach in the projected 2027 conditions on Beverly Road at the Proposed Entrance resulted in 61 feet. This distance is available between the railroad track and the Proposed Entrance location. Due to the hazards presented at an at-grade railroad crossing, it is recommended that the site designer keep this separation between the two.

Keeping the Proposed Entrance on Beverly Road as far south from the railroad and creek crossing helps ensure that any potential backups do not extend back to the track.

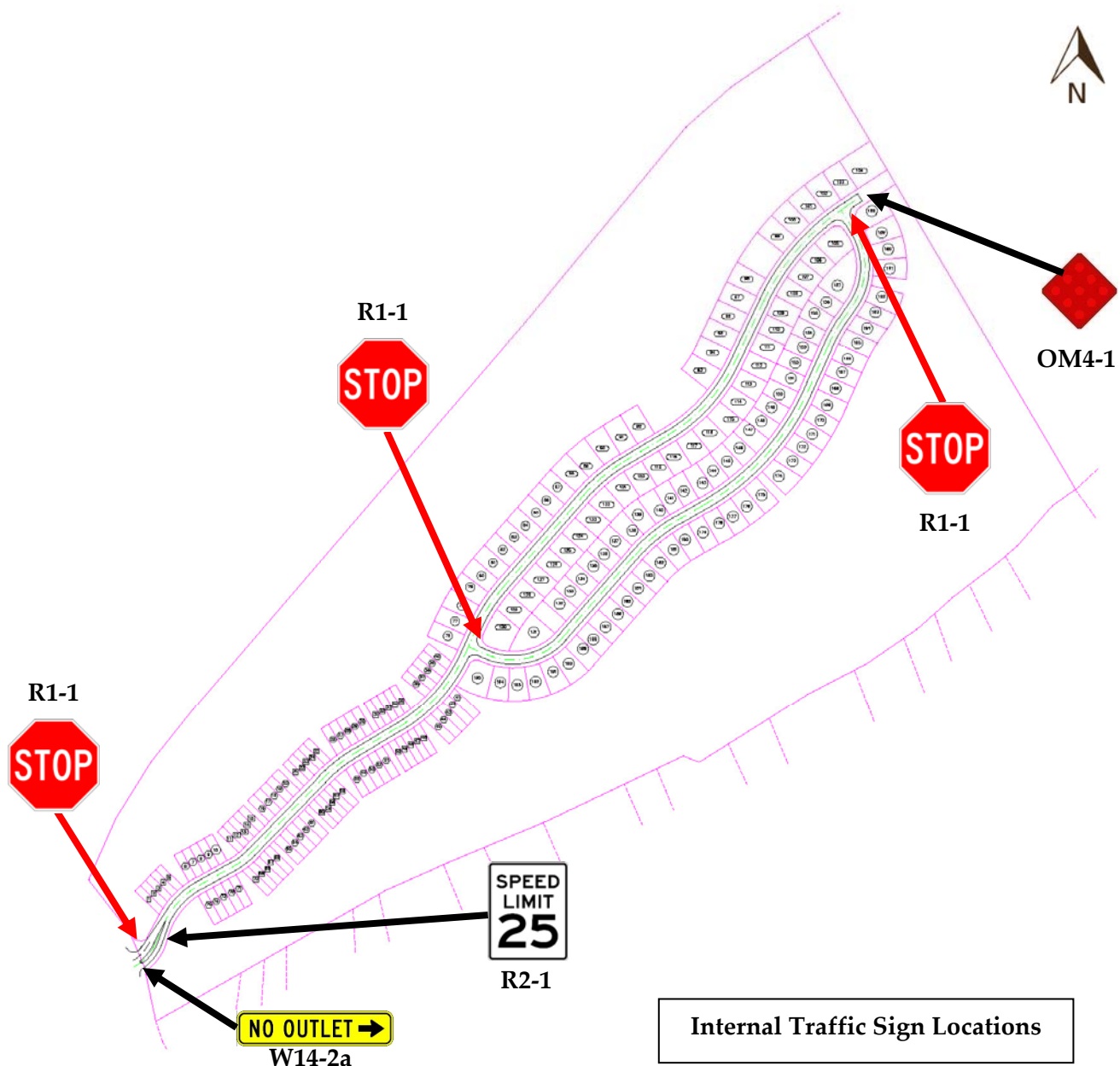
Furthermore, due to the low elevation and proximity to Whites Creek, keeping the Proposed Entrance away, there will be a reduced possibility that the entrance will be blocked during significant storm events.

The potential for a secondary access point into the development is non-existent. This non-potential is due to the limited road frontage along Beverly Road, the existing land features, and the lack of other roads around the development property. The existing land features include the mountain ridge with steep topography, Whites Creek, the railroad line, and these all contribute to limited opportunities to develop a secondary access point.



The Preserve at Whites Creek Internal Roads: The layout plan shows one entrance on Beverly Road constructed for the development, as shown in Figure 3.

- 3a) A 25-mph Speed Limit Sign (R2-1) is recommended to be posted near the beginning of the development entrance off Beverly Road. It is recommended that a “No Outlet” Sign (W14-2a) be installed at the front of the development at Beverly Road. This sign can be installed above or below the street name sign.
- 3b) End of roadway signage (OM4-1) should be installed at the eastern end of Road “A” if a stub road is constructed. Stop Signs (R1-1) with 24” white stop bars and other traffic signage are recommended to be installed at the internal locations, as shown below:



- 3c) 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 these internal sight distance lengths are met.
- 3d) All drainage grates and covers for the residential development must be pedestrian and bicycle safe.
- 3e) The site designer should include a parking area and a centralized mail delivery center within the development if directed by the local post office. The site plan does not show a general location in the development, but a specific plan with a parking area should be designed and provided if required.
- 3f) For residential subdivisions with a single access point and more than 150 units, the County has a long-standing unwritten design policy requiring a boulevard road typical section at the entrance. This policy is to ensure access to the subdivision during potential emergencies. Since the proposed layout of The Preserve at Whites Creek only includes one means of ingress and egress and will have 195 units, the subdivision entrance is recommended to be designed and constructed with a boulevard roadway section. At a minimum, the boulevard section should have a 10-foot median with 2 – 18-foot lanes within 60 feet of right-of-way. Typically, a boulevard road section is designed and constructed to the first intersecting street within the development, which would be Road “B” in this case.
- 3g) All road grade and intersection elements should be designed to AASHTO, TDOT, the City of Knoxville, and Knox County specifications and guidelines to ensure proper operation.



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

- 4a) It is recommended that a “Do Not Stop on Tracks” (R8-8) sign be installed to provide additional awareness regarding the railroad crossing if an unexpectedly long vehicle queue forms on the southbound approach of Beverly Road at the intersection with the Proposed Entrance. The sign should be located on the right-hand side of Beverly Road on the near side (north side) of the railroad grade crossing facing southbound traffic.



**Do Not Stop on
Tracks
(R8-8)**

- 4b) According to Google Street Maps, as recently as February 2019, a “Narrow Bridge” (W5-2) sign was installed for southbound traffic on Beverly Road just north of the railroad crossing and south of the intersection with Oakland Drive. This sign is no longer installed. To match the existing warning sign for northbound traffic on Beverly Road before the bridge and to provide advance warning, this signage should be reinstalled. Its previous location may need re-examination since the image in Google Maps shows the signage leaning backward, suggesting that a larger vehicle turning right from Oakland Drive to southbound Beverly Road may have struck and pushed it over.



**Narrow Bridge
(W5-2)**

- 4c) The existing bridge alignment and width on Beverly Road adjacent to the rail crossing are not ideal. Still, it has sufficient width (just over 20 feet) even though it does make some motorists driving larger vehicles uncomfortable to cross simultaneously, as observed. However, this bridge, along with the s-curvature of Beverly Road and the railroad crossing, does seem to reduce vehicle speeds in the vicinity and acts as a “natural” traffic calming measure.

APPENDIX A

HISTORICAL TRAFFIC COUNT DATA

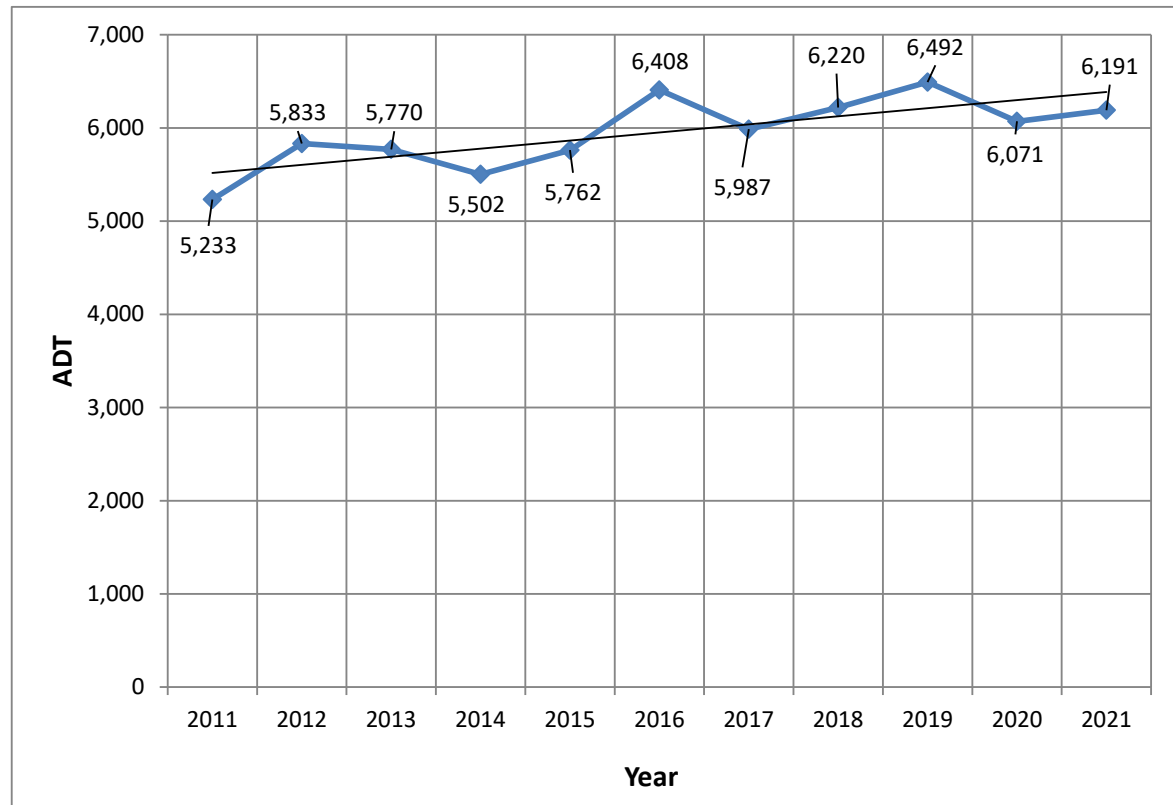
Historical Traffic Counts

Organization: TDOT

Station ID #: 47000508

Location: Greenway Drive, east of Beverly Road

YEAR	ADT	
2011	5,233	Trendline ↓
2012	5,833	
2013	5,770	
2014	5,502	
2015	5,762	
2016	6,408	
2017	5,987	
2018	6,220	
2019	6,492	
2020	6,071	
2021	6,191	



2011 - 2021 Growth Rate = 18.3%

Average Annual Growth Rate = 1.7%

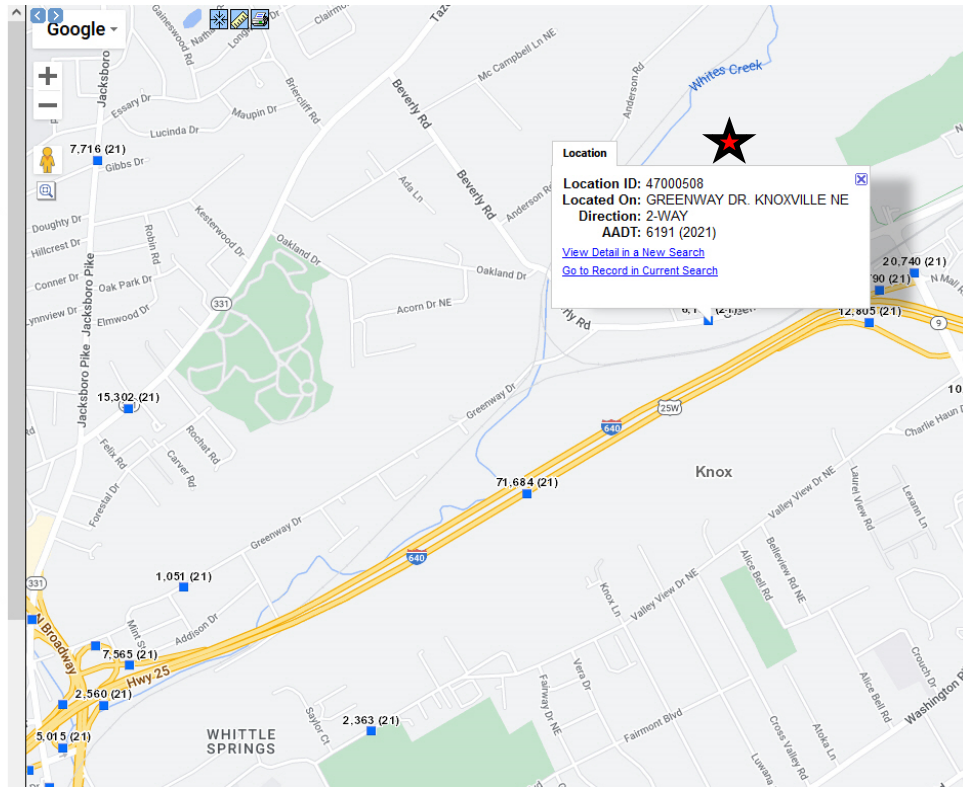
[List View](#)
[All DIRs](#)

Record	7631	of 15612	Goto Record	go
Location ID	47000508	MPO ID		
Type	SPOT	HPMS ID		
On NHS		On HPMS		
LRS ID	4705653001	LRS Loc Pt.	1.058	
SF Group	Urban	Route Type		
AF Group	18	Route		
GF Group	Knox	Active	Yes	
Class Dist Grp	18	Category	CC	
Seas Class Grp				
WIM Group				
QC Group	Default			
Funct'l Class	Minor Collector	Milepost		
Located On	GREENWAY DR.			
Loc On Alias	KNOXVILLE NE			
More Detail				
STATION DATA				

Directions: **2-WAY**

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2021	6,191	557	9	65	6,104 (99%)	87 (1%)	
2020	6,071	663	11	65	5,865 (97%)	206 (3%)	
2019	6,492		12	65			
2018	6,220		10	65			
2017	5,987 ²						

1-5 of 12



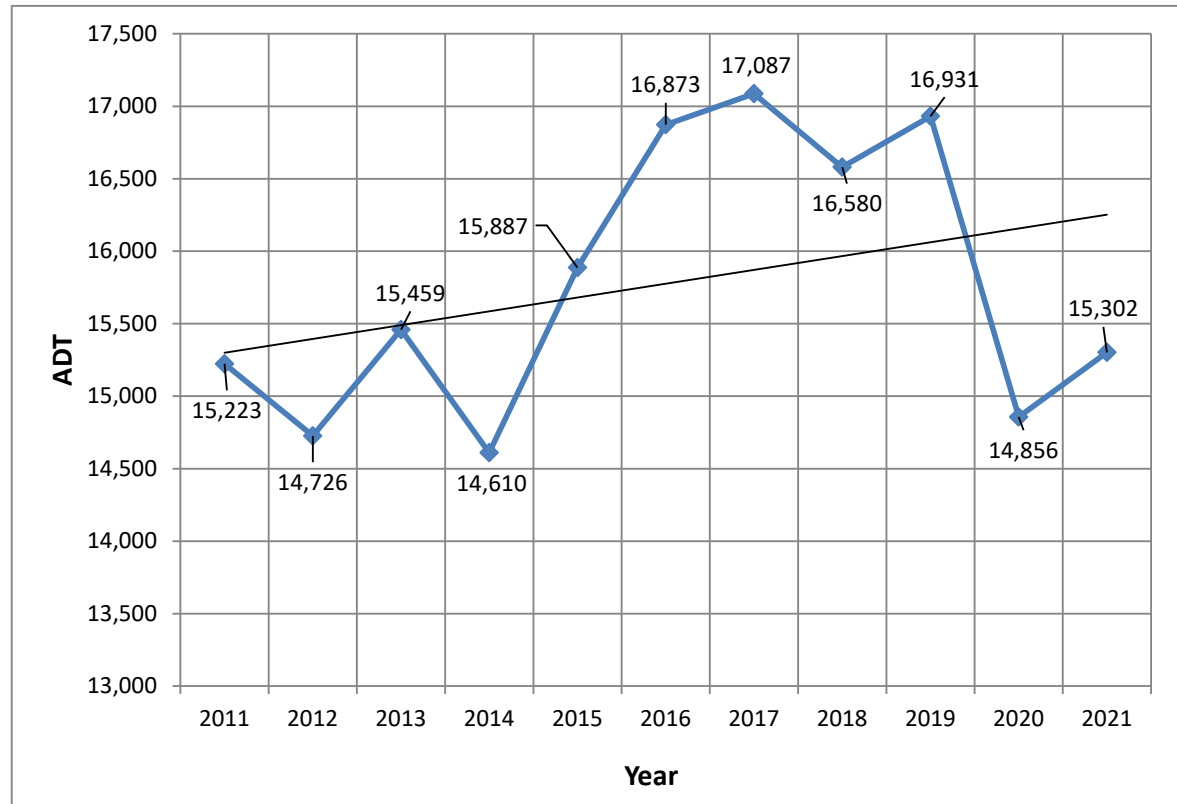
Historical Traffic Counts

Organization: TDOT

Station ID #: 47000054

Location: Tazewell Pike, east of Jacksboro Pike

YEAR	ADT	Trendline ↓
2011	15,223	
2012	14,726	
2013	15,459	
2014	14,610	
2015	15,887	
2016	16,873	
2017	17,087	
2018	16,580	
2019	16,931	
2020	14,856	
2021	15,302	



2011 - 2021 Growth Rate = 0.5%


Average Annual Growth Rate = 0.1%


APPENDIX B

WALK SCORE

WALKSCORE


(from walkscore.com)




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

 [Go](#)


4760 Beverly Road

Knoxville, Tennessee, 37918

Commute to **Knoxville, TN** 

 16 min  39 min  60+ min [View Routes](#)

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

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

Walk Score

5

Car-Dependent
Almost all errands require a car.

Transit Score

17

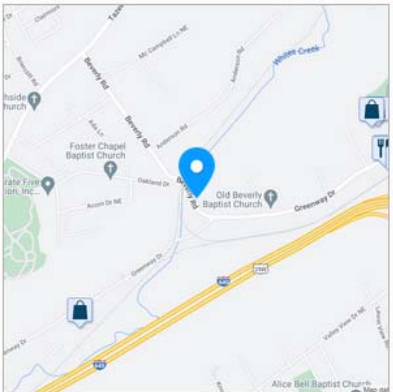
Minimal Transit
It is possible to get on a bus.

Bike Score

3

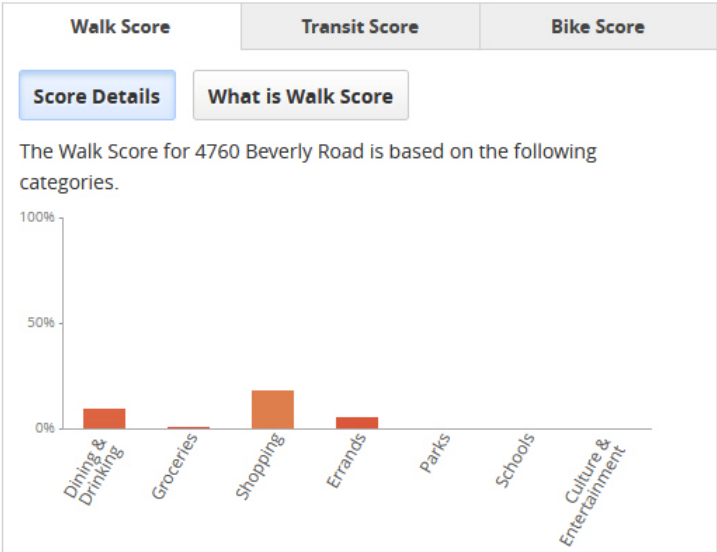
Somewhat Bikeable
Minimal bike infrastructure.

[About your score](#)



Scores for 4760 Beverly Road

×



Scores for 4760 Beverly Road

×



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 4760 Beverly Road

×

Walk Score

5

Transit Score

17

Bike Score

3

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 4760 Beverly Road.

Map showing the area around 4760 Beverly Road. The map displays a 20-minute walking radius (indicated by a green outline) and includes labels for nearby streets (Beverly Rd, Greenway Dr, Jackaboro Pike) and landmarks (New Harvest Park). The map is powered by Google Maps and OpenStreetMap contributors.

What's Nearby

Restaurants:

Habaneros Mexican Grill

0.7mi

Coffee:

Starbucks

0.8mi

Bars:

Toney Baked Ham

0.9mi

Parks:

Fountain City Park

1.7mi

Schools:

Richard Yankley School

1.2mi

Shopping:

Vounteer Lawn Care

0.6mi

Entertainment:

Regal Entertainment Group

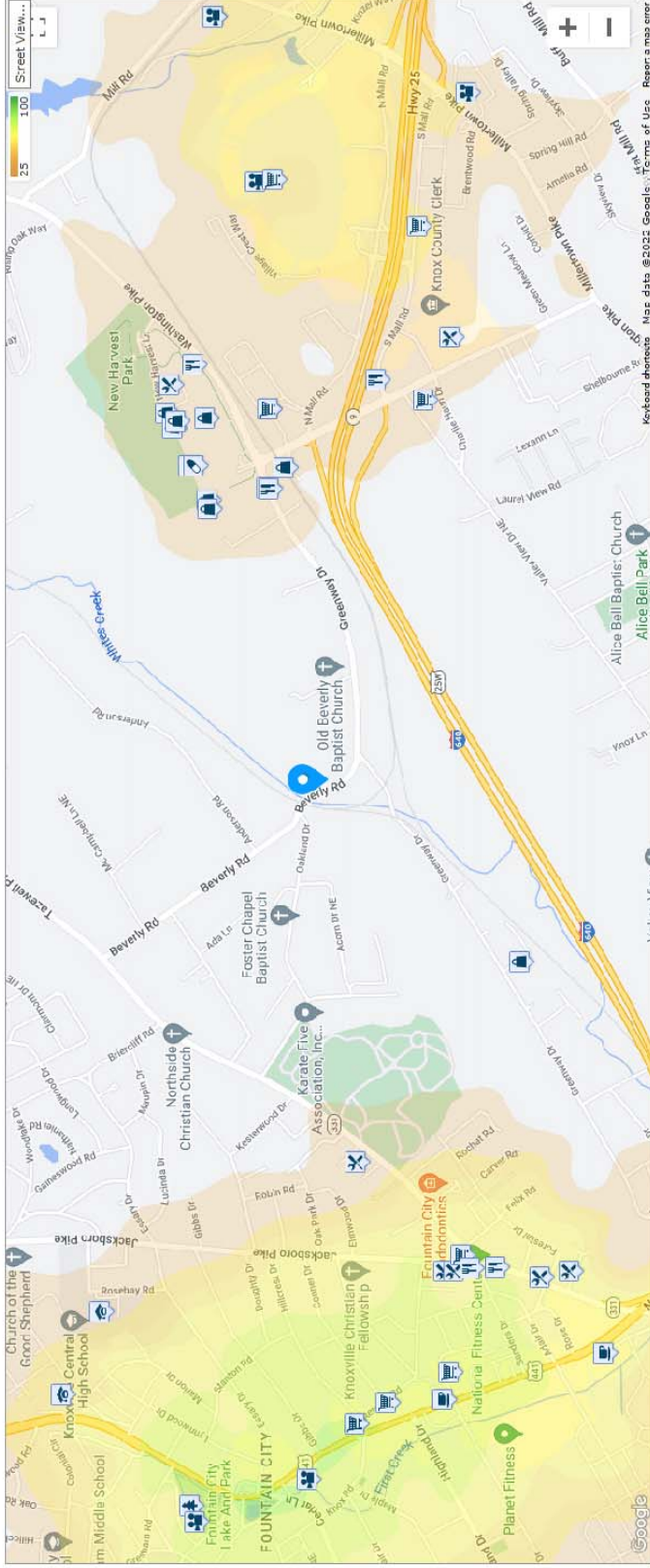
1.5mi

Errands:

Target Pharmacy

0.8mi

Search Nearby:



APPENDIX C

KNOXVILLE AREA TRANSIT MAP AND INFORMATION

Knoxville City Center



Legend

Transfer Point

Lift Service Area Boundary

Points of Interest

Hospital

School

Library

Point of Interest

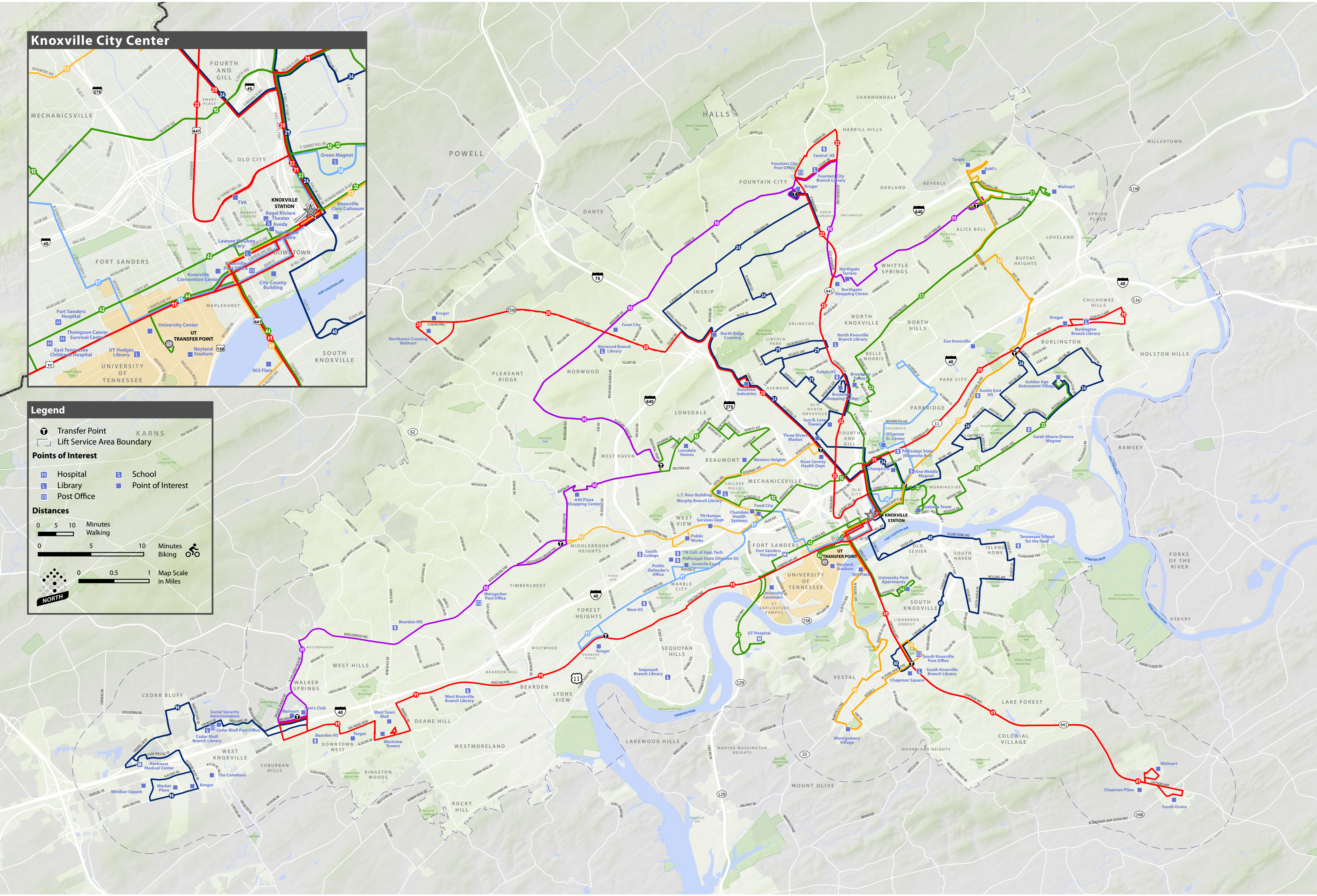
Post Office

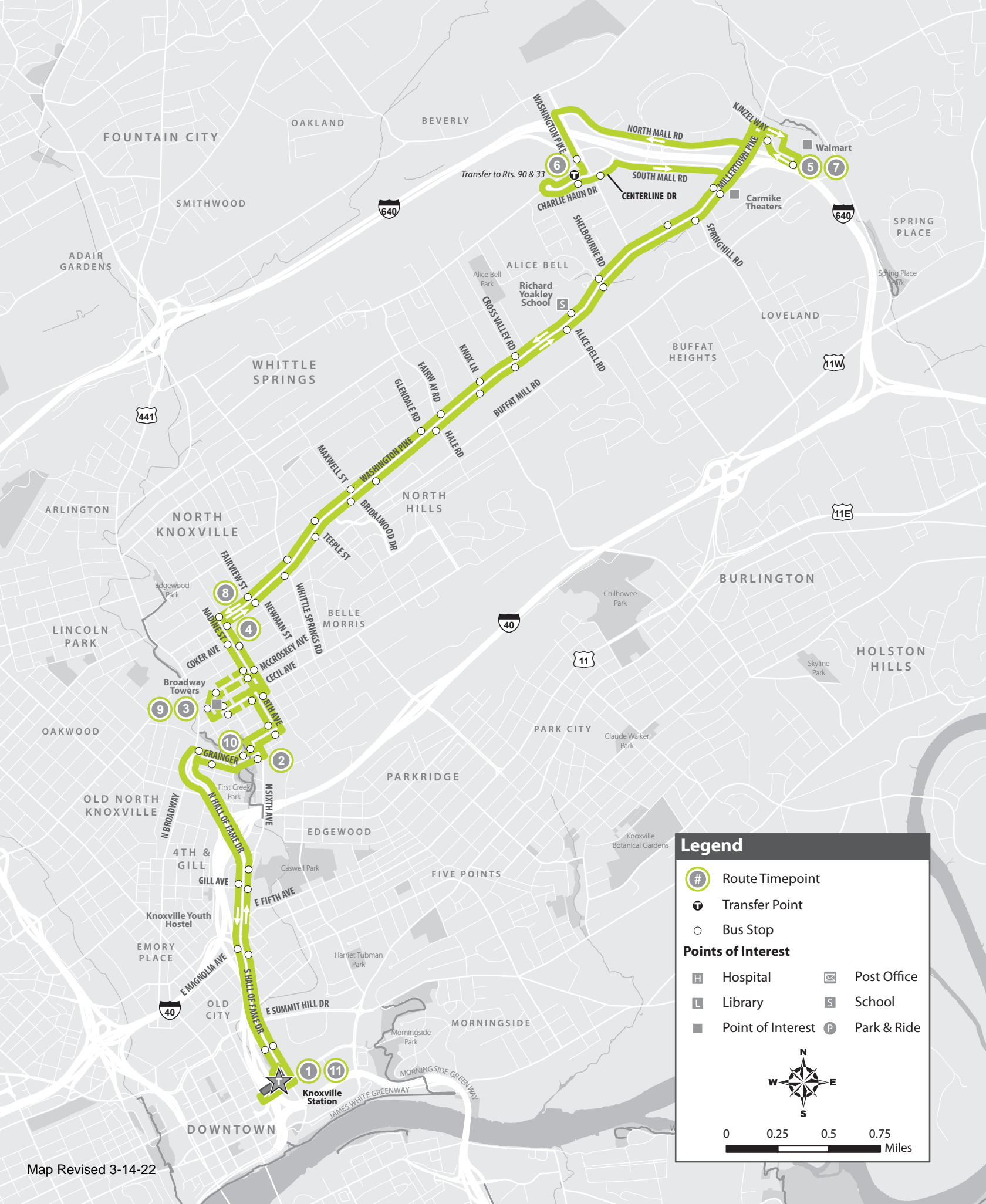
Distances

0 5 10 Minutes Walking

0 5 10 Minutes Biking

0 0.5 1 Map Scale in Miles





Route 23 - Millertown: Weekdays

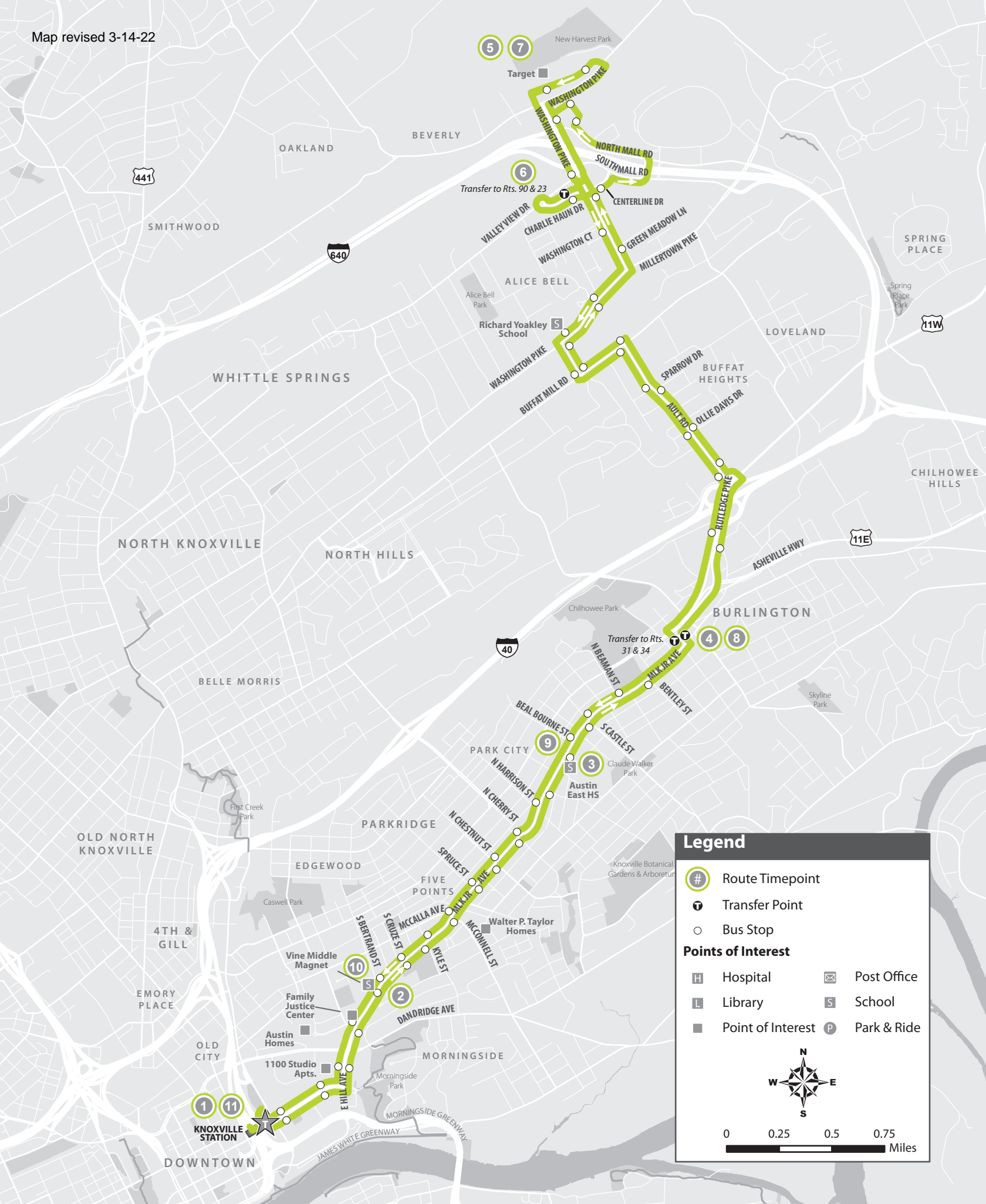
Going away from downtown						Going toward downtown						
Knoxville Station Bay I	Grainger @ Sixth	Broadway Towers	Nadine @ Washington Pike	Walmart	Charlie Haun at Washingt on Pike	Goes on to serve	Charlie Haun @ Washingt on Pike	Walmart	Washington Pike @ Fairview	Broadway Towers	Sixth @ Grainger	Knoxville Station Bay
1	2	3	4	5	6		6	7	8	9	10	11
							5:30 AM	5:37 AM	5:49 AM		5:56 AM	6:10 AM
							6:30 AM	6:37 AM	6:49 AM		6:56 AM	7:10 AM
6:15 AM	6:24 AM		6:29 AM	6:45 AM	7:00 AM	Route 33	7:30 AM	7:37 AM	7:49 AM		7:56 AM	8:10 AM
7:15 AM	7:24 AM		7:29 AM	7:45 AM	8:00 AM	Route 33	8:30 AM	8:37 AM	8:49 AM	8:54 AM	8:56 AM	9:10 AM
8:15 AM	8:24 AM		8:29 AM	8:45 AM	9:00 AM	Route 33	9:30 AM	9:37 AM	9:49 AM	9:54 AM	9:56 AM	10:10 AM
9:15 AM	9:24 AM	9:27 AM	9:29 AM	9:45 AM	10:00 AM	Route 33	10:30 AM	10:37 AM	10:49 AM	10:54 AM	10:56 AM	11:10 AM
10:15 AM	10:24 AM	10:27 AM	10:29 AM	10:45 AM	11:00 AM	Route 33	11:30 AM	11:37 AM	11:49 AM	11:54 AM	11:56 AM	12:10 PM
11:15 AM	11:24 AM	11:27 AM	11:29 AM	11:45 AM	12:00 PM	Route 33	12:30 PM	12:37 PM	12:49 PM	12:54 PM	12:56 PM	1:10 PM
12:15 PM	12:24 PM	12:27 PM	12:29 PM	12:45 PM	1:00 PM	Route 33	1:30 PM	1:37 PM	1:49 PM	1:54 PM	1:56 PM	2:10 PM
1:15 PM	1:24 PM	1:27 PM	1:29 PM	1:45 PM	2:00 PM	Route 33	2:30 PM	2:37 PM	2:49 PM	2:54 PM	2:56 PM	3:10 PM
2:15 PM	2:24 PM	2:27 PM	2:29 PM	2:45 PM	3:00 PM	Route 33	3:30 PM	3:37 PM	3:49 PM	3:54 PM	3:56 PM	4:10 PM
3:15 PM	3:24 PM	3:27 PM	3:29 PM	3:45 PM	4:00 PM	Route 33	4:30 PM	4:37 PM	4:49 PM		4:56 PM	5:10 PM
4:15 PM	4:24 PM	4:27 PM	4:29 PM	4:45 PM	5:00 PM	Route 33	5:30 PM	5:37 PM	5:49 PM		5:56 PM	6:10 PM
5:15 PM	5:24 PM		5:29 PM	5:45 PM	6:00 PM	Route 33	6:30 PM	6:37 PM	6:49 PM		6:56 PM	7:10 PM
6:15 PM	6:24 PM		6:29 PM	6:45 PM	7:00 PM	Route 33	7:30 PM	7:37 PM	7:49 PM		7:56 PM	8:10 PM
7:15 PM	7:24 PM		7:29 PM	7:45 PM	8:00 PM	Route 33	8:30 PM	8:37 PM	8:49 PM		8:56 PM	9:10 PM
8:15 PM	8:24 PM		8:29 PM	8:45 PM	9:00 PM							
9:15 PM	9:24 PM		9:29 PM	9:45 PM	10:00 PM							

Route 23 - Millertown: SATURDAYS

Going away from downtown						Going toward downtown						
Knoxville Station Bay I	Grainger @ Sixth	Broadway Towers	Nadine @ Washington Pike	Walmart	Charlie Haun @ Washingt on Pike	Goes on to serve	Charlie Haun @ Washingt on Pike	Walmart	Washington Pike @ Fairview	Broadway Towers	Sixth @ Grainger	Knoxville Station Bay I
1	2	3	4	5	6		6	7	8	9	10	11
							7:30 AM	7:37 AM	7:49 AM		7:56 AM	8:10 AM
7:15 AM	7:24 AM		7:29 AM	7:45 AM	8:00 AM	Route 33	8:30 AM	8:37 AM	8:49 AM		8:56 AM	9:10 AM
8:15 AM	8:24 AM		8:29 AM	8:45 AM	9:00 AM	Route 33	9:30 AM	9:37 AM	9:49 AM		9:56 AM	10:10 AM
9:15 AM	9:24 AM		9:29 AM	9:45 AM	10:00 AM	Route 33	10:30 AM	10:37 AM	10:49 AM		10:56 AM	11:10 AM
10:15 AM	10:24 AM		10:29 AM	10:45 AM	11:00 AM	Route 33	11:30 AM	11:37 AM	11:49 AM		11:56 AM	12:10 PM
11:15 AM	11:24 AM		11:29 AM	11:45 AM	12:00 PM	Route 33	12:30 PM	12:37 PM	12:49 PM		12:56 PM	1:10 PM
12:15 PM	12:24 PM		12:29 PM	12:45 PM	1:00 PM	Route 33	1:30 PM	1:37 PM	1:49 PM		1:56 PM	2:10 PM
1:15 PM	1:24 PM		1:29 PM	1:45 PM	2:00 PM	Route 33	2:30 PM	2:37 PM	2:49 PM		2:56 PM	3:10 PM
2:15 PM	2:24 PM		2:29 PM	2:45 PM	3:00 PM	Route 33	3:30 PM	3:37 PM	3:49 PM		3:56 PM	4:10 PM
3:15 PM	3:24 PM		3:29 PM	3:45 PM	4:00 PM	Route 33	4:30 PM	4:37 PM	4:49 PM		4:56 PM	5:10 PM
4:15 PM	4:24 PM		4:29 PM	4:45 PM	5:00 PM	Route 33	5:30 PM	5:37 PM	5:49 PM		5:56 PM	6:10 PM
5:15 PM	5:24 PM		5:29 PM	5:45 PM	6:00 PM	Route 33	6:30 PM	6:37 PM	6:49 PM		6:56 PM	7:10 PM
6:15 PM	6:24 PM		6:29 PM	6:45 PM	7:00 PM	Route 33	7:30 PM	7:37 PM	7:49 PM		7:56 PM	8:10 PM
7:15 PM	7:24 PM		7:29 PM	7:45 PM	8:00 PM	Route 33	8:30 PM	8:37 PM	8:49 PM		8:56 PM	9:10 PM
8:15 PM	8:24 PM		8:29 PM	8:45 PM	9:00 PM							
9:15 PM	9:24 PM		9:29 PM	9:45 PM	10:00 PM							

Route 23 - Millertown: SUNDAYS

Going away from downtown						Going toward downtown						
Knoxville Station Bay I	Grainger @ Sixth	Broadway Towers	Nadine @ Washington Pike	Walmart	Charlie Haun @ Washingt on Pike	Goes on to serve	Charlie Haun @ Washingt on Pike	Walmart	Washington Pike @ Fairview	Broadway Towers	Sixth @ Grainger	Knoxville Station Bay
1	2	3	4	5	6		6	7	8	9	10	11
							7:30 AM	7:37 AM	7:49 AM		7:56 AM	8:10 AM
							8:30 AM	8:37 AM	8:49 AM		8:56 AM	9:10 AM
8:15 AM	8:24 AM		8:29 AM	8:45 AM	9:00 AM	Route 33	9:30 AM	9:37 AM	9:49 AM		9:56 AM	10:10 AM
9:15 AM	9:24 AM		9:29 AM	9:45 AM	10:00 AM	Route 33	10:30 AM	10:37 AM	10:49 AM		10:56 AM	11:10 AM
10:15 AM	10:24 AM		10:29 AM	10:45 AM	11:00 AM	Route 33	11:30 AM	11:37 AM	11:49 AM		11:56 AM	12:10 PM
11:15 AM	11:24 AM		11:29 AM	11:45 AM	12:00 PM	Route 33	12:30 PM	12:37 PM	12:49 PM		12:56 PM	1:10 PM
12:15 PM	12:24 PM		12:29 PM	12:45 PM	1:00 PM	Route 33	1:30 PM	1:37 PM	1:49 PM		1:56 PM	2:10 PM
1:15 PM	1:24 PM		1:29 PM	1:45 PM	2:00 PM	Route 33	2:30 PM	2:37 PM	2:49 PM		2:56 PM	3:10 PM
2:15 PM	2:24 PM		2:29 PM	2:45 PM	3:00 PM	Route 33	3:30 PM	3:37 PM	3:49 PM		3:56 PM	4:10 PM
3:15 PM	3:24 PM		3:29 PM	3:45 PM	4:00 PM	Route 33	4:30 PM	4:37 PM	4:49 PM		4:56 PM	5:10 PM
4:15 PM	4:24 PM		4:29 PM	4:45 PM	5:00 PM							
5:15 PM	5:24 PM		5:29 PM	5:45 PM	6:00 PM							



#

Route Timepoint

T

Transfer Point

O

Bus Stop

Points of Interest

H

Hospital

L

Library

■

Point of Interest

⌘

Post Office

S

School

P

Park & Ride

N

W

E

S

0

0.25

0.5

0.75

Miles

Route 33 - MLK, Jr. Ave: Weekdays

Going away from downtown						Going toward downtown						
Knoxville Station Bay N	MLK @ Bertrand	Austin East High	Kirkwood St. Superstop	Target	Charlie Haun @ Washington Pike	Goes on to serve	Charlie Haun @ Washington Pike	Target	Kirkwood St. Superstop	MLK @ Beal Bourne Street	MLK @ Bertrand	Knoxville Station Bay N
1	2	3	4	5	6		6	7	8	9	10	11
									6:24 AM	6:27 AM	6:34 AM	6:40 AM
							7:00 AM	7:07 AM	7:24 AM	7:27 AM	7:34 AM	7:40 AM
6:45 AM	6:48 AM	6:57 AM	7:03 AM	7:16 AM	7:25 AM	Route 23	8:00 AM	8:07 AM	8:24 AM	8:27 AM	8:34 AM	8:40 AM
7:45 AM	7:48 AM	7:57 AM	8:03 AM	8:16 AM	8:25 AM	Route 23	9:00 AM	9:07 AM	9:24 AM	9:27 AM	9:34 AM	9:40 AM
8:45 AM	8:48 AM	8:57 AM	9:03 AM	9:16 AM	9:25 AM	Route 23	10:00 AM	10:07 AM	10:24 AM	10:27 AM	10:34 AM	10:40 AM
9:45 AM	9:48 AM	9:57 AM	10:03 AM	10:16 AM	10:25 AM	Route 23	11:00 AM	11:07 AM	11:24 AM	11:27 AM	11:34 AM	11:40 AM
10:45 AM	10:48 AM	10:57 AM	11:03 AM	11:16 AM	11:25 AM	Route 23	12:00 PM	12:07 PM	12:24 PM	12:27 PM	12:34 PM	12:40 PM
11:45 AM	11:48 AM	11:57 AM	12:03 PM	12:16 PM	12:25 PM	Route 23	1:00 PM	1:07 PM	1:24 PM	1:27 PM	1:34 PM	1:40 PM
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2:45 PM	2:48 PM	2:57 PM	3:03 PM	3:16 PM	3:25 PM	Route 23	4:00 PM	4:07 PM	4:24 PM	4:27 PM	4:34 PM	4:40 PM
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4:45 PM	4:48 PM	4:57 PM	5:03 PM	5:16 PM	5:25 PM	Route 23	6:00 PM	6:07 PM	6:24 PM	6:27 PM	6:34 PM	6:40 PM
5:45 PM	5:48 PM	5:57 PM	6:03 PM	6:16 PM	6:25 PM	Route 23	7:00 PM	7:07 PM	7:24 PM	7:27 PM	7:34 PM	7:40 PM
6:45 PM	6:48 PM	6:57 PM	7:03 PM	7:16 PM	7:25 PM	Route 23	8:00 PM	8:07 PM	8:24 PM	8:27 PM	8:34 PM	8:40 PM
7:45 PM	7:48 PM	7:57 PM	8:03 PM	8:16 PM	8:25 PM							
8:45 PM	8:48 PM	8:57 PM	9:03 PM	9:16 PM	9:25 PM							

Route 33 - MLK, Jr. Ave: SATURDAYS

Going away from downtown						Going toward downtown						
Knoxville Station Bay N 1	MLK @ Bertrand 2	Austin East High 3	Kirkwood St. Superstop 4	Target 5	Charlie Haun @ Washington Pike 6	Goes on to serve	Charlie Haun @ Washington Pike 6	Target 7	Kirkwood St. Superstop 8	MLK @ Beal Bourne Street 9	MLK @ Bertrand 10	Knoxville Station Bay N 11
									7:24 AM	7:27 AM	7:34 AM	7:40 AM
							8:00 AM	8:07 AM	8:24 AM	8:27 AM	8:34 AM	8:40 AM
7:45 AM	7:48 AM	7:57 AM	8:03 AM	8:16 AM	8:30 AM	Route 23	9:00 AM	9:07 AM	9:24 AM	9:27 AM	9:34 AM	9:40 AM
8:45 AM	8:48 AM	8:57 AM	9:03 AM	9:16 AM	9:30 AM	Route 23	10:00 AM	10:07 AM	10:24 AM	10:27 AM	10:34 AM	10:40 AM
9:45 AM	9:48 AM	9:57 AM	10:03 AM	10:16 AM	10:30 AM	Route 23	11:00 AM	11:07 AM	11:24 AM	11:27 AM	11:34 AM	11:40 AM
10:45 AM	10:48 AM	10:57 AM	11:03 AM	11:16 AM	11:30 AM	Route 23	12:00 PM	12:07 PM	12:24 PM	12:27 PM	12:34 PM	12:40 PM
11:45 AM	11:48 AM	11:57 AM	12:03 PM	12:16 PM	12:30 PM	Route 23	1:00 PM	1:07 PM	1:24 PM	1:27 PM	1:34 PM	1:40 PM
12:45 PM	12:48 PM	12:57 PM	1:03 PM	1:16 PM	1:30 PM	Route 23	2:00 PM	2:07 PM	2:24 PM	2:27 PM	2:34 PM	2:40 PM
1:45 PM	1:48 PM	1:57 PM	2:03 PM	2:16 PM	2:30 PM	Route 23	3:00 PM	3:07 PM	3:24 PM	3:27 PM	3:34 PM	3:40 PM
2:45 PM	2:48 PM	2:57 PM	3:03 PM	3:16 PM	3:30 PM	Route 23	4:00 PM	4:07 PM	4:24 PM	4:27 PM	4:34 PM	4:40 PM
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5:45 PM	5:48 PM	5:57 PM	6:03 PM	6:16 PM	6:30 PM	Route 23	7:00 PM	7:07 PM	7:24 PM	7:27 PM	7:34 PM	7:40 PM
6:45 PM	6:48 PM	6:57 PM	7:03 PM	7:16 PM	7:30 PM	Route 23	8:00 PM	8:07 PM	8:24 PM	8:27 PM	8:34 PM	8:40 PM
7:45 PM	7:48 PM	7:57 PM	8:03 PM	8:16 PM	8:30 PM	Route 23						
8:45 PM	8:48 PM	8:57 PM	9:03 PM	9:16 PM	9:30 PM							

Route 33 - MLK, Jr. Ave: SUNDAYS

Going away from downtown						Going toward downtown						
Knoxville Station Bay N 1	MLK @ Bertrand 2	Austin East High 3	Kirkwood St. Superstop 4	Target 5	Charlie Haun @ Washington Pike 6	Goes on to serve	Charlie Haun @ Washington Pike 6	Target 7	Kirkwood St. Superstop 8	MLK @ Beal Bourne Street 9	MLK @ Bertrand 10	Knoxville Station Bay N 11
							8:00 AM	8:07 AM	8:24 AM	8:27 AM	8:34 AM	8:40 AM
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8:45 AM	8:48 AM	8:57 AM	9:03 AM	9:16 AM	9:30 AM	Route 23	10:00 AM	10:07 AM	10:24 AM	10:27 AM	10:34 AM	10:40 AM
9:45 AM	9:48 AM	9:57 AM	10:03 AM	10:16 AM	10:30 AM	Route 23	11:00 AM	11:07 AM	11:24 AM	11:27 AM	11:34 AM	11:40 AM
10:45 AM	10:48 AM	10:57 AM	11:03 AM	11:16 AM	11:30 AM	Route 23	12:00 PM	12:07 PM	12:24 PM	12:27 PM	12:34 PM	12:40 PM
11:45 AM	11:48 AM	11:57 AM	12:03 PM	12:16 PM	12:30 PM	Route 23	1:00 PM	1:07 PM	1:24 PM	1:27 PM	1:34 PM	1:40 PM
12:45 PM	12:48 PM	12:57 PM	1:03 PM	1:16 PM	1:30 PM	Route 23	2:00 PM	2:07 PM	2:24 PM	2:27 PM	2:34 PM	2:40 PM
1:45 PM	1:48 PM	1:57 PM	2:03 PM	2:16 PM	2:30 PM	Route 23	3:00 PM	3:07 PM	3:24 PM	3:27 PM	3:34 PM	3:40 PM
2:45 PM	2:48 PM	2:57 PM	3:03 PM	3:16 PM	3:30 PM	Route 23	4:00 PM	4:07 PM	4:24 PM	4:27 PM	4:34 PM	4:40 PM
3:45 PM	3:48 PM	3:57 PM	4:03 PM	4:16 PM	4:30 PM	Route 23						
4:45 PM	4:48 PM	4:57 PM	5:03 PM	5:16 PM	5:30 PM							

APPENDIX D

RAILROAD INVENTORY DATA

U. S. DOT CROSSING INVENTORY FORM

DEPARTMENT OF TRANSPORTATION

FEDERAL RAILROAD ADMINISTRATION

OMB No. 2130-0017

Instructions for the initial reporting of the following types of new or previously unreported crossings: For public highway-rail grade crossings, complete the entire inventory Form. For private highway-rail grade crossings, complete the Header, Parts I and II, and the Submission Information section. For public pathway grade crossings (including pedestrian station grade crossings), complete the Header, Parts I and II, and the Submission Information section. For Private pathway grade crossings, complete the Header, Parts I and II, and the Submission Information section. For grade-separated highway-rail or pathway crossings (including pedestrian station crossings), complete the Header, Part I, and the Submission Information section. For changes to existing data, complete the Header, Part I Items 1-3, and the Submission Information section, in addition to the updated data fields. Note: For private crossings only, Part I Item 20 and Part III Item 2.K. are required unless otherwise noted. An asterisk * denotes an optional field.

A. Revision Date (MM/DD/YYYY) 02 / 28 / 2022	B. Reporting Agency <input checked="" type="checkbox"/> Railroad <input type="checkbox"/> Transit <input type="checkbox"/> State <input type="checkbox"/> Other	C. Reason for Update (Select only one) <div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Change in Data <input type="checkbox"/> Re-Open </div> <div> <input type="checkbox"/> New Crossing <input type="checkbox"/> Date Change Only </div> <div> <input type="checkbox"/> Closed <input checked="" type="checkbox"/> Change in Primary Operating RR </div> <div> <input type="checkbox"/> No Train Traffic <input type="checkbox"/> Admin. Correction </div> <div> <input type="checkbox"/> Quiet Zone Update </div> </div>	D. DOT Crossing Inventory Number 730476N
---	--	---	--

Part I: Location and Classification Information

1. Primary Operating Railroad Knoxville & Cumberland Gap Railroad LLC [KXCG]		2. State TENNESSEE		3. County KNOX	
4. City / Municipality <input checked="" type="checkbox"/> In <input type="checkbox"/> Near KNOXVILLE		5. Street/Road Name & Block Number BEVERLY RD (Street/Road Name) * (Block Number)		6. Highway Type & No. Is	
7. Do Other Railroads Operate a Separate Track at Crossing? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, Specify RR			8. Do Other Railroads Operate Over Your Track at Crossing? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, Specify RR		
9. Railroad Division or Region <input type="checkbox"/> None GULF		10. Railroad Subdivision or District <input type="checkbox"/> None KNOXVILLE WEST		11. Branch or Line Name <input type="checkbox"/> None MIDDLESBORO LINE	
12. RR Milepost 0006.170 CG (prefix) (nnnn.nnn) (suffix)					
13. Line Segment *		14. Nearest RR Timetable Station * KNOXVILLE		15. Parent RR (if applicable) <input checked="" type="checkbox"/> N/A	
16. Crossing Owner (if applicable) <input checked="" type="checkbox"/> N/A					
17. Crossing Type <input checked="" type="checkbox"/> Public <input type="checkbox"/> Private		18. Crossing Purpose <input checked="" type="checkbox"/> Highway <input type="checkbox"/> Pathway, Ped. <input type="checkbox"/> Station, Ped.		19. Crossing Position <input checked="" type="checkbox"/> At Grade <input type="checkbox"/> RR Under <input type="checkbox"/> RR Over	
20. Public Access (if Private Crossing) <input type="checkbox"/> Yes <input type="checkbox"/> No		21. Type of Train <input checked="" type="checkbox"/> Freight <input type="checkbox"/> Intercity Passenger <input type="checkbox"/> Commuter		<input type="checkbox"/> Transit <input type="checkbox"/> Shared Use Transit <input type="checkbox"/> Tourist/Other	
22. Average Passenger Train Count Per Day <input type="checkbox"/> Less Than One Per Day <input type="checkbox"/> Number Per Day 0					
23. Type of Land Use <input type="checkbox"/> Open Space <input type="checkbox"/> Farm <input type="checkbox"/> Residential <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Industrial <input type="checkbox"/> Institutional <input type="checkbox"/> Recreational <input type="checkbox"/> RR Yard					
24. Is there an Adjacent Crossing with a Separate Number? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, Provide Crossing Number			25. Quiet Zone (FRA provided) <input checked="" type="checkbox"/> No <input type="checkbox"/> 24 Hr <input type="checkbox"/> Partial <input type="checkbox"/> Chicago Excused Date Established		
26. HSR Corridor ID <input checked="" type="checkbox"/> N/A		27. Latitude in decimal degrees (WGS84 std: nn.nnnnnnn) 36.0336955		28. Longitude in decimal degrees (WGS84 std: -nnn.nnnnnnn) -83.9029356	
29. Lat/Long Source <input checked="" type="checkbox"/> Actual <input type="checkbox"/> Estimated					
30.A. Railroad Use *			31.A. State Use *		
30.B. Railroad Use *			31.B. State Use *		
30.C. Railroad Use *			31.C. State Use *		
30.D. Railroad Use *			31.D. State Use *		
32.A. Narrative (Railroad Use) *			32.B. Narrative (State Use) *		
33. Emergency Notification Telephone No. (posted) 800-946-4744		34. Railroad Contact (Telephone No.) 800-946-4744		35. State Contact (Telephone No.) 615-741-9558	

Part II: Railroad Information

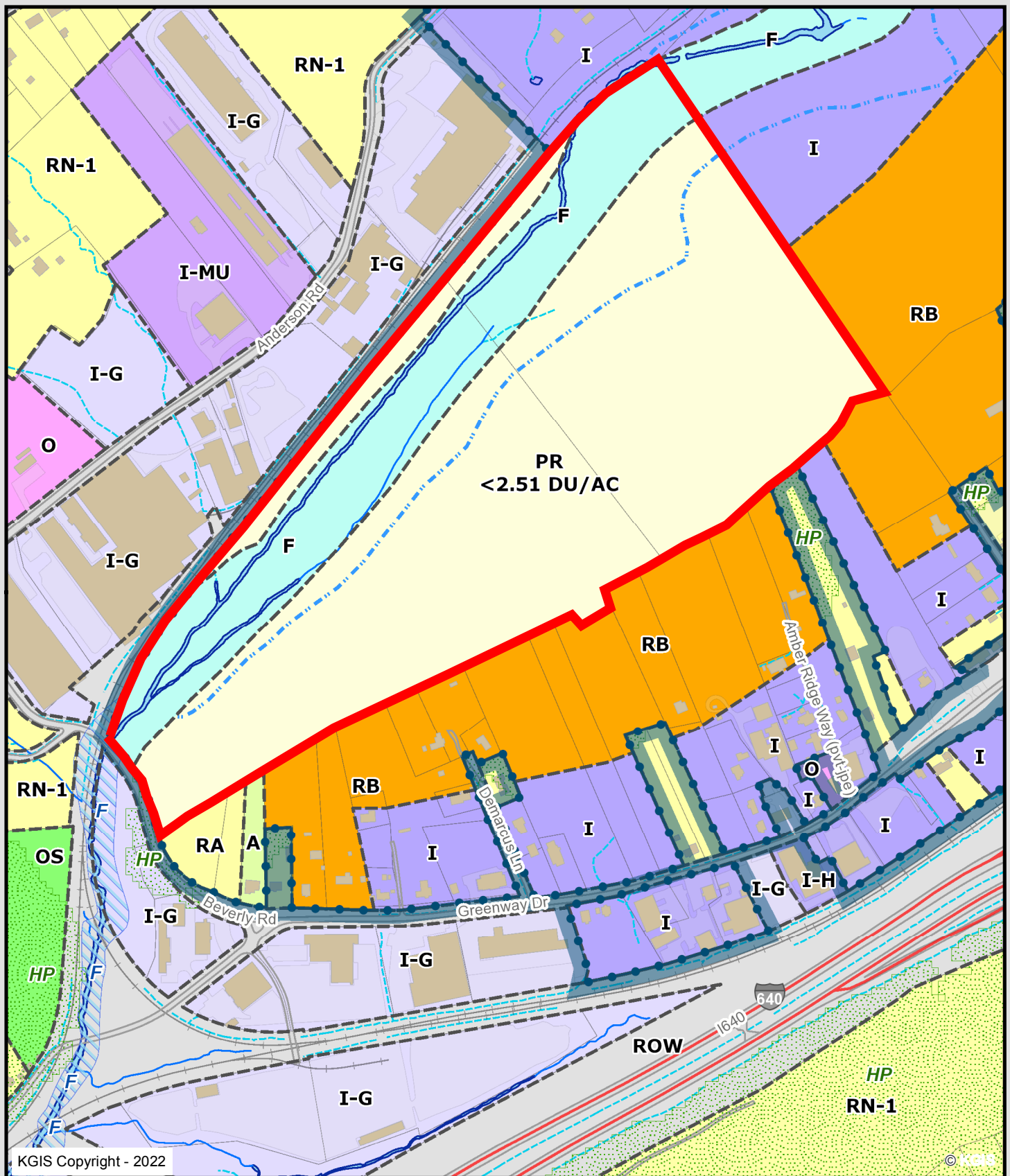
1. Estimated Number of Daily Train Movements				
1.A. Total Day Thru Trains (6 AM to 6 PM) 1	1.B. Total Night Thru Trains (6 PM to 6 AM) 0	1.C. Total Switching Trains 1	1.D. Total Transit Trains 0	1.E. Check if Less Than One Movement Per Day <input type="checkbox"/> How many trains per week?
2. Year of Train Count Data (YYYY) 2021		3. Speed of Train at Crossing 3.A. Maximum Timetable Speed (mph) 30 3.B. Typical Speed Range Over Crossing (mph) From 5 to 15		
4. Type and Count of Tracks Main 1 Siding 0 Yard 0 Transit 0 Industry 0				
5. Train Detection (Main Track only) <input type="checkbox"/> Constant Warning Time <input checked="" type="checkbox"/> Motion Detection <input type="checkbox"/> AFO <input type="checkbox"/> PTC <input type="checkbox"/> DC <input type="checkbox"/> Other <input type="checkbox"/> None				
6. Is Track Signaled? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		7.A. Event Recorder <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		7.B. Remote Health Monitoring <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

U. S. DOT CROSSING INVENTORY FORM

A. Revision Date (MM/DD/YYYY) 02/28/2022		PAGE 2		D. Crossing Inventory Number (7 char.) 730476N	
Part III: Highway or Pathway Traffic Control Device Information					
1. Are there Signs or Signals? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		2. Types of Passive Traffic Control Devices associated with the Crossing			
2.A. Crossbuck Assemblies (count) 2		2.B. STOP Signs (R1-1) (count) 0	2.C. YIELD Signs (R1-2) (count)	2.D. Advance Warning Signs (Check all that apply; include count) <input type="checkbox"/> None <input checked="" type="checkbox"/> W10-1 <input type="checkbox"/> W10-3 <input type="checkbox"/> W10-11 <input type="checkbox"/> W10-2 <input type="checkbox"/> W10-4 <input type="checkbox"/> W10-12	
2.E. Low Ground Clearance Sign (W10-5) <input type="checkbox"/> Yes (count _____) <input checked="" type="checkbox"/> No		2.F. Pavement Markings <input type="checkbox"/> Stop Lines <input type="checkbox"/> Dynamic Envelope <input type="checkbox"/> RR Xing Symbols <input checked="" type="checkbox"/> None		2.G. Channelization Devices/Medians <input type="checkbox"/> All Approaches <input type="checkbox"/> Median <input type="checkbox"/> One Approach <input type="checkbox"/> None	
2.H. EXEMPT Sign (R15-3) <input type="checkbox"/> Yes <input type="checkbox"/> No		2.I. ENS Sign (I-13) Displayed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
2.J. Other MUTCD Signs Specify Type _____ Count _____ Specify Type _____ Count _____ Specify Type _____ Count _____		2.K. Private Crossing Signs (if private) <input type="checkbox"/> Yes <input type="checkbox"/> No		2.L. LED Enhanced Signs (List types)	
3. Types of Train Activated Warning Devices at the Grade Crossing (specify count of each device for all that apply)					
3.A. Gate Arms (count) Roadway 0 Pedestrian 0		3.B. Gate Configuration <input type="checkbox"/> 2 Quad <input type="checkbox"/> Full (Barrier) Resistance <input type="checkbox"/> 3 Quad <input type="checkbox"/> Median Gates <input type="checkbox"/> 4 Quad		3.C. Cantilevered (or Bridged) Flashing Light Structures (count) Over Traffic Lane 1 <input checked="" type="checkbox"/> Incandescent Not Over Traffic Lane 1 <input type="checkbox"/> LED	
3.D. Mast Mounted Flashing Lights (count of masts) 1 <input checked="" type="checkbox"/> Incandescent <input type="checkbox"/> LED <input checked="" type="checkbox"/> Back Lights Included <input type="checkbox"/> Side Lights Included		3.E. Total Count of Flashing Light Pairs 4			
3.F. Installation Date of Current Active Warning Devices: (MM/YYYY) 12 / 1979 <input type="checkbox"/> Not Required		3.G. Wayside Horn <input type="checkbox"/> Yes Installed on (MM/YYYY) ____/____ <input checked="" type="checkbox"/> No		3.H. Highway Traffic Signals Controlling Crossing <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
3.I. Bells (count) 1		3.J. Non-Train Active Warning <input type="checkbox"/> Flagging/Flagman <input type="checkbox"/> Manually Operated Signals <input type="checkbox"/> Watchman <input type="checkbox"/> Floodlighting <input checked="" type="checkbox"/> None			
3.K. Other Flashing Lights or Warning Devices Count 0 Specify type _____					
4.A. Does nearby Hwy Intersection have Traffic Signals? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		4.B. Hwy Traffic Signal Interconnection <input checked="" type="checkbox"/> Not Interconnected <input type="checkbox"/> For Traffic Signals <input type="checkbox"/> For Warning Signs		4.C. Hwy Traffic Signal Preemption <input type="checkbox"/> Simultaneous <input type="checkbox"/> Advance	
5. Highway Traffic Pre-Signals <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Storage Distance * 0 Stop Line Distance * 0		6. Highway Monitoring Devices (Check all that apply) <input type="checkbox"/> Yes - Photo/Video Recording <input type="checkbox"/> Yes - Vehicle Presence Detection <input checked="" type="checkbox"/> None			
Part IV: Physical Characteristics					
1. Traffic Lanes Crossing Railroad <input type="checkbox"/> One-way Traffic <input type="checkbox"/> Two-way Traffic Number of Lanes 2 <input type="checkbox"/> Divided Traffic		2. Is Roadway/Pathway Paved? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		3. Does Track Run Down a Street? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
4. Is Crossing Illuminated? (Street lights within approx. 50 feet from nearest rail) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		5. Crossing Surface (on Main Track, multiple types allowed) Installation Date * (MM/YYYY) ____/____ Width * _____ Length * _____ <input type="checkbox"/> 1 Timber <input type="checkbox"/> 2 Asphalt <input checked="" type="checkbox"/> 3 Asphalt and Timber <input type="checkbox"/> 4 Concrete <input type="checkbox"/> 5 Concrete and Rubber <input type="checkbox"/> 6 Rubber <input type="checkbox"/> 7 Metal <input type="checkbox"/> 8 Unconsolidated <input type="checkbox"/> 9 Composite <input type="checkbox"/> 10 Other (specify) _____			
6. Intersecting Roadway within 500 feet? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If Yes, Approximate Distance (feet) _____		7. Smallest Crossing Angle <input type="checkbox"/> 0° - 29° <input type="checkbox"/> 30° - 59° <input checked="" type="checkbox"/> 60° - 90°		8. Is Commercial Power Available? * <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Part V: Public Highway Information					
1. Highway System <input type="checkbox"/> (01) Interstate Highway System <input type="checkbox"/> (02) Other Nat Hwy System (NHS) <input type="checkbox"/> (03) Federal AID, Not NHS <input checked="" type="checkbox"/> (08) Non-Federal Aid		2. Functional Classification of Road at Crossing <input type="checkbox"/> (0) Rural <input checked="" type="checkbox"/> (1) Urban <input type="checkbox"/> (1) Interstate <input type="checkbox"/> (5) Major Collector <input type="checkbox"/> (2) Other Freeways and Expressways <input type="checkbox"/> (3) Other Principal Arterial <input type="checkbox"/> (6) Minor Collector <input type="checkbox"/> (4) Minor Arterial <input checked="" type="checkbox"/> (7) Local		3. Is Crossing on State Highway System? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
4. Highway Speed Limit 30 _____ MPH <input checked="" type="checkbox"/> Posted <input type="checkbox"/> Statutory		5. Linear Referencing System (LRS Route ID) *			
6. LRS Milepost *					
7. Annual Average Daily Traffic (AADT) Year 2006 AADT 005937		8. Estimated Percent Trucks 06 _____ %		9. Regularly Used by School Buses? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Average Number per Day 4	
10. Emergency Services Route <input type="checkbox"/> Yes <input type="checkbox"/> No					
Submission Information - This information is used for administrative purposes and is not available on the public website.					
Submitted by _____ Organization _____ Phone _____ Date _____ Public reporting burden for this information collection is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed and completing and reviewing the collection of information. According to the Paperwork Reduction Act of 1995, a federal agency may not conduct or sponsor, and a person is not required to, nor shall a person be subject to a penalty for failure to comply with, a collection of information unless it displays a currently valid OMB control number. The valid OMB control number for information collection is 2130-0017. Send comments regarding this burden estimate or any other aspect of this collection, including for reducing this burden to: Information Collection Officer, Federal Railroad Administration, 1200 New Jersey Ave. SE, MS-25 Washington, DC 20590.					

APPENDIX E

ZONING MAP



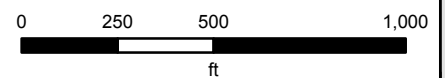
Existing Zoning - 10.3.22

The Preserve at Whites Creek

Knoxville - Knox County - KUB Geographic Information System



Printed: 10/3/2022 at 3:53:17 PM



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APPENDIX F

MANUAL TRAFFIC COUNT DATA

TRAFFIC COUNT DATA

Major Street: Tazewell Pike (EB and WB)
 Minor Street: Beverly Road (NB)
 Traffic Control: Stop Sign on Beverly Road

9/29/2022 (Thursday)
 Sunny, Mild
 Conducted by: Ajax Engineering

	Tazewell Pike		Beverly Road		Tazewell Pike			
TIME	WESTBOUND		NORTHBOUND		EASTBOUND		VEHICLE	PEAK
BEGIN	LT	THRU	LT	RT	THRU	RT	TOTAL	HOUR
7:00 AM	23	192	4	2	70	20	311	
7:15 AM	35	247	5	21	70	19	397	7:15 AM - 8:15 AM
7:30 AM	80	180	8	15	74	28	385	
7:45 AM	52	192	9	11	83	44	391	
8:00 AM	31	175	14	11	75	41	347	
8:15 AM	30	184	12	3	69	35	333	
8:30 AM	13	153	5	4	67	20	262	
8:45 AM	7	142	22	3	65	17	256	
TOTAL	271	1465	79	70	573	224	2682	
2:00 PM	8	116	34	9	97	37	301	
2:15 PM	13	89	32	9	128	36	307	
2:30 PM	16	102	21	10	147	44	340	
2:45 PM	24	102	26	21	160	36	369	
3:00 PM	29	108	28	12	136	47	360	
3:15 PM	11	113	32	19	140	45	360	
3:30 PM	14	119	19	20	135	40	347	
3:45 PM	20	97	20	14	151	51	353	
4:00 PM	17	110	25	12	193	39	396	
4:15 PM	12	126	21	11	199	48	417	
4:30 PM	13	109	26	18	213	29	408	
4:45 PM	14	114	17	21	214	38	418	4:45 PM - 5:45 PM
5:00 PM	16	109	21	22	202	43	413	
5:15 PM	13	121	15	11	235	26	421	
5:30 PM	20	124	25	17	196	44	426	
5:45 PM	11	129	21	15	189	24	389	
TOTAL	251	1788	383	241	2735	627	6025	

2022 AM Peak Hour 7:15 AM - 8:15 AM

	Tazewell Pike		Beverly Road		Tazewell Pike	
TIME	WESTBOUND		NORTHBOUND		EASTBOUND	
BEGIN	LT	THRU	LT	RT	THRU	RT
7:15 AM	35	247	5	21	70	19
7:30 AM	80	180	8	15	74	28
7:45 AM	52	192	9	11	83	44
8:00 AM	31	175	14	11	75	41
TOTAL	198	794	36	58	302	132
PHF	0.62	0.80	0.64	0.69	0.91	0.75
Truck %	0.5%	0.3%	0.0%	1.7%	2.3%	1.5%

2022 PM Peak Hour 4:45 PM - 5:45 PM

	Tazewell Pike		Beverly Road		Tazewell Pike	
TIME	WESTBOUND		NORTHBOUND		EASTBOUND	
BEGIN	LT	THRU	LT	RT	THRU	RT
4:45 PM	14	114	17	21	214	38
5:00 PM	16	109	21	22	202	43
5:15 PM	13	121	15	11	235	26
5:30 PM	20	124	25	17	196	44
TOTAL	63	468	78	71	847	151
PHF	0.79	0.94	0.78	0.81	0.90	0.86
Truck %	0.0%	0.4%	0.0%	0.0%	0.5%	0.7%

TRAFFIC COUNT DATA

Major Street: Beverly Road (SB and NB)

Minor Street: McCampbell Lane (WB)

Traffic Control: Stop Sign on McCampbell Lane

9/29/2022 (Thursday)

Sunny, Mild

Conducted by: Ajax Engineering

	Beverly Road		McC Campbell Lane		Beverly Road			
TIME BEGIN	SOUTHBOUND		WESTBOUND		NORTHBOUND		VEHICLE TOTAL	PEAK HOUR
	LT	THRU	LT	RT	THRU	RT		
7:15 AM	1	-	1	3	-	0	5	7:15 AM - 8:15 AM
7:30 AM	2	-	0	1	-	0	3	
7:45 AM	0	-	1	2	-	0	3	
8:00 AM	1	-	4	3	-	0	8	
TOTAL	4	-	6	9	-	0	19	
ENTER FROM NORTH	100%							
ENTER FROM SOUTH	0%							
EXIT TO SOUTH	40%							
EXIT TO NORTH	60%							
4:15 PM	2	-	2	1	-	3		4:15 PM - 5:15 PM
4:30 PM	3	-	1	1	-	2		
4:45 PM	2	-	0	1	-	2		
5:00 PM	1	-	0	0	-	2		
TOTAL	8	-	3	3	-	9		
ENTER FROM NORTH	47%							
ENTER FROM SOUTH	53%							
EXIT TO SOUTH	50%							
EXIT TO NORTH	50%							

TRAFFIC COUNT DATA

Major Street: Beverly Road (SB and NB)
 Minor Street: n/a
 Traffic Control: n/a

9/29/2022 (Thursday)
 Sunny, Mild
 Conducted by: Ajax Engineering

	Beverly Road	Beverly Road		
TIME	SOUTHBOUND	NORTHBOUND	VEHICLE	PEAK
BEGIN	THRU	THRU	TOTAL	HOUR
7:00 AM	51	14	65	
7:15 AM	78	25	103	7:15 AM - 8:15 AM
7:30 AM	148	30	178	
7:45 AM	117	36	153	
8:00 AM	80	29	109	
8:15 AM	80	20	100	
8:30 AM	52	18	70	
8:45 AM	34	21	55	
TOTAL	640	193	833	
2:00 PM	51	51	102	
2:15 PM	64	49	113	
2:30 PM	69	61	130	
2:45 PM	77	52	129	
3:00 PM	84	68	152	
3:15 PM	74	52	126	
3:30 PM	74	44	118	
3:45 PM	76	55	131	
4:00 PM	70	65	135	
4:15 PM	82	71	153	4:15 PM - 5:15 PM
4:30 PM	69	70	139	
4:45 PM	72	57	129	
5:00 PM	94	62	156	
5:15 PM	57	64	121	
5:30 PM	87	70	157	
5:45 PM	48	43	91	
TOTAL	1148	934	2082	

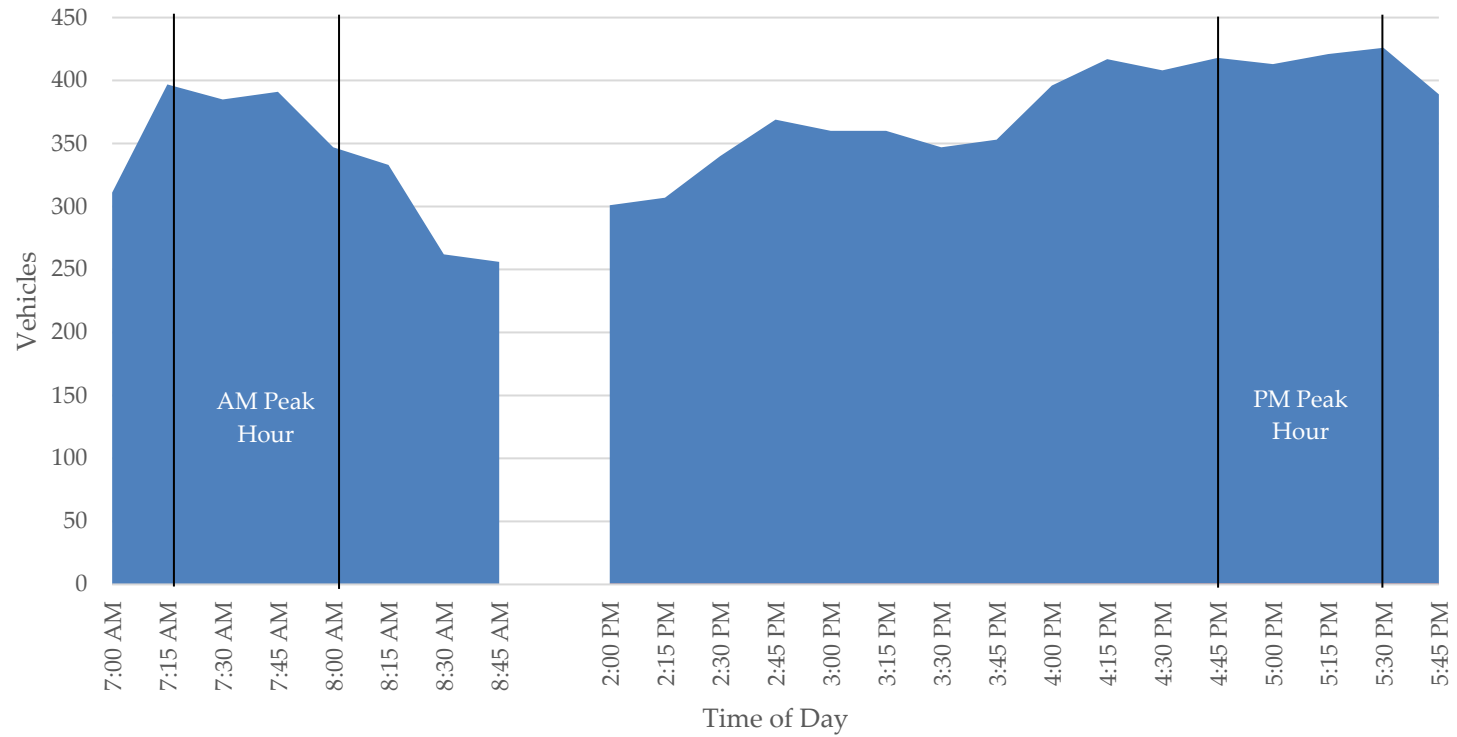
2022 AM Peak Hour 7:15 AM - 8:15 AM

	Beverly Road	Beverly Road
TIME	SOUTHBOUND	NORTHBOUND
BEGIN	THRU	THRU
7:15 AM	78	25
7:30 AM	148	30
7:45 AM	117	36
8:00 AM	80	29
TOTAL	423	120
PHF	0.71	0.83
Truck %	1.2%	0.8%

2022 PM Peak Hour 4:15 PM - 5:15 PM

	Beverly Road	Beverly Road
TIME	SOUTHBOUND	NORTHBOUND
BEGIN	THRU	THRU
4:15 PM	82	71
4:30 PM	69	70
4:45 PM	72	57
5:00 PM	94	62
TOTAL	317	260
PHF	0.84	0.92
Truck %	1.6%	1.2%

**Tazewell Pike at Beverly Road
Intersection Traffic Count Totals
9/29/2022**






APPENDIX G

CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 11)

EXISTING CONDITIONS




HCM 2010 TWSC
4: Beverly Road & Tazewell Pike

10/05/2022

Intersection						
Int Delay, s/veh	111.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	302	132	198	794	36	58
Future Vol, veh/h	302	132	198	794	36	58
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, %	1	-	-	2	3	-
Peak Hour Factor	91	75	62	80	64	69
Heavy Vehicles, %	2	2	0	0	0	2
Mvmt Flow	332	176	319	993	56	84
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	508	0	2051	420
Stage 1	-	-	-	-	420	-
Stage 2	-	-	-	-	1631	-
Critical Hdwy	-	-	4.1	-	7	6.52
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.318
Pot Cap-1 Maneuver	-	-	1067	-	~ 44	612
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	135	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1067	-	~ 15	612
Mov Cap-2 Maneuver	-	-	-	-	~ 15	-
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	~ 45	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		2.4		\$ 1531.8	
HCM LOS	F					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	36	-	-	1067	-	
HCM Lane V/C Ratio	3.897	-	-	0.299	-	
HCM Control Delay (s)	\$ 1531.8	-	-	9.8	0	
HCM Lane LOS	F	-	-	A	A	
HCM 95th %tile Q(veh)	16.3	-	-	1.3	-	
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

HCM 2010 TWSC
4: Beverly Road & Tazewell Pike




10/05/2022

Intersection						
Int Delay, s/veh	50.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	847	151	63	468	78	71
Future Vol, veh/h	847	151	63	468	78	71
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, %	1	-	-	2	3	-
Peak Hour Factor	90	86	79	94	78	81
Heavy Vehicles, %	0	1	0	0	0	0
Mvmt Flow	941	176	80	498	100	88
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1117	0	1687	1029
Stage 1	-	-	-	-	1029	-
Stage 2	-	-	-	-	658	-
Critical Hdwy	-	-	4.1	-	7	6.5
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	633	-	~ 79	263
Stage 1	-	-	-	-	293	-
Stage 2	-	-	-	-	465	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	633	-	~ 65	263
Mov Cap-2 Maneuver	-	-	-	-	~ 65	-
Stage 1	-	-	-	-	293	-
Stage 2	-	-	-	-	384	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.6		\$ 501.5	
HCM LOS	F					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	100	-	-	633	-	
HCM Lane V/C Ratio	1.877	-	-	0.126	-	
HCM Control Delay (s)	\$ 501.5	-	-	11.5	0	
HCM Lane LOS	F	-	-	B	A	
HCM 95th %tile Q(veh)	15.5	-	-	0.4	-	
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

PROJECTED CONDITIONS (WITHOUT THE PROJECT)




HCM 2010 TWSC
4: Beverly Road & Tazewell Pike

10/05/2022

Intersection						
Int Delay, s/veh	563.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	332	145	218	873	41	67
Future Vol, veh/h	332	145	218	873	41	67
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, %	1	-	-	2	3	-
Peak Hour Factor	91	75	62	80	64	69
Heavy Vehicles, %	2	2	0	0	0	2
Mvmt Flow	365	193	352	1091	64	97
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	558	0	2257	462
Stage 1	-	-	-	-	462	-
Stage 2	-	-	-	-	1795	-
Critical Hdwy	-	-	4.1	-	7	6.52
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.318
Pot Cap-1 Maneuver	-	-	1023	-	~ 32	577
Stage 1	-	-	-	-	591	-
Stage 2	-	-	-	-	109	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1023	-	~ 4	577
Mov Cap-2 Maneuver	-	-	-	-	~ 4	-
Stage 1	-	-	-	-	591	-
Stage 2	-	-	-	-	~ 14	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		2.5		\$ 7531.7	
HCM LOS					F	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	10	-	-	1023	-	
HCM Lane V/C Ratio	16.116	-	-	0.344	-	
HCM Control Delay (s)	\$ 7531.7	-	-	10.4	0	
HCM Lane LOS	F	-	-	B	A	
HCM 95th %tile Q(veh)	21.7	-	-	1.5	-	
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

HCM 2010 TWSC
4: Beverly Road & Tazewell Pike

10/05/2022




Intersection						
Int Delay, s/veh	101.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	932	166	69	515	90	82
Future Vol, veh/h	932	166	69	515	90	82
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, %	1	-	-	2	3	-
Peak Hour Factor	90	86	79	94	78	81
Heavy Vehicles, %	0	1	0	0	0	0
Mvmt Flow	1036	193	87	548	115	101
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	1229	0	1855	1133
Stage 1	-	-	-	-	1133	-
Stage 2	-	-	-	-	722	-
Critical Hdwy	-	-	4.1	-	7	6.5
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	574	-	~ 60	227
Stage 1	-	-	-	-	257	-
Stage 2	-	-	-	-	430	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	574	-	~ 47	227
Mov Cap-2 Maneuver	-	-	-	-	~ 47	-
Stage 1	-	-	-	-	257	-
Stage 2	-	-	-	-	336	-
Approach	EB	WB		NB		
HCM Control Delay, s	0	1.7		\$ 970.7		
HCM LOS	F					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	75	-	-	574	-	
HCM Lane V/C Ratio	2.888	-	-	0.152	-	
HCM Control Delay (s)	\$ 970.7	-	-	12.4	0	
HCM Lane LOS	F	-	-	B	A	
HCM 95th %tile Q(veh)	21.5	-	-	0.5	-	
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

PROJECTED CONDITIONS (WITH THE PROJECT)

HCM 2010 TWSC




4: Beverly Road & Tazewell Pike

10/23/2022

Intersection						
Int Delay, s/veh	3211.4					
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	332	153	229	873	75	91
Future Vol, veh/h	332	153	229	873	75	91
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, %	1	-	-	2	3	-
Peak Hour Factor	91	75	62	80	64	69
Heavy Vehicles, %	2	2	0	0	0	2
Mvmt Flow	365	204	369	1091	117	132
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	569	0	2296	467
Stage 1	-	-	-	-	467	-
Stage 2	-	-	-	-	1829	-
Critical Hdwy	-	-	4.1	-	7	6.52
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.318
Pot Cap-1 Maneuver	-	-	1013	-	~ 30	573
Stage 1	-	-	-	-	588	-
Stage 2	-	-	-	-	~ 104	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1013	-	~ 2	573
Mov Cap-2 Maneuver	-	-	-	-	~ 2	-
Stage 1	-	-	-	-	588	-
Stage 2	-	-	-	-	~ 8	-
Approach	EB		WB		NW	
HCM Control Delay, s	0		2.7		\$ 29361.8	
HCM LOS					F	
Minor Lane/Major Mvmt	NWLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	4	-	-	1013	-	
HCM Lane V/C Ratio	62.268	-	-	0.365	-	
HCM Control Delay (s)	\$ 29361.8	-	-	10.6	0	
HCM Lane LOS	F	-	-	B	A	
HCM 95th %tile Q(veh)	33.4	-	-	1.7	-	
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

HCM 2010 TWSC
4: Beverly Road & Tazewell Pike




10/23/2022

Intersection						
Int Delay, s/veh	184.8					
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	932	203	86	515	108	99
Future Vol, veh/h	932	203	86	515	108	99
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, %	1	-	-	2	3	-
Peak Hour Factor	90	86	79	94	78	81
Heavy Vehicles, %	0	1	0	0	0	0
Mvmt Flow	1036	236	109	548	138	122
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1272	0	1920	1154
Stage 1	-	-	-	-	1154	-
Stage 2	-	-	-	-	766	-
Critical Hdwy	-	-	4.1	-	7	6.5
Critical Hdwy Stg 1	-	-	-	-	6	-
Critical Hdwy Stg 2	-	-	-	-	6	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	553	-	~ 54	220
Stage 1	-	-	-	-	250	-
Stage 2	-	-	-	-	407	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	553	-	~ 39	220
Mov Cap-2 Maneuver	-	-	-	-	~ 39	-
Stage 1	-	-	-	-	250	-
Stage 2	-	-	-	-	292	-
Approach	EB		WB		NW	
HCM Control Delay, s	0		2.2		\$ 1545.9	
HCM LOS	F					
Minor Lane/Major Mvmt	NWLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	63	-	-	553	-	
HCM Lane V/C Ratio	4.138	-	-	0.197	-	
HCM Control Delay (s)	\$ 1545.9	-	-	13.1	0	
HCM Lane LOS	F	-	-	B	A	
HCM 95th %tile Q(veh)	28.2	-	-	0.7	-	
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

HCM 2010 TWSC

2: Beverly Road & Proposed Entrance




10/23/2022

Intersection						
Int Delay, s/veh	1.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	39	58	138	13	19	486
Future Vol, veh/h	39	58	138	13	19	486
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	-7	-	-	1
Peak Hour Factor	90	90	83	90	90	71
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	43	64	166	14	21	685
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	900	173	0	0	180	0
Stage 1	173	-	-	-	-	-
Stage 2	727	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	312	876	-	-	1408	-
Stage 1	862	-	-	-	-	-
Stage 2	482	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	305	876	-	-	1408	-
Mov Cap-2 Maneuver	305	-	-	-	-	-
Stage 1	862	-	-	-	-	-
Stage 2	470	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	14.2	0		0.2		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	500	1408	-	
HCM Lane V/C Ratio	-	-	0.216	0.015	-	
HCM Control Delay (s)	-	-	14.2	7.6	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.8	0	-	

HCM 2010 TWSC

2: Beverly Road & Proposed Entrance

10/23/2022

Intersection						
Int Delay, s/veh	1.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	36	35	299	53	54	365
Future Vol, veh/h	36	35	299	53	54	365
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	-7	-	-	1
Peak Hour Factor	90	90	92	90	90	84
Heavy Vehicles, %	0	0	1	0	0	2
Mvmt Flow	40	39	325	59	60	435
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	910	355	0	0	384	0
Stage 1	355	-	-	-	-	-
Stage 2	555	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	307	693	-	-	1186	-
Stage 1	714	-	-	-	-	-
Stage 2	579	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	286	693	-	-	1186	-
Mov Cap-2 Maneuver	286	-	-	-	-	-
Stage 1	714	-	-	-	-	-
Stage 2	540	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	16.1	0	1			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	403	1186	-	
HCM Lane V/C Ratio	-	-	0.196	0.051	-	
HCM Control Delay (s)	-	-	16.1	8.2	0	
HCM Lane LOS	-	-	C	A	A	
HCM 95th %tile Q(veh)	-	-	0.7	0.2	-	

PROJECTED CONDITIONS (WITH THE PROJECT) AND TRAFFIC SIGNAL

HCM Signalized Intersection Capacity Analysis

4: Beverly Road & Tazewell Pike

11/15/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	332	153	229	873	75	91
Future Volume (vph)	332	153	229	873	75	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	1%			2%	3%	
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1853	1575	1787	1881	1778	1560
Flt Permitted	1.00	1.00	0.52	1.00	0.95	1.00
Satd. Flow (perm)	1853	1575	971	1881	1778	1560
Peak-hour factor, PHF	0.91	0.75	0.62	0.80	0.64	0.69
Adj. Flow (vph)	365	204	369	1091	117	132
RTOR Reduction (vph)	0	72	0	0	0	101
Lane Group Flow (vph)	365	132	369	1091	117	31
Heavy Vehicles (%)	2%	2%	0%	0%	0%	2%
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Actuated Green, G (s)	51.6	51.6	51.6	51.6	18.9	18.9
Effective Green, g (s)	51.6	51.6	51.6	51.6	18.9	18.9
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.24	0.24
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1202	1022	630	1220	422	370
v/s Ratio Prot	0.20			c0.58	c0.07	
v/s Ratio Perm		0.08	0.38			0.02
v/c Ratio	0.30	0.13	0.59	0.89	0.28	0.08
Uniform Delay, d1	6.1	5.3	7.9	11.7	24.7	23.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	1.4	8.7	1.6	0.5
Delay (s)	6.2	5.4	9.3	20.4	26.4	24.0
Level of Service	A	A	A	C	C	C
Approach Delay (s)	5.9			17.6	25.1	
Approach LOS	A			B	C	
Intersection Summary						
HCM 2000 Control Delay			15.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.73			
Actuated Cycle Length (s)			79.5		Sum of lost time (s)	9.0
Intersection Capacity Utilization			57.6%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

4: Beverly Road & Tazewell Pike

11/15/2022

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	932	203	86	515	108	99
Future Volume (vph)	932	203	86	515	108	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	1%			2%	3%	
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1890	1591	1787	1881	1778	1591
Flt Permitted	1.00	1.00	0.07	1.00	0.95	1.00
Satd. Flow (perm)	1890	1591	140	1881	1778	1591
Peak-hour factor, PHF	0.90	0.86	0.79	0.94	0.78	0.81
Adj. Flow (vph)	1036	236	109	548	138	122
RTOR Reduction (vph)	0	37	0	0	0	95
Lane Group Flow (vph)	1036	199	109	548	138	27
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Actuated Green, G (s)	49.2	49.2	57.5	57.5	19.3	19.3
Effective Green, g (s)	49.2	49.2	57.5	57.5	19.3	19.3
Actuated g/C Ratio	0.57	0.57	0.67	0.67	0.22	0.22
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1083	912	166	1260	399	357
v/s Ratio Prot	c0.55		c0.03	0.29	c0.08	
v/s Ratio Perm		0.13	0.41			0.02
v/c Ratio	0.96	0.22	0.66	0.43	0.35	0.08
Uniform Delay, d1	17.3	8.9	20.2	6.6	27.9	26.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	17.7	0.1	9.0	0.2	2.4	0.4
Delay (s)	35.0	9.0	29.2	6.8	30.3	26.6
Level of Service	C	A	C	A	C	C
Approach Delay (s)	30.2			10.5	28.6	
Approach LOS	C			B	C	
Intersection Summary						
HCM 2000 Control Delay			24.1		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.78			
Actuated Cycle Length (s)			85.8		Sum of lost time (s)	13.5
Intersection Capacity Utilization			71.1%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

APPENDIX H

ITE AND LOCAL TRIP GENERATION RATES

Land Use: 210

Single-Family Detached Housing

Description

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

Specialized Land Use

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

Additional Data

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

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

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

Source Numbers

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

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 174

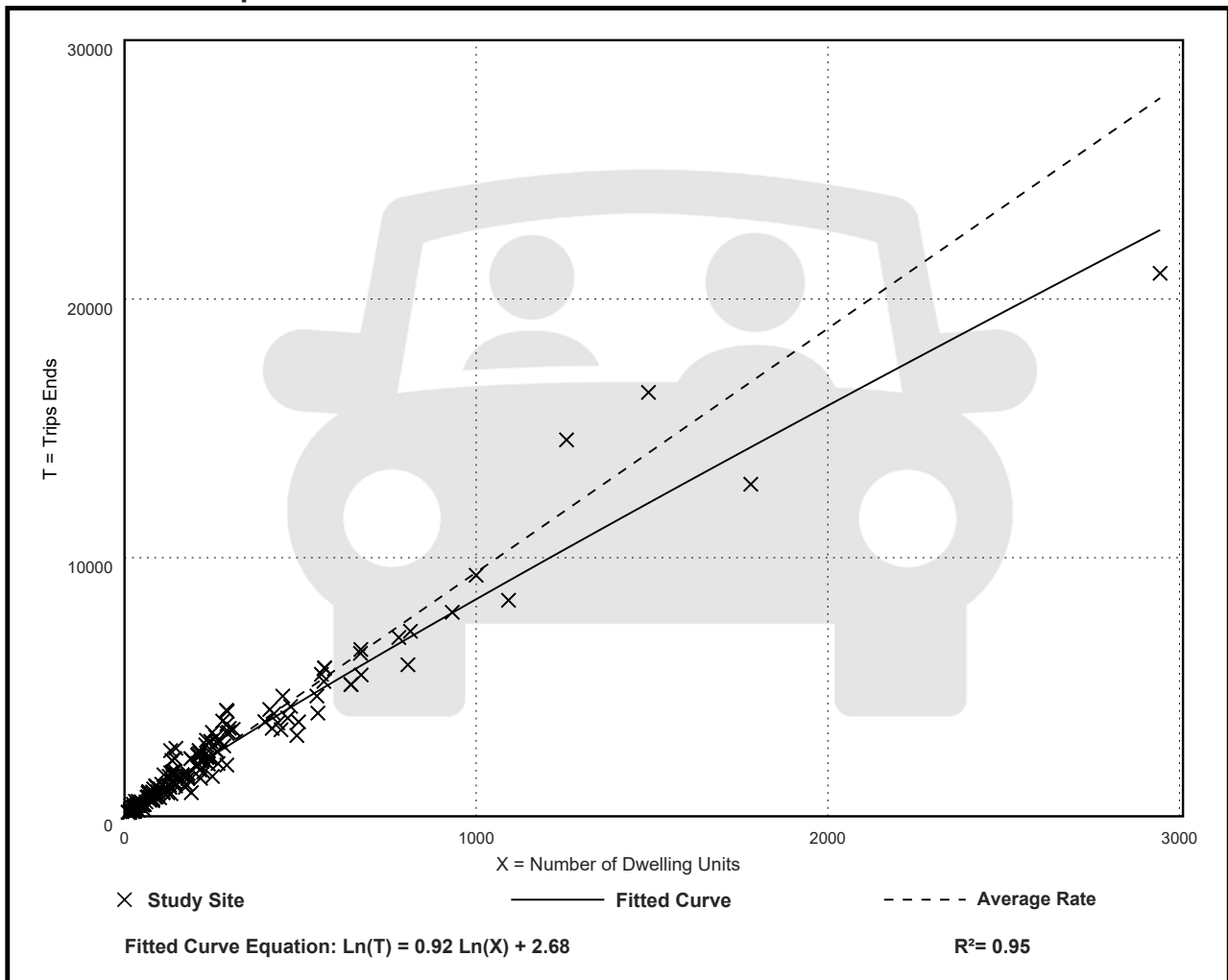
Avg. Num. of Dwelling Units: 246

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 192

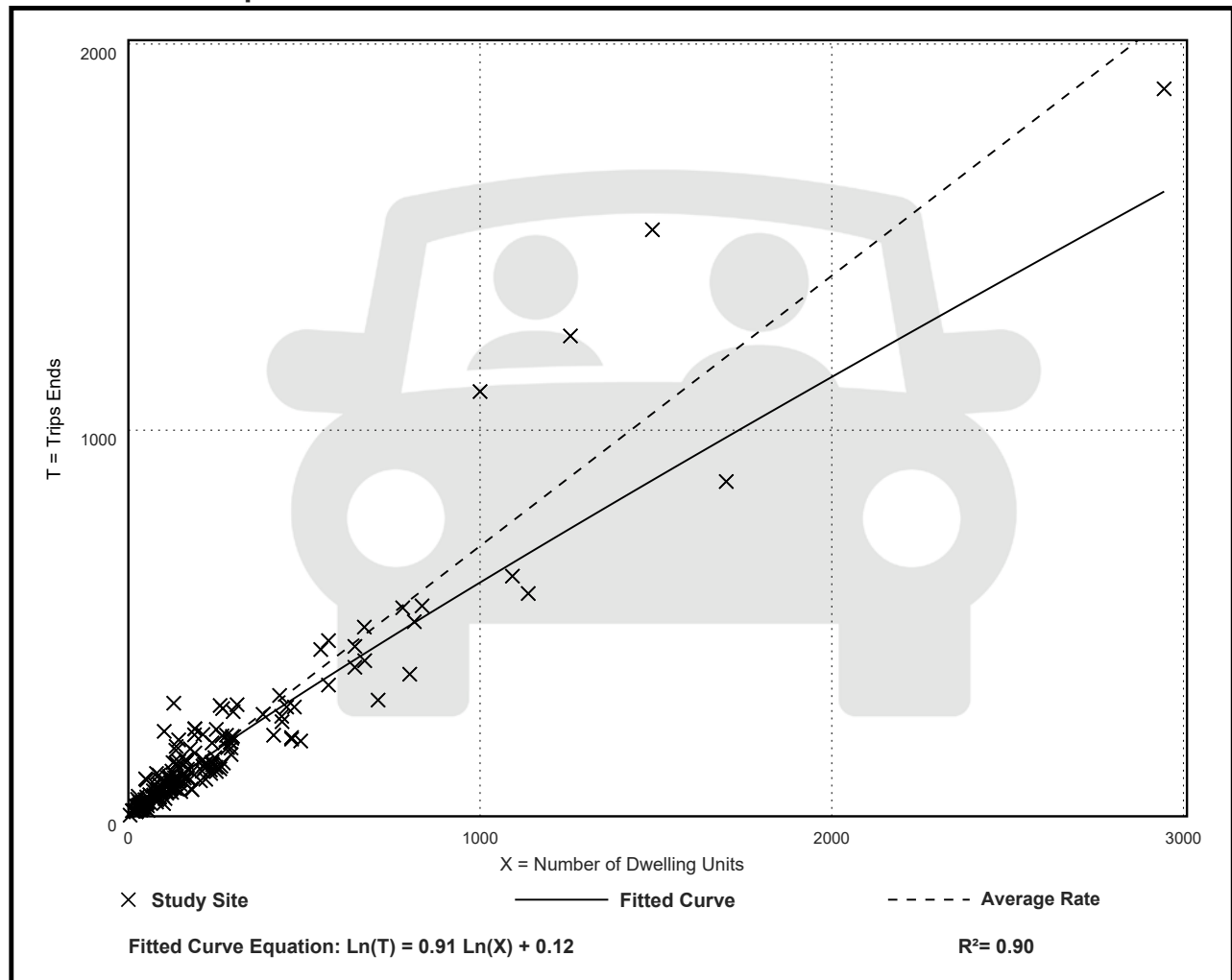
Avg. Num. of Dwelling Units: 226

Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 208

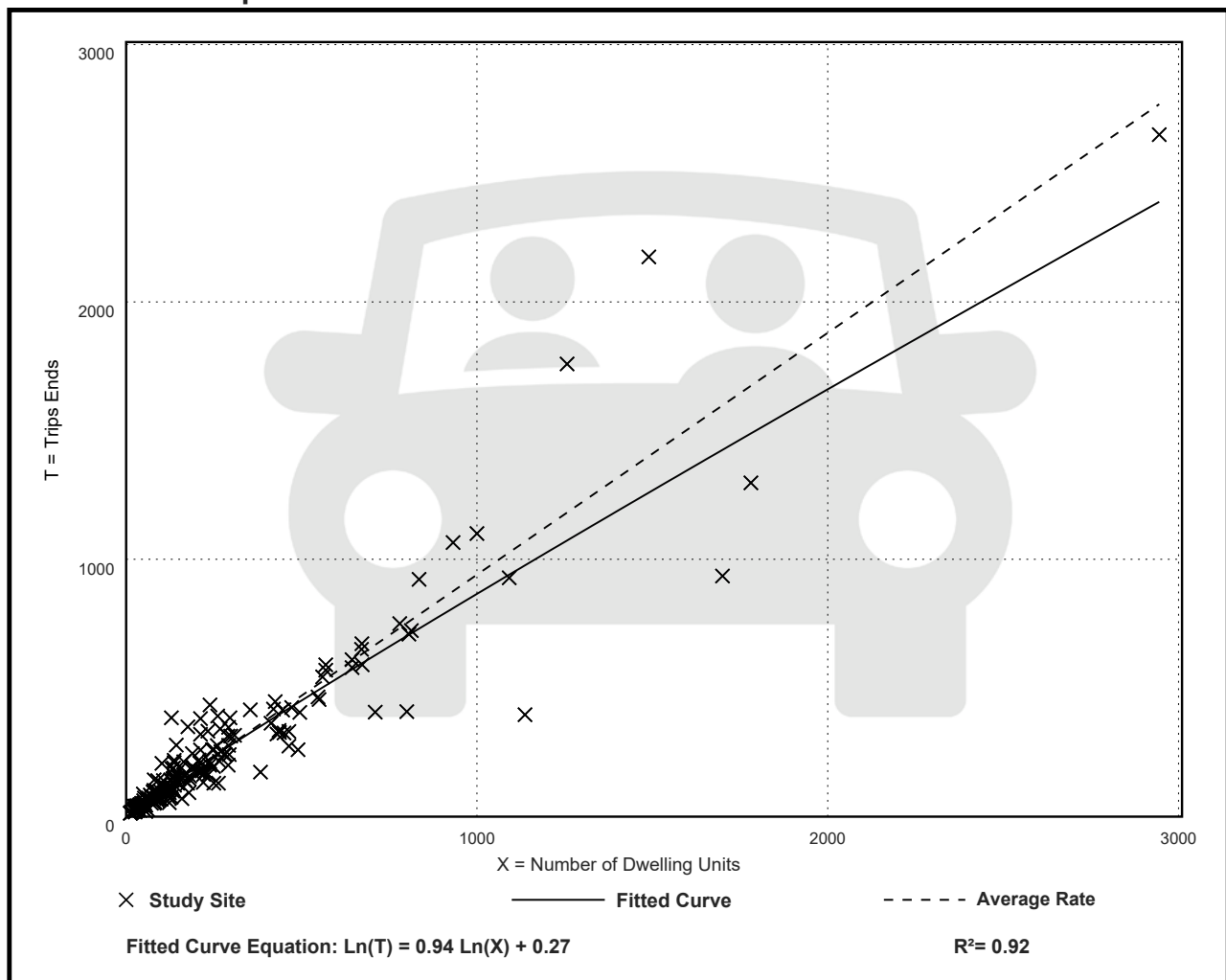
Avg. Num. of Dwelling Units: 248

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



Local Apartment Trip Generation Study

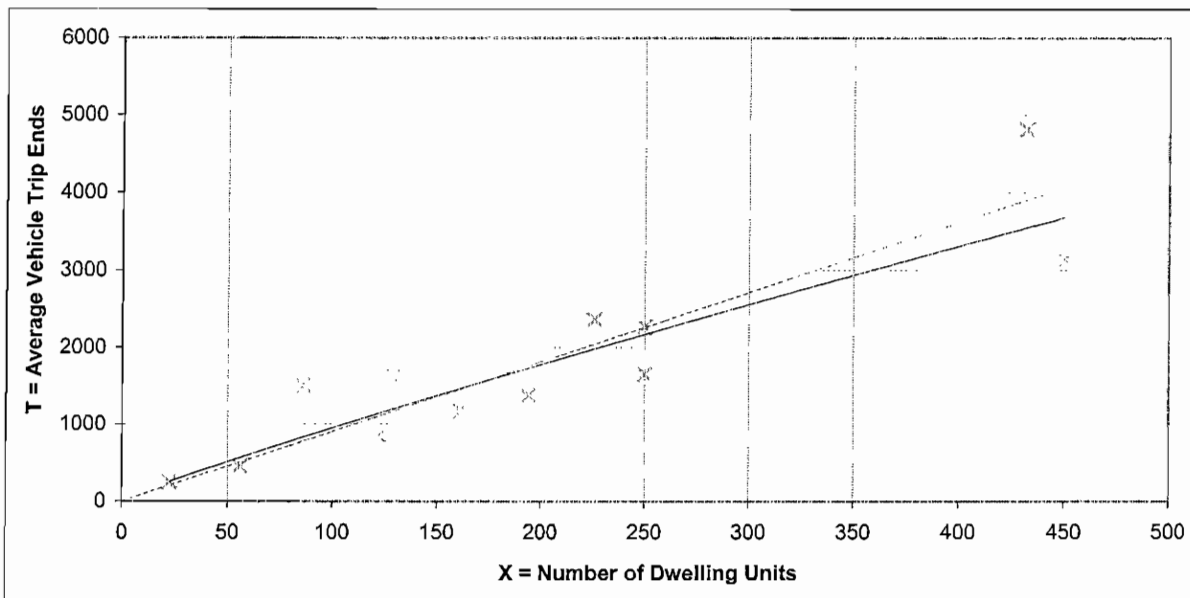
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Number of Studies: 13
Average Number of Dwelling Units: 193
Directional Distribution: 50% entering, 50% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
9.03	6.59 - 17.41	2.47

Data Plot and Equation



X Actual Data Points

— Fitted Curve

Average Rate

Fitted Curve Equation: $T = 15.193(X)^{0.899}$

$R^2 = 0.88$

Local Apartment Trip Generation Study

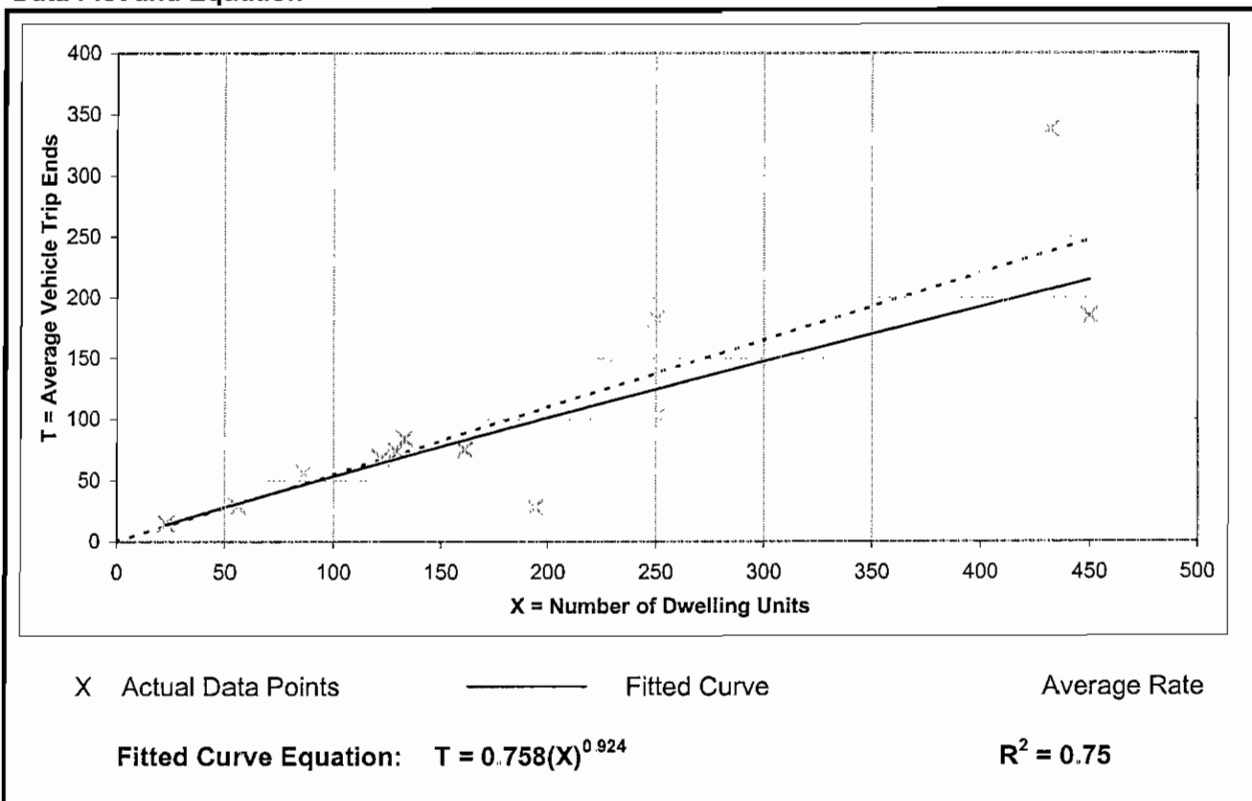
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 13
Average Number of Dwelling Units: 193
Directional Distribution: 22% entering, 78% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
0.55	0.14 - 0.78	0.18

Data Plot and Equation



Local Apartment Trip Generation Study

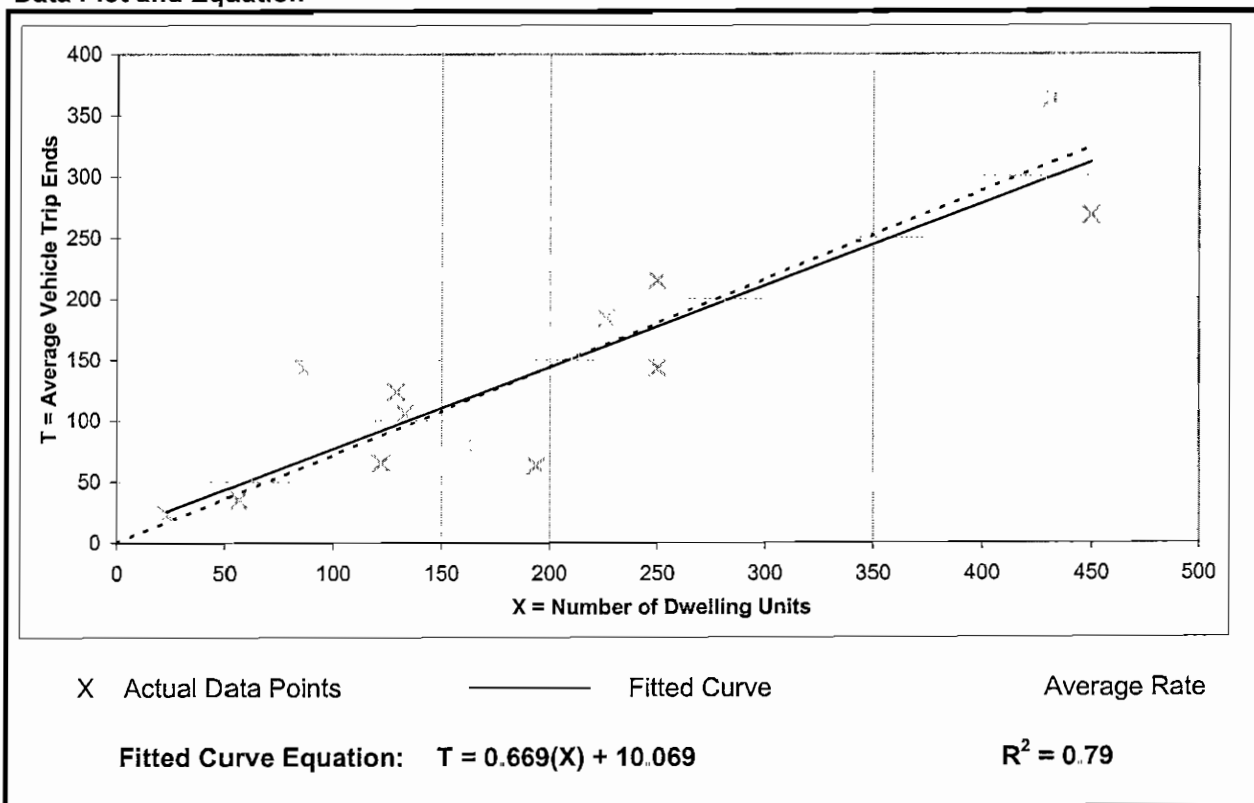
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 13
Average Number of Dwelling Units: 193
Directional Distribution: 55% entering, 45% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
0.72	0.32 - 1.66	0.25

Data Plot and Equation



TRIP GENERATION FOR THE PRESERVE AT WHITES CREEK

120 Single-Family Detached Homes & 75 Multi-Family Attached Townhouses

ITE LAND USE CODE	LAND USE DESCRIPTION	# OF UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	120	1,193	26%	74%		63%	37%	
				23	65	88	74	44	118
Local Trip Rate	Multi-Family Attached Townhouses	75	737	22%	78%		55%	45%	
				9	32	41	33	27	60
Total New Volume Site Trips			1,930	32	97	129	107	71	178

ITE Trip Generation Manual, 11th Edition and Local Trip Rates

Trips calculated by using Fitted Curve Equations

TRIP GENERATION FOR THE PRESERVE AT WHITES CREEK

120 Single-Family Detached Houses

120 Residential Houses = X

Weekday:

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

$$\ln(T) = 0.92 * 4.79 + 2.68$$

$$\ln(T) = 7.08$$

$$T = \underline{\underline{1,193 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 7 and 9 am:

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

$$T = 0.91 * 5 + 0.12$$

$$\ln(T) = 4.48$$

$$T = \underline{\underline{88 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 4 and 6 pm:

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

$$\ln(T) = 0.94 * 4.79 + 0.27$$

$$\ln(T) = 4.77$$

$$T = \underline{\underline{118 \text{ trips}}}$$

TRIP GENERATION FOR THE PRESERVE AT WHITES CREEK

75 Multi-Family Attached Townhouses

75 Residential Houses = X

Weekday:

Fitted Curve Equation: $T = 15.193(X)^{0.899}$

$$T = 15 * 48.49$$

$$T = \underline{\underline{737 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: $T = 0.758(X)^{0.924}$

$$T = 0.758 * 54$$

$$T = \underline{\underline{41 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: $T = 0.669(X)+10.069$

$$T = 0.669 * 75 + 10.07$$

$$T = \underline{\underline{60 \text{ trips}}}$$

APPENDIX I

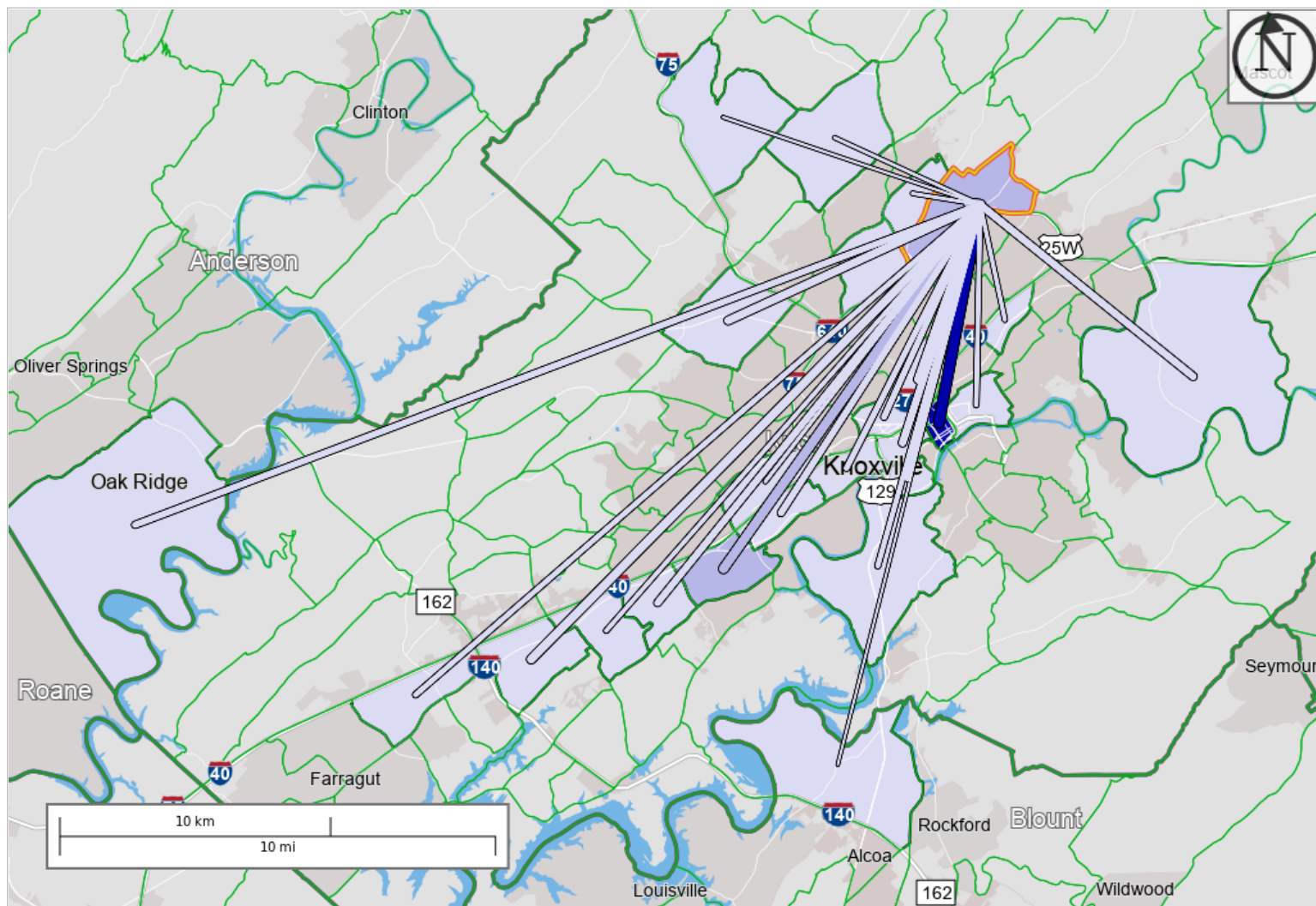
2019 CENSUS BUREAU DATA

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 10/03/2022

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

All Workers



Map Legend

Job Count

- 135 - 154
- 115 - 134
- 95 - 114
- 75 - 94
- 55 - 74
- 35 - 54
- 15 - 34

Selection Areas

- Analysis Selection

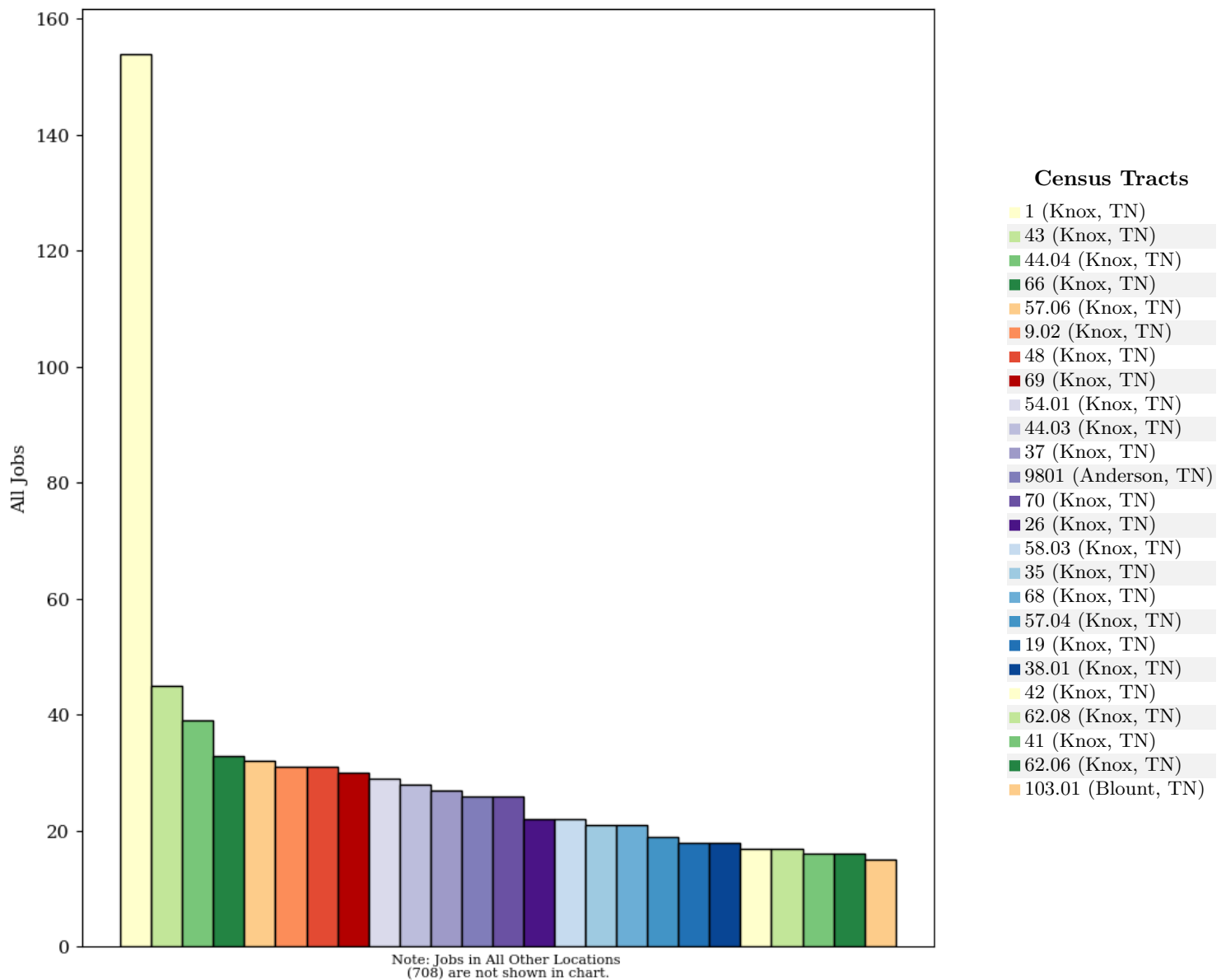
Job Count

- 135 - 154
- 115 - 134
- 95 - 114
- 75 - 94
- 55 - 74
- 35 - 54
- 15 - 34



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

All Workers



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

All Workers

Census Tracts as Work Destination Area	2019	
	Count	Share
All Census Tracts	1,461	100.0
1 (Knox, TN)	154	10.5
43 (Knox, TN)	45	3.1
44.04 (Knox, TN)	39	2.7
66 (Knox, TN)	33	2.3
57.06 (Knox, TN)	32	2.2
9.02 (Knox, TN)	31	2.1
48 (Knox, TN)	31	2.1
69 (Knox, TN)	30	2.1
54.01 (Knox, TN)	29	2.0
44.03 (Knox, TN)	28	1.9

Census Tracts as Work Destination Area	2019	
	Count	Share
37 (Knox, TN)	27	1.8
9801 (Anderson, TN)	26	1.8
70 (Knox, TN)	26	1.8
26 (Knox, TN)	22	1.5
58.03 (Knox, TN)	22	1.5
35 (Knox, TN)	21	1.4
68 (Knox, TN)	21	1.4
57.04 (Knox, TN)	19	1.3
19 (Knox, TN)	18	1.2
38.01 (Knox, TN)	18	1.2
42 (Knox, TN)	17	1.2
62.08 (Knox, TN)	17	1.2
41 (Knox, TN)	16	1.1
62.06 (Knox, TN)	16	1.1
103.01 (Blount, TN)	15	1.0
All Other Locations	708	48.5

Additional Information

Analysis Settings

Analysis Type	Destination
Destination Type	Census Tracts
Selection area as	Home
Year(s)	2019
Job Type	All Jobs
Selection Area	43 (Knox, TN) from Census Tracts
Selected Census Blocks	78
Analysis Generation Date	10/03/2022 15:56 - OnTheMap 6.8.1
Code Revision	f9358819d46a60bb89052036516a1c8fe8bbbbeac
LODES Data Version	20211018_1647

Data Sources

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

Notes

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

APPENDIX J

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)

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

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

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
13 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

Beverly Road at
Proposed Entrance

2027 Projected AM
NB Right Turns = 13

NB 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)

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

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149	100	80	70	60	55	50
150 - 199	90	75	65	55	50	45
200 - 249	80	72	60	55	50	45
250 - 299	70	65	55	50	45	40
300 - 349	60	60	50	50	45	40
350 - 399	60	55	50	45	40	40
400 - 449	55	Beverly Road at Proposed Entrance 2027 Projected PM SB Left Turns = 54 SB Left-Turn Lane NOT Warranted		45	40	35
450 - 499	50			40	35	35
500 - 549	50			40	35	35
550 - 599	45			35	35	35
600 - 649	40			35	35	30
650 - 699	35			30	30	30
700 - 749	30			30	30	30
750 or More	30	30	30	30	30	30

* 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

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					Yes	Yes
350 - 399				Yes	Yes	Yes
400 - 449				Yes	Yes	Yes
450 - 499				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

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

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

APPENDIX K

SIMTRAFFIC VEHICLE QUEUE WORKSHEETS

Intersection: 4: Beverly Road & Tazewell Pike

Movement	EB	WB	NW
Directions Served	TR	LT	LR
Maximum Queue (ft)	26	388	324
Average Queue (ft)	2	129	116
95th Queue (ft)	14	301	292
Link Distance (ft)	487	518	1728
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Intersection: 4: Beverly Road & Tazewell Pike

Movement	EB	WB	NW
Directions Served	TR	LT	LR
Maximum Queue (ft)	28	440	847
Average Queue (ft)	3	124	458
95th Queue (ft)	18	318	967
Link Distance (ft)	487	518	1728
Upstream Blk Time (%)		1	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Intersection: 4: Beverly Road & Tazewell Pike

Movement	EB	WB	NW
Directions Served	TR	LT	LR
Maximum Queue (ft)	25	497	702
Average Queue (ft)	3	190	345
95th Queue (ft)	16	426	832
Link Distance (ft)	487	518	1728
Upstream Blk Time (%)		1	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Intersection: 4: Beverly Road & Tazewell Pike

Movement	EB	WB	NW
Directions Served	TR	LT	LR
Maximum Queue (ft)	27	501	1734
Average Queue (ft)	3	209	1304
95th Queue (ft)	16	485	2039
Link Distance (ft)	487	518	1728
Upstream Blk Time (%)		6	36
Queuing Penalty (veh)		0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Intersection: 4: Beverly Road & Tazewell Pike

Movement	EB	WB	NW
Directions Served	TR	LT	LR
Maximum Queue (ft)	28	533	1726
Average Queue (ft)	2	207	1261
95th Queue (ft)	13	463	1965
Link Distance (ft)	487	518	1728
Upstream Blk Time (%)		2	27
Queuing Penalty (veh)		0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Intersection: 4: Beverly Road & Tazewell Pike

Movement	EB	WB	NW
Directions Served	TR	LT	LR
Maximum Queue (ft)	25	533	1742
Average Queue (ft)	5	364	1580
95th Queue (ft)	20	668	2051
Link Distance (ft)	487	518	1728
Upstream Blk Time (%)		30	69
Queuing Penalty (veh)		0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Intersection: 2: Beverly Road & Proposed Entrance

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	74	40
Average Queue (ft)	36	3
95th Queue (ft)	59	23
Link Distance (ft)	201	394
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Intersection: 2: Beverly Road & Proposed Entrance

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	64	89
Average Queue (ft)	31	20
95th Queue (ft)	55	61
Link Distance (ft)	201	394
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

APPENDIX L

RESPONSE LETTER TO ADDRESS REVIEW COMMENTS



CIVIL ENGINEERING / TRAFFIC ENGINEERING

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

November 15, 2022

PROJECT NAME: The Preserve at Whites Creek

TO: Knoxville-Knox County Planning

SUBJECT: Response Document for The Preserve at Whites Creek TIS Review Comments
(12-SC-22-C/12-C-22-DP)

Knoxville-Knox County Planning, Knox County Engineering, & City of Knoxville Staff:

The following response document addresses comments in a letter from Mike Conger, PE, dated November 10, 2022. This letter is added to the end of the revised report in Appendix L.

1. **This study is in regard to property that lies in the County but with an access point on a city road (Beverly Road). You have noted that the Knoxville city limit runs along "the eastern edge of Beverly Road" (page 4), but have not explicitly stated that the access point is within the jurisdiction of the City. Please state this at an appropriate point in the study.**

Response: This requested change was made on Page 4 at the end of the first paragraph.

2. **In the discussion on sight distance (page 44) it states that intersection sight distance (ISD) "is considered the desirable ... standard". This is not accurate since minimum ISD is specified as a requirement in section 3.04.J.5 of the Knoxville-Knox County Subdivision Regulations. Please correct the verbiage in this section to reflect that it is a standard and not optional as could be construed from this section of the TIS.**

Response: This request to correct the verbiage has been made on Page 44 and updated to state that meeting the ISD is required.

3. **Regarding the sight distance evaluation – since this intersection is within the jurisdiction of the City of Knoxville the subdivision regulations specify that ISD is evaluated per AASHTO standards. Please update the TIS accordingly specifying all**

assumptions and coordinate with the site civil design engineer to include a plan and profile showing sight lines that demonstrate required sight distance is available.

Response: The intersection sight distance discussion has been addressed in various locations in the following:

- Updated on Page 2 in the last bullet point
- Updated on Page 45 in the first paragraph and the images at the bottom of the page
- Updated on Page 50 in point 2b

In addition, the site designer, Scott Williams, is aware of this comment and will address it in the civil site plans.

- 4. A traffic signal warrant analysis for the intersection of Tazewell Pk and Beverly Rd should be included since it appears that the recommendation of installing a traffic signal immediately is solely based on the delay component and does not account for other criteria included in MUTCD traffic signal warrants. The TIS should also provide data and analysis to support the recommendation for turn lanes on all approaches at this intersection as well as required storage length. Finally, please also include a capacity (LOS) analysis at full-build out with the signal installed as a scenario shown in Table 6 of the TIS.**

Response: As requested in a follow-up question, a traffic signal warrant analysis was not completed for this intersection. However for the revised report, the intersection was analyzed with a traffic signal to provide some general recommendations based on the projected results of this study. These recommendations are given on Page 49 and include a new table, Table 9. The Synchro results of the intersection with a traffic signal have been added in Appendix G.

- 5. It is acknowledged that there are site constraints as noted on page 50 of the TIS that limit the ability to provide a second access to this development. The number of units however points to the need for alternative access in the event of a blocked roadway. When alternative access is not feasible as in this case, Knox County has preferred a boulevard section (typically 18'-10'-18' cross section) from the access point to the first intersection (at Road B) in lieu of a separate second access point. It is less likely that access would be cut off on a boulevard section than on a single 26-foot roadway. The study should recommend this treatment in this situation.**

Response: This comment has been addressed and included on Page 3 in the sixth bullet point and on Page 53 in point 3f.

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

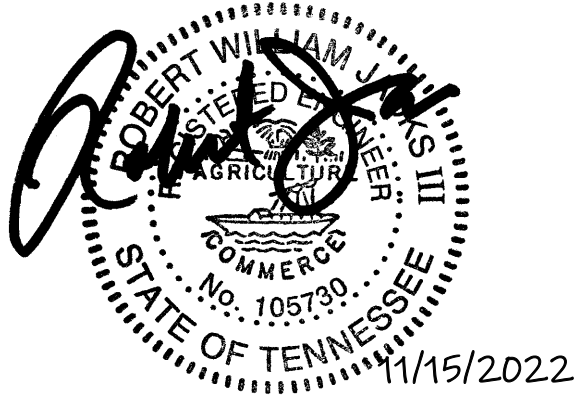
- Updated Title Page
- Updated Table of Contents
- Re-numbered Pages 49 to end

- Updated Page Footers
- A few minor grammatical corrections, including three instances where Tazewell Pike was misspelled
- Added Appendix L 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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© 2022 Ajax Engineering, LLC



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