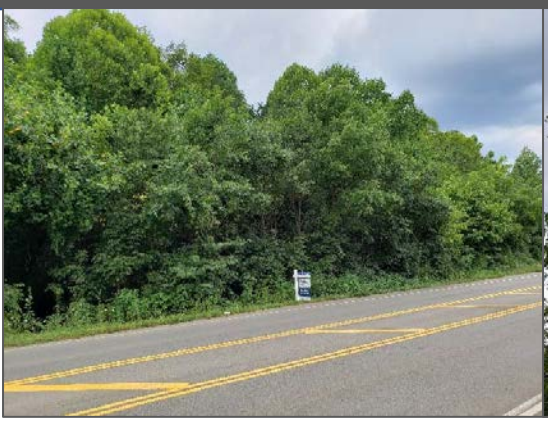
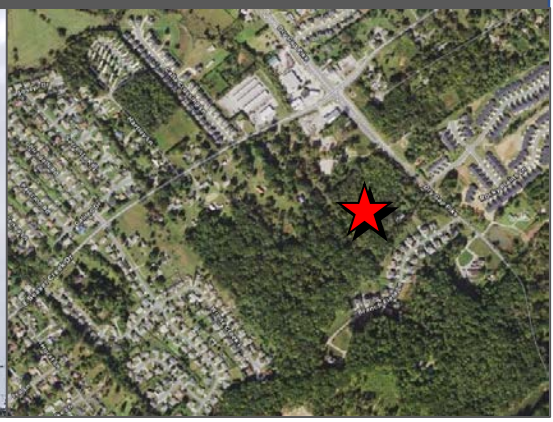
AJAX ENGINEERING

CIVIL ENGINEERING / TRAFFIC ENGINEERING

Transportation Impact Study
Dry Gap Pike Subdivision
Knox County, Tennessee





2nd Revision September 2020

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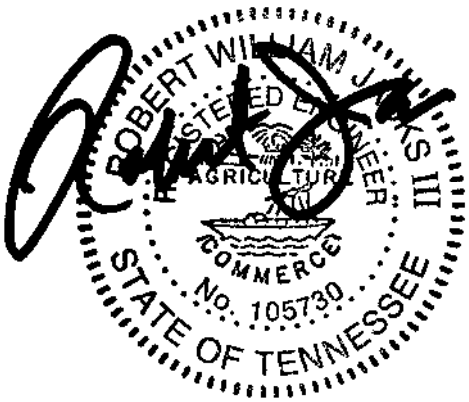

9/25/2020

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EXECUTIVE SUMMARY

Preface:

B&B Builders is proposing a residential development adjacent to Dry Gap Pike in North Knox County, TN. In this report, this proposed residential development is referred to as "Dry Gap Pike Subdivision". This development will consist of 93 single-family attached houses on 25.15± acres. This development is anticipated to be fully built-out and occupied by the year 2025. This study's primary purpose is to determine and evaluate the potential impacts of the residential subdivision on the adjacent transportation system. The study includes a review of the operating characteristics of the existing transportation system that will provide access to the proposed development site. Recommendations and mitigation measures are analyzed and offered where traffic operations have been projected to be below traffic engineering standards.

Study Results:

The findings of this study include the following:

- At full build-out and occupancy in the year 2025, the residential subdivision with 93 single-family attached houses is estimated to generate 894 trips on an average weekday. Of these trips, 50 of these trips are expected to occur during the AM peak hour and 73 trips in the PM peak hour at full build-out and occupancy.
- The new proposed subdivision road entrance on Dry Gap Pike is anticipated to operate adequately with respect to road capacity in the projected 2025 conditions when coupled with the proposed recommendations.

Recommendations:

The following recommendations are offered based on the study analyses:

- It is recommended that the Road "A" subdivision entrance approach at Dry Gap Pike be designed and constructed with a 24" white stop bar and a Stop Sign (R1-1).
- It is recommended that a 75-foot northbound left-turn lane and 75-foot southbound right-turn lane be constructed on Dry Gap Pike at Road "A" for travel into the subdivision. These turn lanes will require the appropriate turn lane pavement arrows and marked at the proper spacing. These lanes should be installed by 2025 or before the subdivision is completely constructed.

- Based on a posted speed limit of 40-mph on Dry Gap Pike, the required Intersection Sight Distance (ISD) is 400 feet, and the Stopping Sight Distance (SSD) with a flat road grade on Dry Gap Pike is 325 feet for northbound and southbound vehicles. These distances must be met to ensure safe operations.
- It is recommended that a "No Outlet" Sign (W14-2a) be posted at the front of the subdivision on Road "A", and a 25-mph Speed Limit Sign (R2-1) should also be posted at the beginning of the street for travel into the subdivision.
- Stop Signs (R1-1) and 24" white stop bars should be installed internally on the new streets, as shown in the report.
- Sight distance at the new internal intersections in the subdivision must not be impacted by new signage or future landscaping. For a posted speed limit of 25-mph, the intersection sight distance requirement is 250 feet. The stopping sight distance required is 155 feet for a level road grade. The road layout designer should ensure that these sight distance lengths are met, and they should be labeled on the plans.
- All drainage grates and covers for the residential development need to be pedestrian and bicycle-safe.
- Sidewalks are not shown on the concept plan. If the development does install internal sidewalks, they should have appropriate ADA compliant curbed ramps at intersection corners and are recommended to be 5 feet minimum in width. Furthermore, if provided, the internal sidewalk system should tie into the existing sidewalk located on the west side of Dry Gap Pike that currently terminates just to the north of the proposed subdivision entrance location.
- The United States Postal Service (USPS) has recently implemented changes to its delivery guidelines in new residential subdivisions. If directed by the local post office, the designer should include an area within the development with a parking area for a centralized mail delivery center.
- All road grade and intersection elements internally, and externally, should be designed to AASHTO, TDOT, and Knox County specifications and guidelines to ensure proper operation.
- It is recommended that a 40-mph Speed Limit Sign (R2-1) be posted on Dry Gap Pike for southbound traffic just to the south of the signalized intersection of East Beaver Creek Drive/Cunningham Road.

DESCRIPTION OF EXISTING CONDITIONS

- **STUDY AREA:**

The proposed location of this new residential development is shown on a map in Figure 1. This proposed development will be located on the west side of Dry Gap Pike between East Beaver Creek Drive/Cunningham Road and Dante Road in North Knox County, TN. The outermost northern boundary of the development property at Dry Gap Pike is located approximately 600 feet to the south of the existing signalized intersection of East Beaver Creek Drive/Cunningham Road at Dry Gap Pike.

Subdivision road access will be limited to Dry Gap Pike with only one road entrance. The subdivision will comprise three new internal paved streets and contain a maximum of 93 single-family attached residential houses on approximately 25.15 acres. As requested by Knoxville/Knox County Planning, this report analyzes the new entrance intersection at Dry Gap Pike.

In the study area, there are several other existing residential subdivisions, individual residences, undeveloped properties, and several commercial properties located to the north. The proposed development property currently consists entirely of woodlands and one single-family home.

The property for the proposed residential subdivision currently consists of one parcel and is surrounded by single-family homes and undeveloped properties with Dry Gap Pike to the east.

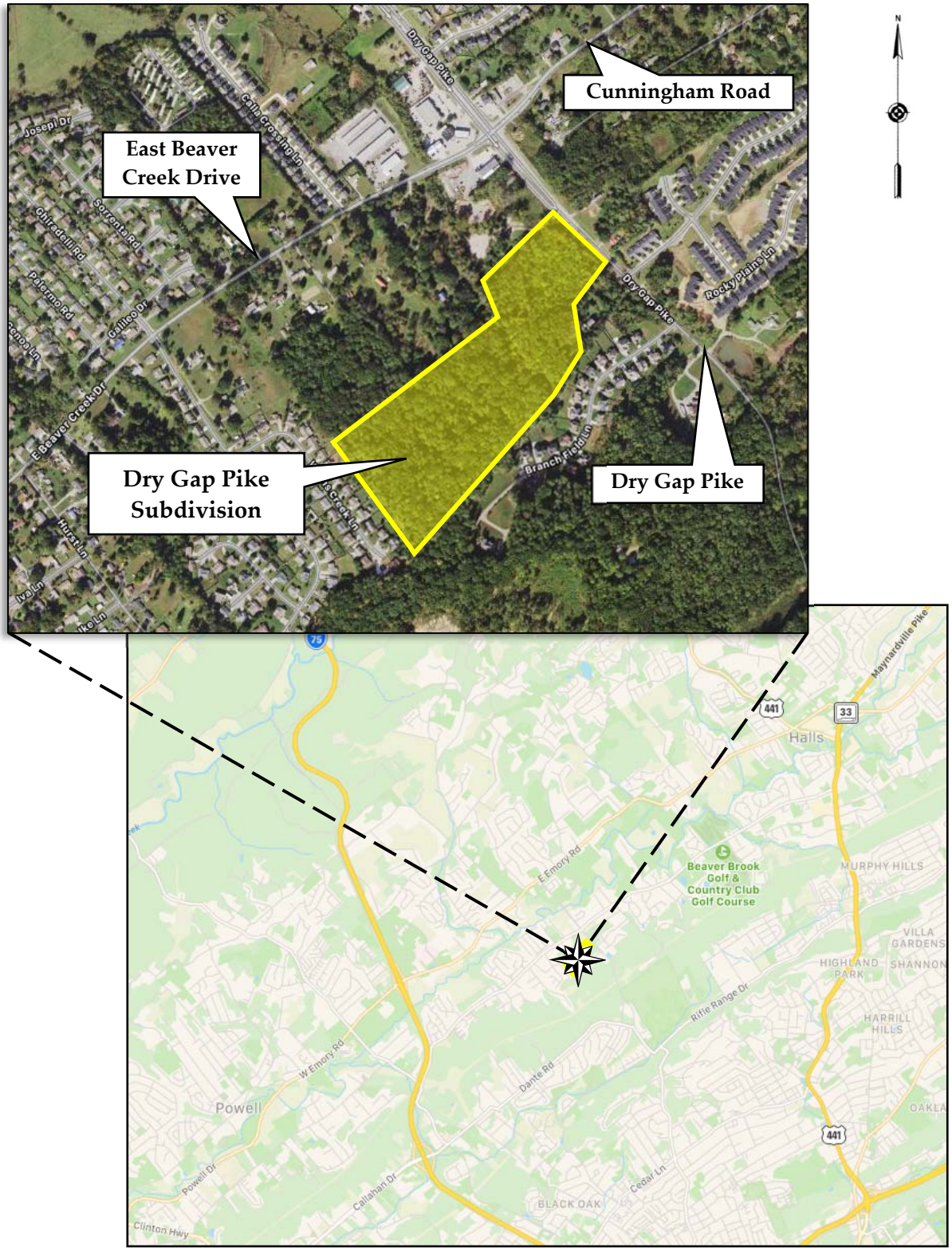


Figure 1
Location Map

- **EXISTING ROADWAYS:**

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

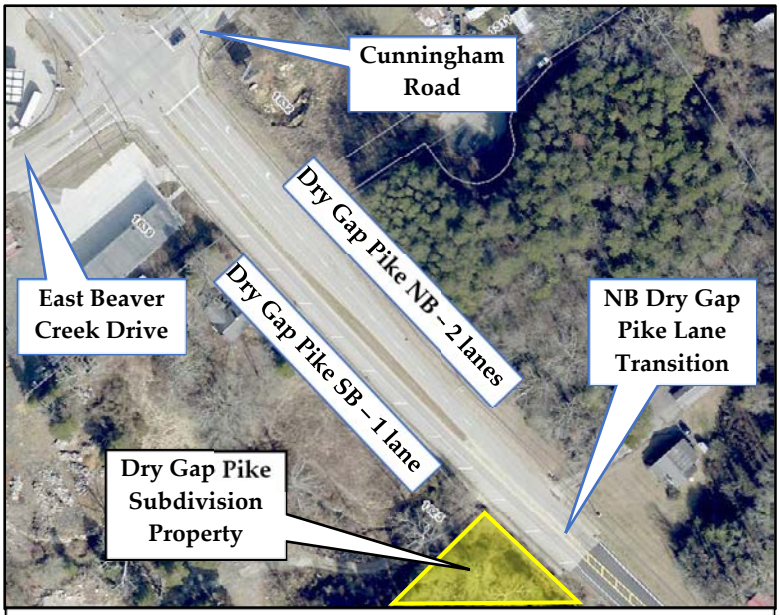
TABLE 1
STUDY CORRIDOR CHARACTERISTICS

NAME	CLASSIFICATION [1]	SPEED LIMIT	LANES	ROAD WIDTH [2]	TRANSIT [3]	PEDESTRIAN FACILITIES	BICYCLE FACILITIES
Dry Gap Pike	Major Collector	40 mph	2 lanes - undivided	40 feet	None	Sidewalks partially along roadway [4]	No bike lanes

[1] 2018 Major Road Plan by Knoxville/Knox County Planning
[2] Edge of curb to edge of pavement at proposed entrance location
[3] According to Knoxville Area Transit System Map
[4] Sidewalks are available on the north side of the frontage development property (approximately 110 feet)

Dry Gap Pike is classified as a Major Collector and traverses in a generally north-south direction, but in the study area, it traverses in a more northwest-southeast direction. On its north end, Dry Gap Pike begins at a signalized T-intersection at East Emory Road. On its south side, Dry Gap Pike terminates at an unsignalized T-intersection at Central Avenue Pike for a total length of 3.8 miles.

Dry Gap Pike exists as a 4-lane divided highway on its north end, but transitions to a 2-lane undivided road just past the signalized intersection of East Beaver Creek Drive/Cunningham Road. Between the signalized intersection and the development property on Dry Gap Pike, the southbound direction is one lane. The northbound direction consists of 2 lanes after transitioning from a single lane to the south.



Dry Gap Pike Lane Configurations between East Beaver Creek Drive/Cunningham Road and Property Site

To the south, Dry Gap Pike continues as a 2-lane undivided road from the development site to its termination at Central Avenue Pike.

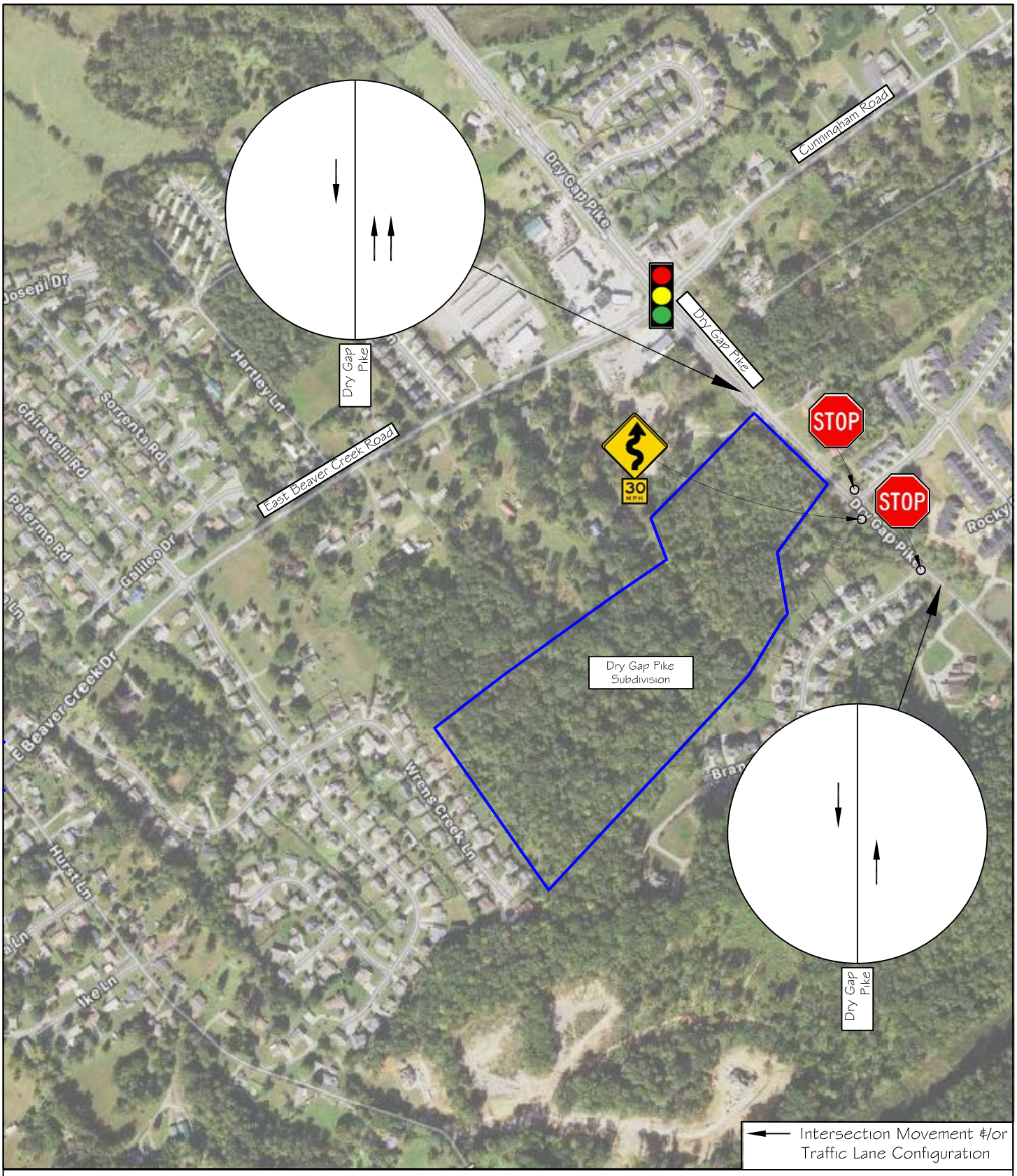
View of Dry Gap Pike Lane Transition near Proposed Subdivision Entrance Location (Looking North)

At the subdivision proposed entrance location, Dry Gap Pike currently consists of a 2-lane pavement section within a lane transition area. The pavement is 40 feet in total width at this location. The east side of Dry Gap Pike (southbound travel) at the proposed entrance location consists of a 4.5-foot paved shoulder, a white edge line, and an 11-foot lane. The transverse center pavement marking area is 8 feet in width. The west side of Dry Gap Pike (northbound travel) has a detached concrete curb with a 3-foot paved shoulder, a white edge line, and a 13.5-foot lane. Dry Gap Pike does not have any utility streetlights at the proposed subdivision entrance location.

To the north of the development property, a 5' concrete sidewalk exists on both sides of Dry Gap Pike. It runs in front of the development property for approximately 110 feet prior to terminating abruptly before the proposed location of the subdivision entrance. The existing sidewalk ends about 90 feet from the proposed subdivision entrance.

End of Sidewalk on West Side of Dry Gap Pike (Looking South)

Figure 2 on the following page shows the lane configurations on Dry Gap Pike and shows traffic signage in the study area. The pages following Figure 2 provide an overview of the site study area with photographs.



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NOT TO SCALE

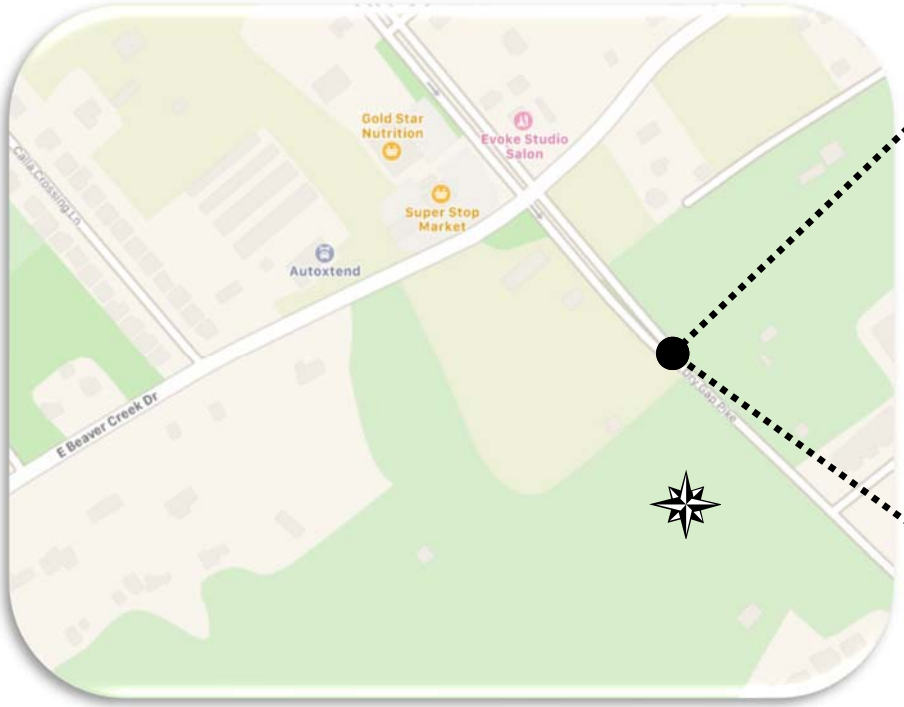
NORTH

FIGURE 2

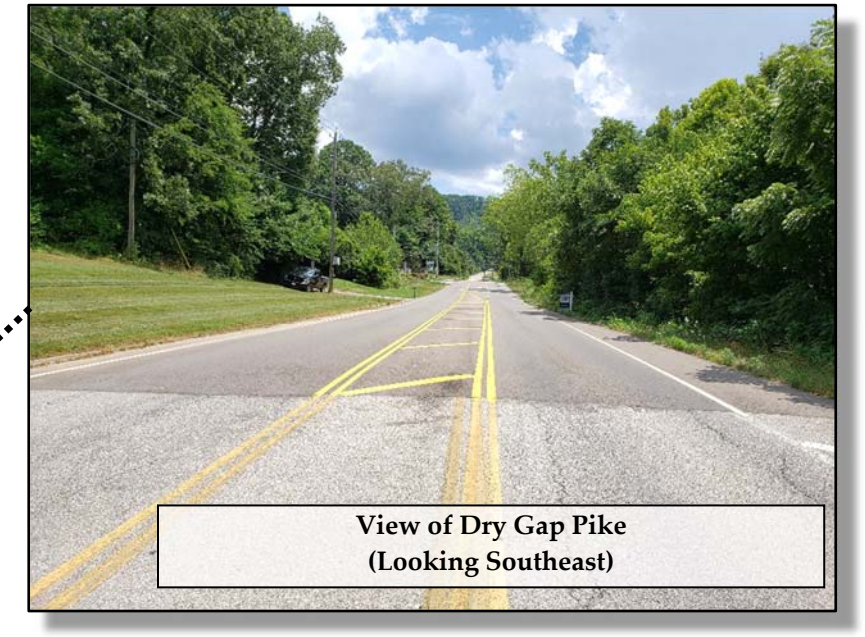
Dry Gap Pike Subdivision

Traffic Signage & Existing Lane Configurations

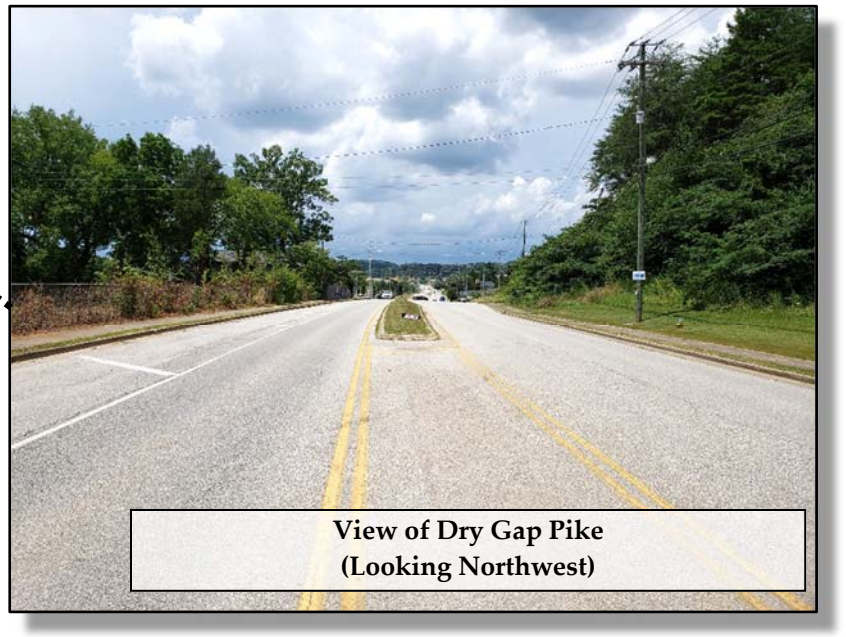
PHOTO EXHIBITS



Dry Gap Pike



View of Dry Gap Pike
(Looking Southeast)



View of Dry Gap Pike
(Looking Northwest)

Dry Gap Pike

View of Site Property
(Looking Northwest)

▪ EXISTING TRANSPORTATION VOLUMES PER MODE:

There are two permanent vehicular traffic count locations nearby the project site. One of these count locations is conducted yearly by the Tennessee Department of Transportation (TDOT). The Knoxville Regional TPO conducts the other count location. The traffic count location data is the following:

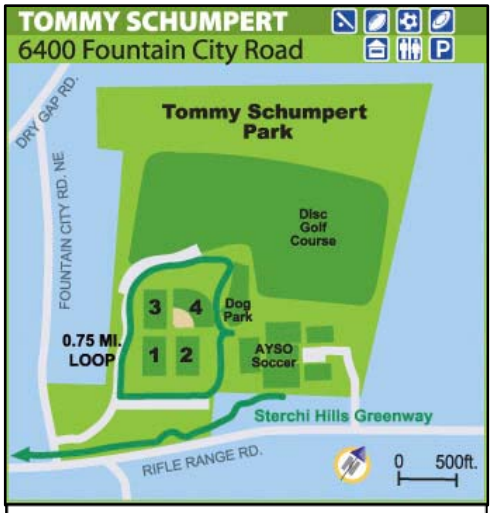
- o Existing vehicular roadway traffic:
  - Average Annual Daily Traffic (AADT) on Dry Gap Pike to the north of the project site was reported by TDOT at 10,804 vehicles per day in 2018. From 2010 – 2018, this count station has indicated a 4.3% average annual growth rate.
  - The Knoxville Regional TPO reported an Average Daily Traffic (ADT) on Dry Gap Pike just south of the project site at 7,790 vehicles per day in 2019. From 2009 – 2019, this count station has indicated a 3.4% average annual growth rate. Appendix A includes all the researched historical traffic count data for this report.
- o Existing bicycle and pedestrian volumes:

  The average daily pedestrian and bicycle traffic along the study corridor is not known. These volumes are assumed to be minimal to non-existent in the study area.

▪ BICYCLE FACILITIES:

Bicycle facilities (lanes) are not currently available within the project site study area.

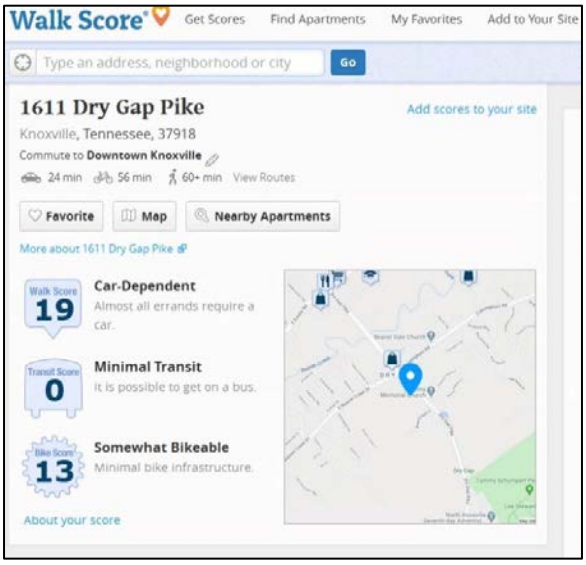
In the area, the closest bicycle accommodation is located to the southeast of the site at Tommy Schumpert Park near the intersection of Fountain City Road and Rifle Range Road. The facilities provided at this park include Sterchi Hills Greenway that connects to Sterchi Hills Park to the west. Soccer fields, baseball fields, a dog park, a disc golf course, and a paved walking loop are also provided. This park is located 1.4 miles away by roadway via Dry Gap Pike and Fountain City Road.



Map of Tommy Schumpert Park (Knox County)

- **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. According to the website, the numerical values assigned for the Walk Score and the Bike Score are based on the distance to the closest amenity in various relevant categories (businesses, schools, parks, etc.) and are graded from 0 to 100. The Transit Score measures how well a location is served by public transit based on distance and type of nearby transit. The Transit Score is also graded from 0 to 100.



Appendix B shows maps and other information for the Walk Score, Bike Score, and Transit Score at 1611 Dry Gap Pike, which is the current address for the site development property. Based on the project location, the location is graded with a Walk Score of 19. This Walk Score indicates that the site is almost completely dependent on vehicles for errands and travel. The site is graded with a Bike Score of 13, which means that there is minimal bike infrastructure but is somewhat bikeable. Also, based on the project location, the site is graded with a Transit Score of 0 due to no existing nearby public transportation options.

- **TRANSIT SERVICES:**

The City of Knoxville has a network of public transit opportunities offered by Knoxville Area Transit (KAT). Bus service is not available in this area of Knox County. The overall KAT bus system map is in Appendix C. The closest public transit bus service is 3 miles away to the south (by roadway) at the intersection of Cedar Lane at Haynes-Sterchi Road. This KAT service is Route 90 "Crosstown Connector". The bus route operates on weekdays and weekends, and the route map is also included in Appendix C. Other transit services include the East Tennessee Human Resource Agency (ETHRA) and the Community Action Committee (CAC), which provides transportation services when requested. Private taxis and ride-sharing opportunities (Uber, etc.) are also available.

PROJECT DESCRIPTION

- **LOCATION AND SITE PLAN:**

The proposed plan layout given by Batson, Himes, Norvell, & Poe is shown in Figure 3. As shown in the figure, three new internal streets will be constructed, and all of them will terminate at cul-de-sacs. Road "A" will intersect Dry Gap Pike and will be the only entrance for the development. The total length of new streets in the subdivision will be approximately 2,880 feet (0.55 miles). The 25.15-acre residential development will incorporate four common areas with two areas for stormwater facilities. The size of the single-family attached lots will average approximately 6,000 square feet (.14 acre) to 10,000 square feet (.23 acre) in size with a couple of lots near 1/2 acre. Each home will have a garage and driveway.

This development will not specifically be marketed to senior citizens and will not be age-restricted. However, the developer is fully expecting that most residents in this new residential community will be seniors and retired persons based on his previous experience with other developments in the area.

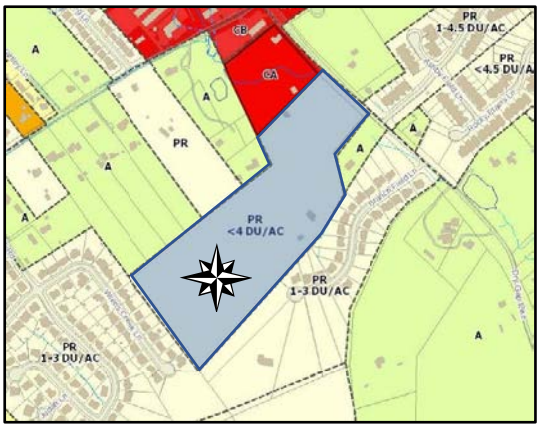
The schedule for completion of this new residential development is dependent on economic factors and construction timelines. This project is also contingent on permitting, design, and other issues. However, for this study, it is assumed that the total construction build-out of the development and full occupancy will occur within the next five years (2025).

Figure 3
Proposed Plan Layout
Dry Gap Pike Subdivision

Not to Scale

- **PROPOSED USES AND ZONING REQUIREMENTS:**

The property for the proposed development is within the Knox County limits and zoned as Planned Residential (PR) with a density of <4 units per acre. Appendix D provides the current zoning map. The existing adjacent surrounding land uses are the following:



- Dry Gap Pike bounds the development property to the northeast. The properties across Dry Gap Pike are zoned as Agricultural (A) and Planned Residential (PR) and consist of standalone single-family homes and the Autumn Walk Subdivision, respectively.
- All the properties to the south, southeast, and southwest are zoned as Planned Residential (PR) and consist of Wrens Creek Subdivision and Woodrun Estates Subdivision. A single parcel abuts the development property to the southeast at Dry Gap Pike and is zoned as Agricultural (A). This property contains a standalone single-family residence.
- The properties to the north and northeast of the proposed development property are zoned with a mix of Agricultural (A), Planned Residential (PR), and General Business (CA) zones. These properties consist of single-family residences except for the single General Business (CA) property located to the northeast of the site development property. This property is unoccupied but contains a barn and has miscellaneous items stored on-site (rock, dirt, tires, etc.). It appears to be currently undergoing some vegetation clearing and cleanup.

The Planned Residential (PR) zone allows for various land uses primarily within the residential realm. Uses permitted in this zone include single-family dwellings, duplexes, and multi-dwelling structures and developments.

- **DEVELOPMENT DENSITY:**

The proposed density for the Dry Gap Pike Subdivision is based on a maximum of 93 houses on 25.15 acres. These numbers compute to 3.7 dwelling units per acre, which is less than the current zoning that allows up to 4 units per acre.

- **ON-SITE CIRCULATION:**

The total length of the three new streets within the development will be just over 2,880 feet (0.55 miles) in length and will be designed and constructed to Knox County, TN specifications. The new streets shown in Figure 3 are labeled Road "A" thru Road "C". The development will have asphalt paved internal roadways and include 8" extruded concrete curbs. The lane widths will be 13 feet each for a total 26-foot pavement width. The street right-of-way within the development will be 50 feet. Concrete sidewalks are not proposed based on the typical section show on the concept plan. Knox County will maintain the streets in the subdivision after construction.

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

Besides residential passenger vehicles, the new streets will also provide access for service, delivery, maintenance, and fire protection/rescue vehicles. None of these other types of vehicles will impact roadway operations other than when they occasionally enter and exit the development. It is expected that curbside garbage collection services will be available for this residential subdivision. Concerning fire protection and rescue vehicles, the new roads will be designed and constructed to Knox County specifications and thus expected to be adequate in size. The internal roadways in the subdivision are anticipated to accommodate the larger types of vehicles along with standard passenger vehicles.

TRAFFIC ANALYSIS OF EXISTING AND PROJECTED CONDITIONS

EXISTING TRAFFIC CONDITIONS:

Due to the current worldwide coronavirus pandemic, usable traffic count data has not been able to be collected. Because traffic counts conducted at this time would not yield accurate data, previous traffic count data was used for this study. The most recent traffic count data adjacent to the project site was obtained from Knox County Engineering. This previous traffic count was conducted on Tuesday, September 17, 2019, by National Data & Surveying Services on Dry Gap Pike just south of Branch Field Lane. Branch Field Lane is the single access road for Woodrun Estates Subdivision, which is located just to the south of the proposed development site. The northbound and southbound traffic movements at this location from this count were used to determine the northbound and southbound thru volumes on Dry Gap Pike at the proposed subdivision entrance.

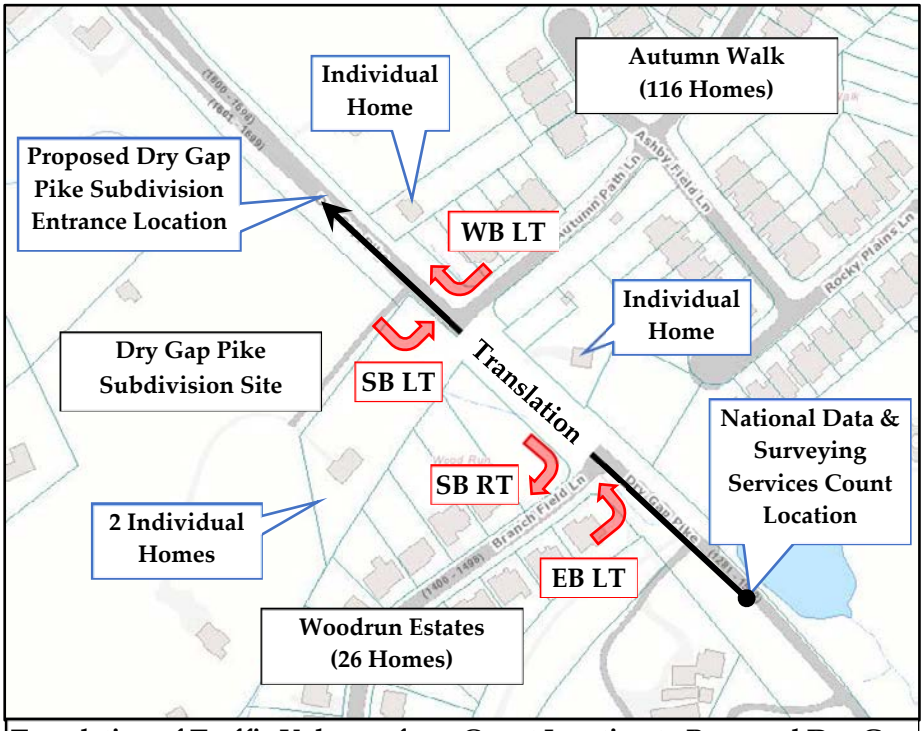
During the previously collected traffic volumes, the AM and PM peak hours of traffic on Dry Gap Pike was 7:15 – 8:15 AM and 5:00 – 6:00 PM. The September 2019 tabulated traffic counts from National Data & Surveying Services are shown in Appendix E and Figure 4a.

The following figure, Figure 4b, shows adjusted thru volumes on Dry Gap Pike at the same location for the current year, 2020. The conversion of the traffic volumes from 2019 to 2020 was made by applying a +3.5% annual growth rate for one year. A +3.5% annual growth rate was assumed and used based on the historical data shown in Appendix A from TDOT and the Knoxville TPO.

Finally, Figure 4c shows the adjusted 2020 thru volumes on Dry Gap Pike "translated" to the proposed location for the new Dry Gap Pike Subdivision entrance. The thru volumes on Dry Gap Pike shown in Figure 4c take into account the trips that were not included in the previous traffic count to the south. These include the trips generated by the homes in between the count location and the proposed subdivision entrance located to the north. The National Data & Surveying Services 2019 count location was 1,000 feet to the south of the proposed subdivision entrance and did not include the adjacent subdivision and standalone homes trips to the north on Dry Gap Pike. The volumes that were not captured include the southbound left and right entering movements, eastbound left exiting movements, and westbound right exiting movements.

Currently, there are two subdivisions, Autumn Walk and Woodrun Estates, and another four standalone individual homes in between the traffic count location and the proposed subdivision entrance on Dry Gap Pike for a total of 146 homes (116 Autumn Walk + 26 Woodrun Estates + 4 standalone). The traffic volumes from these existing homes and not tabulated in the traffic count were estimated and calculated using Trip Generation Manual, 10th Edition, a publication of the Institute of Transportation Engineers (ITE). This process is discussed in this report in Trip Generation, and the calculations are shown in Appendix F.

The calculated generated trips from these homes were distributed into southbound left and right entering movements, eastbound left exiting movements, and westbound left exiting movements. The trips were subsequently added to the thru volumes on Dry Gap Pike. The calculated generated trips were distributed based on data for the traffic impact study performed for the nearby Autumn Walk Subdivision. This process is discussed further in this report in Trip Distribution and Assignment. The following exhibits and tables below illustrate the process of translating the traffic volumes from the count collection location to the proposed Dry Gap Pike Subdivision entrance location. The turn arrows shown in the exhibits illustrate the traffic volumes associated with the subdivisions and the four individual standalone homes that were not included in the traffic count.



Translation of Traffic Volumes from Count Location to Proposed Dry Gap Pike Subdivision Entrance Location

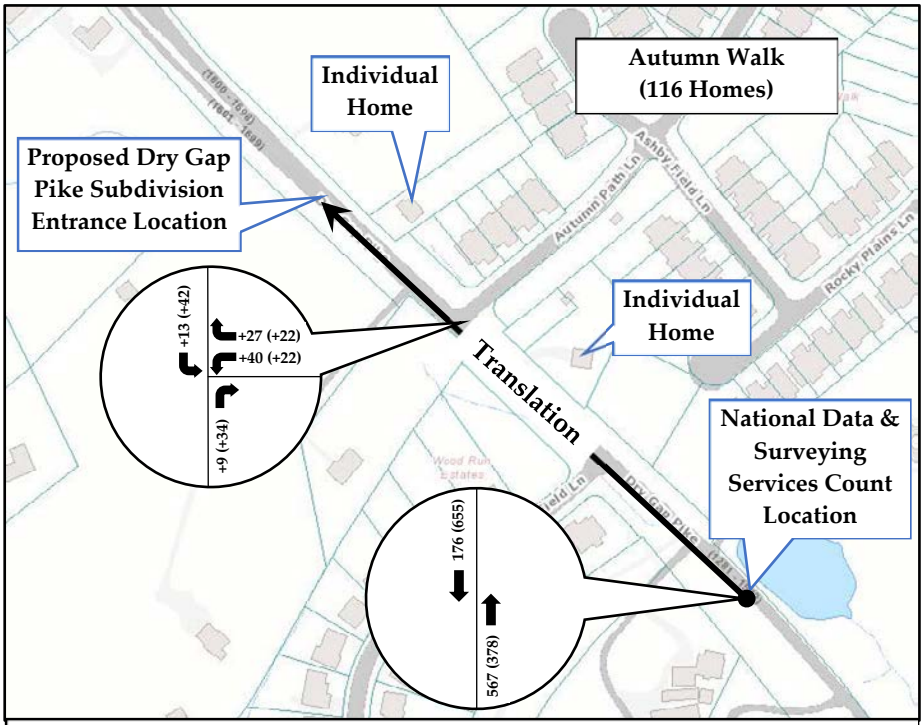
TABLE 2a
TRIP GENERATION FOR AUTUMN WALK SUBDIVISION & EAST SIDE STAND-ALONE HOMES
116 Single-Family Attached Houses + 2 Standalone Homes on East Side of Dry Gap Pike in 2020

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	118 Houses	1,211	25%	75%		63%	37%	
				22	67	89	76	44	120
Total New Volume Site Trips			**1,211**	**22**	**67**	**89**	**76**	**44**	**120**

ITE Trip Generation Manual, 10th Edition
Trips calculated by using Fitted Curve Equation

TABLE 2b
CALCULATION OF ADDITIONAL THRU VOLUMES ON DRY GAP PIKE - 2019 to 2020
(Translation of National Data & Surveying Services (NDSS) Count Location to Proposed Dry Gap Pike Subdivision Entrance Location)

SUBDIVISION	# OF HOMES	TRIP GENERATION				TRAFFIC MOVEMENT DISTRIBUTION					
		AM PEAK		PM PEAK			AM PEAK	PM PEAK		AM PEAK	PM PEAK
		ENTER	EXIT	ENTER	EXIT						
Autumn Walk +2 Standalone Homes on East Side	118	22	67	76	44	EXIT WB RIGHT	40% **27**	50% **22**	EXIT WB LEFT	60% **40**	50% **22**
						ENTER SB LEFT	60% **13**	55% **42**	ENTER NB RIGHT	40% **9**	45% **34**



Translation of Traffic Volumes from Count Location to Proposed Dry Gap Pike Subdivision Entrance Location – 118 East Side Houses Unaccounted Traffic Volumes in National Data Surveying Services Count

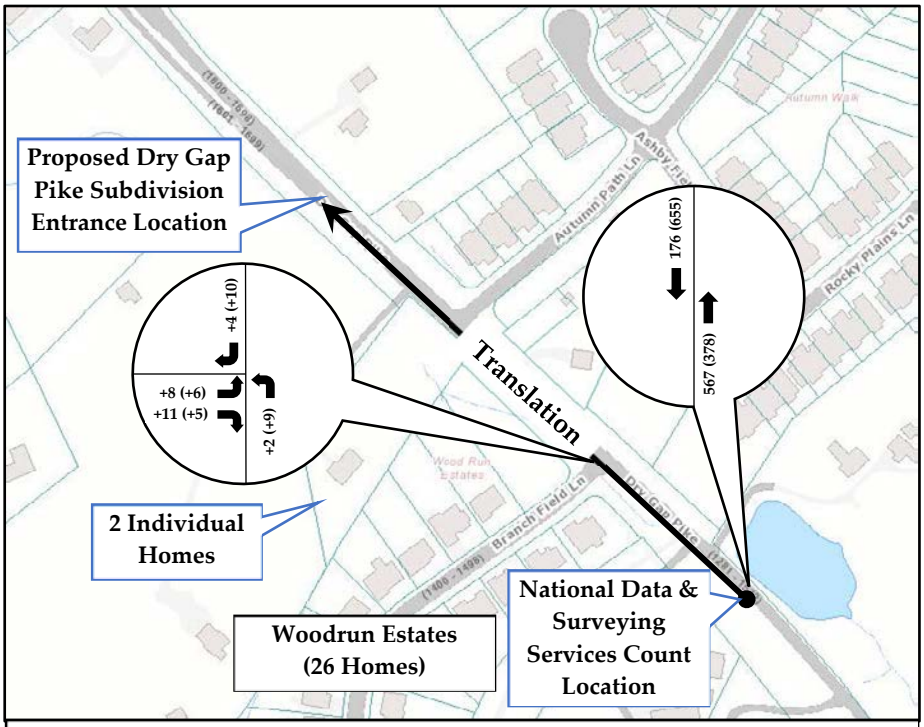
TABLE 2c
TRIP GENERATION FOR WOODRUN ESTATES SUBDIVISION & WEST SIDE STAND-ALONE HOMES
26 Single-Family Detached Houses + 2 Standalone Homes on West Side of Dry Gap Pike in 2020

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	28 Houses	323	25%	75%		63%	37%	
				6	19	25	19	11	30
Total New Volume Site Trips			**323**	**6**	**19**	**25**	**19**	**11**	**30**

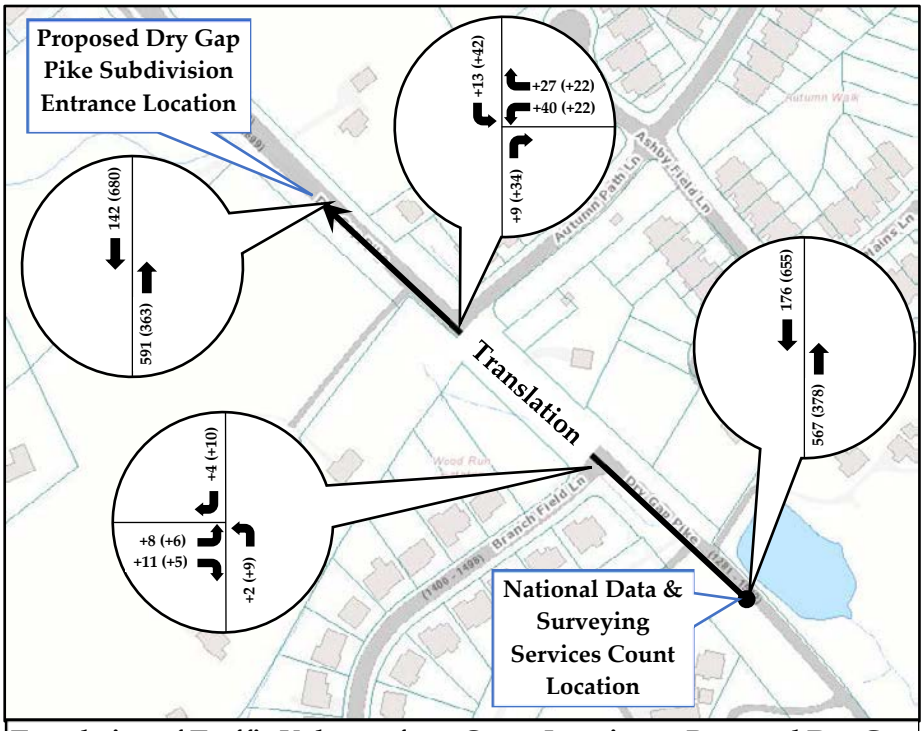
ITE Trip Generation Manual, 10th Edition
Trips calculated by using Fitted Curve Equation

TABLE 2d
CALCULATION OF ADDITIONAL THRU VOLUMES ON DRY GAP PIKE - 2019 to 2020
(Translation of National Data & Surveying Services (NDSS) Count Location to Proposed Dry Gap Pike Subdivision Entrance Location)

SUBDIVISION	# OF HOMES	TRIP GENERATION				TRAFFIC MOVEMENT DISTRIBUTION					
		AM PEAK		PM PEAK			AM PEAK	PM PEAK		AM PEAK	PM PEAK
		ENTER	EXIT	ENTER	EXIT						
Wood Run Estates +2 Standalone Homes on West Side	28	6	19	19	11	ENTER SB RIGHT	60% **4**	55% **10**	ENTER NB LEFT	40% **2**	45% **9**
						EXIT EB LEFT	40% **8**	50% **6**	EXIT EB RIGHT	60% **11**	50% **5**



Translation of Traffic Volumes from Count Location to Proposed Dry Gap Pike Subdivision Entrance Location – 28 West Side Houses Unaccounted Traffic Volumes in National Data Surveying Services Count



Translation of Traffic Volumes from Count Location to Proposed Dry Gap Pike Subdivision Entrance Location –
<u>Total</u> of 146 East and West Side Houses Unaccounted Traffic Volumes in National Data Surveying Services Count

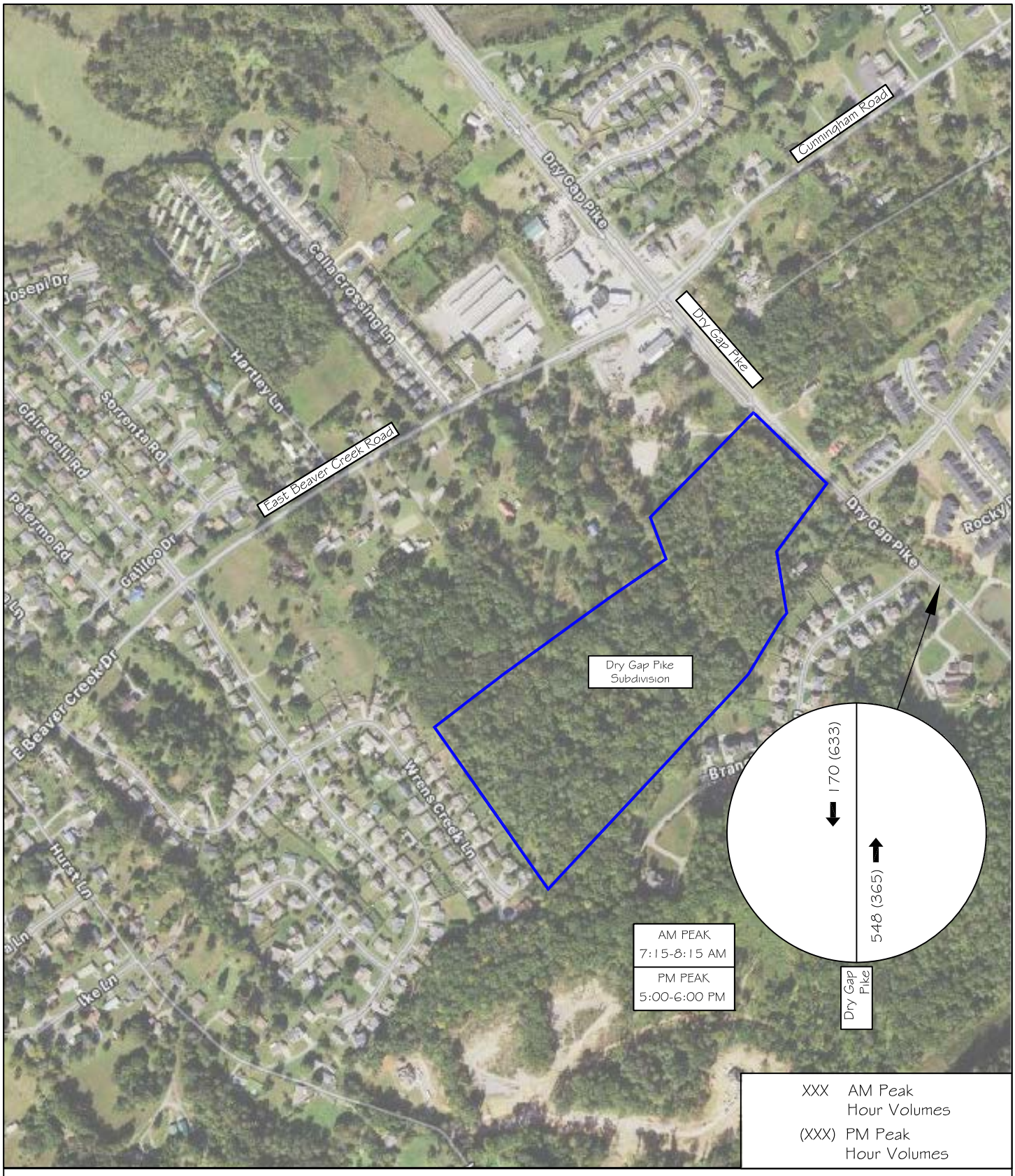


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FIGURE 4a

Dry Gap Pike Subdivision

2019 Peak Hour Traffic Volumes
(from National Data & Surveying Services 9/17/2019)

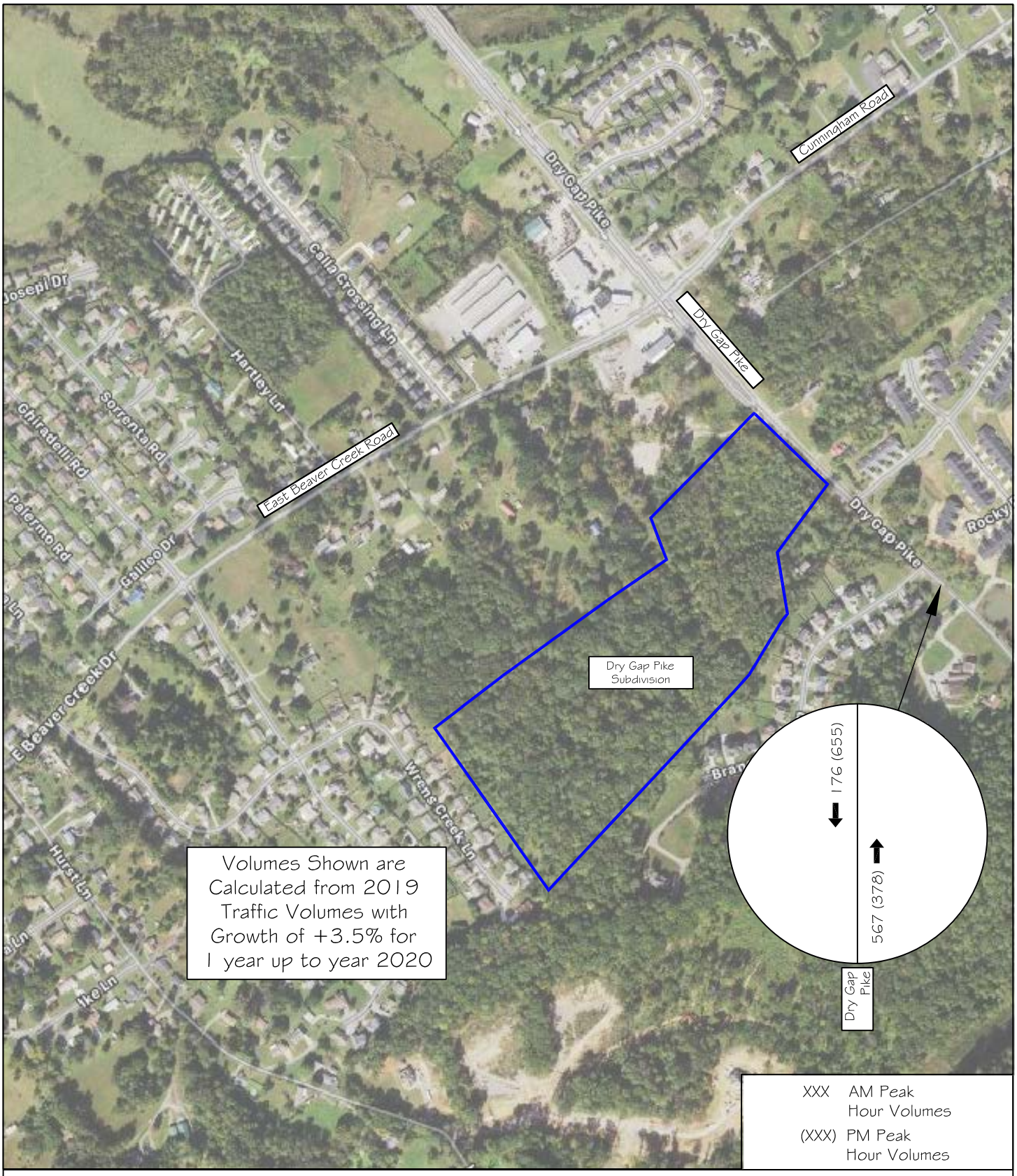

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FIGURE 4b

Dry Gap Pike Subdivision

2020 Peak Hour Traffic Volumes - CALCULATED (+3.5% GROWTH)

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FIGURE 4c

Dry Gap Pike Subdivision

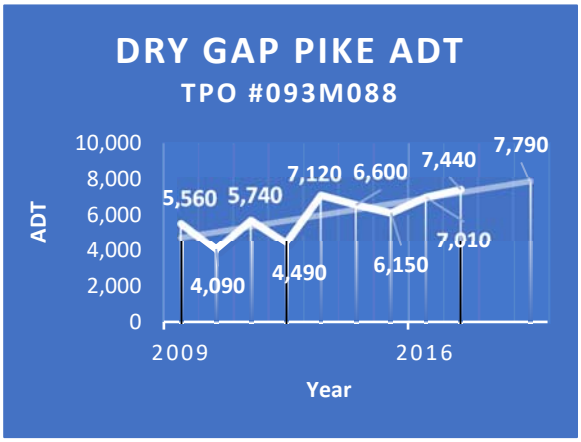
2020 Peak Hour Traffic Volumes - EXISTING TRAFFIC CONDITIONS (Translated 2019 Peak Hour Volumes)

- **OPENING YEAR TRAFFIC CONDITIONS (WITHOUT PROJECT):**

Opening year traffic volumes represent the future condition the proposed study area is potentially subject to even without the proposed project (no-build option). As previously stated, the build-out and full occupancy for this proposed new residential development is assumed to occur in the year 2025. This horizon year corresponds to five years for the subdivision to reach full capacity and occupancy.

TDOT reported an Average Annual Daily Traffic (AADT) at 10,804 vehicles per day in 2018 on Dry Gap Pike just to the north of the intersection with East Beaver Creek Drive/Cunningham Road (Appendix A includes the historical traffic data). From 2008 – 2018, this count station has indicated a +4.3% average annual growth rate. The local TPO reported an Average Annual Traffic (ADT) at 7,790 vehicles per day in 2019 at a location slightly to the south of the project site. Over the past ten years, this count station has indicated a +3.4% average annual growth rate.

A +3.5% annual growth rate was assumed to consider any future development in the area, potential rising travel volumes, and to ensure a reasonable estimate for this study. Figure 5 shows the projected opening year traffic volumes for the year 2025 during the AM and PM peak hours based on an assumed annual growth rate of +3.5% applied to the translated 2020 traffic volumes.



Besides overall traffic growth in the study area, by 2025, additional vehicle trips will be created by the construction of homes on lots that are currently empty or under construction within the two adjacent subdivisions. The trips generated by these future homes will need to be accounted for in the thru volumes on Dry Gap Pike. These trips include the remaining 32 home lots in Autumn Walk and four home lots in Woodrun Estates. Furthermore, one existing standalone home on the west side of Dry Gap Pike was removed from the calculations for the year 2025 since it will be razed to construct the new subdivision. The calculations for these additional 2025 volumes are shown in Appendix F, the following tables and exhibits, and Figure 5 shows the results. The same process was used as previously shown in the exhibits at the end of the Existing Traffic Conditions section of the report. The traffic volumes shown in Figure 5 could potentially exist in the future, even if the proposed Dry Gap Pike Subdivision is not constructed.

TABLE 2e
TRIP GENERATION FOR AUTUMN WALK SUBDIVISION
32 Single-Family Attached Houses in 2025

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	32 Houses	365	25%	75%		63%	37%	
				7	21	28	22	13	35
Total New Volume Site Trips			**365**	**7**	**21**	**28**	**22**	**13**	**35**

ITE Trip Generation Manual, 10th Edition
Trips calculated by using Fitted Curve Equation

TABLE 2f
TRIP GENERATION FOR WOODRUN ESTATES SUBDIVISION
4 Single-Family Detached Houses - 1 Stand-Alone Home on West Side of Dry Gap Pike in 2025

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	3 Houses	42	25%	75%		63%	37%	
				2	5	7	3	1	4
Total New Volume Site Trips			**42**	**2**	**5**	**7**	**3**	**1**	**4**

ITE Trip Generation Manual, 10th Edition
Trips calculated by using Fitted Curve Equation

TABLE 2g
CALCULATION OF ADDITIONAL THRU VOLUMES ON DRY GAP PIKE - 2020 to 2025

SUBDIVISION	# OF HOMES	TRIP GENERATION				TRAFFIC MOVEMENT DISTRIBUTION					
		AM PEAK		PM PEAK			AM PEAK	PM PEAK		AM PEAK	PM PEAK
		ENTER	EXIT	ENTER	EXIT						
Autumn Walk	32	7	21	22	13	EXIT WB RIGHT	40% **8**	50% **7**	EXIT WB LEFT	60% **40**	50% **22**
						ENTER SB LEFT	60% **4**	55% **12**	ENTER NB RIGHT	40% **9**	45% **34**
Wood Run Estates -1 Standalone Home on West Side	3	2	5	3	1	ENTER SB RIGHT	60% **1**	55% **2**	ENTER NB LEFT	40% **2**	45% **9**
						EXIT EB LEFT	40% **2**	50% **1**	EXIT EB RIGHT	60% **11**	50% **5**

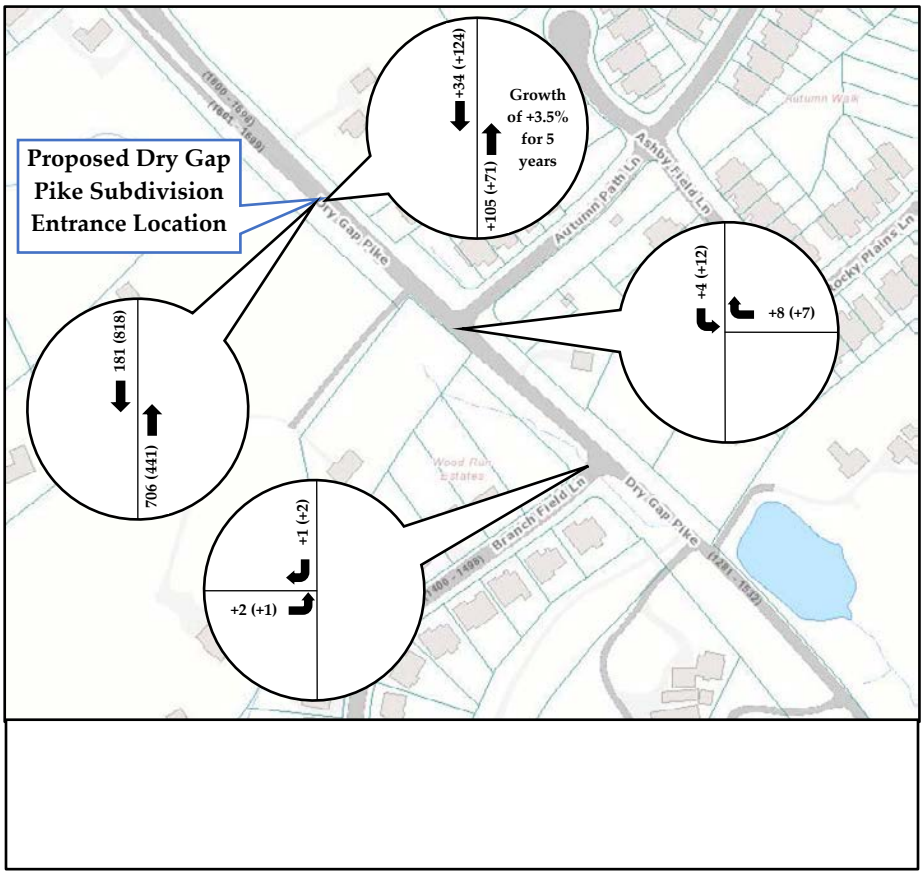

Proposed Dry Gap Pike Subdivision Entrance Location
+34 (+124)
+105 (+71)
Growth of +3.5% for 5 years
181 (818)
706 (441)
+4 (+12)
+8 (+7)
+1 (+2)
+2 (+1)
Dry Gap Pike
Autumn Path Ln
Ashby Field Ln
Branch Field Ln
Rocky Plains Ln

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FIGURE 5

Dry Gap Pike Subdivision

2025 Peak Hour Traffic Volumes - OPENING YEAR TRAFFIC (WITHOUT PROJECT)

- **TRIP GENERATION:**

A generated trip is a single or one-direction vehicle movement that is either entering or exiting the study site. The estimated amount of traffic generated by the proposed 93 single-family attached units was calculated based upon equations for peak hour trips provided by Knoxville-Knox County Planning. These equations were developed from local studies to estimate apartment trip generation in the surrounding area and published in December 1999. The data and calculations utilizing the local trip rates are in Appendix F. A summary of this information is presented in the following table:

TABLE 3
TRIP GENERATION FOR DRY GAP PIKE SUBDIVISION
93 Single-Family Attached Houses

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
Local Trip Rate	Single-Family Attached Housing	93 Houses	894	22%	78%		55%	45%	
				11	39	50	40	33	73
Total New Volume Site Trips			**894**	**11**	**39**	**50**	**40**	**33**	**73**

TPO Local Trip Rates
Trips calculated by using Fitted Curve Equation

For the proposed residential subdivision, with a maximum of 93 single-family attached houses, it is estimated that 11 vehicles will enter, and 39 will exit, for a total of 50 generated trips during the AM Peak Hour in the year 2025. Similarly, 40 vehicles are estimated to enter, and 33 will exit, for a total of 73 generated trips during the PM Peak Hour in the year 2025. The calculated trips generated for an average weekday are expected to be approximately 894 vehicles for the proposed development in the year 2025. The local apartment trip rate was used since these homes will be single-family attached units rather than detached homes and assumed to more closely follow the trip rates generated by typical local apartment units.

As discussed earlier, Appendix F also contains the calculations for the trip generation and distribution of trips from the adjacent homes in the study area that were necessary to determine the traffic count volumes on Dry Gap Pike. The trip generation rates for the nearby houses were calculated using Land Use Code #210, Single-Family Detached Housing from the Trip Generation Manual, 10th Edition, a publication of the Institute of Transportation Engineers (ITE).

- **TRIP DISTRIBUTION AND ASSIGNMENT:**

Figure 6 shows the projected distribution for traffic entering and exiting at the proposed entrance for the subdivision at Dry Gap Pike. The percentages shown pertain to the trips generated by the new proposed residential dwellings in the development and calculated from the local trip rates from Knoxville-Knox County Planning.

The percentages assumed and shown in Figure 6 are based on the results of an earlier traffic count that was conducted on March 22, 2016, at Autumn Path Lane for a traffic impact study completed by Fulghum MacIndoe & Associates. This study was for a subsequent additional phase of Autumn Walk Subdivision, which is located just to the south and east of the proposed Dry Gap Pike Subdivision.

The data from this previous study was correlated to the proposed traffic distribution for the Dry Gap Pike Subdivision located on the other side of Dry Gap Pike. The turning movement counts from Autumn Path Lane were assumed to be a reasonable estimate for the Dry Gap Pike Subdivision travel patterns since this was an existing similar land use near this study development.

Various outside developments will "attract" the projected generated traffic to and from the new residential subdivision. All these "attractors" are accessible by traveling northbound and southbound via Dry Gap Pike. In addition to employment centers and commercial development, some traffic will travel to and from a variety of public and private elementary, middle, and high schools. This site development property is currently zoned for Brickey McCloud Elementary School, Powell Middle School, and Central High School. These schools are located north and south of the proposed residential development. These school locations suggest some residential traffic to and from the north and south on Dry Gap Pike for those who do not utilize public school bus transportation.

Figure 7 shows the Traffic Assignment of the computed trips generated by the subdivision (from Table 3) and applied to the intersection movements based on the assumed distribution of trips shown in Figure 6.

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FIGURE 6

Dry Gap Pike Subdivision

Directional Distribution of Generated Traffic during AM and PM Peak Hour

TRIP GENERATION FOR
DRY GAP PIKE SUBDIVISION
93 Single-Family Attached Houses

	AM PEAK	PM PEAK
ENTER	11	40
EXIT	39	33

XXX AM Peak Hour Volumes

(XXX) PM Peak Hour Volumes

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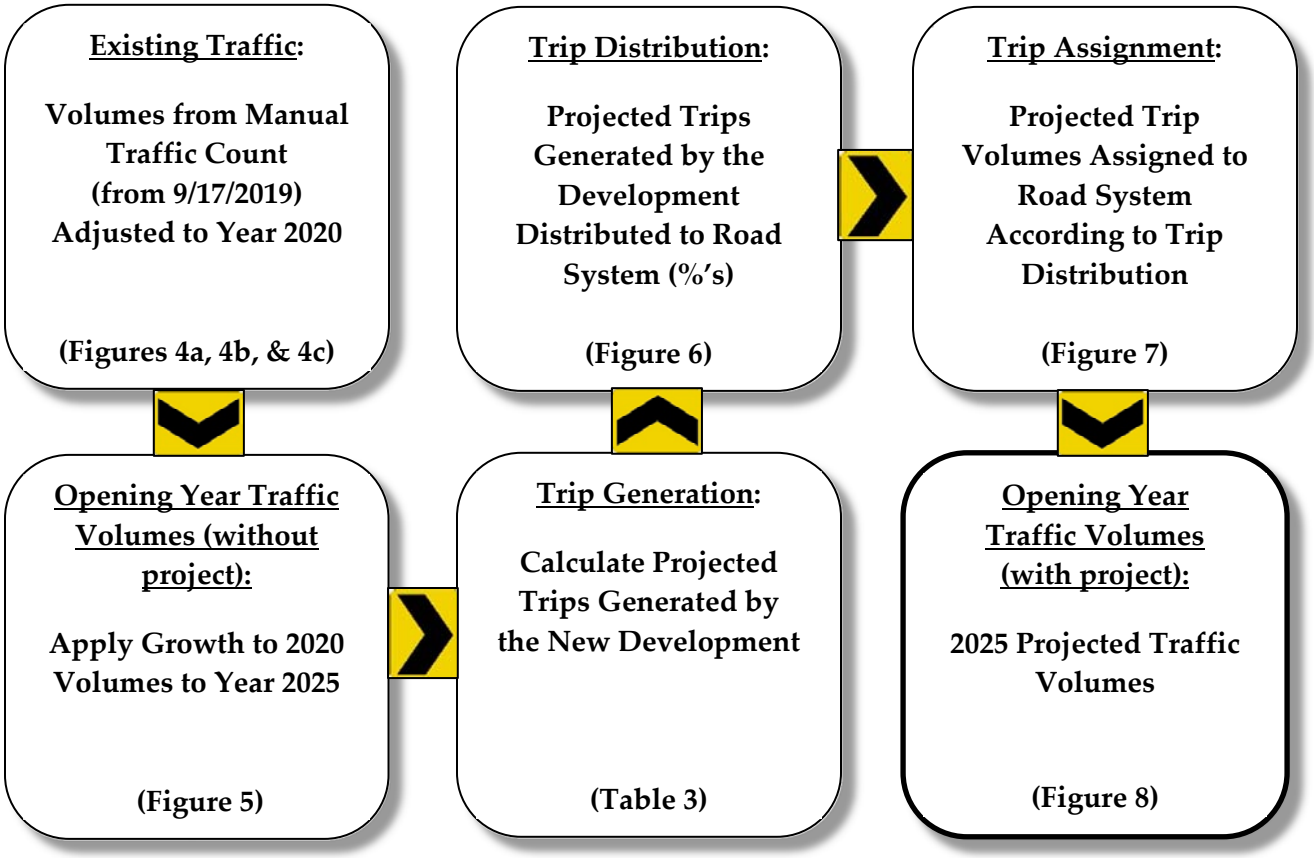
FIGURE 7

Dry Gap Pike Subdivision

Traffic Assignment of Generated Traffic during AM and PM Peak Hour

- **OPENING YEAR TRAFFIC CONDITIONS (WITH PROJECT):**

Overall, several additive steps were taken to estimate the total opening year projected traffic volumes at the studied entrance intersection at Dry Gap Pike when the residential development is fully constructed and occupied by the year 2025. The steps are illustrated below for clarity:



To calculate the total future projected traffic volumes at the studied entrance intersection, the calculated peak hour traffic (from local trip rates) generated by the new proposed residential development was added to the 2025 opening year traffic (shown in Figure 5) by following the predicted directional distributions and assignments (shown in Figures 6 and 7). This procedure was necessary to obtain the total projected traffic volumes when the development is fully built-out. Figure 8 shows the projected AM and PM peak hour volumes at the studied entrance intersection for the year 2025.

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FIGURE 8

Dry Gap Pike Subdivision

2025 Peak Hour Traffic Volumes - OPENING YEAR TRAFFIC (WITH PROJECT)

Capacity analyses were completed to determine the projected Level of Service (LOS) for the entrance intersection at Dry Gap Pike for vehicular traffic. The capacity analyses were calculated by following the methods outlined in the Highway Capacity Manual (HCM) and using Synchro Traffic Software (Version 8).

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). 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 the approach is operating at 75% of its available capacity. The designations for LOS are based on delay and are reported differently for unsignalized and signalized intersections. The difference is primarily due to motorists having different expectations between the two road facilities. Generally, for most instances, the boundary of LOS D / LOS E 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 4 lists the level of service criteria for unsignalized intersections. The analysis results of unsignalized intersections using the HCM methodologies are conservative due to the larger 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.

From the capacity calculations, the results from the projected peak hour vehicular traffic are shown in Table 5 for the intersection. 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 from the capacity analyses for the projected peak hour vehicular traffic. As shown in Table 5, the studied intersection is calculated to operate at reasonable levels (low vehicle delays) for the northbound left-turn entering movement during the projected AM and PM peak hours and average to slightly below-average levels for eastbound exiting vehicles. The calculations and results shown are based on a projected need for both a southbound right-turn lane and northbound left-turn lane on Dry Gap Pike at the proposed entrance and as discussed in the next section.

TABLE 4
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

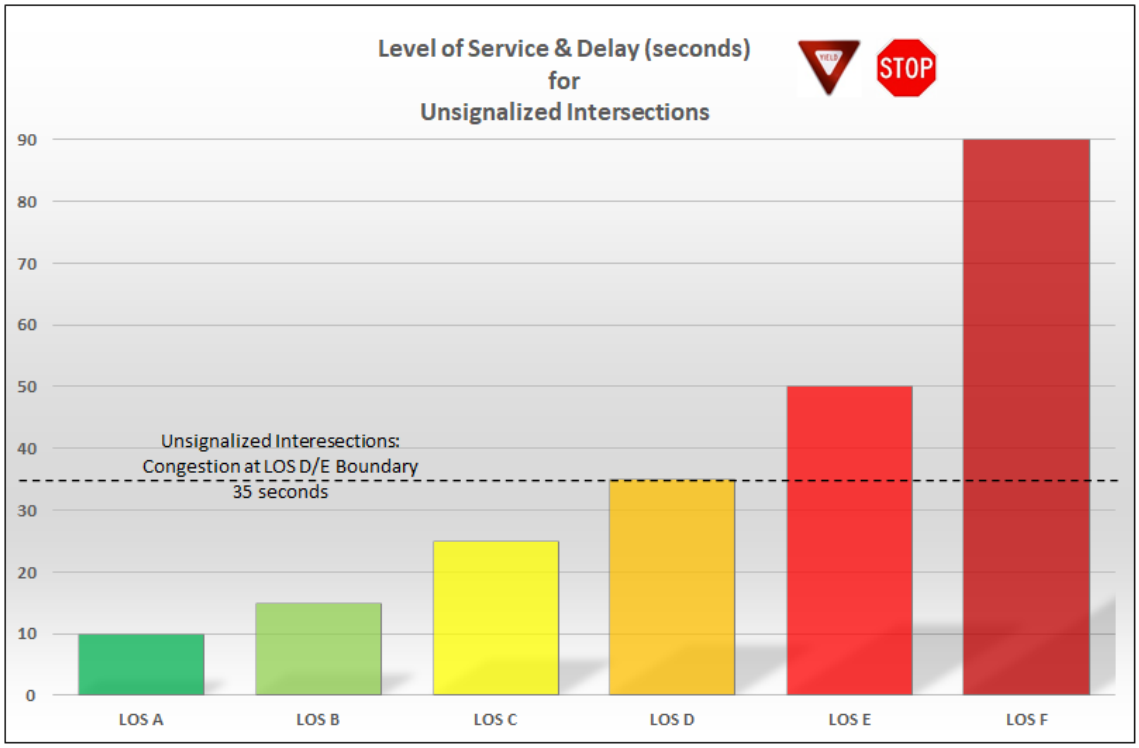
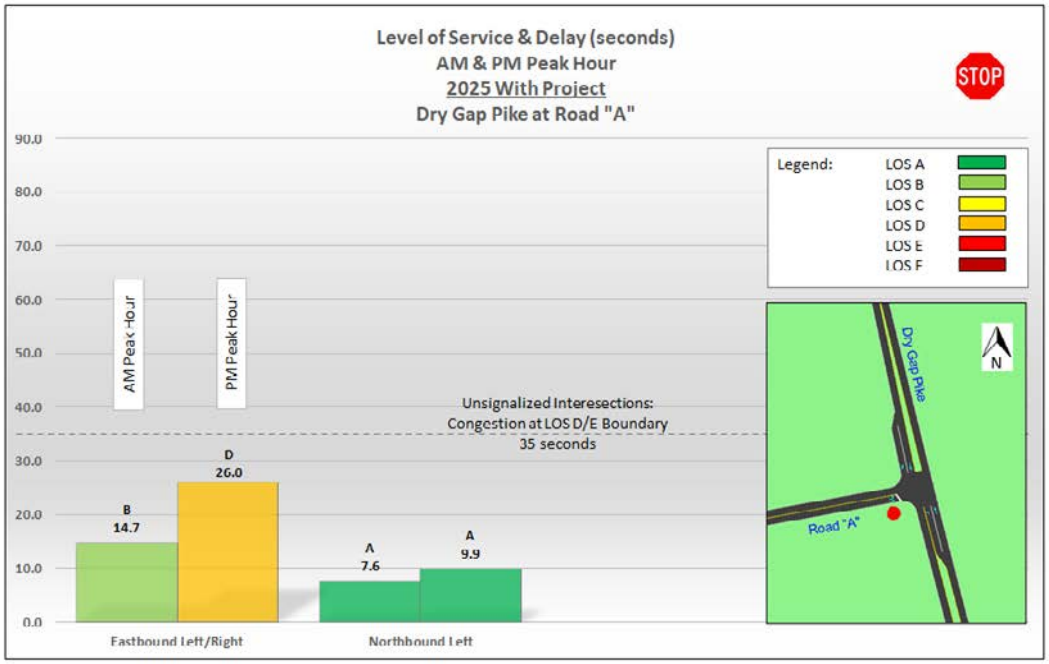


TABLE 5
2025 INTERSECTION CAPACITY ANALYSIS RESULTS -
DRY GAP PIKE AT ROAD "A"
OPENING YEAR (WITH PROJECT)

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS	DELAY (seconds)	V/C	LOS	DELAY (seconds)	V/C
Dry Gap Pike at Road "A"	STOP Unsignalized	Eastbound Left/Right	B	14.7	0.100	D	26.0	0.180
		Northbound Left	A	7.6	0.000	A	9.9	0.030

Note: All analyses were calculated in Synchro 8 software and reported using HCM 2000 intersection methodology
[a] Level of Service
[b] Average Delay (sec/vehicle)
[c] Volume-to-Capacity Ratio



- **POTENTIAL SAFETY ISSUES:**

Potential existing and future safety issues in the study area were investigated. A discussion of these issues of the adjacent transportation system is in the following pages.

EVALUATION OF TURN LANE THRESHOLDS

An evaluation of the Dry Gap Pike at Road "A" intersection for the need for separate turn lanes for entering vehicles into the development in the year 2025 (and as assumed in the preceding section) was conducted. The design policy used for these turn lane evaluations is based on "Knox County's Access Control and Driveway Design Policy". This design policy by Knox County relates vehicle volume thresholds based on prevailing speeds for two-lane and four-lane roadways. This Knox County policy is based on TDOT and nationally accepted guidelines for unsignalized intersections. A determination was made to determine if turn lanes are warranted using these criteria.

Based on the projected 2025 traffic volumes at the proposed intersection on Dry Gap Pike and according to "Knox County's Access Control and Driveway Design Policy", the need for a separate southbound right-turn lane and a northbound left-turn lane will be just slightly below the warrant threshold. Even though these thresholds are not fully met, it is nonetheless recommended that a separate southbound right-turn lane and a northbound left-turn lane be constructed on Dry Gap Pike.

The speed classification chosen for this evaluation was based on the posted speed limit of 40-mph on Dry Gap Pike. Therefore, this intersection evaluation used the Knox County classification for speeds between 36 and 45-mph with the calculated projected volumes.

EVALUATION OF SIGHT DISTANCE

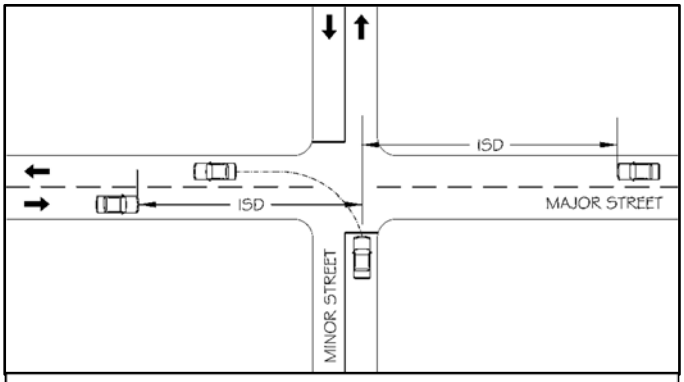
For evaluating intersections, sight distance evaluations can be categorized into two categories: Stopping Sight Distance (SSD) and Intersection Sight Distance (ISD).

Methodology:

> SSD is the distance required for a motorist to perceive, react, and for their vehicle to come to a complete stop before colliding with an object in 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 assessing the safety of an intersection.

ISD is based on the time required to perceive, react, and complete the desired traffic maneuver once a motorist on a minor street decides to perform a traffic maneuver. Three traffic maneuvers are available for vehicles stopped on a minor street at a 4-way intersection: left-turn from the minor road, right-turn from the minor road, and a crossing maneuver from the minor road across the major road. For turns from the minor street, ISD is needed to allow a stopped motorist on a minor street to turn onto a major street without being overtaken by an approaching vehicle. The most critical (longest) ISD is for left-turns from the minor street. The ISD for this maneuver includes the time to turn left and to clear half of the intersection without conflicting with the oncoming traffic from the left and to also accelerate to the operating speed of the road without causing approaching vehicles from the right to reduce their speed substantially. SSD can be considered the desirable visibility distance standard for evaluating the safety of an intersection. In general, SSD is more critical than ISD; however, the ISD must be at least the same distance or greater than SSD to provide safe operations at an intersection.



Intersection Sight Distance Diagram

Based on a posted speed limit of 40-mph on Dry Gap Pike, the required intersection sight distance is 400 feet looking each direction at the intersection of Dry Gap Pike at Road "A" based on Knox County policy of requiring 10 feet of sight distance per 1-mph of speed. Based on a flat grade on Dry Gap Pike at the proposed Road "A" intersection and a speed of 40-mph, the SSD is calculated to be 325 feet for southbound and northbound vehicles.

A cursory examination of the sight distances on Dry Gap Pike was undertaken. Based on visual observation, it appears that the intersection sight distance from the Road "A" location at Dry Gap Pike looking to the north and south is adequate. Using a Nikon Laser Rangefinder at the

proposed location of the intersection, the intersection sight distance was estimated to be more than 800+ feet to both the north and south.

**View of Sight Distance on Dry Gap Pike at Road "A"
Proposed Location
(Looking North)**

**View of Sight Distance on Dry Gap Pike at Road "A"
Proposed Location
(Looking South)**

CONCLUSIONS & RECOMMENDATIONS

The following is an overview of recommendations to minimize the traffic impacts of the proposed development on the adjacent road system while attempting to achieve an acceptable level of traffic flow and safety.

Dry Gap Pike at Road "A":

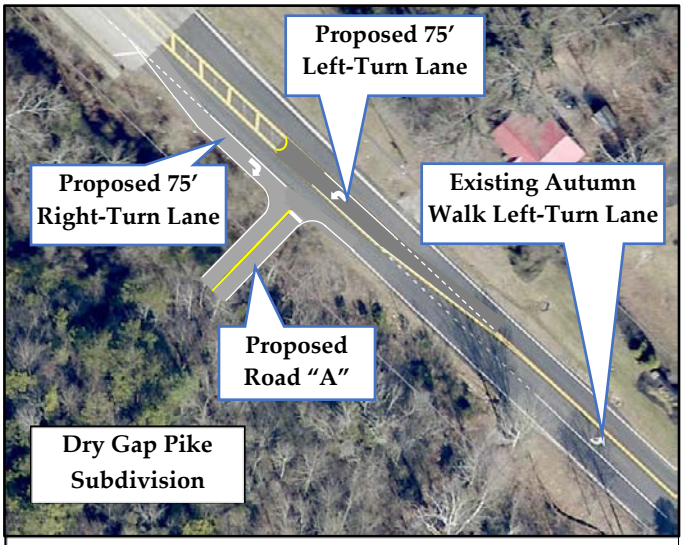
1a) The capacity calculation results shown in Table 5 indicate that northbound left-turns from a separate left-turn lane on Dry Gap Pike into the development at Road "A" should operate very well during the AM and PM peak periods in the year 2025. The level of service for exiting vehicles at Road "A" with a single lane will operate adequately but at a reduced level. For the AM and PM peak periods, eastbound exiting vehicles will operate at LOS B and D, respectively. These lower levels of service are directly related to large numbers of thru vehicles on Dry Gap Pike in the peak periods that conflict with these future exiting turning movements. However, it is possible the gaps in traffic on Dry Gap Pike due to the influence of the signalized intersection to the north at East Beaver Creek Drive/Cunningham Road may be more significant than can be modeled.

1b) As discussed earlier, it is recommended that the intersection of Dry Gap Pike at Road "A" have an exclusive southbound right-turn lane and northbound left-turn lane based on the projected 2025 AM and PM peak hour volumes. These lanes should be installed by 2025 or before the subdivision is completely constructed.

Typically, determining the length of a right-turn lane would be made by calculating the stopping sight distance based on the observed operating speed. Based on A Policy on Geometric Design of Highway and Streets by the American Association of Highway Transportation Officials (AASHTO), 325 feet is recommended for vehicles to decelerate and stop from a posted speed limit of 40-mph. However, this recommended length is based on vehicles coming to a complete stop, and the southbound right-turning vehicles coming off Dry Gap Pike onto Road "A" will not completely stop. A 75-foot right-turn length is a reasonable length consistent with the Autumn Walk Subdivision right-turn lane located across Dry Gap Pike. A recommended taper length of 120 feet (10:1) with 75 feet of storage is based on the available distance between the proposed subdivision entrance location and the adjacent property line to the north. The right-turn lane should

be marked with the appropriate right-turn pavement marking symbols.

The northbound left-turn lane is also recommended to be 75 feet in length, and the taper should match the existing taper provided for the left-turn lane for the Autumn Walk Subdivision. Due to horizontal space constraints, the proposed left-turn lane for the Dry Gap Pike Subdivision will need to be constructed back-to-back to the existing southbound left-turn lane on Dry Gap Pike. Constructing a left-turn lane for the Dry Gap Pike Subdivision will also require Dry Gap Pike to be widened slightly since the existing center transverse pavement marking area is only approximately 8 feet in width at the proposed entrance location. The left-turn lane will require the appropriate pavement marking symbols and marked at the proper spacing.



View of Proposed Turn Lanes on Dry Gap Pike at Road "A" Location

1c) As part of the analysis of the proposed intersection northbound left-turn lane length, a calculation to estimate the vehicle queue length with the projected left-turn traffic volumes in the year 2025 was completed.

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 8) software was utilized to estimate the required northbound left-turn storage lengths on Dry Gap Pike at Road "A".

Based on the software results from the projected northbound left-turn 2025 volumes, the 95th percentile vehicle queue distance was calculated. The 95th percentile vehicle queue is the recognized measurement in the traffic engineering profession as the design standard used when considering queue distances. A 95th percentile vehicle queue

means that there is a 95% certainty 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 vehicle queue results from the SimTraffic software are in Appendix I. The 95th percentile queue for northbound left-turns on Dry Gap Pike at Road "A" was calculated to be 10 feet during the projected AM peak hour and 34 feet during the projected PM peak hour. Based on these results, the proposed storage length of 75 feet, which is the Knox County standard minimum length for left-turn storage lanes, is adequate.

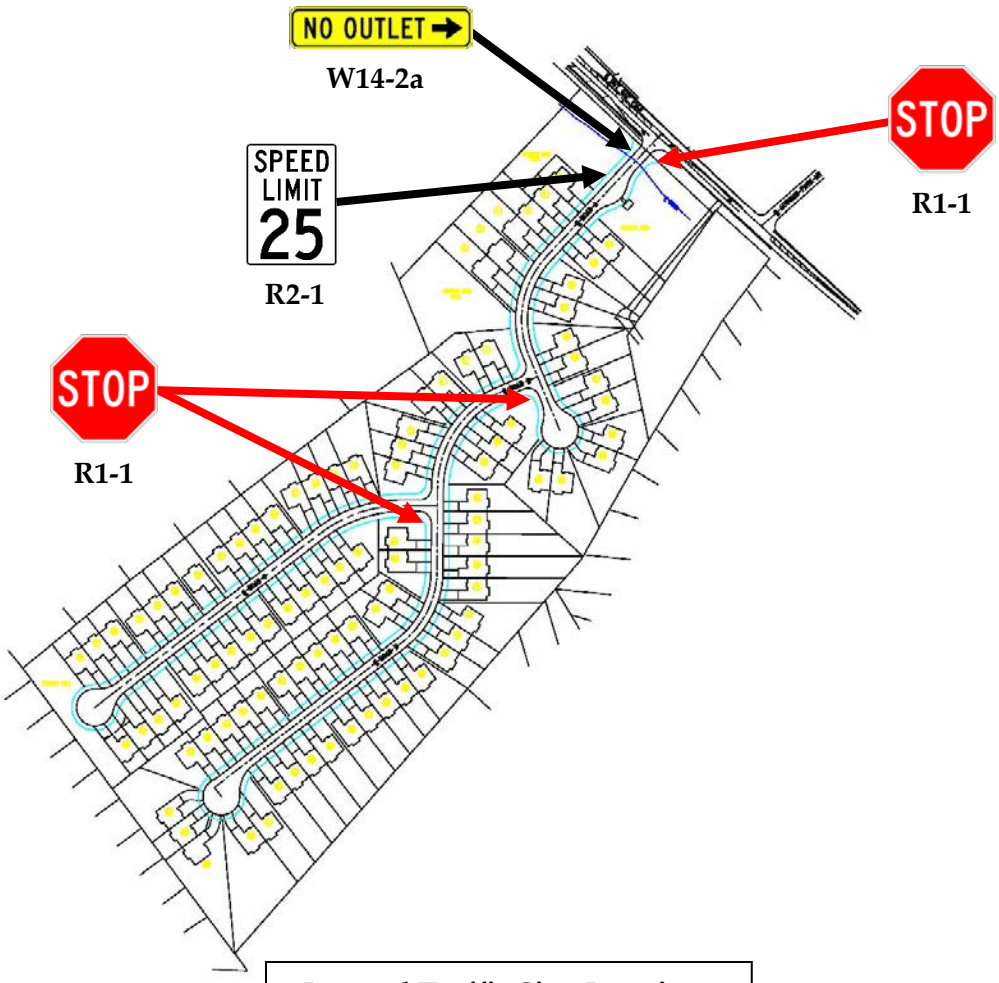
1d) Sight distance at the new proposed Road "A" at Dry Gap Pike intersection must not be impacted by new signage, future landscaping, or existing vegetation. The existing site is heavily forested and will need site clearing along the roadway to ensure sight distances are adequate. Based on a posted speed limit on Dry Gap Pike, the required Intersection Sight Distance (ISD) is 400 feet, and the Stopping Sight Distance (SSD) is 350 feet. These distances must be met to ensure safe operations.

1e) It is recommended that the Road "A" entrance approach at Dry Gap Pike be designed and constructed with a 24" white stop bar and a Stop Sign (R1-1). The stop bar should be applied at a minimum of 4 feet away from the edge of Dry Gap Pike and should be placed at the desired stopping point that provides the maximum sight distance.

2 **<u>Dry Gap Pike Subdivision Internal Roads</u>**: The current concept plan shows three new streets being constructed within the development, as shown in Figure 3.

2a) It is recommended that a "No Outlet" Sign (W14-2a) be posted near the front of the subdivision on Road "A". This sign can be posted below the street name sign. A 25-mph Speed Limit Sign (R2-1) should also be posted at the beginning of Road "A".

2b) Stop Signs (R1-1) with 24" white stop bars and other traffic signage should be installed at the locations, as shown below:



Internal Traffic Sign Locations

2c) Sight distance at the new internal intersections in the subdivision must not be impacted by new signage or future landscaping. For a posted speed limit of 25-mph in the subdivision, the intersection sight distance requirement is 250 feet. The stopping sight distance required is 155 feet for a level road grade. The road layout designer should ensure that these sight distance lengths are met, and they should be labeled on the plans.

2d) All drainage grates and covers for the residential development need to be pedestrian and bicycle-safe.

2e) Sidewalks are not shown on the concept plan. If the development does install internal sidewalks, they should have appropriate ADA compliant curbed ramps at intersection corners and are recommended to be 5 feet minimum in width. Furthermore, if provided, the internal sidewalk system should tie into the existing sidewalk located on the west side of Dry Gap Pike that currently terminates just to the north of the proposed subdivision entrance location.

2f) The United States Postal Service (USPS) has recently implemented changes to its guidelines for delivery in new residential subdivisions. If directed by the local post office, the designer should include an area within the development with a parking area for a centralized mail delivery center.

Centralized USPS Delivery Center

2g) All road grade and intersection elements, internally and externally, should be designed to AASHTO, TDOT, and Knox County specifications and guidelines to ensure proper operation.

Dry Gap Pike:

3a) The Knox County requirement for intersection spacing on a collector road is 300 feet. This requirement is met since the proposed Road "A" intersection location is just a couple feet short of 300 feet (~296 feet) from the existing Autumn Path Lane intersection.

3b) It is recommended that a 40-mph Speed Limit Sign (R2-1) be posted on Dry Gap Pike for southbound traffic just to the south of the signalized intersection at East Beaver Creek Drive/Cunningham Road. Based on Google Street View, several years ago, a 40-mph speed limit sign was posted on the road at this location. It has since been removed, and it is recommended to be reinstalled to notify motorists on the appropriate speed before traveling thru the area on Dry Gap Pike, where three residential subdivisions will be closely spaced together.

APPENDIX A

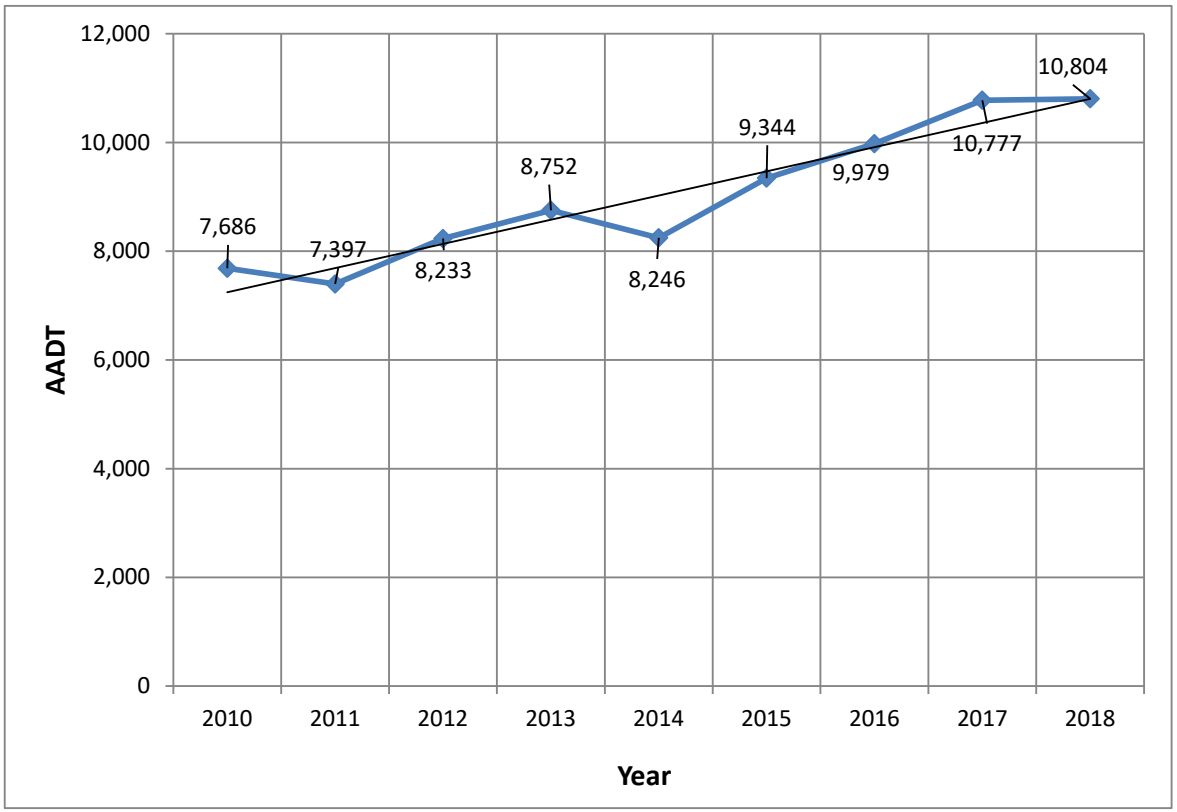
HISTORICAL TRAFFIC COUNT DATA

Historical Traffic Counts

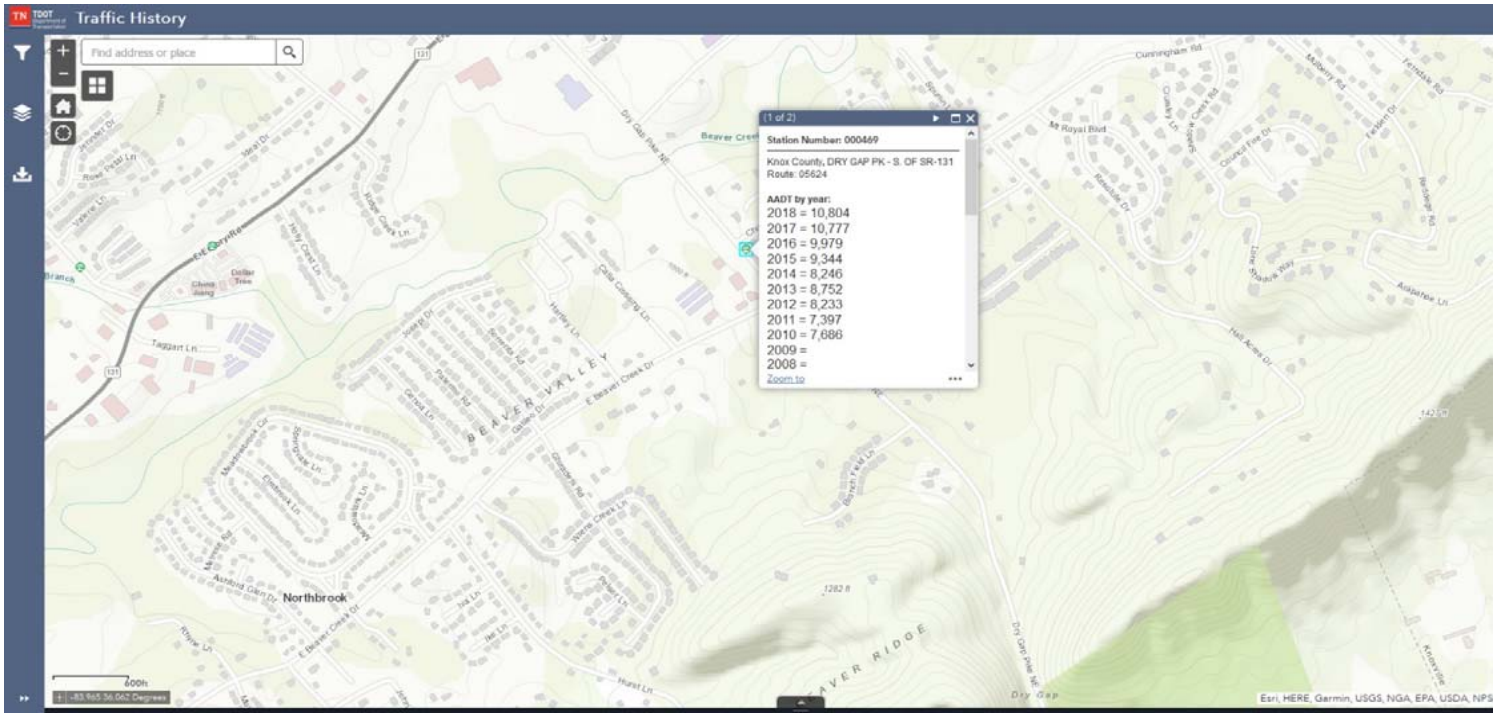
Organization: TDOT
Station ID #: 000469
Location: Dry Gap Pike - South of SR 131

YEAR	AADT
2008	n/a
2009	n/a
2010	7,686
2011	7,397
2012	8,233
2013	8,752
2014	8,246
2015	9,344
2016	9,979
2017	10,777
2018	10,804

Trendline



2010 - 2018 Growth Rate = 40.6%
Average Annual Growth Rate = 4.3%

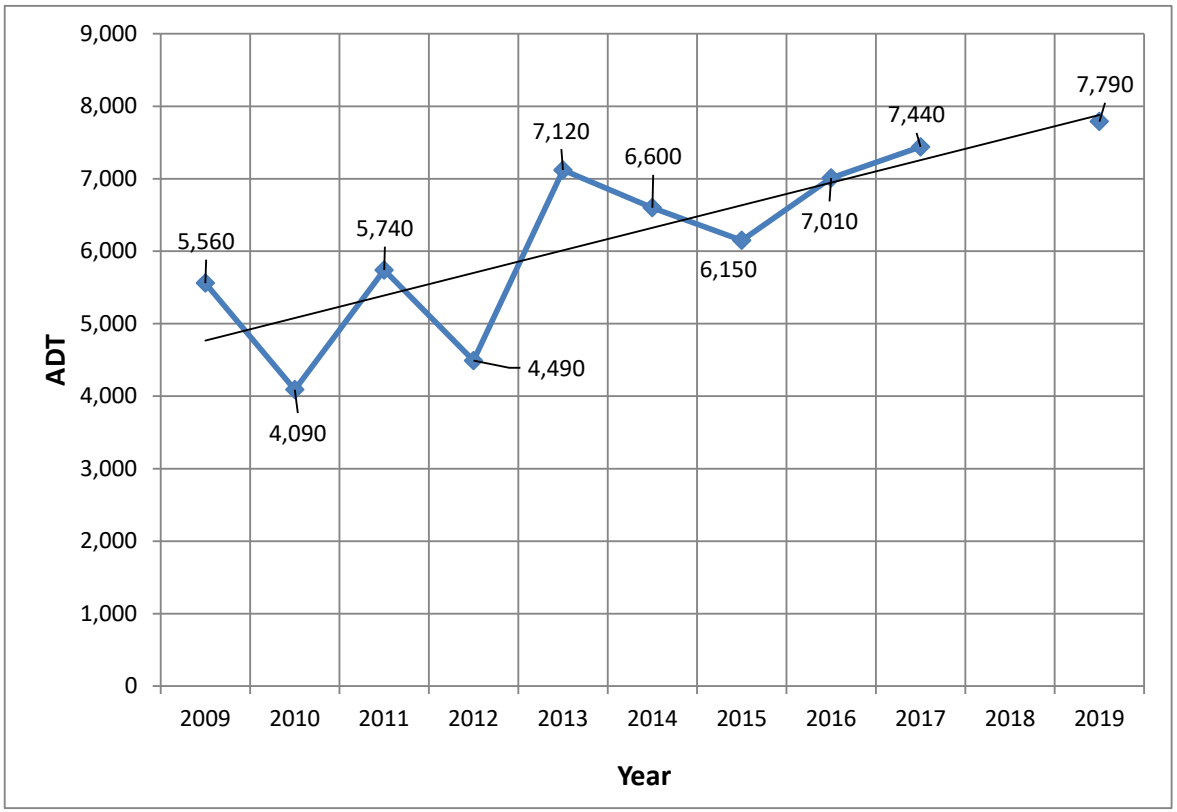

TN TDOT
Traffic History
Find address or place
(1 of 2)
Station Number: 000469
Knox County, DRY GAP PK - S. OF SR-131
Route: 05624
AADT by year:
2018 = 10,804
2017 = 10,777
2016 = 9,979
2015 = 9,344
2014 = 8,246
2013 = 8,752
2012 = 8,233
2011 = 7,397
2010 = 7,686
2009 =
2008 =
Zoom to
Northbrook
BEAVER VALLEY
BEAVER RIDGE
Dry Gap Pike NE
Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS

Historical Traffic Counts

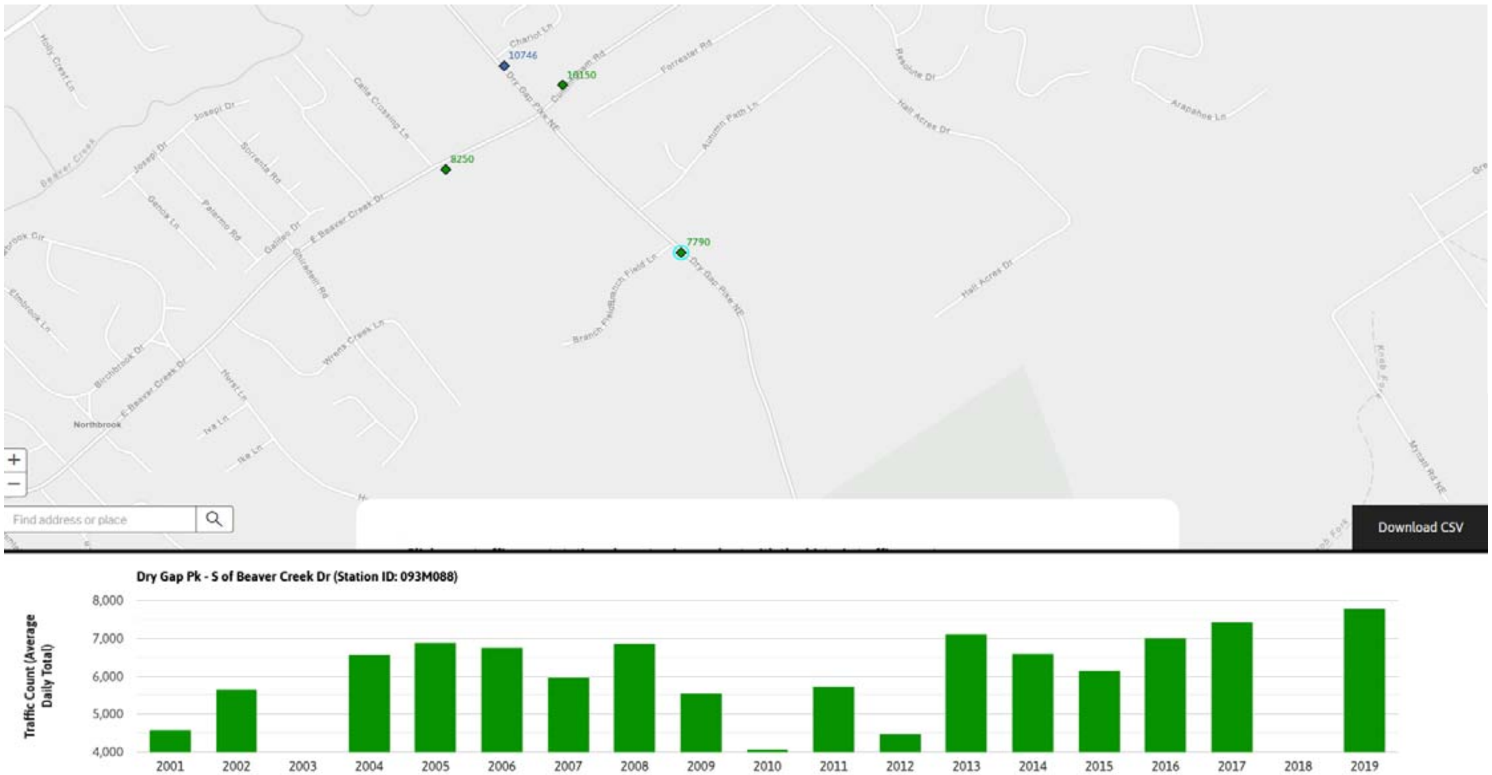
Organization: TPO
Station ID #: 093M088
Location: Dry Gap Pike - South of Beaver Creek Drive

YEAR	ADT
2009	5,560
2010	4,090
2011	5,740
2012	4,490
2013	7,120
2014	6,600
2015	6,150
2016	7,010
2017	7,440
2018	
2019	7,790

Trendline



2009 - 2019 Growth Rate = 40.1%
Average Annual Growth Rate = 3.4%



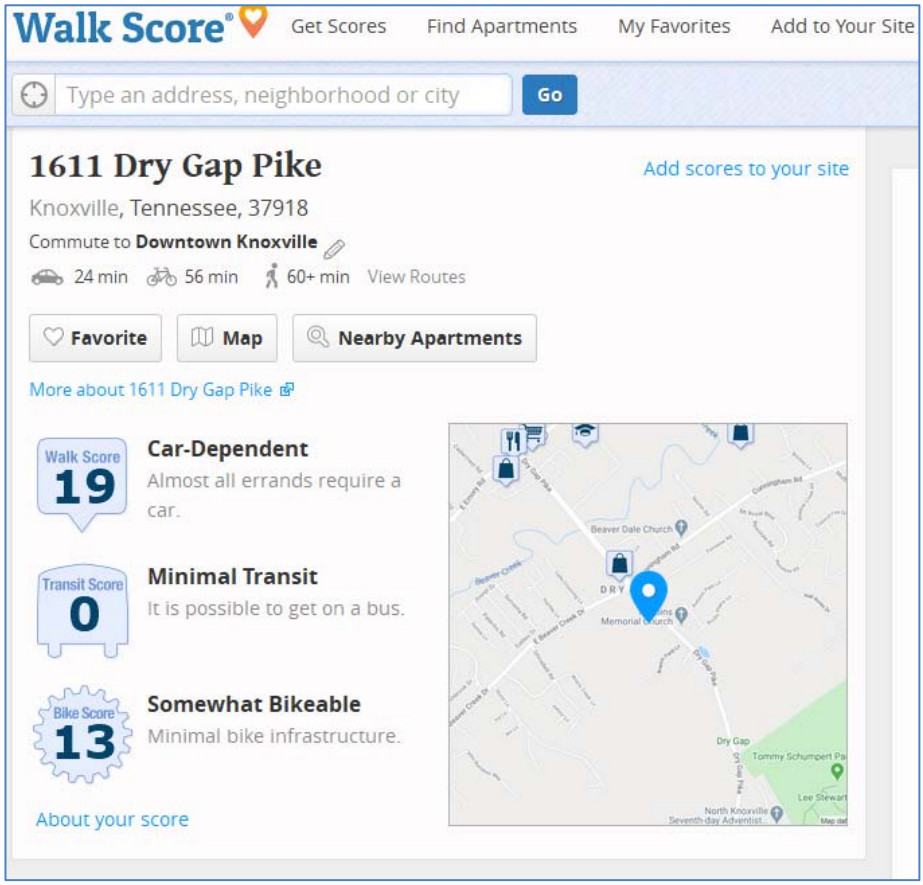
10746
10150
8250
7790
Dry Gap Pike NE
E Beaver Creek Dr
Northbrook
Find address or place
Download CSV
Dry Gap Pk - S of Beaver Creek Dr (Station ID: 093M088)
Traffic Count (Average Daily Total)
8,000
7,000
6,000
5,000
4,000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

APPENDIX B

WALK SCORE

WALKSCORE

(from walkscore.com)



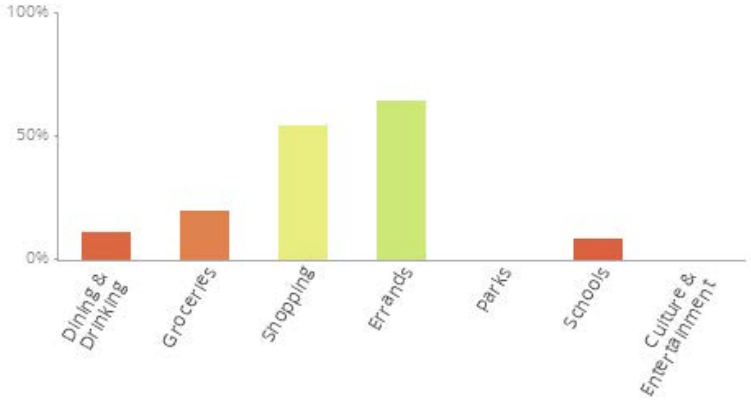
Scores for 1611 Dry Gap Pike

Walk Score 19 Bike Score 13

Walk Score | Transit Score | Bike Score

Score Details | What is Walk Score

The Walk Score for 1611 Dry Gap Pike is based on the following categories.



Scores for 1611 Dry Gap Pike

Walk Score 19 Bike Score 13

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 1611 Dry Gap Pike

Walk Score 19

Bike Score 13

Walk Score	Transit Score	Bike Score

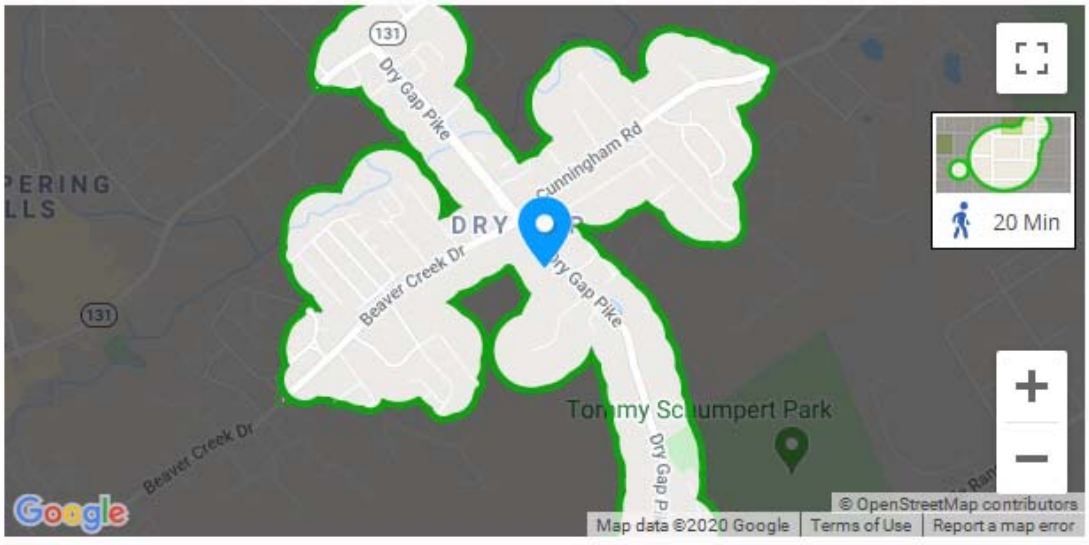
Bike Score measures whether an area is good for biking based on bike lanes and trails, hills, road connectivity, and destinations.

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 1611 Dry Gap Pike.



What's Nearby

Restaurants:
Grujo's .8mi

Coffee:
Starbucks 1.6mi

Bars:
The Rocks Tavern 2.7mi

Groceries:
Ingles Market 1.6mi

Parks:
Fountain City Park 2.3mi

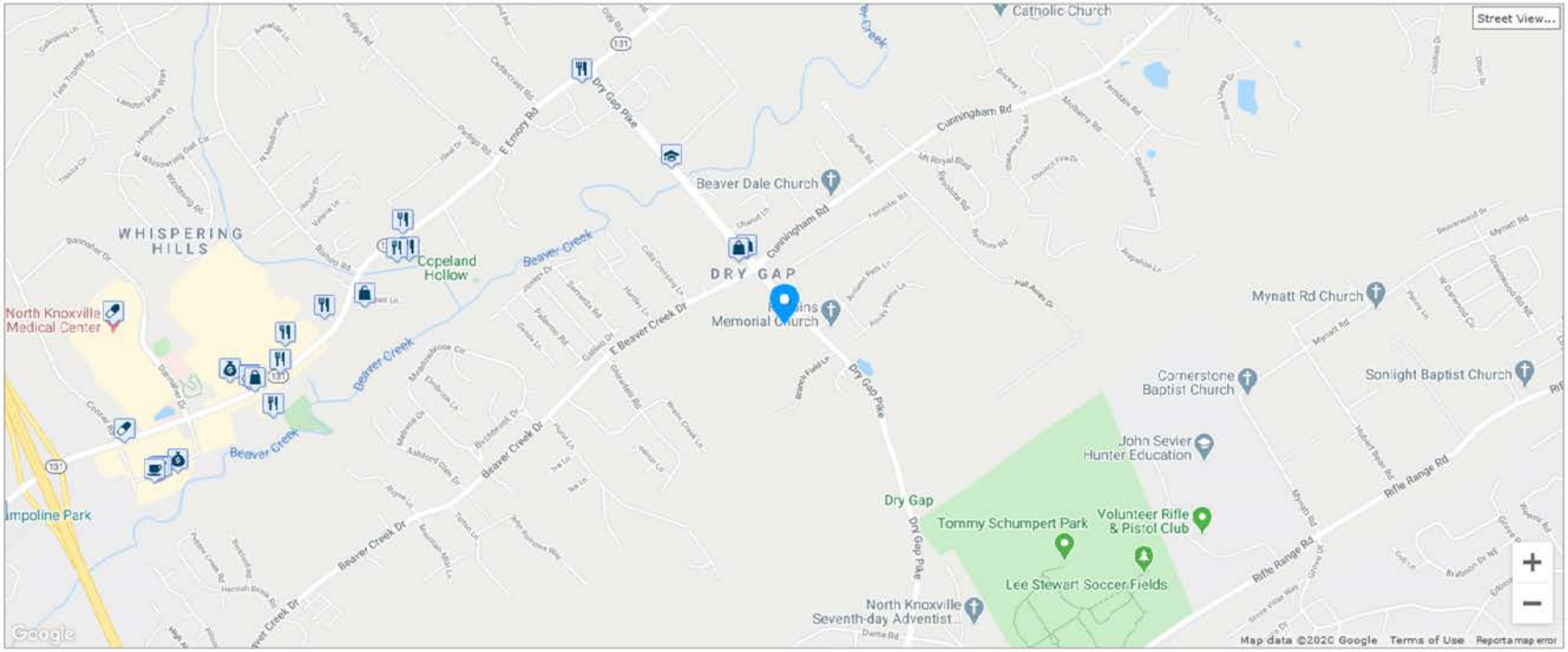
Schools:
Brickey McCloud Elementary 5mi

Shopping:
Knoxville Spirit Ink LLC .2mi

Entertainment:
Halls Cinema 7 2.5mi

Errands:
Ryan J. Flatt, Pharm 1.3mi

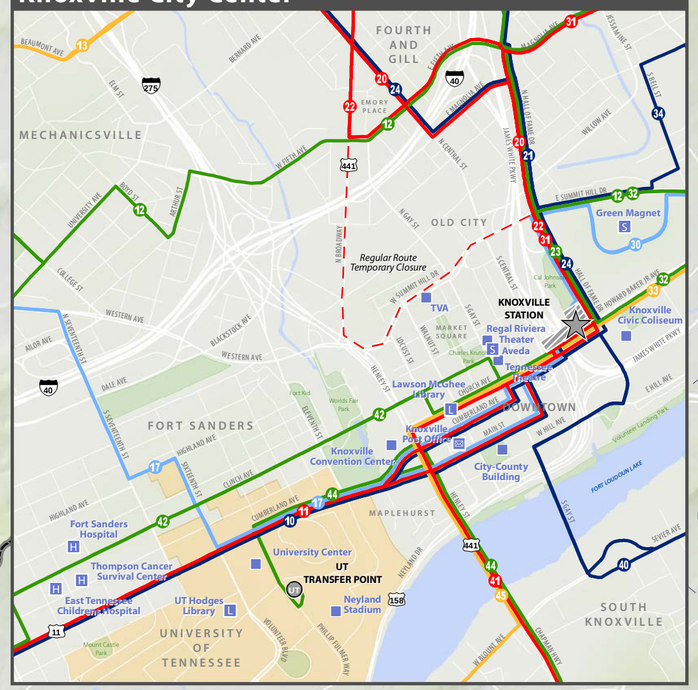
Search Nearby:



APPENDIX C

KNOXVILLE AREA TRANSIT MAP AND INFORMATION

Knoxville City Center



Legend

- Transfer Point
- Lift Service Area Boundary

Points of Interest

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

Distances

0 5 10 Minutes Walking

0 5 10 Minutes Biking

0 0.5 1 Map Scale in Miles

NORTH

FARE INFORMATION

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

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

REDUCED FARE INFORMATION

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

BUS STOPS ONLY!

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

KAT HOLIDAYS

KAT buses do not run on the following holidays:

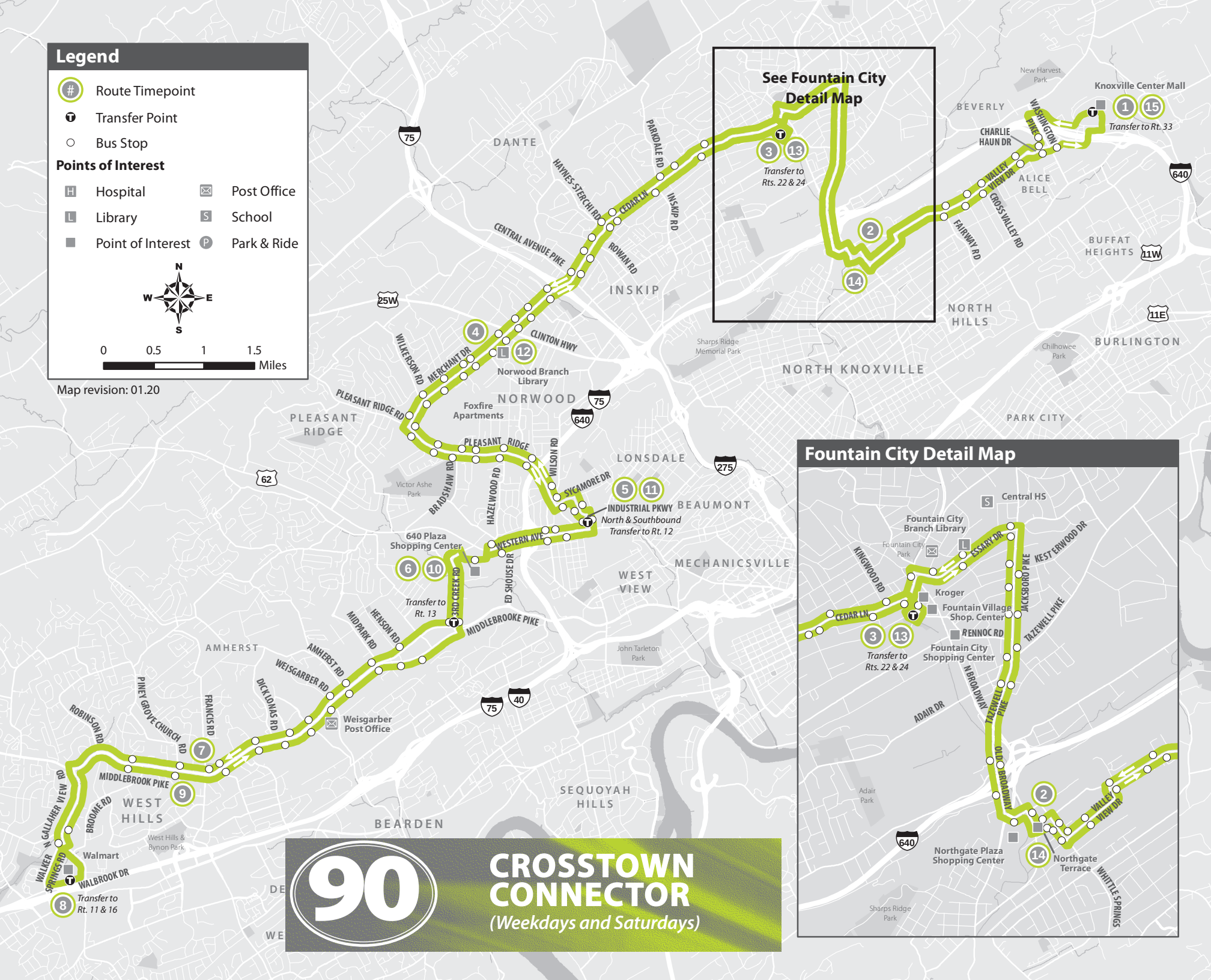
- New Year's Day
- Independence Day
- Thanksgiving
- Christmas

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

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

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

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


Legend
Route Timepoint
Transfer Point
Bus Stop
Points of Interest
Hospital
Library
Point of Interest
Post Office
School
Park & Ride
N
W
E
S
0
0.5
1
1.5
Miles
Map revision: 01.20
See Fountain City Detail Map
Transfer to Rts. 22 & 24
Knoxville Center Mall
Transfer to Rt. 33
Norwood Branch Library
Foxfire Apartments
INDUSTRIAL PKWY
North & Southbound
Transfer to Rt. 12
640 Plaza Shopping Center
Transfer to Rt. 13
Weisgarber Post Office
Walmart
WALBROOK DR
Transfer to Rt. 11 & 16
DANTE
INSKIP
NORWOOD
PLEASANT RIDGE
LONSDALE
BEAUMONT
MECHANICSVILLE
WEST VIEW
AMHERST
WEST HILLS
BEARDEN
SEQUOYAH HILLS
NORTH KNOXVILLE
NORTH HILLS
BEVERLY
ALICE BELL
BUFFAT HEIGHTS
BURLINGTON
PARK CITY
Fountain City Detail Map
Central HS
Fountain City Branch Library
Kroger
Fountain Village Shop. Center
Fountain City Shopping Center
Transfer to Rts. 22 & 24
Northgate Plaza Shopping Center
Northgate Terrace
90
CROSSTOWN CONNECTOR
(Weekdays and Saturdays)

90 CROSSTOWN CONNECTOR

(Weekdays and Saturdays)

kat KNOXVILLE AREA TRANSIT

SERVES:

- 640 Plaza
- Fountain City Branch Library
- Knoxville Center Mall
- Knox Road/Kroger
- Northgate Shopping Center
- Northgate Terrace
- Norwood Branch Library
- Walmart

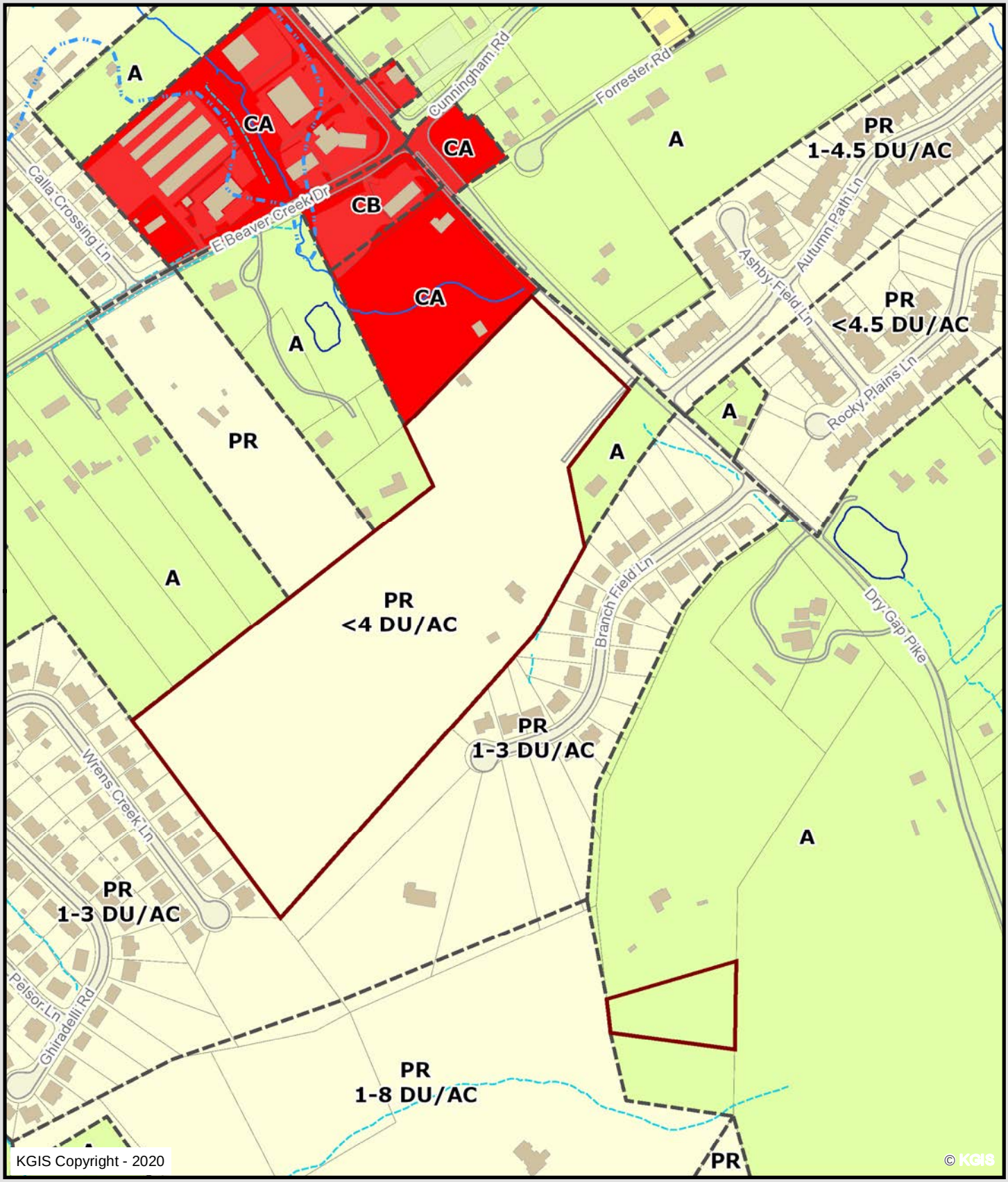
Information Updated: January 6, 2020

	Going toward Wal Mart West							Going toward Knoxville Center Mall							
	Transfer to:		Rts. 22 & 24	Rt. 20	Rt. 12			Rts. 11 & 16			Rt. 12	Rt. 20	Rts. 22 & 24		Rt. 23 &33
	Knoxville Center Mall	Northgate Terrace	Fountain City Superstop	Merchants at Marguerite	Industrial Parkway	I-640 Plaza	Middlebrook at Francis	Walbrook	Middlebrook at Piney Grove Church Rd.	I-640 Plaza	Industrial Parkway	Merchants at Marguerite	Fountain City Superstop	Northgate Terrace	Knoxville Center Mall
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
WEEKDAY SCHEDULE															
A.M.								5:55	6:08	6:16	6:25	6:35	7:05	7:11	7:25
			6:05	6:15	6:25	6:34	6:42	6:55	7:08	7:16	7:25	7:35	8:05	8:11	8:25
	6:30	6:45	7:05	7:15	7:25	7:34	7:42	7:55	8:08	8:16	8:25	8:35	9:05	9:11	9:25
	7:30	7:45	8:05	8:15	8:25	8:34	8:42	8:55	9:08	9:16	9:25	9:35	10:05	10:11	10:25
	8:30	8:45	9:05	9:15	9:25	9:34	9:42	9:55	10:08	10:16	10:25	10:35	11:05	11:11	11:25
	9:30	9:45	10:05	10:15	10:25	10:34	10:42	10:55	11:08	11:16	11:25	11:35	**12:05**	**12:11**	**12:25**
	10:30	10:45	11:05	11:15	11:25	11:34	11:42	11:55	**12:08**	**12:16**	**12:25**	**12:35**	**1:05**	**1:11**	**1:25**
	11:30	11:45	**12:05**	**12:15**	**12:25**	**12:34**	**12:42**	**12:55**	**1:08**	**1:16**	**1:25**	**1:35**	**2:05**	**2:11**	**2:25**
P.M.	**12:30**	**12:45**	**1:05**	**1:15**	**1:25**	**1:34**	**1:42**	**1:55**	**2:08**	**2:16**	**2:25**	**2:35**	**3:05**	**3:11**	**3:25**
	1:30	**1:45**	**2:05**	**2:15**	**2:25**	**2:34**	**2:42**	**2:55**	**3:08**	**3:16**	**3:25**	**3:35**	**4:05**	**4:11**	**4:25**
	2:30	**2:45**	**3:05**	**3:15**	**3:25**	**3:34**	**3:42**	**3:55**	**4:08**	**4:16**	**4:25**	**4:35**	**5:05**	**5:11**	**5:25**
	3:30	**3:45**	**4:05**	**4:15**	**4:25**	**4:34**	**4:42**	**4:55**	**5:08**	**5:16**	**5:25**	**5:35**	**6:05**	**6:11**	**6:25**
	4:30	**4:45**	**5:05**	**5:15**	**5:25**	**5:34**	**5:42**	**5:55**	**6:08**	**6:16**	**6:25**	**6:35**	**7:05**	**7:11**	**7:25**
	5:30	**5:45**	**6:05**	**6:15**	**6:25**	**6:34**	**6:42**	**6:55**	**7:08**	**7:16**	**7:25**	**7:35**	**8:15**	**8:21**	**8:35**
	6:30	**6:45**	**7:05**	**7:15**	**7:25**	**7:34**	**7:42**	**7:55**	**8:08**	**8:16**					
	7:30	**7:45**	**8:05**	**8:15**	**8:25**	**8:34**	**8:42**		*To Garage*						
SATURDAY SCHEDULE															
A.M.								6:55	7:08	7:16	7:25	7:35	8:05	8:11	8:25
	6:30	6:45	7:05	7:15	7:25	7:34	7:42	7:55	8:08	8:16	8:25	8:35	9:05	9:11	9:25
	7:30	7:45	8:05	8:15	8:25	8:34	8:42	8:55	9:08	9:16	9:25	9:35	10:05	10:11	10:25
	8:30	8:45	9:05	9:15	9:25	9:34	9:42	9:55	10:08	10:16	10:25	10:35	11:05	11:11	11:25
	9:30	9:45	10:05	10:15	10:25	10:34	10:42	10:55	11:08	11:16	11:25	11:35	**12:05**	**12:11**	**12:25**
	10:30	10:45	11:05	11:15	11:25	11:34	11:42	11:55	**12:08**	**12:16**	**12:25**	**12:35**	**1:05**	**1:11**	**1:25**
	11:30	11:45	**12:05**	**12:15**	**12:25**	**12:34**	**12:42**	**12:55**	**1:08**	**1:16**	**1:25**	**1:35**	**2:05**	**2:11**	**2:25**
P.M.	**12:30**	**12:45**	**1:05**	**1:15**	**1:25**	**1:34**	**1:42**	**1:55**	**2:08**	**2:16**	**2:25**	**2:35**	**3:05**	**3:11**	**3:25**
	1:30	**1:45**	**2:05**	**2:15**	**2:25**	**2:34**	**2:42**	**2:55**	**3:08**	**3:16**	**3:25**	**3:35**	**4:05**	**4:11**	**4:25**
	2:30	**2:45**	**3:05**	**3:15**	**3:25**	**3:34**	**3:42**	**3:55**	**4:08**	**4:16**	**4:25**	**4:35**	**5:05**	**5:11**	**5:25**
	3:30	**3:45**	**4:05**	**4:15**	**4:25**	**4:34**	**4:42**	**4:55**	**5:08**	**5:16**	**5:25**	**5:35**	**6:05**	**6:11**	**6:25**
	4:30	**4:45**	**5:05**	**5:15**	**5:25**	**5:34**	**5:42**	**5:55**	**6:08**	**6:16**	**6:25**	**6:35**	**7:05**	**7:11**	**7:25**
	5:30	**5:45**	**6:05**	**6:15**	**6:25**	**6:34**	**6:42**	**6:55**	**7:08**	**7:16**	**7:25**	**7:35**	**8:05**	**8:11**	**8:25**
	6:30	**6:45**	**7:05**	**7:15**	**7:25**	**7:34**	**7:42**	**7:55**	**8:08**	**8:16**	**8:25**	**8:35**	**9:05**	**9:11**	**9:25**
	7:30	**7:45**	**8:05**	**8:15**	**8:25**	**8:34**	**8:42**	**8:55**	**9:08**	**9:16**	*To Garage*				

Need help reading this schedule?
Need other general information on how to ride?
Click here to Download the General Schedule Information pdf available from katbus.com

APPENDIX D

ZONING MAP



Zoning Map

Knoxville - Knox County - KUB Geographic Information System

Printed: 7/22/2020 at 11:15:37 AM

0 200 400 800

ft

APPENDIX E

MANUAL TRAFFIC COUNT DATA

Prepared by National Data & Surveying Services

VOLUME

Dry Gap Pike S/O Beaver Creek Dr/Cunningham Rd(36.052762, -83.966678)

Day: Tuesday
Date: 9/17/2019

City: Knoxville
Site #: 093M088

DAILY TOTALS	NB	SB	EB	WB	Total
	3,565	4,225	0	0	7,790

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
0:00	3		3				6		12:00	34		58				92	
0:15	2		1				3		12:15	40		38				78	
0:30	2		7				9		12:30	46		48				94	
0:45	3	10	0	11			3	21	12:45	40	160	58	202			98	362
1:00	1		3				4		13:00	41		49				90	
1:15	1		0				1		13:15	50		55				105	
1:30	0		3				3		13:30	37		59				96	
1:45	2	4	1	7			3	11	13:45	45	173	50	213			95	386
2:00	1		1				2		14:00	36		48				84	
2:15	1		3				4		14:15	52		57				109	
2:30	0		0				0		14:30	51		70				121	
2:45	1	3	3	7			4	10	14:45	63	202	72	247			135	449
3:00	0		1				1		15:00	67		71				138	
3:15	2		4				6		15:15	45		77				122	
3:30	1		1				2		15:30	51		72				123	
3:45	0	3	0	6			0	9	15:45	54	217	98	318			152	535
4:00	1		2				3		16:00	69		88				157	
4:15	4		0				4		16:15	62		104				166	
4:30	1		0				1		16:30	78		138				216	
4:45	2	8	3	5			5	13	16:45	73	282	160	490			233	772
5:00	5		2				7		17:00	77		138				215	
5:15	3		6				9		17:15	103		163				266	
5:30	11		9				20		17:30	81		176				257	
5:45	11	30	8	25			19	55	17:45	104	365	156	633			260	998
6:00	15		9				24		18:00	96		105				201	
6:15	28		10				38		18:15	77		109				186	
6:30	23		25				48		18:30	75		104				179	
6:45	55	121	27	71			82	192	18:45	64	312	64	382			128	694
7:00	87		33				120		19:00	46		68				114	
7:15	164		31				195		19:15	40		72				112	
7:30	171		46				217		19:30	44		87				131	
7:45	119	541	57	167			176	708	19:45	33	163	77	304			110	467
8:00	94		36				130		20:00	37		55				92	
8:15	71		51				122		20:15	38		71				109	
8:30	60		54				114		20:30	24		115				139	
8:45	56	281	50	191			106	472	20:45	35	134	33	274			68	408
9:00	41		33				74		21:00	22		31				53	
9:15	32		27				59		21:15	18		28				46	
9:30	38		41				79		21:30	14		29				43	
9:45	37	148	39	140			76	288	21:45	10	64	15	103			25	167
10:00	43		40				83		22:00	9		19				28	
10:15	29		51				80		22:15	8		12				20	
10:30	27		35				62		22:30	7		12				19	
10:45	34	133	35	161			69	294	22:45	9	33	7	50			16	83
11:00	34		32				66		23:00	3		12				15	
11:15	42		45				87		23:15	6		10				16	
11:30	43		46				89		23:30	6		6				12	
11:45	42	161	56	179			98	340	23:45	2	17	11	39			13	56
TOTALS		1443		970				**2413**	**TOTALS**		2122		3255				**5377**
SPLIT %		59.8%		40.2%				**31.0%**	**SPLIT %**		39.5%		60.5%				**69.0%**

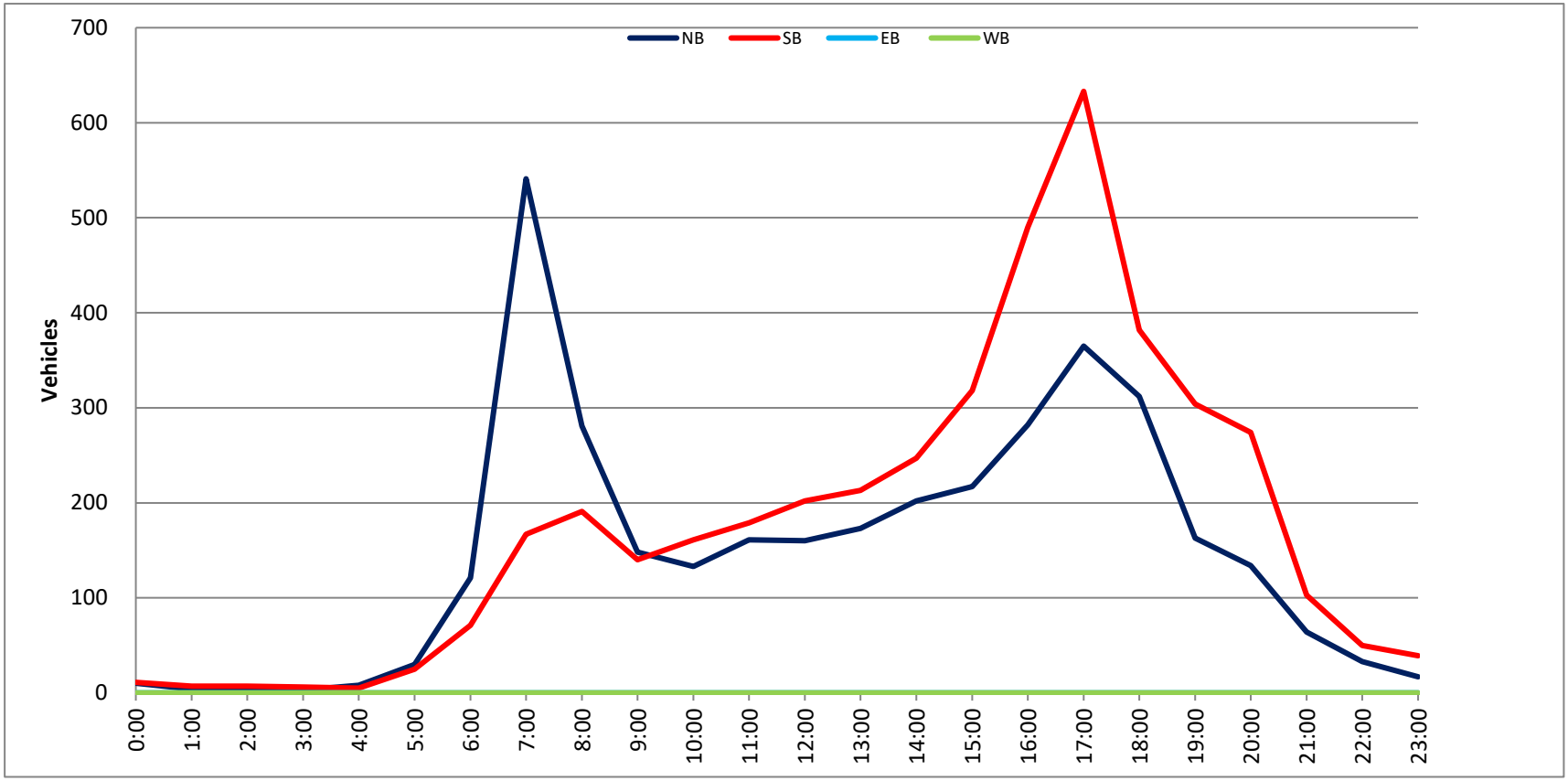
DAILY TOTALS	NB	SB	EB	WB	Total
	3,565	4,225	0	0	7,790

AM Peak Hour	7:15	11:15					**7:15**		**PM Peak Hour**	17:15	16:45					**17:00**		
AM Pk Volume	548	205					**718**		**PM Pk Volume**	384	637					**998**		
Pk Hr Factor	0.801	0.884					**0.827**		**Pk Hr Factor**	0.923	0.905					**0.938**		
7 - 9 Volume	822	358	0	0			**1180**		**4 - 6 Volume**	647	1123	0	0			**1770**		
7 - 9 Peak Hour	7:15	7:45					**7:15**		**4 - 6 Peak Hour**	17:00	16:45					**17:00**		
7 - 9 Pk Volume	548	198	0	0			**718**		**4 - 6 Pk Volume**	365	637	0	0			**998**		
Pk Hr Factor	0.801	0.868	0.000	0.000			**0.827**		**Pk Hr Factor**	0.877	0.905	0.000	0.000			**0.938**		

Prepared by National Data & Surveying Services

Project #: 093M088 **City:** Knoxville

Location: Dry Gap Pike S/O Beaver Creek **Date:** 9/17/2019



APPENDIX F

ITE TRIP GENERATION RATES AND TRIP DISTRIBUTION CALCULATIONS

Local Apartment
Trip Generation Study

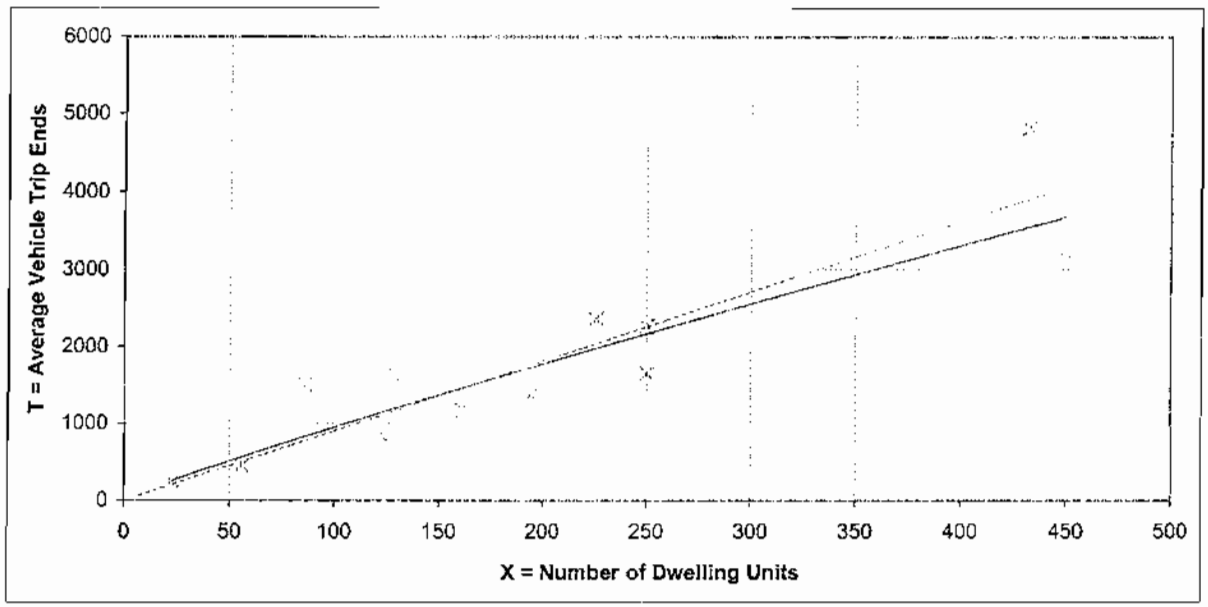
Average Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

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: $T = 15.193(X)^{0.899}$ $R^2 = 0.88$

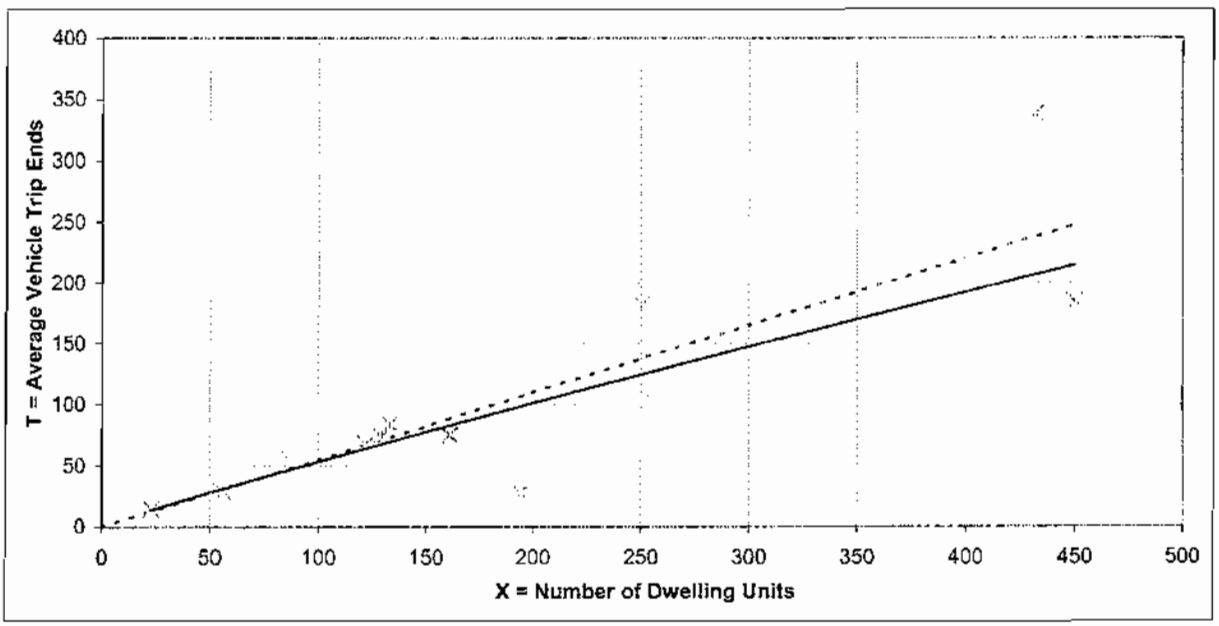
Local Apartment
Trip Generation Study

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



X Actual Data Points ——— Fitted Curve Average Rate

Fitted Curve Equation: $T = 0.758(X)^{0.924}$ $R^2 = 0.75$

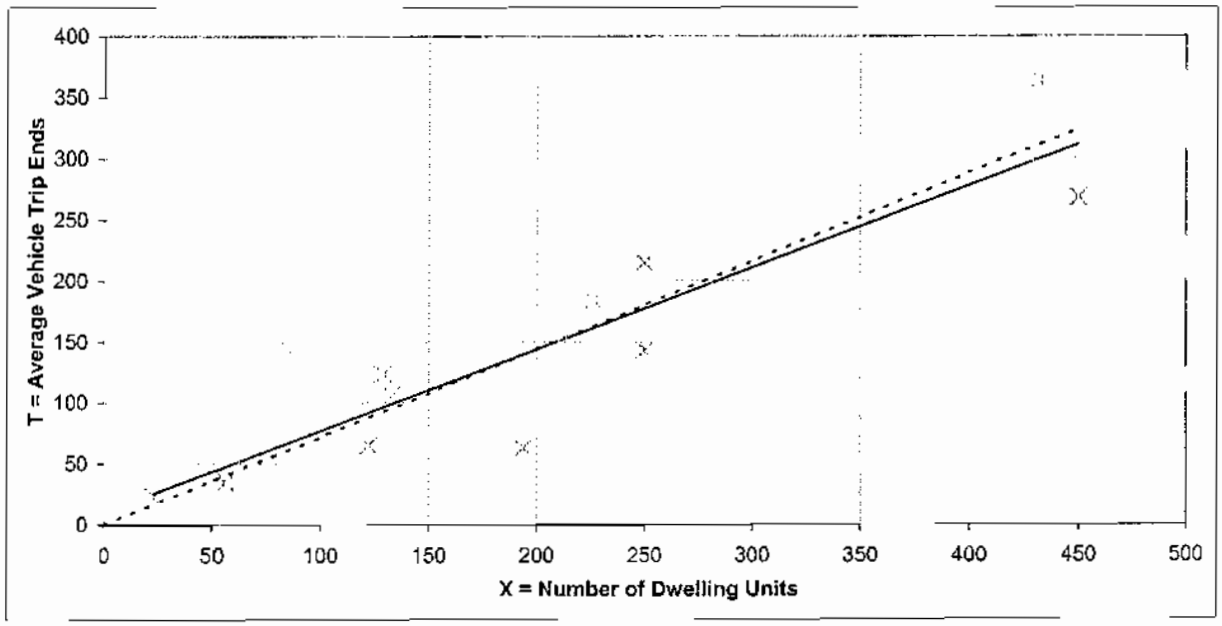
Local Apartment
Trip Generation Study

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



X Actual Data Points ——— Fitted Curve Average Rate

Fitted Curve Equation: T = 0.669(X) + 10.069 **R^2 = 0.79**

Land Use: 210
Single-Family Detached Housing

Description

Single-family detached housing includes all single-family detached homes on individual lots. A typical site surveyed is a suburban subdivision.

Additional Data

The number of vehicles and residents had a high correlation with average weekday vehicle trip ends. The use of these variables was limited, however, because the number of vehicles and residents was often difficult to obtain or predict. The number of dwelling units was generally used as the independent variable of choice because it was usually readily available, easy to project, and had a high correlation with average weekday vehicle trip ends.

This land use included data from a wide variety of units with different sizes, price ranges, locations, and ages. Consequently, there was a wide variation in trips generated within this category. Other factors, such as geographic location and type of adjacent and nearby development, may also have had an effect on the site trip generation.

Single-family detached units had the highest trip generation rate per dwelling unit of all residential uses because they were the largest units in size and had more residents and more vehicles per unit than other residential land uses; they were generally located farther away from shopping centers, employment areas, and other trip attractors than other residential land uses; and they generally had fewer alternative modes of transportation available because they were typically not as concentrated as other residential land uses.

Time-of-day distribution data for this land use are presented in Appendix A. For the six general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 7:15 and 8:15 a.m. and 4:00 and 5:00 p.m., respectively. For the two sites with Saturday data, the overall highest vehicle volume was counted between 3:00 and 4:00 p.m. For the one site with Sunday data, the overall highest vehicle volume was counted between 10:15 and 11:15 a.m.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Connecticut, Delaware, Illinois, Indiana, Maryland, Minnesota, Montana, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, and 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, 903, 925, 936

Single-Family Detached Housing
(210)

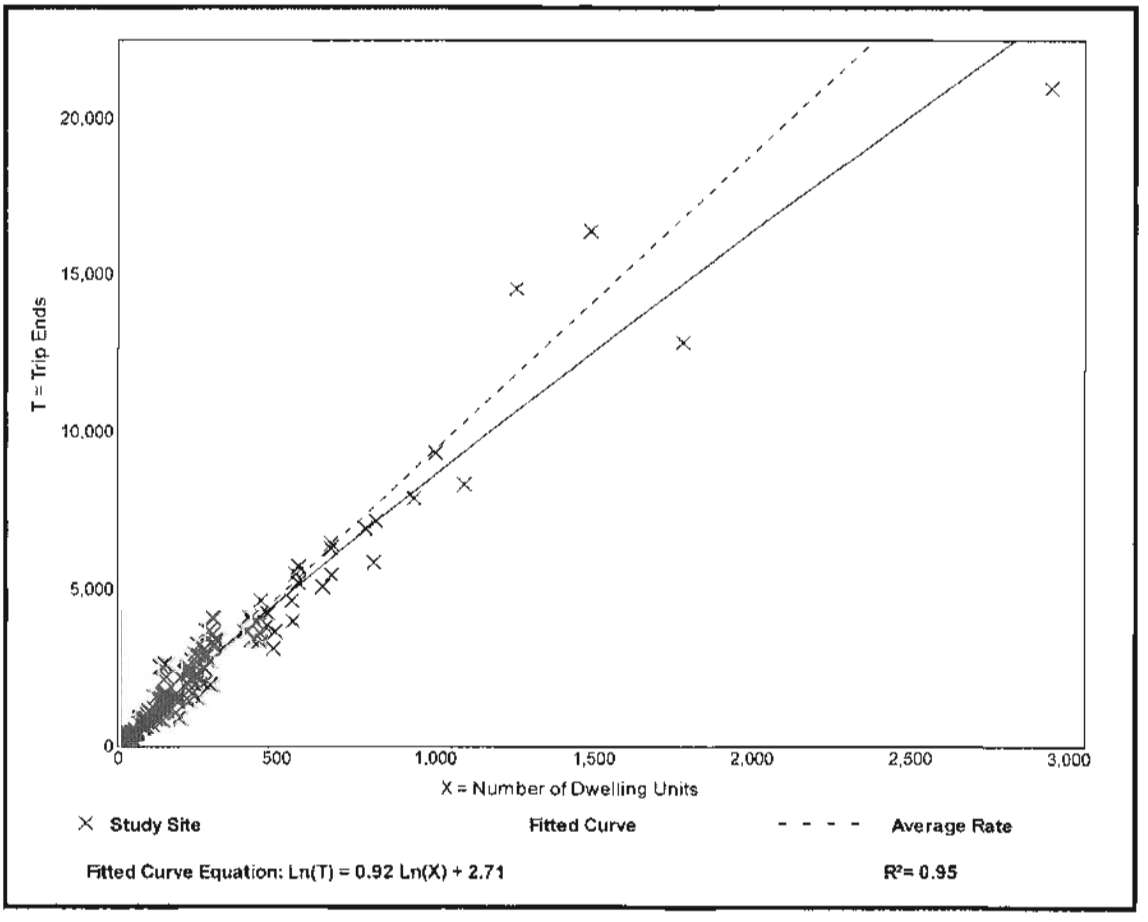
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



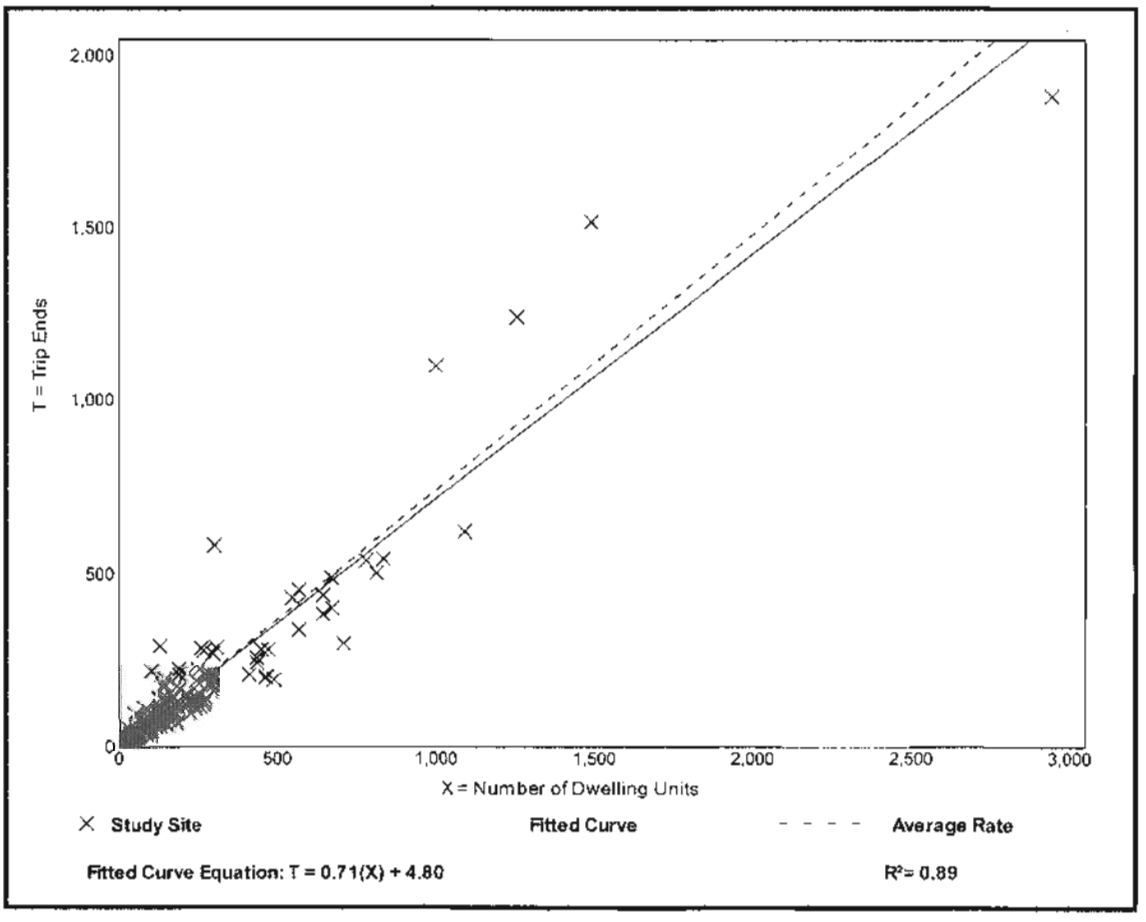
Single-Family Detached Housing
(210)

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: 173
Avg. Num. of Dwelling Units: 219
Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



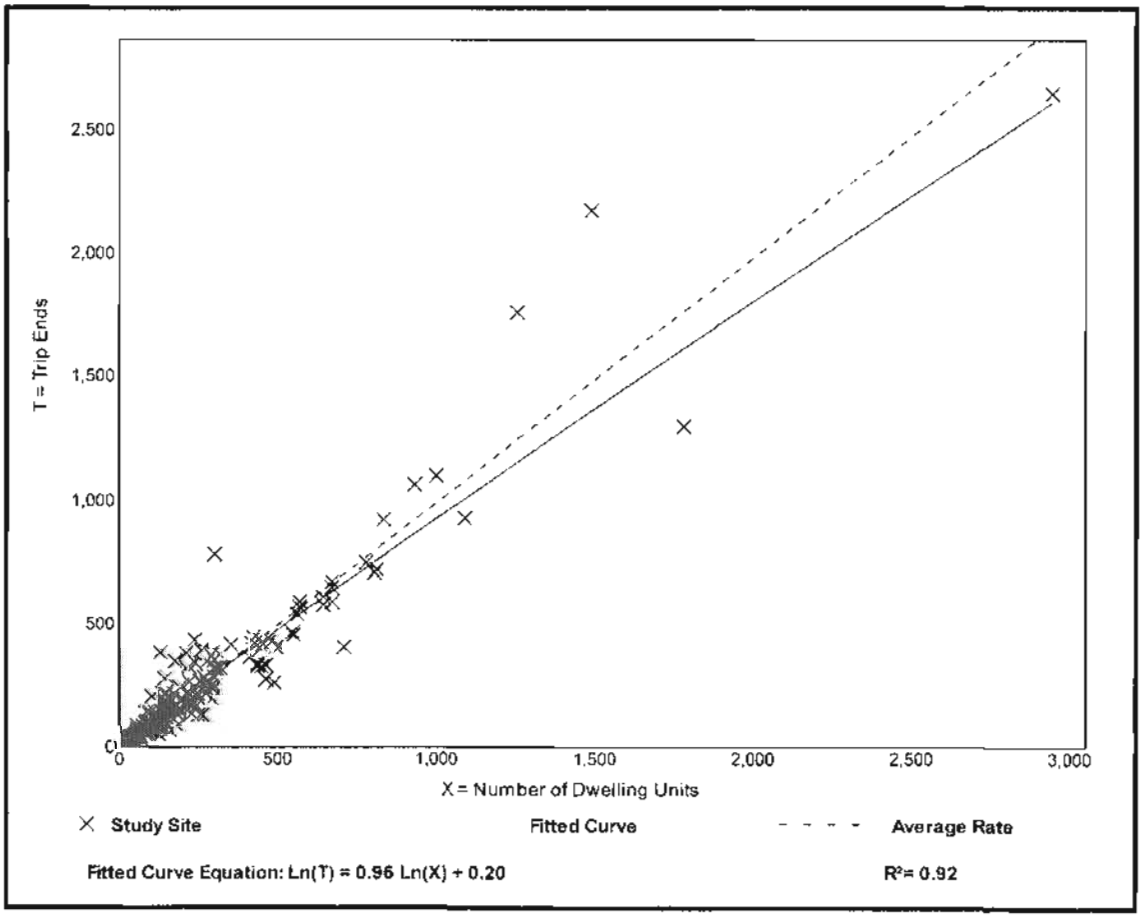
Single-Family Detached Housing
(210)

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: 190
Avg. Num. of Dwelling Units: 242
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



TRIP GENERATION FOR DRY GAP PIKE SUBDIVISION

93 Single-Family Attached Houses

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
Local Trip Rate	Single-Family Attached Housing	93 Houses	894	22%	78%		55%	45%	
				11	39	50	40	33	73
Total New Volume Site Trips			**894**	**11**	**39**	**50**	**40**	**33**	**73**

TPO Local Trip Rates

Trips calculated by using Fitted Curve Equation

TRIP GENERATION FOR DRY GAP PIKE SUBDIVISION
93 Single-Family Attached Houses

93 Residential Houses = X

Weekday:

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

T = 15 * 58.84
T = 894 trips

Peak Hour of Adjacent Traffic between 7 and 9 am:

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

T = 0.758 * 66
T = 50 trips

Peak Hour of Adjacent Traffic between 4 and 6 pm:

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

T = 0.669 * 93 + 10.07
T = 73 trips

CALCULATION OF ADDITIONAL THRU VOLUMES ON DRY GAP PIKE - 2019 to 2020
(Translation of National Data & Surveying Services (NDSS) Count Location to Proposed Dry Gap Pike Subdivision Entrance Location)

SUBDIVISION	# OF HOMES	TRIP GENERATION				TRAFFIC MOVEMENT DISTRIBUTION					
		AM PEAK		PM PEAK			AM PEAK	PM PEAK		AM PEAK	PM PEAK
		ENTER	EXIT	ENTER	EXIT						
Autumn Walk						EXIT WB RIGHT	40%	50%	EXIT WB LEFT	60%	50%
+2 Standalone	118	22	67	76	44		**27**	**22**		**40**	**22**
Homes on						ENTER SB LEFT	60%	55%	ENTER NB RIGHT	40%	45%
East Side							**13**	**42**		**9**	**34**
Wood Run Estates						ENTER SB RIGHT	60%	55%	ENTER NB LEFT	40%	45%
+2 Standalone	28	6	19	19	11		**4**	**10**		**2**	**9**
Homes on						EXIT EB LEFT	40%	50%	EXIT EB RIGHT	60%	50%
West Side							**8**	**6**		**11**	**5**

	AM PEAK	PM PEAK
2019 NDSS NB Thru Volume on Dry Gap Pike	548	365
+3.5% Growth Factor from 2019 to 2020	19	13
2020 Volume (Sub-total)	567	378
Exit WB Right + Exit EB Left - Enter NB Left - Enter NB Right	24	-15
2020 Adjusted NB Thru Volume on Dry Gap Pike at Proposed Entrance Location	**591**	**363**
2019 NDSS SB Thru Volume on Dry Gap Pike	170	633
+3.5% Growth Factor from 2019 to 2020	6	22
2020 Volume (Sub-total)	176	655
Enter SB Left + Enter SB Right - Exit WB Left - Exit EB Right	-34	25
2020 Adjusted SB Thru Volume on Dry Gap Pike at Proposed Entrance Location	**142**	**680**

CALCULATION OF ADDITIONAL THRU VOLUMES ON DRY GAP PIKE - 2020 to 2025

SUBDIVISION	# OF HOMES	TRIP GENERATION				TRAFFIC MOVEMENT DISTRIBUTION					
		AM PEAK		PM PEAK			AM PEAK	PM PEAK		AM PEAK	PM PEAK
		ENTER	EXIT	ENTER	EXIT						
Autumn Walk	32	7	21	22	13	EXIT WB RIGHT	40% **8**	50% **7**	EXIT WB LEFT	60% **40**	50% **22**
						ENTER SB LEFT	60% **4**	55% **12**	ENTER NB RIGHT	40% **9**	45% **34**
Wood Run Estates -1 Standalone Home on West Side	3	2	5	3	1	ENTER SB RIGHT	60% **1**	55% **2**	ENTER NB LEFT	40% **2**	45% **9**
						EXIT EB LEFT	40% **2**	50% **1**	EXIT EB RIGHT	60% **11**	50% **5**

	AM PEAK	PM PEAK
2020 NB Thru Volume on Dry Gap Pike	591	363
+3.5% Growth Factor from 2020 to 2025	105	71
2025 Volume (Sub-total)	696	434
Exit WB Right + Exit EB Left	10	7
2025 Adjusted NB Thru Volume on Dry Gap Pike at Proposed Entrance Location	**706**	**441**
2020 SB Thru Volume on Dry Gap Pike	142	680
+3.5% Growth Factor from 2020 to 2025	34	124
2025 Volume (Sub-total)	176	804
Enter SB Left + Enter SB Right	5	14
2025 Adjusted SB Thru Volume on Dry Gap Pike at Proposed Entrance Location	**181**	**818**

TRIP GENERATION FOR AUTUMN WALK SUBDIVISION & EAST SIDE STAND-ALONE HOMES

116 Single-Family Attached Houses + 2 Standalone Homes on East Side of Dry Gap Pike in 2020

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	118 Houses	1,211	25%	75%		63%	37%	
				22	67	89	76	44	120
Total New Volume Site Trips			**1,211**	**22**	**67**	**89**	**76**	**44**	**120**

ITE Trip Generation Manual, 10th Edition

Trips calculated by using Fitted Curve Equation

TRIP GENERATION FOR AUTUMN WALK SUBDIVISION & EAST SIDE STAND-ALONE HOMES
116 Single-Family Attached Houses + 2 Standalone Homes on East Side of Dry Gap Pike in 2020

118 Residential Houses = X

Weekday:

Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.71

Ln(T) =	0.92	*	4.77	+	2.71
Ln(T) =	7.10				
T =	**1,211 trips**				

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: T = 0.71(X) + 4.80

T =	0.71	*	118	+	4.80
T =	**89 trips**				

Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: Ln(T) = 0.96 Ln(X) + 0.2

Ln(T) =	0.96	*	4.77	+	0.20
Ln(T) =	4.78				
T =	**120 trips**				

TRIP GENERATION FOR WOODRUN ESTATES SUBDIVISION & WEST SIDE STAND-ALONE HOMES

26 Single-Family Detached Houses + 2 Standalone Homes on West Side of Dry Gap Pike in 2020

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	28 Houses	323	25%	75%		63%	37%	
				6	19	25	19	11	30
Total New Volume Site Trips			**323**	**6**	**19**	**25**	**19**	**11**	**30**

ITE Trip Generation Manual, 10th Edition

Trips calculated by using Fitted Curve Equation

TRIP GENERATION FOR WOODRUN ESTATES SUBDIVISION & WEST SIDE STAND-ALONE HOMES

26 Single-Family Detached Houses + 2 Standalone Homes on West Side of Dry Gap Pike in 2020

28 Residential Houses = X

Weekday:

Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.71

Ln(T) = 0.92 * 3.33 + 2.71

Ln(T) = 5.78

T = 323 trips

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: T = 0.71(X) + 4.80

T = 0.71 * 28 + 4.80

T = 25 trips

Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: Ln(T) = 0.96 Ln(X) + 0.2

Ln(T) = 0.96 * 3.33 + 0.20

Ln(T) = 3.40

T = 30 trips

TRIP GENERATION FOR AUTUMN WALK SUBDIVISION

32 Single-Family Attached Houses in 2025

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	32 Houses	365	25%	75%		63%	37%	
				7	21	28	22	13	35
Total New Volume Site Trips			**365**	**7**	**21**	**28**	**22**	**13**	**35**

ITE Trip Generation Manual, 10th Edition

Trips calculated by using Fitted Curve Equation

TRIP GENERATION FOR AUTUMN WALK SUBDIVISION
32 Single-Family Attached Houses in 2025

32 Residential Houses = X

Weekday:

Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.71

Ln(T) =	0.92	*	3.47	+	2.71
Ln(T) =	5.90				
T =	**365 trips**				

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: T = 0.71(X) + 4.80

T =	0.71	*	32	+	4.80
T =	**28 trips**				

Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: Ln(T) = 0.96 Ln(X) + 0.2

Ln(T) =	0.96	*	3.47	+	0.20
Ln(T) =	3.53				
T =	**35 trips**				

TRIP GENERATION FOR WOODRUN ESTATES SUBDIVISION

4 Single-Family Detached Houses - 1 Stand-Alone Home on West Side of Dry Gap Pike in 2025

ITE LAND USE CODE	LAND USE DESCRIPTION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Single-Family Detached Housing	3 Houses	42	25%	75%		63%	37%	
				2	5	7	3	1	4
Total New Volume Site Trips			**42**	**2**	**5**	**7**	**3**	**1**	**4**

ITE Trip Generation Manual, 10th Edition

Trips calculated by using Fitted Curve Equation

TRIP GENERATION FOR WOODRUN ESTATES SUBDIVISION

4 Single-Family Detached Houses - 1 Stand-Alone Home on West Side of Dry Gap Pike in 2025

3 Residential Houses = X

Weekday:

Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.71

Ln(T) =	0.92	*	1.10	+	2.71
Ln(T) =	3.72				
T =	**42 trips**				

Peak Hour of Adjacent Traffic between 7 and 9 am:

Fitted Curve Equation: T = 0.71(X) + 4.80

T =	0.71	*	3	+	4.80
T =	**7 trips**				

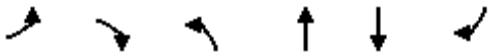
Peak Hour of Adjacent Traffic between 4 and 6 pm:

Fitted Curve Equation: Ln(T) = 0.96 Ln(X) + 0.2

Ln(T) =	0.96	*	1.10	+	0.20
Ln(T) =	1.25				
T =	**4 trips**				

APPENDIX G

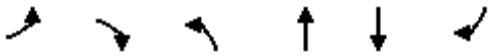
CAPACITY ANALYSES – HCM WORKSHEETS (SYNCHRO 8)



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	16	23	4	706	181	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.80	0.92	0.80
Hourly flow rate (vph)	18	26	4	882	197	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1088	197	205			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1088	197	205			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	97	100			
cM capacity (veh/h)	240	850	1378			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	43	4	882	197	9
Volume Left	18	4	0	0	0
Volume Right	26	0	0	0	9
cSH	416	1378	1700	1700	1700
Volume to Capacity	0.10	0.00	0.52	0.12	0.01
Queue Length 95th (ft)	9	0	0	0	0
Control Delay (s)	14.7	7.6	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	14.7	0.0		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	16	17	18	441	818	22
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.88	0.92	0.88
Hourly flow rate (vph)	18	19	20	501	889	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1430	889	914			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1430	889	914			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	95	97			
cM capacity (veh/h)	146	345	754			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	37	20	501	889	25
Volume Left	18	20	0	0	0
Volume Right	19	0	0	0	25
cSH	208	754	1700	1700	1700
Volume to Capacity	0.18	0.03	0.29	0.52	0.01
Queue Length 95th (ft)	16	2	0	0	0
Control Delay (s)	26.0	9.9	0.0	0.0	0.0
Lane LOS	D	A			
Approach Delay (s)	26.0	0.4		0.0	
Approach LOS	D				

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX H

KNOX COUNTY TURN LANE VOLUME THRESHOLD WORKSHEETS

TABLE 5A

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

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

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149 150 - 199	250 200	180 140	140 105	110 90	80 70	70 60
200 - 249 250 - 299	160 130	115 100	85 75	75 65	65 60	55 50
300 - 349 350 - 399	110 100	90 80	70 65	60 55	55 50	45 40
400 - 449 450 - 499	90 80	70 65	60 55	50 45	45 40	35 30
500 - 549 550 - 599	70 65	60 55	45 40	35 35	35 30	25 25
600 - 649 650 - 699	60 55	45 35	35 35	30 30	25 25	25 20
700 - 749 750 or More	50 45	35 35	30 25	25 25	20 20	20 20

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
7 + 181 = 188	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	=/ > 600
100 - 149 150 - 199	70 60	60 55	50 45	45 40	40 35	30
200 - 249 250 - 299	55 50	50 45	40 35	35 30	30 30	30 30
300 - 349 350 - 399	45 40	40 35			25 25	25 20
400 - 449 450 - 499	35 30	30 25			20 20	20 20
500 - 549 550 - 599	25 25	25 20			20 20	15 15
600 - 649 650 - 699	25 20	20 20			20 20	15 15
700 - 749 750 or More	20 20	20 20	20 20	15 15	15 15	15 15

706

Dry Gap Pike at Road "A"

2025 Projected AM NB Left Turns = 4

Left Turn Lane NOT Warranted

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

TABLE 5B

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

181

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	Yes Yes
300 - 349 350 - 399				Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499		Yes	Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

Dry Gap Pike at Road "A"

2025 Projected AM SB Right Turns = 7

Right Turn Lane NOT Warranted

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

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

TABLE 5A

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

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

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149 150 - 199	250 200	180 140	140 105	110 90	80 70	70 60
200 - 249 250 - 299	160 130	115 100	85 75	75 65	65 60	55 50
300 - 349 350 - 399	110 100	90 80	70 65	60 55	55 50	45 40
400 - 449 450 - 499	90 80	70 65	60 55	50 45	45 40	35 30
500 - 549 550 - 599	70 65	60 55	45 40	35 35	35 30	25 25
600 - 649 650 - 699	60 55	45 35	35 35	30 30	25 25	25 20
700 - 749 750 or More	50 45	35 35	30 25	25 25	20 20	20 20

441

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
22 + 818 = 840	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	=/ > 600
100 - 149 150 - 199	70 60	60 55	50 45	45 40	40 35	35 30
200 - 249 250 - 299	55 50	50 45		35 30	30 30	30 30
300 - 349 350 - 399	45 40	40 35		30 25	25 25	25 20
400 - 449 450 - 499	35 30	30 25		25 20	20 20	20 20
500 - 549 550 - 599	25 25	25 20		20 20	20 20	15 15
600 - 649 650 - 699	25 20	20 20	20 20	20 20	20 20	15 15
700 - 749 750 or More	20 20	20 20	20 20	15 15	15 15	15 15

Dry Gap Pike at Road "A"

2025 Projected AM NB Left Turns = 18

Left Turn Lane Warrant Nearly Met

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

TABLE 5B

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

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

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME * 818					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25 25 - 49 50 - 99				Yes	Yes Yes	Yes Yes
100 - 149 150 - 199		Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	Yes Yes	Yes Yes		Yes Yes	Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes	Yes Yes		Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes	Yes Yes		Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes	Yes Yes		Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

Dry Gap Pike at Road "A"

2025 Projected AM SB Right Turns = 22

Right Turn Lane Warrant Nearly Met

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

APPENDIX I

SIMTRAFFIC VEHICLE QUEUE LENGTHS

Intersection: 2: Dry Gap Pike & Road "A"

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	47	18
Average Queue (ft)	18	1
95th Queue (ft)	37	10
Link Distance (ft)	608	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		75
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Intersection: 2: Dry Gap Pike & Road "A"

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	52	35
Average Queue (ft)	17	10
95th Queue (ft)	41	34
Link Distance (ft)	608	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		75
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

APPENDIX J

RESPONSE LETTER TO ADDRESS REVIEW COMMENTS

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

September 17, 2020

PROJECT NAME: Dry Gap Pike Subdivision TIS

TO: Knoxville-Knox County Planning

SUBJECT: TIS Comment Response Document for Dry Gap Pike Subdivision (10-SC-20-C/10-D-20-UR)
Review Comments dated September 14, 2020

Dear Knoxville-Knox County Planning Staff:

The following comment response document is submitted to address comments dated September 14, 2020.

1. **On page 7 and other figures, the legibility of most all figures is very poor and the numbers are very difficult to read. Please provide clear, legible figures for the report.**

   Response: The revised report has included legible figures throughout the report.

2. **On page 16, the study cites an assumed annual traffic growth rate of 3.5% per year, but the apparent growth rate used to extrapolate volumes from Figure 4a to 4b is 4%. Please verify and correct as needed.**

   Response: The extrapolated volumes shown in Figure 4b were corrected to reflect a growth rate of 3.5%.

3. **On page 17, please add trip generation summary tables and figures to show the incremental steps in the traffic accumulation from the count location to the site driveway.**

   Response: Tables and exhibits were added after page 17 to show the incremental steps in the traffic accumulation from the count location to the site driveway. This included adding Tables 2a thru 2d to the document. It is

believed that this additional information added to the report will help showing the incremental steps.

4. **On page 23 last paragraph, the study cites "Land Use Code #220" for single-family detached unit for adjacent homes in the study area. This should be "Land Use Code #210".**

   Response: On page 26 (previously page 23), last paragraph, the "Land Use Code #220" text was changed to "Land Use Code #210".

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

- Updated Title Page
- Updated Table of Contents
- Updated page footers
- Updated Appendix F and Figure 4c, reflecting a northbound thru volume on Dry Gap Pike in AM peak of 602 vehicles instead of 601
- Revised and updated Table numbers
- Made a few minor grammatical changes to improve readability
- Added Appendix J to include this response letter

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

Sincerely,

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

AJAX ENGINEERING
CIVIL ENGINEERING / TRAFFIC ENGINEERING

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

September 25, 2020

PROJECT NAME: Dry Gap Pike Subdivision TIS

TO: Knoxville-Knox County Planning

SUBJECT: 2nd TIS Comment Response Document for Dry Gap Pike Subdivision (10-SC-20-C/10-D-20-UR)
Review Comments dated September 24, 2020

Dear Knoxville-Knox County Planning Staff:

The following comment response document is submitted to address comments dated September 24, 2020.

1. **On page 17, the map of traffic count volumes has a couple of revisions. The "EB LT" from Autumn Path Ln should be "WB LT" since it is heading west, and likewise for the "WB LT" from Branch Field Ln.**

   Response: The revised report has included these corrections on page 17.

2. **On page 22 (Figure 4b), the background growth rate was not applied to the PM southbound through volume. This is copied to the volume illustrations on pages 18, 19, and 20.**

   Response: The background growth rate was applied to the PM southbound thru volume and is shown in Figure 4b and the illustrations shown on page 18, 19, and 20.

3. **On pages 18-23, the "translation" of volumes from the count location to the site access needs to be revisited. The volumes need to balance through the system taking into account all traffic entering and leaving Dry Gap Pike. Attached is an enlarged view of the volume illustration on page 20 to demonstrate the process. For example, the year 2020 567 northbound AM through vehicles on Dry Gap Pike at the count location decrease by 2 left-turns at Branch Field Lane and then gain 8 vehicles from the same**

location resulting in 573 northbound AM through vehicles. This decreases by 9 northbound AM right-turns at Autumn Path Lane and then gains 27 vehicles from the same location heading westbound out of Autumn Path Lane. Then northbound AM through vehicles at the site is 591. Please correct all accordingly.

Response: This revised method of estimating future traffic volumes on Dry Gap Pike has been added to the report. This resulted in changes throughout the report. These changes were made in Figures 4c, 5, and 8; Tables 2b, 2d, and 5; illustrations on pages 18-20; and Appendices G, F, H, and I.

4. **It would be helpful to see a similar set of illustrations for the 2025 volumes since the same process was used to account for future homes in the nearby subdivisions.**

Response: Illustrations were added to the end of the Opening Year Traffic Conditions (Without Project) section. Also, Tables 2e, 2f, and 2g were added to the report in this section to demonstrate the process.

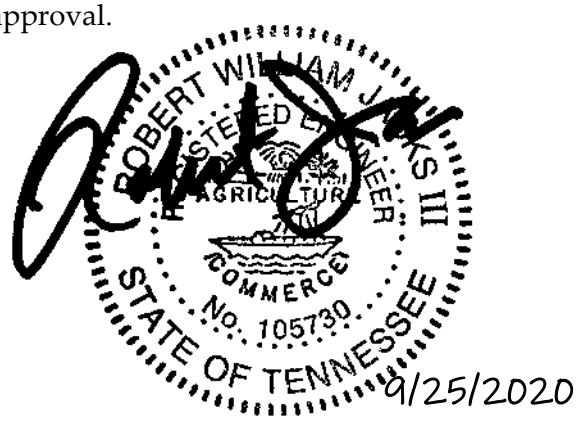
In addition to the requested revisions, other changes in the report include the following:

- Updated Title Page
- Updated Table of Contents
- Updated page footers
- Added this response letter to Appendix J

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

Sincerely,

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



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