

Revised Transportation Impact Letter

Vining Mill and Catatoga Subdivision Proposed Road Connection

Knox County, Tennessee

12-SC-21-C / 12-F-21-UR
TIS Version 3
12/1/2021

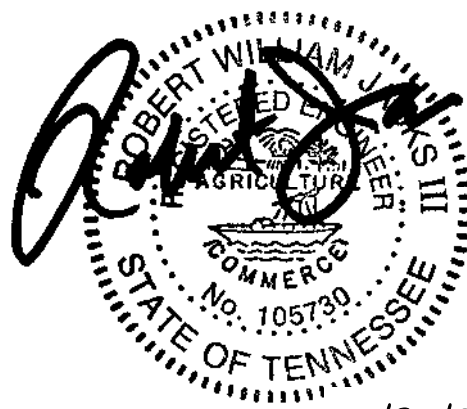
Prepared For:

Rackley Engineering
P.O. Box 30456
Knoxville, TN 37930

Prepared By:



Ajax Engineering, LLC
11812 Black Road
Knoxville, TN 37932
Robert W. Jacks, PE



11/30/2021

November 2021



CIVIL ENGINEERING / TRAFFIC ENGINEERING

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

November 15, 2021

TO: Knoxville-Knox County Planning and Knox County Engineering

**RE: Vining Mill and Catatoga Subdivision Proposed Road Connection –
Revised Traffic Impact Letter
Knox County, Tennessee**

This revised Traffic Impact Letter (TIL) is being submitted for a proposed road connection between the Vining Mill and Catatoga Subdivisions in West Knox County. This proposed internal road connection has caused a change in the final amount of proposed residential lots in both subdivisions. Transportation Impact Studies (TIS) for these subdivisions received prior approval. This TIL provides updates to the projected transportation impacts due to the proposed internal road connection and the change in house lot amounts.

This TIL includes the items requested in the Scope of Work provided by Knoxville-Knox County Planning on October 29, 2021 and includes a response letter to the comment received on November 11, 2021 via email. The response letter is included at the end of the Appendix.

If you have any questions or comments about this submittal, please feel free to contact me at any time. We look forward to your review and approval.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert W. Jacks", written in a cursive style.

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

PROJECT DESCRIPTION

■ GENERAL DESCRIPTION:

The developers of the Vining Mill and Catatoga Subdivisions in West Knox County, TN, are proposing an internal road connection. These two subdivisions will exist between North Campbell Station Road on the southeast side and Hardin Valley Road on the northwest side. This road connection would provide an internal access route that will create connectivity between two subdivisions that will abut each other in their final construction phase. This road would also provide an emergency secondary access point for both subdivisions.

The Transportation Impact Study (TIS) for the Vining Mill Subdivision was approved in 2017 with a proposed total of 190 single-family detached houses. Since receiving approval, the Vining Mill development has built an entrance on Hardin Valley Road with an exclusive left-turn lane for entering vehicles. Several dozen homes have been constructed, occupied, and the development continues with further ongoing house construction. Vining Mill has undergone a few minor revisions during construction, but the most recent revision is significant and includes a proposed internal road connection to Catatoga Subdivision to the east. The revision for Vining Mill Subdivision also includes eliminating a second proposed entrance on Marietta Church Road that was initially proposed. These revisions result in an updated total of 177 single-family detached residential houses, a reduction of 23 houses. The Vining Mill Subdivision TIS assumed that it would be fully built out and occupied by 2024.

The TIS for the Catatoga Subdivision was approved in 2021. Catatoga Subdivision was originally proposed to have 155 single-family detached houses with a single entrance on North Campbell Station Road. This subdivision has not yet begun construction. The revised Catatoga Subdivision site plan results in 158 single-family detached lots, an increase of 3 houses. The Catatoga Subdivision TIS assumed that it would be fully built out and occupied by 2026.

■ SITE ACCESS & LOCATION:

The location of these residential subdivisions is shown on a map in Figure 1. Figure 2 shows the preliminary plan for the road connection between the Vining Mill and Catatoga Subdivisions designed by Rackley Engineering (Vining Mill) and Urban Engineering (Catatoga).

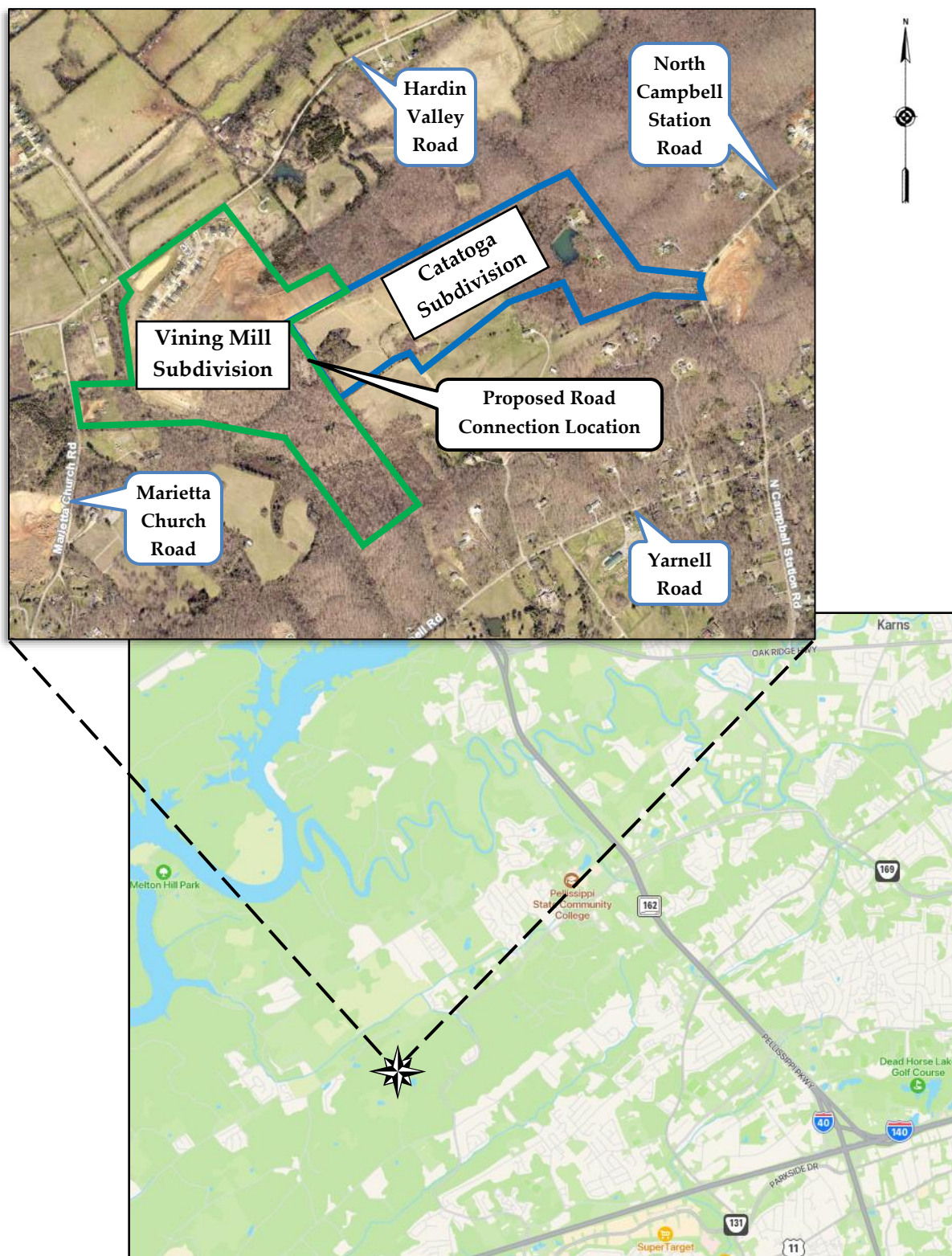


Figure 1
Location Map

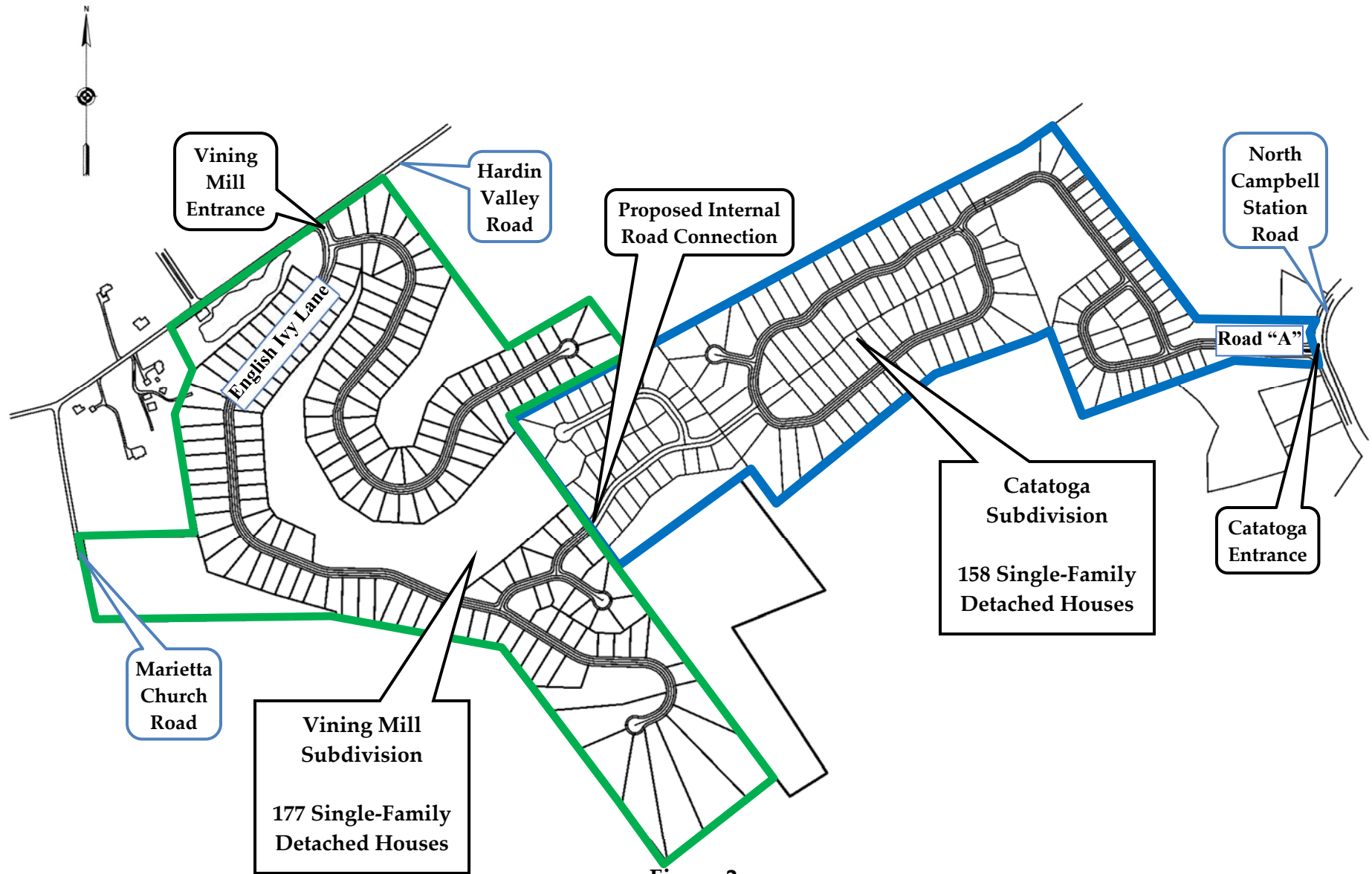


Figure 2
Proposed Plan Layout
Vining Mill and Catatoga Subdivisions with a
Proposed Internal Road Connection

Not to Scale

TRANSPORTATION ANALYSIS OF PROJECTED CONDITIONS

This Transportation Impact Letter (TIL) used information from previously approved studies and other traffic data to analyze the potential impacts of constructing an internal road connection between the two subdivisions. The intention of this TIL is to provide the following updates as requested by Knoxville-Knox County Planning:

- Recompute the trip generation based on the final lot counts for both affected subdivisions
- Include in the background traffic all the currently known sites in the vicinity undergoing development
- Redistribute the traffic volumes for both subdivisions to the access points/entrances (study intersections) that will be retained
- Re-check capacity analyses for all the study intersections
- Re-check the turn lane warrants, including trigger points (number of lots), when they are required for the entrances (study intersections)

The TIL provides the above information in the following sections. The studied intersections in this TIL include the entrance for the Vining Mill Subdivision, located on Hardin Valley Road, and the entrance for the Catatoga Subdivision, which will be located on North Campbell Station Road.

■ **UPDATED TRIP GENERATION:**

The updated estimated amount of traffic that the 177 single-family detached houses in the Vining Mill Subdivision and the 158 houses in the Catatoga Subdivision will generate was calculated based on rates and equations provided by the Trip Generation Manual, 11th Edition, a publication of the Institute of Transportation Engineers (ITE). The data from ITE and the calculations for the proposed subdivisions are shown in the Appendix. A summary of this information is presented in the following table:

TABLE 1
UPDATED TRIP GENERATION FOR VINING MILL AND CATATOGA SUBDIVISIONS

ITE LAND USE CODE	SUBDIVISION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Vining Mill	177 Houses	1,706	26%	74%		63%	37%	
				32	93	125	107	63	170
#210	Catatoga	158 Houses	1,537	26%	74%		63%	37%	
				29	84	113	96	57	153

ITE Trip Generation Manual, 11th Edition

Trips calculated by using Fitted Curve Equation

The updated generated traffic volumes in Table 1 reflect minor but reduced volumes from the original calculations presented in the previously approved studies.

The original study for the Vining Mill Subdivision with 190 lots calculated the following: 1,896 daily vehicles with 143 trips in the AM Peak Hour and 188 trips in the PM Peak Hour. The original study for the Catatoga Subdivision with 155 lots calculated the following: 1,557 daily vehicles with 115 trips in the AM Peak Hour and 155 trips in the PM Peak Hour.

It should be noted that even though the number of lots in the Catatoga Subdivision increased by three, the calculated generated trips decreased since the numbers shown in Table 1 were calculated from the Trip Generation Manual, 11th Edition. The original TIS calculations were calculated from the 10th Edition, and the 11th Edition presents a slight reduction in generated trip rates for single-family detached houses.

■ **PROJECTED HORIZON YEAR TRAFFIC CONDITIONS (WITHOUT THE PROJECT):**

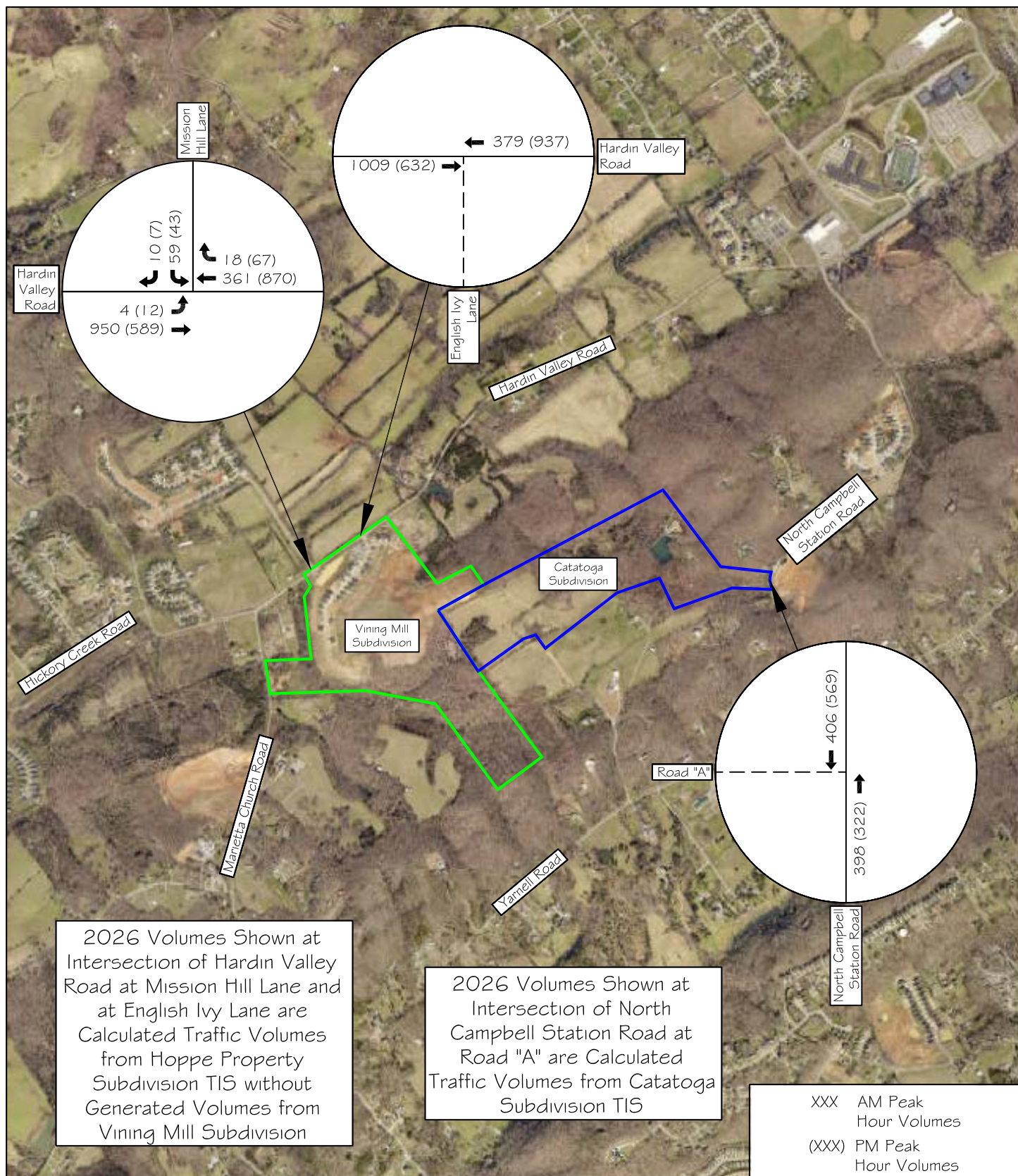
Horizon year traffic conditions represent the projected traffic volumes in the study area without the proposed projects being developed (no-build option). The previously approved studies assumed the build-out and full occupancy for the Vining Mill Subdivision was 2024 and 2026 for Catatoga Subdivision. To properly analyze the impacts of the proposed internal road connection, the traffic volumes for the subdivision entrances were both re-analyzed in 2026.

For this update, the projected 2026 traffic volumes on North Campbell Station Road at the proposed entrance for the Catatoga Subdivision were directly obtained from the TIS completed in April 2021. These projected 2026 traffic volumes at the proposed entrance for Catatoga Subdivision were derived from a traffic count obtained at the intersection of North Campbell Station Road at Yarnell Road. The projected 2026 traffic volumes from the April 2021 TIS included the tabulated volumes plus a 20% factor to account for Covid and 5% growth for five years. These 2026 volumes are shown in Figure 3, and the figure from the original Catatoga Subdivision TIS where these volumes were obtained is in the Appendix.

The projected 2026 traffic volumes at the entrance for Vining Mill were synthesized from a recently completed TIS for the proposed Hoppe Property Subdivision located just north of the intersection of Hardin Valley Road at Marietta Church Road. The Hoppe Property Subdivision TIS was completed in August 2021 and included a comprehensive review of the existing, ongoing, and projected subdivisions that will impact the intersection of Hardin Valley Road at Marietta Church Road. This intersection is located 1,600 feet to the west of the Vining Mill Subdivision entrance. The analyses in this prior TIS included the residential subdivisions of the Hoppe Property, Vining Mill, Seal Property, Massey Creek, Hunters Way, S&E Property, and Briggs Station. The Hoppe Property Subdivision TIS examined the projected road volumes in 2025.

This TIL used a spreadsheet previously created for the Hoppe Property Subdivision study to estimate the 2026 projected traffic volumes on Hardin Valley Road at the Vining Mill Subdivision entrance. The results are shown in Figure 3, and the spreadsheet worksheets are shown in the Appendix. The projected 2026 volumes shown in Figure 3 assume that the Vining Mill Subdivision has not yet been constructed, and the entrance does not exist on Hardin Valley Road. However, the traffic volumes shown in Figure 3 do assume that all the other above-mentioned subdivisions will be completed and fully occupied in 2026. The volumes shown in Figure 3 at the entrance for the Vining Mill Subdivision are the summation of the volumes calculated from the

Hoppe Property Subdivision spreadsheet for the adjacent intersection of Hardin Valley Road at Mission Hill Lane. This intersection is 780 feet to the west of the Vining Mill Subdivision entrance.



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

NOT TO SCALE



FIGURE 3
Vining Mill and Catatoga Subdivision
Proposed Road Connection

2026 Peak Hour Traffic Volumes -
PROJECTED HORIZON YEAR TRAFFIC
(WITHOUT THE PROJECT)

■ **TRIP DISTRIBUTION AND ASSIGNMENT:**

Figure 4a shows the assumed projected distribution of traffic entering and exiting the subdivisions from the original TIS's. As shown in Figure 4a, the original study for the Vining Mill Subdivision assumed that a small percentage of residents would use the proposed second entrance tied to Marietta Church Road. The Appendix includes the original figure showing the assumed distribution from the Vining Mill Subdivision TIS. Figure 4a also shows the assumed projected distribution of traffic entering and exiting the proposed Catatoga Subdivision, and the Appendix includes the original figure from the Catatoga Subdivision TIS.

Figure 4b shows the updated and revised trip distribution for the Vining Mill and Catatoga Subdivisions based on the proposed site layout changes. These changes include eliminating the second entrance for the Vining Mill Subdivision at Marietta Church Road and the proposed internal road connection between the two subdivisions. Figure 4b shows the revised Vining Mill Subdivision trip distribution at the entrance on Hardin Valley Road and reflects the removal of the entrance on Marietta Church Road. It maintains the original assumption that 5% of travel will use Marietta Church Road, and 5% will travel to and from the west on Hardin Valley Road and Hickory Creek Road.

The assumed trip distribution percentage at the Vining Mill Subdivision entrance to and from the east traveling on Hardin Valley Road has also been updated to include a slight reduction from the original study. This reduction is due to the assumption that 10% of the Vining Mill Subdivision traffic will travel through the Catatoga Subdivision for access to North Campbell Station Road for southbound travel towards Yarnell Road and the reverse for return travel.

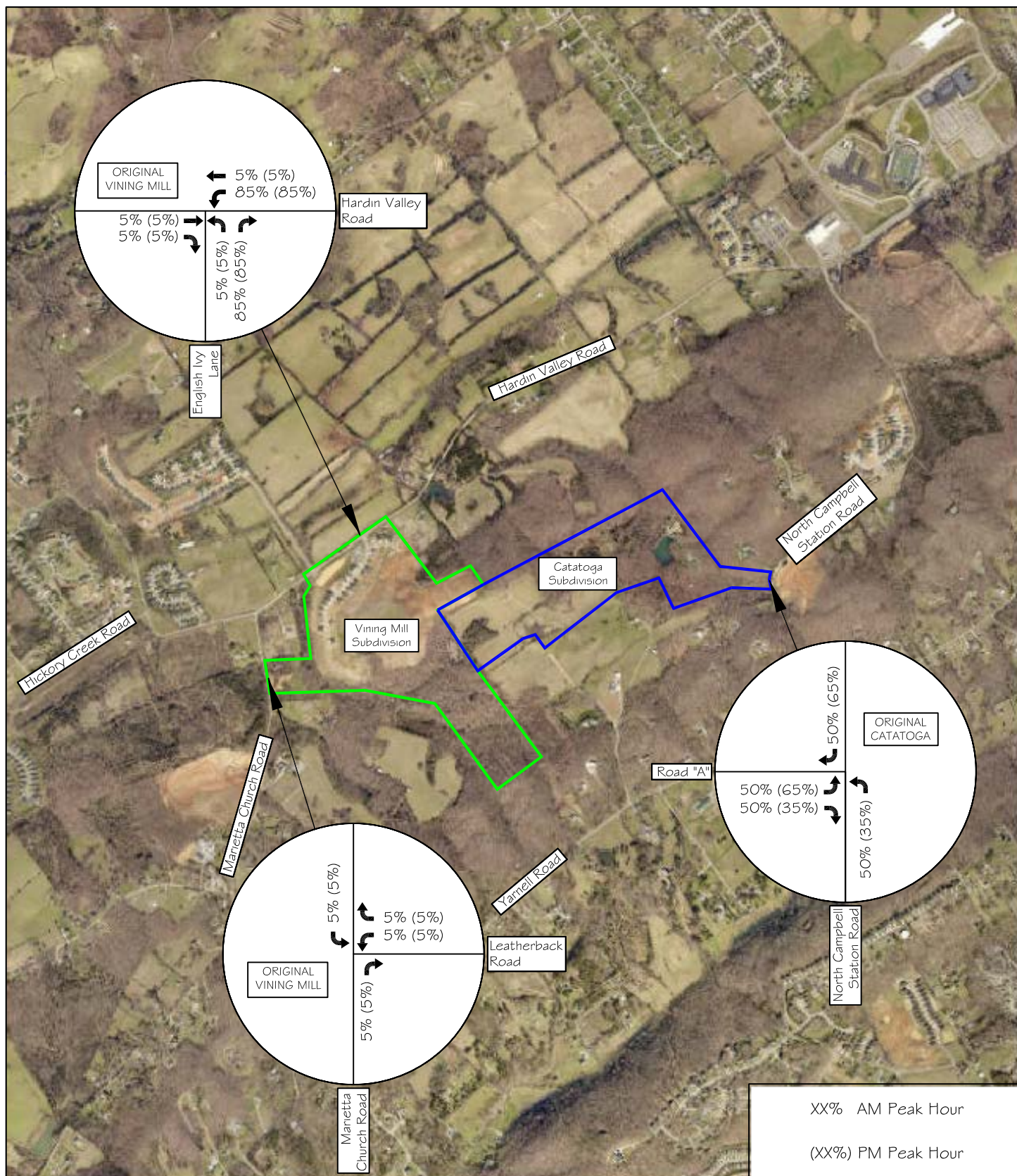
The previous study for the Vining Mill Subdivision documented that most traffic on Hardin Valley Road is generated to and from the east (toward the Hardin Valley schools and Pellissippi Parkway). A traffic count at the intersection of Hardin Valley Road at North Campbell Station Road was obtained from Knox County Engineering. This count was obtained to determine the percentage of traffic that travels east on Hardin Valley Road from the surrounding Vining Mill Subdivision area and turns towards the south on North Campbell Station Road and vice versa. This intersection traffic count was conducted on 9/25/18 by Zhiwar Rashid and is shown in the Appendix. During the AM and PM peak hours at this intersection, roughly 5% of eastbound traffic was observed turning right onto North Campbell Station Road from Hardin Valley Road. Likewise, roughly 7% of northbound traffic turned left onto Hardin Valley Road from North

Campbell Station Road. These observed percentages are hypothesized as a potential indicator of the percentage of motorists from the surrounding Vining Mill Subdivision area on Hardin Valley Road that have a desired destination to the south. Instead of traveling further to the east on Hardin Valley Road, these motorists travel south on North Campbell Station Road towards the Interstate or for travel east on Yarnell Road. If an internal road connection is provided between the Vining Mill and Catatoga Subdivisions, the residents in Vining Mill who want to travel southward on North Campbell Station Road (and in the return direction) would be able to do so by exiting and entering at the Catatoga Subdivision entrance. This shift in travel patterns would reduce the number of vehicles entering and exiting at the Vining Mill Subdivision entrance on Hardin Valley Road but increase vehicles at the Catatoga Subdivision entrance on North Campbell Station Road.

Thus, to present a conservative result, 10% of the Vining Mill Subdivision generated traffic was assumed would travel to and from the Catatoga Subdivision entrance via a proposed internal road connection. This assumption is shown in Figure 4b with the appropriate percentage reduction at the Vining Mill Subdivision entrance and increase at the Catatoga Subdivision entrance. The original TIS distribution for the Catatoga Subdivision was maintained in Figure 4b but included the additional 10% generated from the Vining Mill Subdivision.

Due to the documented minimal travel demand to and from the west via Hardin Valley Road and further to Hickory Creek Road, it is expected that there will be negligible generated traffic from the Catatoga Subdivision thru the Vining Mill Subdivision towards Hardin Valley Road. It is also expected that there will be negligible generated traffic from the residents at the rear of Vining Mill Subdivision that will travel thru the Catatoga Subdivision to and from Hardin Valley Road.

Figure 5 shows the traffic assignment of the updated computed trips generated by the subdivisions (Table 1) and applied to the intersection movements based on the assumed updated distribution of trips shown in Figure 4b.



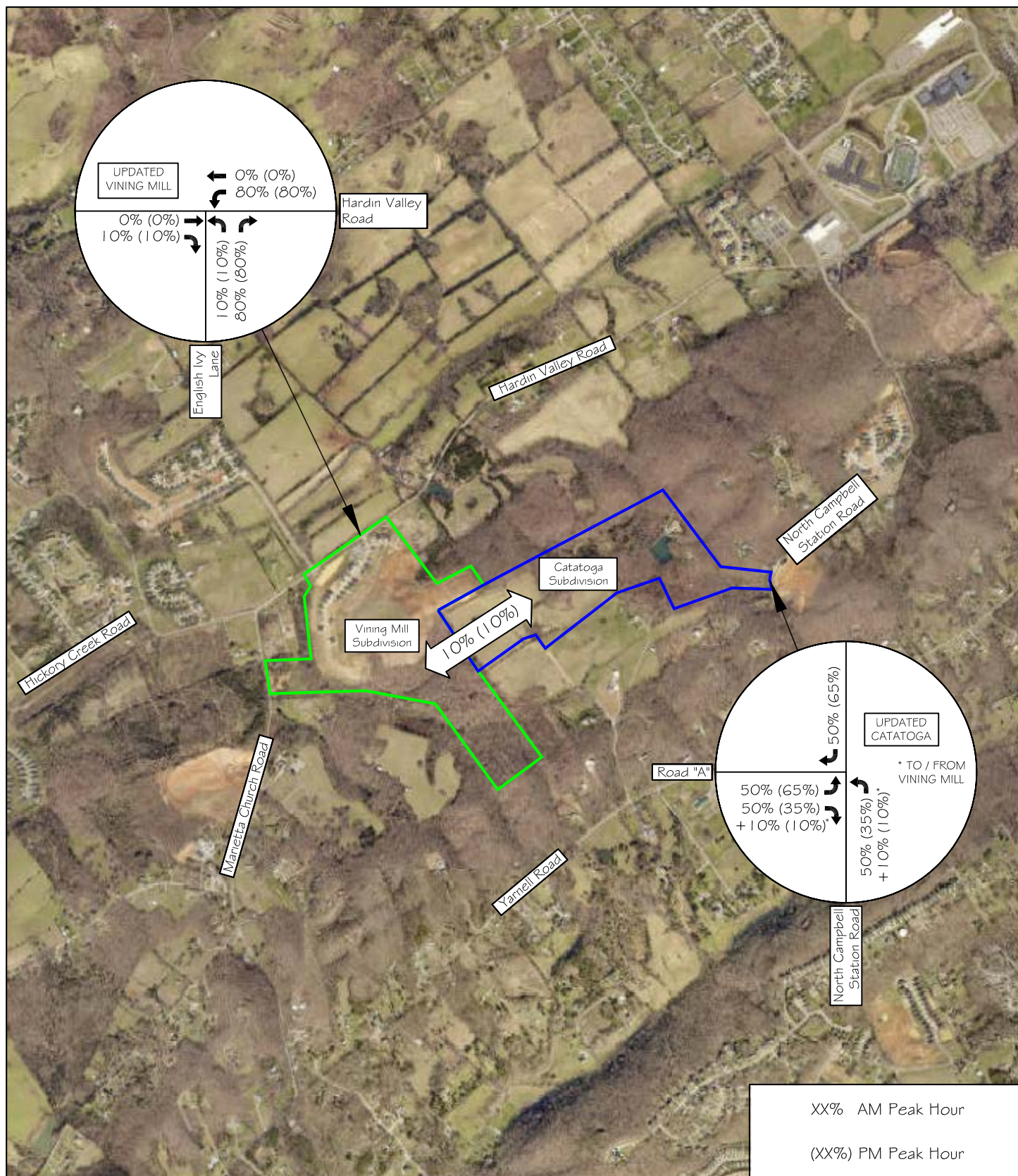
11812 Black Road
Knoxville, TN 37932
Phone: (865) 556-0042
Email: ajaxengineering@gmail.com

NOT TO SCALE



FIGURE 4a
Vining Mill and Catatoga Subdivision
Proposed Road Connection

Original Directional Distribution of
Generated Traffic during AM and PM
Peak Hour



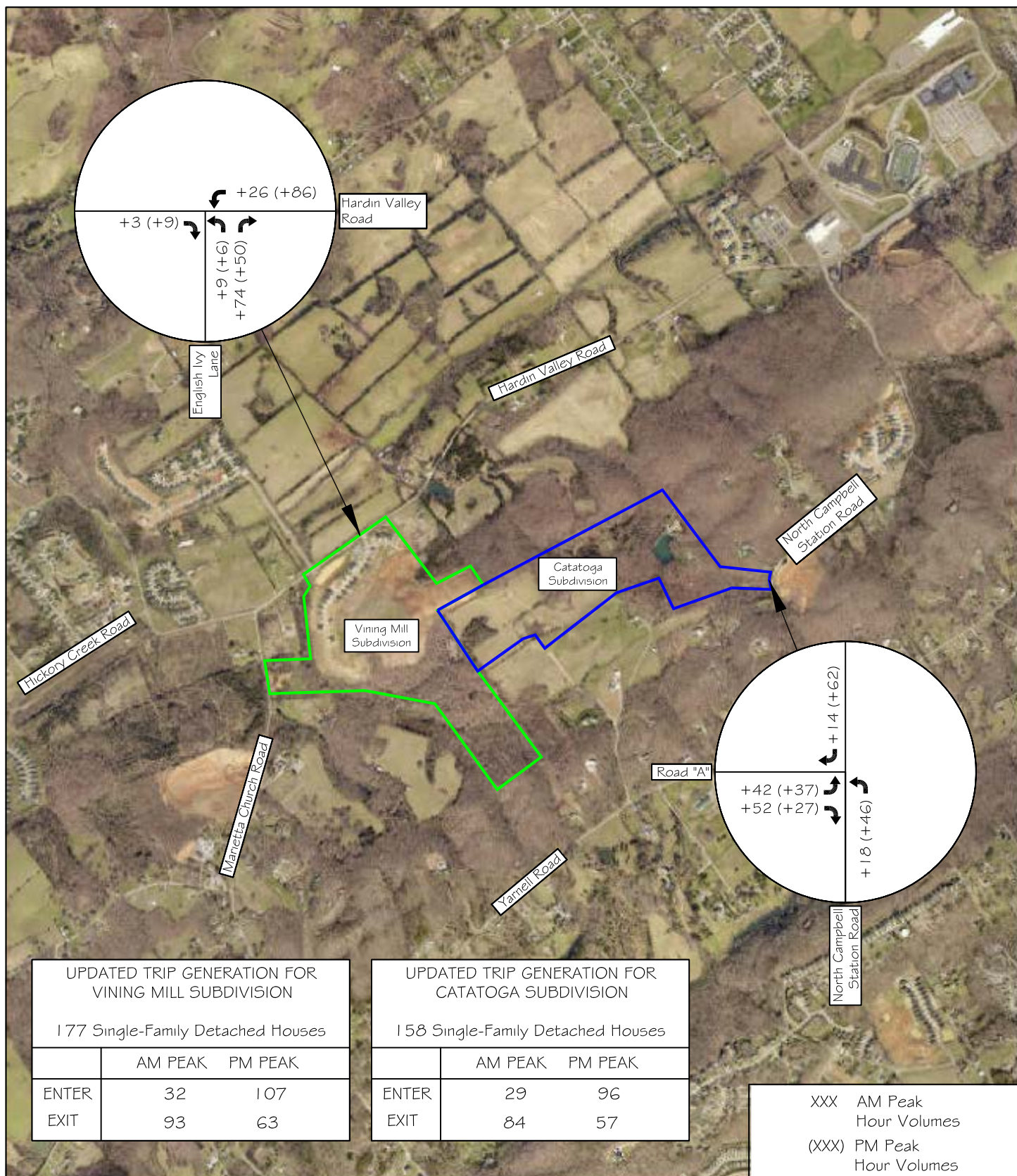
11812 Black Road
Knoxville, TN 37932
Phone: (865) 556-0042
Email: ajaxengineering@gmail.com

NOT TO SCALE



FIGURE 4b
Vining Mill and Catatoga Subdivision
Proposed Road Connection

Updated Directional Distribution of
Generated Traffic during AM and PM
Peak Hour



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

NOT TO SCALE



FIGURE 5
Vining Mill and Catatoga Subdivision
Proposed Road Connection


Traffic Assignment of Generated Traffic
during AM and PM Peak Hour


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

Figure 6 shows the projected and updated 2026 AM and PM peak hour volumes for the studied intersections. Capacity analyses were undertaken to determine the projected Level of Service (LOS) for these intersections. The capacity analyses were calculated following the methods outlined in the Highway Capacity Manual (HCM) and using Synchro Traffic Software (Version 8). The results are shown in Table 2, and the worksheets are in the Appendix.

The entrances are calculated to operate at acceptable levels with minimal to average vehicle delays for the intersection movements with the updated 2026 projected traffic volumes.

TABLE 2
2026 INTERSECTION CAPACITY ANALYSIS RESULTS -
OPENING YEAR (2026 WITH THE PROJECT)

INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS ^a	DELAY ^b (seconds)	v/c ^c	LOS ^a	DELAY ^b (seconds)	v/c ^c
Hardin Valley Road at English Ivy Lane	 Unsignalized	Northbound Left/Right	D	34.2	0.433	C	19.7	0.203
		Westbound Left	B	11.5	0.050	A	9.4	0.105

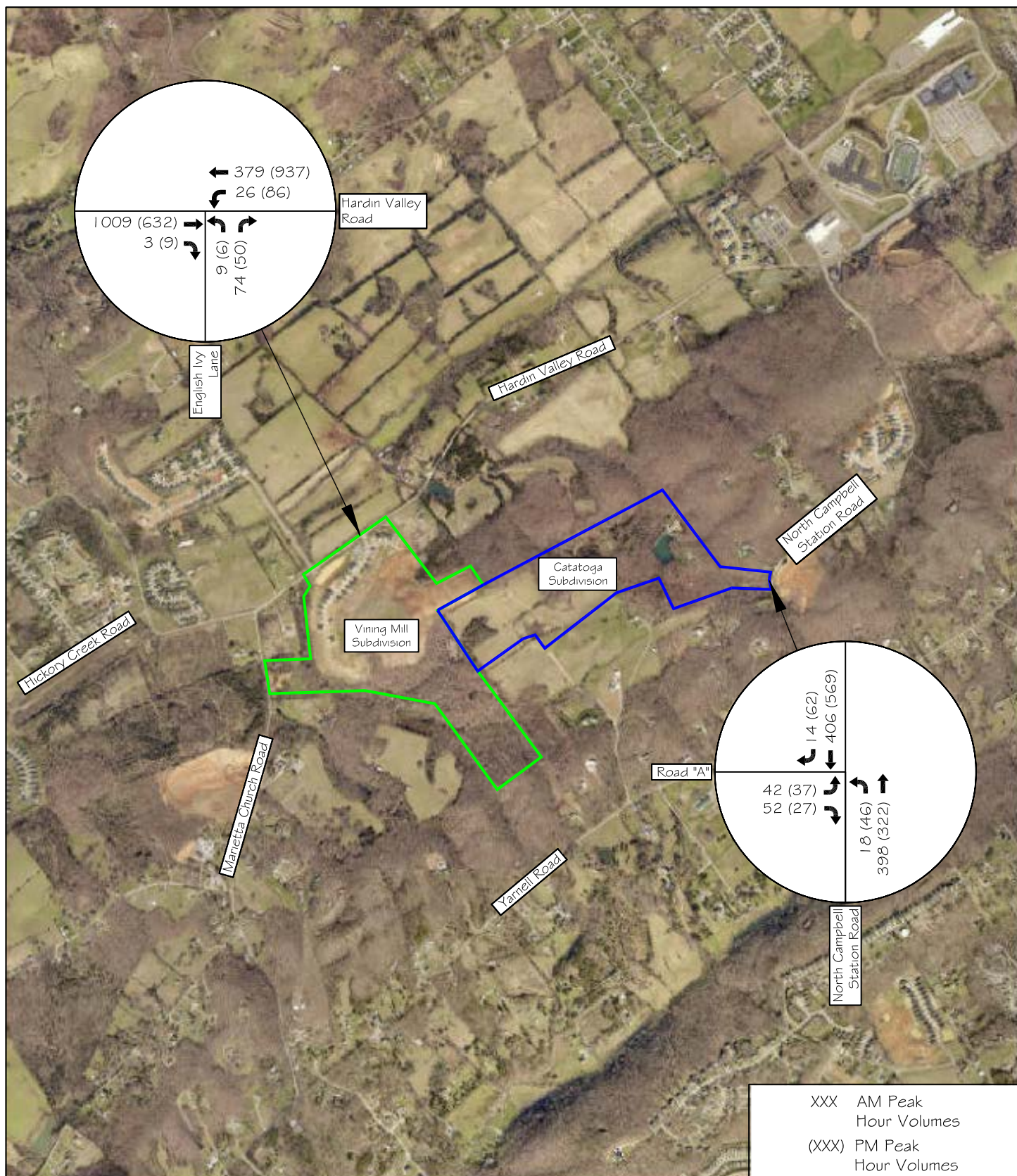
INTERSECTION	TRAFFIC CONTROL	APPROACH/ MOVEMENT	AM PEAK			PM PEAK		
			LOS ^a	DELAY ^b (seconds)	v/c ^c	LOS ^a	DELAY ^b (seconds)	v/c ^c
North Campbell Station Road at Road "A"	 Unsignalized	Northbound Left	A	8.5	0.019	A	9.4	0.059
		Eastbound Left/Right	C	18.3	0.279	D	27.1	0.305

Note: All analyses were calculated in Synchro 8 software and reported with HCM 2010 methodology

^a Level of Service

^b Average Delay (sec/vehicle)

^c Volume-to-Capacity Ratio



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

NOT TO SCALE



FIGURE 6
 Vining Mill and Catatoga Subdivision
 Proposed Road Connection

2026 Peak Hour Traffic Volumes -
 PROJECTED HORIZON YEAR TRAFFIC
 (WITH THE PROJECT)

▪ **EVALUATION OF TURN LANE THRESHOLDS:**

The previous studies for the Vining Mill and Catatoga Subdivisions determined that exclusive turn lanes were warranted at the entrances for entering vehicles. The Vining Mill Subdivision was recommended to construct an exclusive left-turn lane on Hardin Valley Road. The Catatoga Subdivision was recommended to construct an exclusive left and right-turn lane on North Campbell Station Road.

A re-evaluation of the need for separate turn lanes for entering vehicles at the entrances in the updated and projected 2026 conditions with an internal road connection was conducted.

The criteria used for this turn lane evaluation is based on “Knox County’s Access Control and Driveway Design Policy”. The previous turn lane recommendations were confirmed in the re-evaluation, and the worksheets for these evaluations are provided in the Appendix.

▪ **EVALUATION OF TURN LANE STORAGE LENGTHS:**

The previous studies for the Vining Mill and Catatoga Subdivisions also recommended specific storage lengths for the turn lanes at the entrances. The projected vehicle queue lengths were recalculated with the updated projected volumes to determine if the initially recommended turn lane storage lengths are expected to be adequate.

The construction of the Vining Mill Subdivision entrance in 2019 included adding an exclusive westbound left-turn lane on Hardin Valley Road with 100 feet of storage as recommended in the original study. Catatoga Subdivision has yet to be constructed but was recommended to have an exclusive northbound left-turn lane length of 50 feet and an exclusive southbound right-turn lane length of 50 feet.

The 95th percentile vehicle queue lengths were recalculated in SimTraffic software to determine the adequacy of the prior recommended lengths.

The calculated vehicle queue results were averaged from the outcome obtained during ten traffic simulations in the SimTraffic software. The vehicle queue results from the SimTraffic software are in the Appendix. The 95th percentile vehicle queue lengths at the intersections for the

projected 2026 conditions are shown in Table 3, and the recalculated results indicate that the originally recommended turn lane storage lengths are adequate.

TABLE 3
TURN LANE STORAGE & VEHICLE QUEUE SUMMARY -
2026 AM AND PM PEAK HOUR TRAFFIC VOLUMES

INTERSECTION	APPROACH/ MOVEMENT	STORAGE RECOMMENDED	95 th PERCENTILE QUEUE LENGTH *		ADEQUATE LENGTH?
			AM PEAK HOUR	PM PEAK HOUR	
Hardin Valley Road at English Ivy Lane	Westbound Left	100'	42'	51'	YES
	Northbound Left/Right	n/a	87'	56'	n/a

INTERSECTION	APPROACH/ MOVEMENT	STORAGE RECOMMENDED	95 th PERCENTILE QUEUE LENGTH *		ADEQUATE LENGTH?
			AM PEAK HOUR	PM PEAK HOUR	
North Campbell Station Road at Road "A" (Catatoga Entrance)	Eastbound Left/Right	n/a	58'	52'	n/a
	Northbound Left	50'	28'	45'	YES
	Southbound Right	50'	0'	3'	YES

* 95th percentile queues were calculated in SimTraffic 8 software

OVERVIEW OF RESULTS

The following is an overview of the results of constructing a proposed Vining Mill and Catatoga Subdivision internal road connection based on the updated projected 2026 conditions:

- The overall total generated trips for the subdivisions were recalculated based on the updated number of proposed houses. It was determined that the subdivisions overall would produce a reduced number of vehicle trips compared to the original studies. This calculated reduction is due to the decrease in houses in the Vining Mill Subdivision and using the recently updated equations provided in the Trip Generation Manual, 11th Edition from ITE.
- It was determined that the LOS results and capacity of the subdivision entrances will be adequate with the updated 2026 projected traffic volumes.
- The previous studies for the Vining Mill and Catatoga Subdivisions determined that exclusive entering turn lanes were warranted. The updated calculations confirmed that the original turn lane recommendations are still valid and determined that the originally recommended turn lane storage lengths are also adequate.

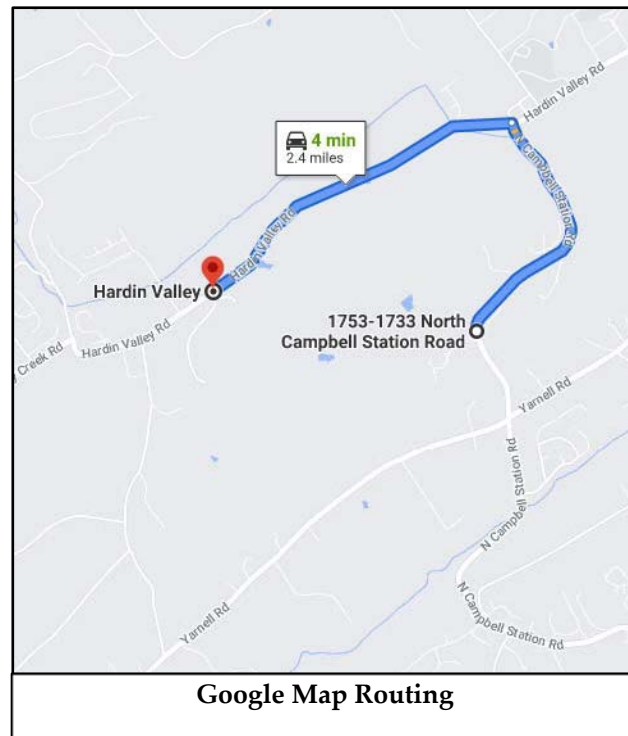
The developers of the subdivisions are not planning on connecting the two developments until late into the construction. The two subdivisions will be connected with a road connector in the last phase as the construction proceeds from the entrances to the rear of each development.

The Vining Mill Subdivision development has already constructed the appropriate westbound left-turn lane at the entrance on Hardin Valley Road, and Catatoga Subdivision has yet to begin construction. Assuming that the two subdivisions will not be connected until the last phase and assuming linear home construction growth in Catatoga Subdivision, it is estimated that the southbound right-turn lane on North Campbell Station Road at the entrance will be warranted by the time the 126th home is constructed in the Catatoga Subdivision. The northbound left-turn lane on North Campbell Station Road at the entrance will be warranted when the 138th home is constructed in Catatoga Subdivision. This result was determined

by iteration, and the spreadsheet for this calculation is included in the Appendix.

- The construction of an internal road connection between the subdivisions is not expected to attract any cut-thru traffic by outside motorists between North Campbell Station Road and Hardin Valley Road. The revised site plans have been specifically modified with t-intersections to create internal vehicle stops and increase travel time through the subdivisions.

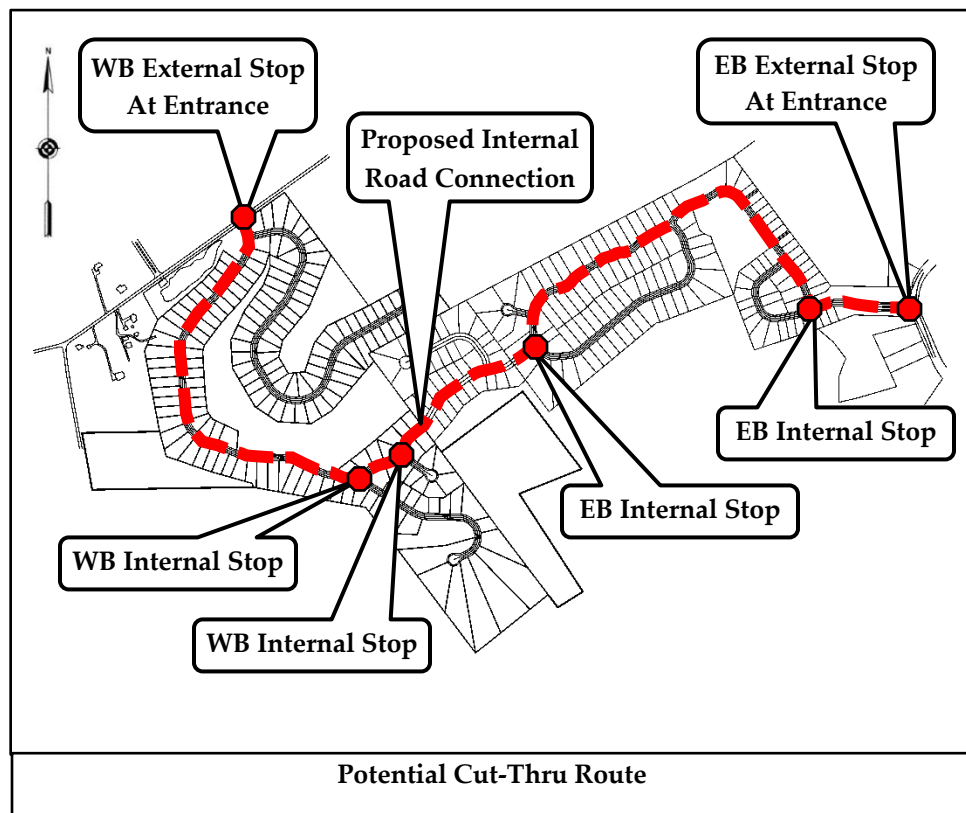
Using Google Maps, it can be shown that during normal road conditions, it currently takes a motorist 4 minutes to go 2.4 miles from the entrance of Vining Mill Subdivision to the proposed Catatoga Subdivision entrance and vice versa. (It takes 6 minutes and 3.5 miles via Marietta Church Road.)



Based on the revised site plans shown in Figure 2 with a road connection, the total length of the internal roads from the Vining Mill entrance to the Catatoga entrance will be 1.73 miles. Thus, a motorist traveling southeast from the Vining Mill Subdivision entrance to the Catatoga Subdivision entrance (and vice versa) could save 0.67 miles of travel ($2.4 - 1.73 = 0.67$ miles) by cutting through the subdivisions in the future.

However, taking into account travel time, a motorist would lose the overall travel savings by cutting through the subdivisions. The posted speed limit in the subdivisions will be set at 25 mph. Assuming a vehicle could travel through the subdivisions at 30 mph results in an overall internal travel time of 3 minutes and 28 seconds. This time does not include the required vehicle stops at the t-intersections encountered along the internal route through the subdivisions.

The potential cut-thru route within the subdivisions would include two internal vehicle stops (Stop Signs at t-intersections) in either direction. Assuming a moderate vehicle deceleration and acceleration rate of 10 ft/s^2 with a vehicle speed of 30 mph would add 8.8 seconds to the travel time per stop. Two vehicle stops result in an extra 17.6 seconds, increasing the overall travel time to 3 minutes and 45.6 seconds (3 minutes, 28 seconds + 17.6 seconds = 3 minutes, 45.6 seconds). However, this does not include the additional travel time due to the vehicle delays experienced exiting either at the Vining Mill Subdivision entrance or the Catatoga Subdivision entrance.



As shown in Table 2, the 2026 projected average vehicle delay for northbound left-turns at the Vining Mill Subdivision entrance is 31.7 seconds in the AM peak hour and 18.8 seconds in the PM peak hour. The delay for eastbound right-turns at the Catatoga Subdivision entrance is 18.3 seconds in the AM peak hour and 27.1 seconds in the PM peak hour. Even if an exiting vehicle delay is assumed to be only 15 seconds at the entrances, the overall cut-thru travel time will increase above 4 minutes. This travel time can already be achieved otherwise by driving on Hardin Valley Road and North Campbell Station Road and not cutting thru the subdivisions.

Thus, even after assuming ideal road conditions (30 mph internal vehicle speeds and minimal exiting delays at the entrances), a cut-thru maneuver would not make sense for outside motorists attempting to save travel time, which is the prime goal of cut-thru traffic. Furthermore, the above ideal cut-thru travel time calculation does not consider other impediments that could reduce the potential attractiveness of cut-thru traffic. These impediments include increased travel time due to on-street parking, residents entering and exiting driveways, and pedestrian activity.

APPENDIX

Land Use: 210

Single-Family Detached Housing

Description

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

Specialized Land Use

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

Additional Data

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

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

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

Source Numbers

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

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 174

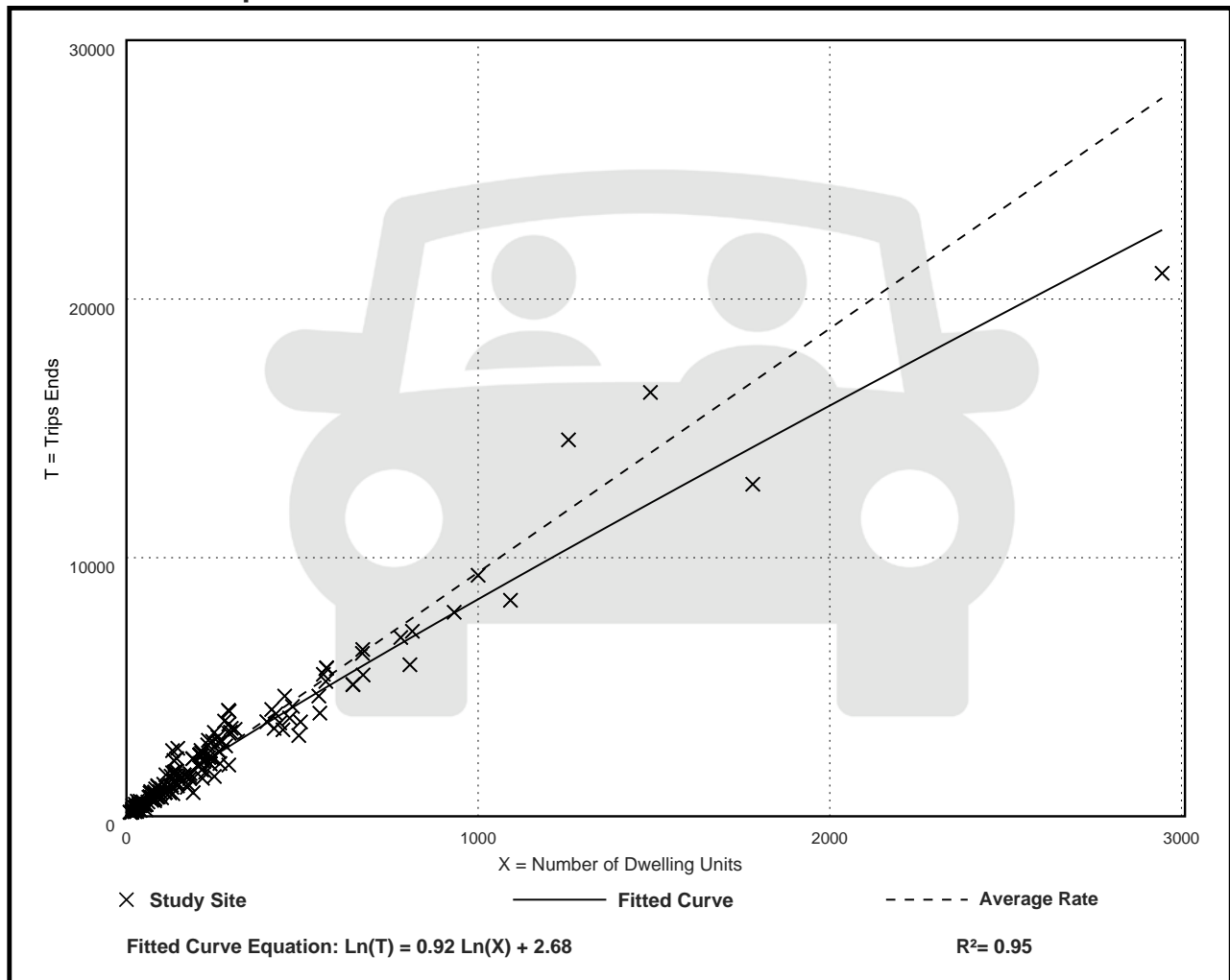
Avg. Num. of Dwelling Units: 246

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 192

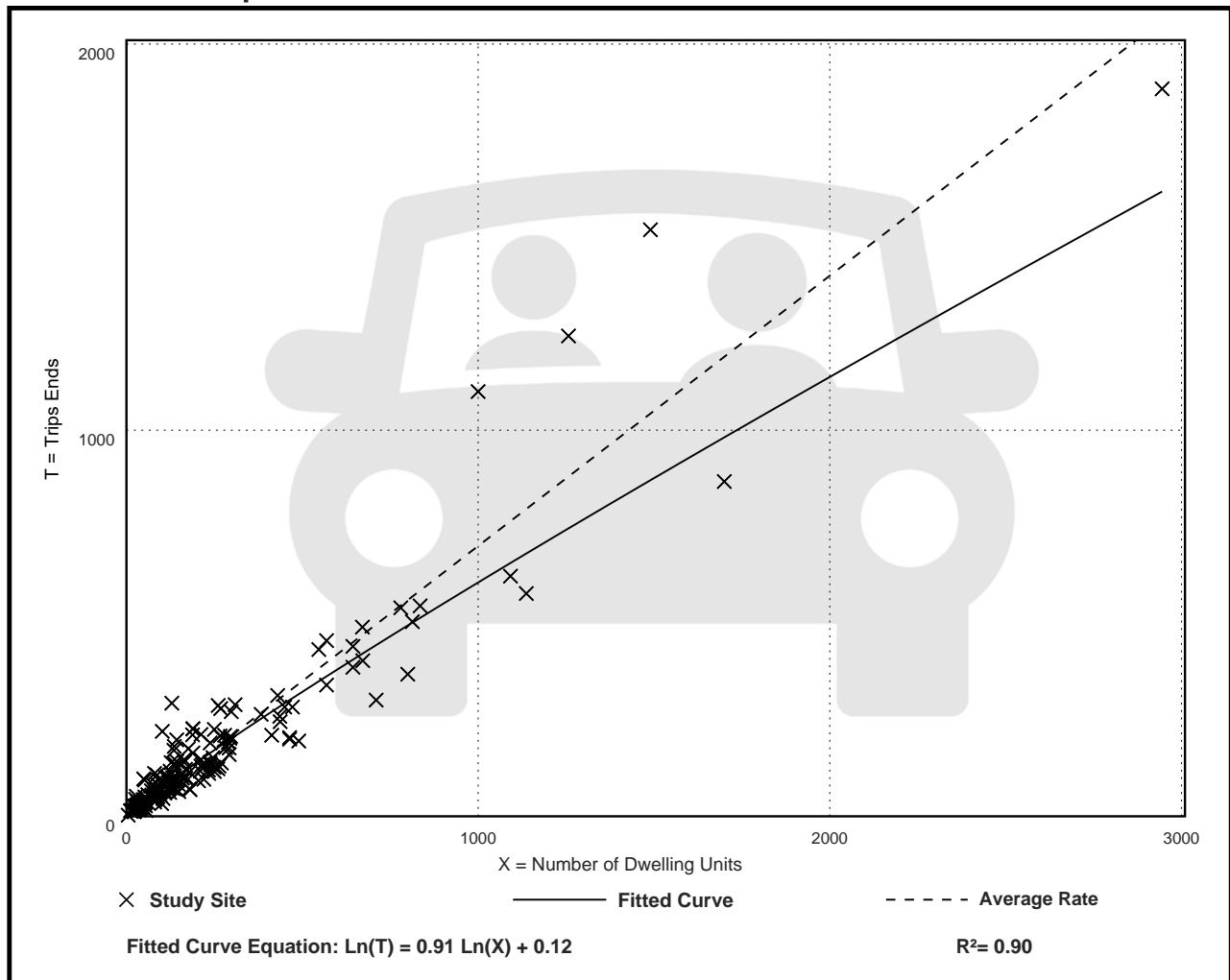
Avg. Num. of Dwelling Units: 226

Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 208

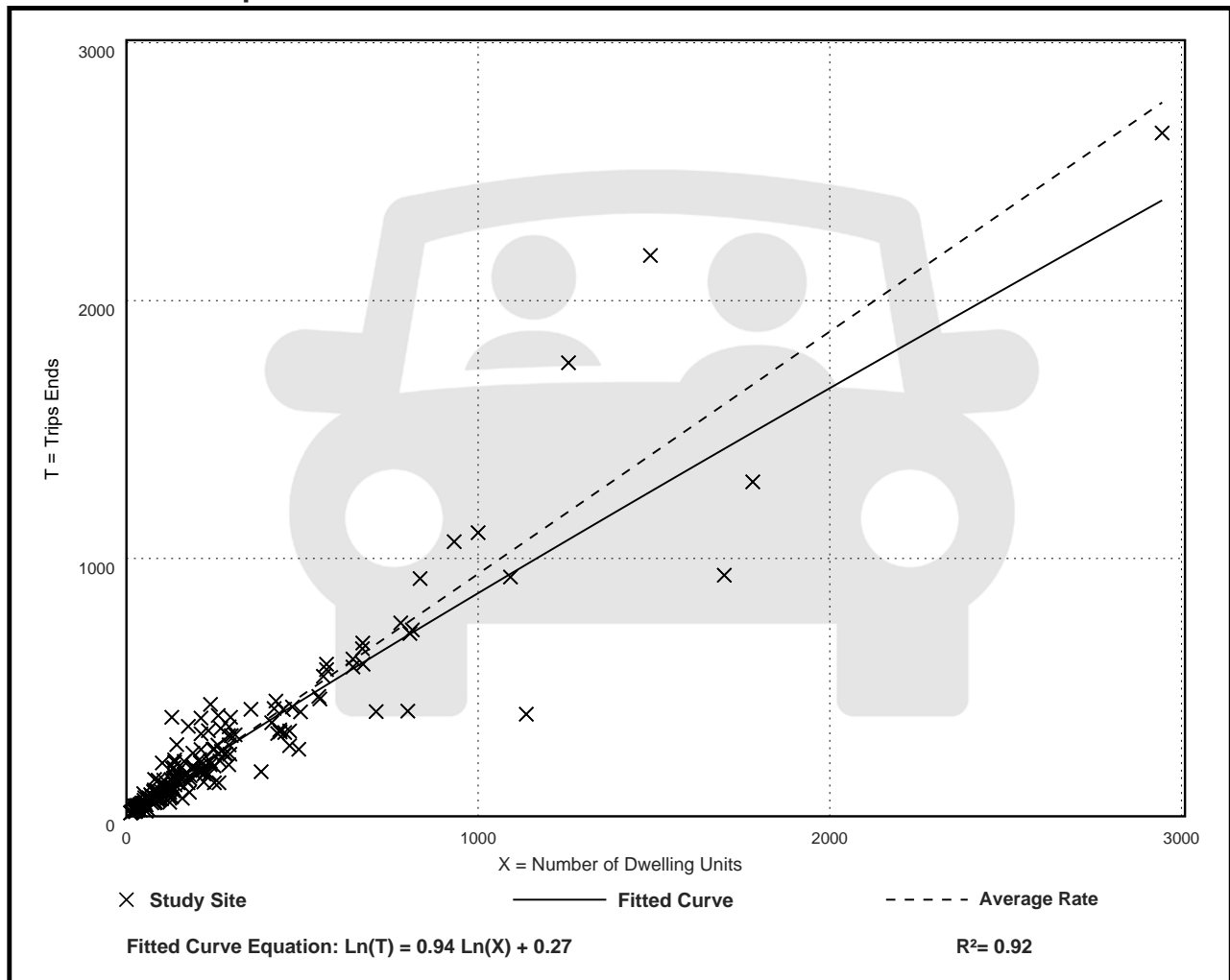
Avg. Num. of Dwelling Units: 248

Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



UPDATED TRIP GENERATION FOR VINING MILL AND CATATOGA SUBDIVISIONS

ITE LAND USE CODE	SUBDIVISION	UNITS	GENERATED DAILY TRAFFIC	GENERATED TRAFFIC AM PEAK HOUR			GENERATED TRAFFIC PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
#210	Vining Mill	177 Houses	1,706	26%	74%		63%	37%	
				32	93	125	107	63	170
#210	Catatoga	158 Houses	1,537	26%	74%		63%	37%	
				29	84	113	96	57	153

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

TRIP GENERATION FOR VINING MILL SUBDIVISION

177 Single-Family Detached Houses

177 Residential Houses = X

Weekday:

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

$$\ln(T) = 0.92 * 5.18 + 2.68$$

$$\ln(T) = 7.44$$

$$T = \underline{\underline{1,706 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 7 and 9 am:

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

$$T = 0.91 * 5 + 0.12$$

$$\ln(T) = 4.83$$

$$T = \underline{\underline{125 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 4 and 6 pm:

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

$$\ln(T) = 0.94 * 5.18 + 0.27$$

$$\ln(T) = 5.14$$

$$T = \underline{\underline{170 \text{ trips}}}$$

TRIP GENERATION FOR CATATOGA SUBDIVISION

158 Single-Family Detached Houses

158 Residential Houses = X

Weekday:

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

$$\ln(T) = 0.92 * 5.06 + 2.68$$

$$\ln(T) = 7.34$$

$$T = \underline{\underline{1,537 \text{ trips}}}$$

Peak Hour of Adjacent Traffic between 7 and 9 am:

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

$$T = 0.91 * 5 + 0.12$$

$$\ln(T) = 4.73$$

$$T = \underline{\underline{113 \text{ trips}}}$$

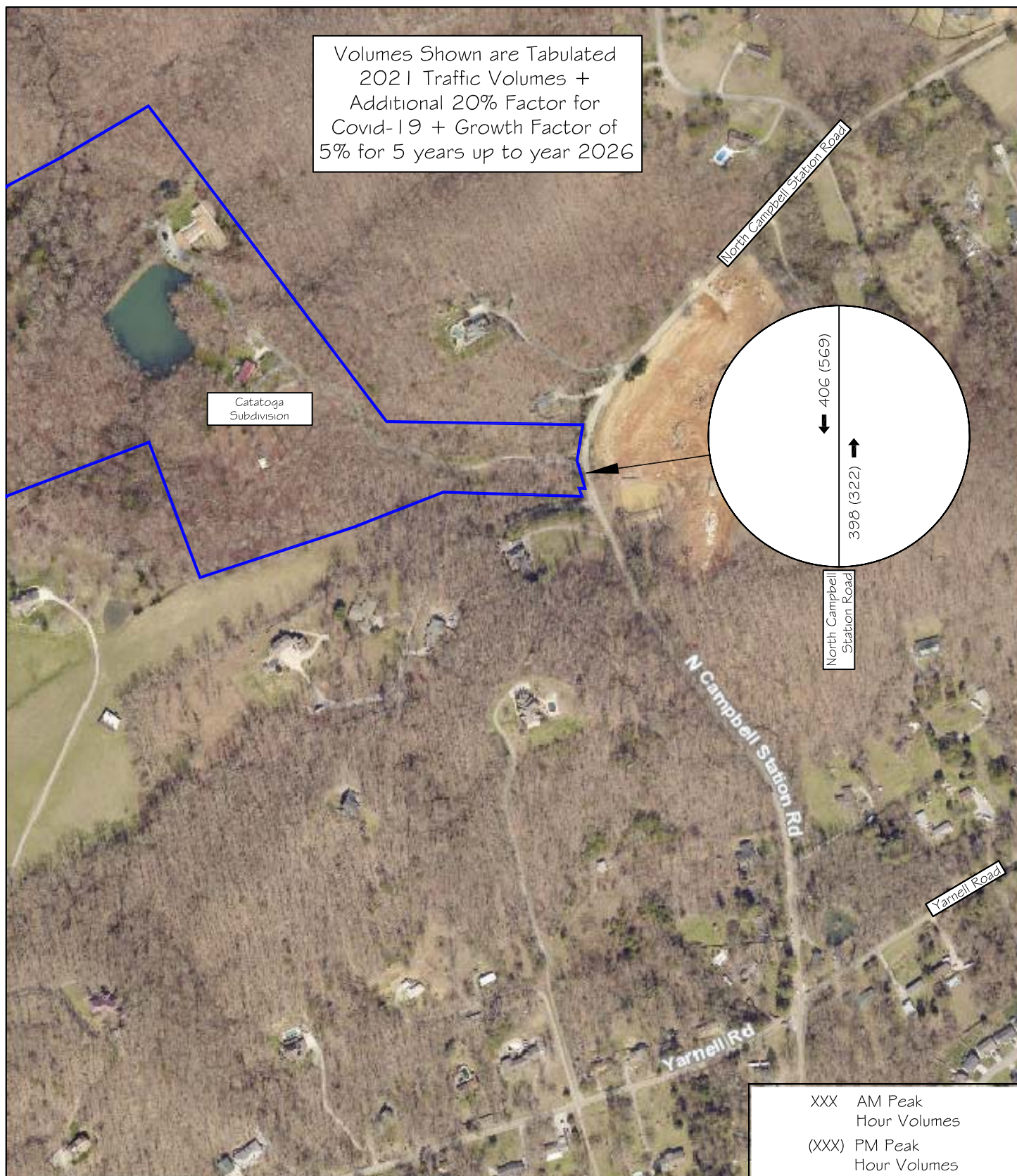
Peak Hour of Adjacent Traffic between 4 and 6 pm:

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

$$\ln(T) = 0.94 * 5.06 + 0.27$$

$$\ln(T) = 5.03$$

$$T = \underline{\underline{153 \text{ trips}}}$$



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

NOT TO SCALE



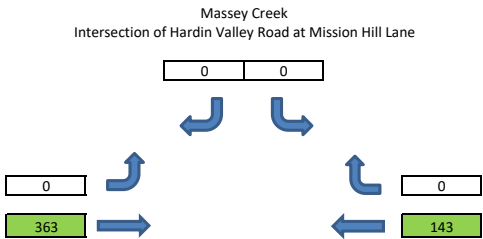
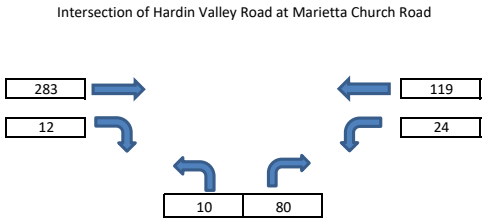
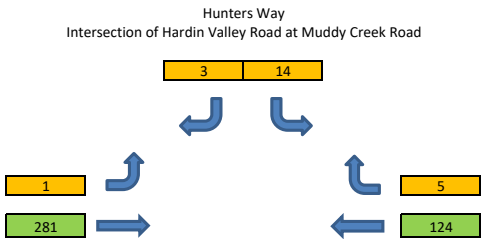
FIGURE 5

Catatoga Subdivision

2026 Peak Hour Traffic Volumes -
OPENING YEAR TRAFFIC (WITHOUT THE
PROJECT)

2016 AM PEAK HOUR

Addition and Subtractions Only
Trip Generation



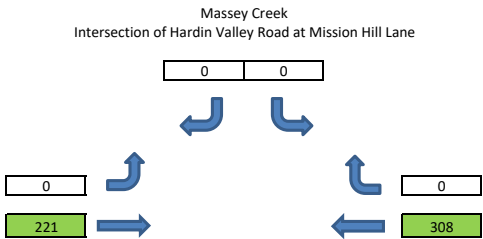
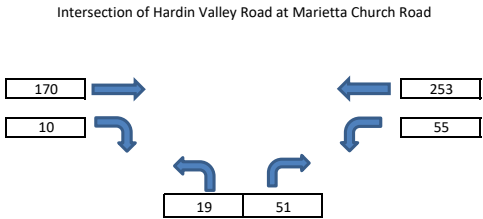
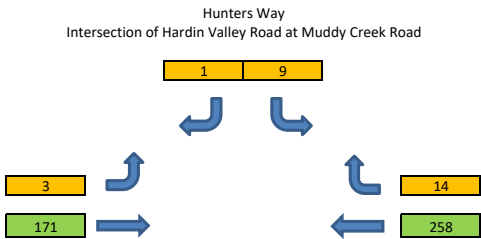
				AM			PM		
				Enter	Exit		Enter	Exit	
#210	Hunters Way (2016)	25 Houses		25%	75%		63%	37%	
				6	17	23	17	10	27

Trip Distribution for
Hunters Way

5% Hickory Creek Road (West)
10% Marietta Church Road (South)
85% Hardin Valley Road (East)

2016 PM PEAK HOUR

Addition and Subtractions Only
Trip Generation



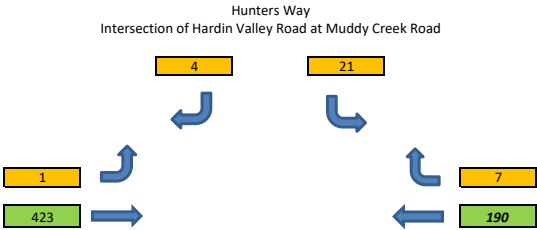
				AM			PM		
				Enter	Exit		Enter	Exit	
#210	Hunters Way (2016)	25 Houses		25%	75%		63%	37%	
				6	17	23	17	10	27

Trip Distribution for
Hunters Way

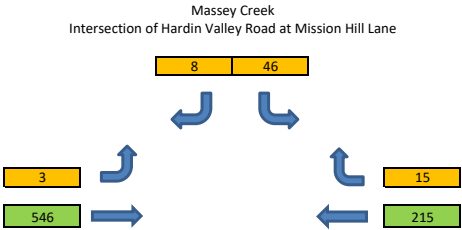
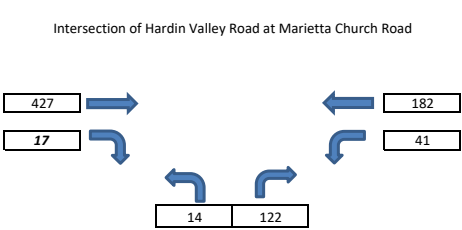
5% Hickory Creek Road (West)
10% Marietta Church Road (South)
85% Hardin Valley Road (East)

2021 AM PEAK HOUR

Addition and Subtractions Only
Trip Generation



* Bold Italic = Hard Coded to Balance



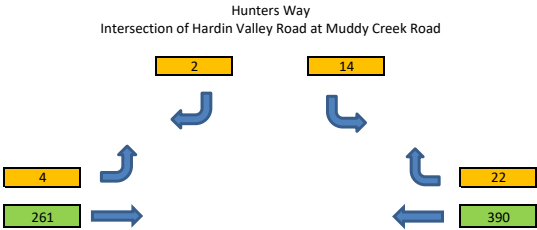
			AM			PM		
			Enter	Exit		Enter	Exit	
#210	Hunters Way (2021)	40 Houses	25%	75%		63%	37%	
			8	25	33	26	16	42
			AM			PM		
			Enter	Exit		Enter	Exit	
#210	Massey Creek (2021)	95 Houses	25%	75%		63%	37%	
			18	54	72	61	36	97
			AM			PM		
			Enter	Exit		Enter	Exit	
#210	Vining Mill (2021)	46 Houses	25%	75%		63%	37%	

Trip Distribution for
Hunters Way
Massey Creek
5% Hickory Creek Road (West)
10% Marietta Church Road (South)
85% Hardin Valley Road (East)

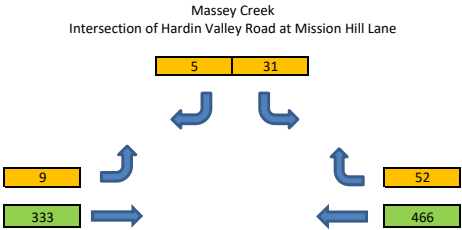
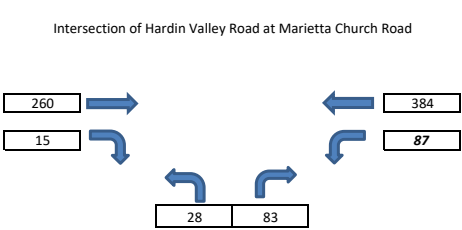
Trip Distribution for
Vining Mill
5% Hickory Creek Road (West)
5% Marietta Church Road (South)
90% Hardin Valley Road (East)

2021 PM PEAK HOUR

Addition and Subtractions Only
Trip Generation



* Bold Italic = Hard Coded to Balance



				AM			PM		
#210	Hunters Way (2021)	40 Houses		Enter	Exit		Enter	Exit	
				25%	75%		63%	37%	
				8	25	33	26	16	42
				AM			PM		
#210	Massey Creek (2021)	95 Houses		Enter	Exit		Enter	Exit	
				25%	75%		63%	37%	
				18	54	72	61	36	97
				AM			PM		
#210	Vining Mill (2021)	46 Houses		Enter	Exit		Enter	Exit	
				25%	75%		63%	37%	

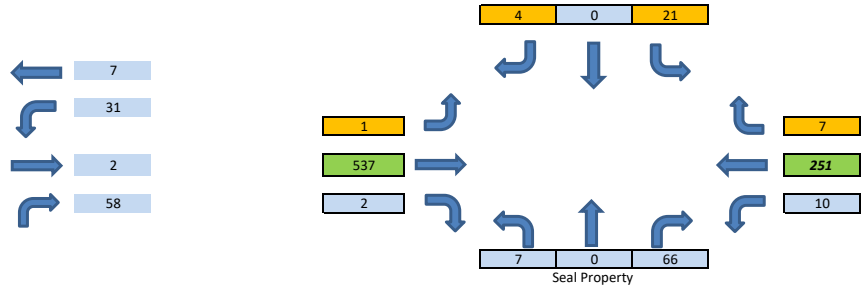
Trip Distribution for
Hunters Way
Massey Creek
5% Hickory Creek Road (West)
10% Marietta Church Road (South)
85% Hardin Valley Road (East)

Trip Distribution for
Vining Mill
5% Hickory Creek Road (West)
5% Marietta Church Road (South)
90% Hardin Valley Road (East)

2023 AM PEAK HOUR

- Addition and Subtractions Only
- Trip Generation
- Trip Generation from Seal Property

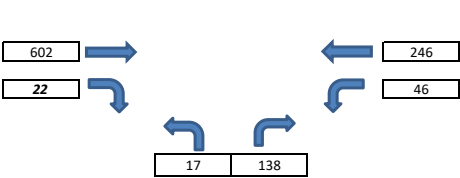
Seal Property at Roundabout



			AM			PM		
#210	Hunters Way (2023)	40 Houses	Enter	Exit		Enter	Exit	
			25%	75%		63%	37%	
			8	25	33	26	16	42
			AM			PM		
#210	Massey Creek (2023)	95 Houses	Enter	Exit		Enter	Exit	
			25%	75%		63%	37%	
			18	54	72	61	36	97
			AM			PM		
#210	Vining Mill (2023)	190 Houses	Enter	Exit		Enter	Exit	
			25%	75%		63%	37%	

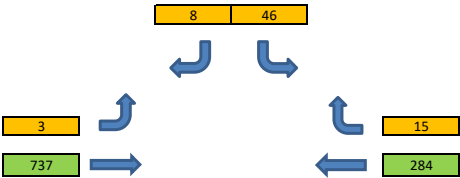
Trip Distribution for Hunters Way Massey Creek	5%	Hickory Creek Road (West)
	10%	Marietta Church Road (South)
	85%	Hardin Valley Road (East)
Trip Distribution for Vining Mill	5%	Hickory Creek Road (West)
	5%	Marietta Church Road (South)
	90%	Hardin Valley Road (East)
Trip Distribution for Seal Property	10%	Hickory Creek Road (West)
	5%	Marietta Church Road (South) - Assumed
	85%	Hardin Valley Road (East)

Intersection of Hardin Valley Road at Marietta Church Road



* Bold Italic = Hard Coded to Balance

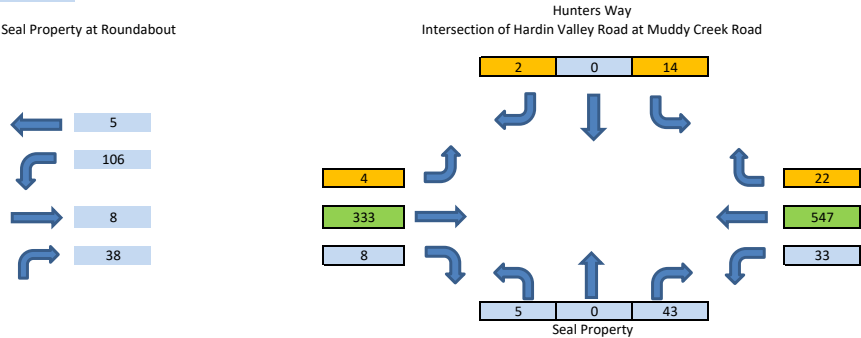
Massey Creek
Intersection of Hardin Valley Road at Mission Hill Lane



2023 PM PEAK HOUR

- Addition and Subtractions Only
- Trip Generation
- Trip Generation from Seal Property

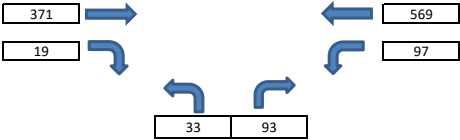
Seal Property at Roundabout



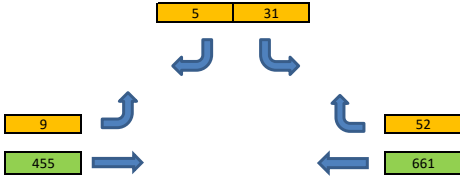
			AM			PM		
#210	Hunters Way (2023)	40 Houses	Enter 25%	Exit 75%		Enter 63%	Exit 37%	
			8	25	33	26	16	42
			AM			PM		
#210	Massey Creek (2023)	95 Houses	Enter 25%	Exit 75%		Enter 63%	Exit 37%	
			18	54	72	61	36	97
			AM			PM		
#210	Vining Mill (2023)	190 Houses	Enter 25%	Exit 75%		Enter 63%	Exit 37%	

Trip Distribution for Hunters Way Massey Creek	5%	Hickory Creek Road (West)
	10%	Marietta Church Road (South)
	85%	Hardin Valley Road (East)
Trip Distribution for Vining Mill	5%	Hickory Creek Road (West)
	5%	Marietta Church Road (South)
	90%	Hardin Valley Road (East)
Trip Distribution for Seal Property	10%	Hickory Creek Road (West)
	5%	Marietta Church Road (South) - Assumed
	85%	Hardin Valley Road (East)

Intersection of Hardin Valley Road at Marietta Church Road



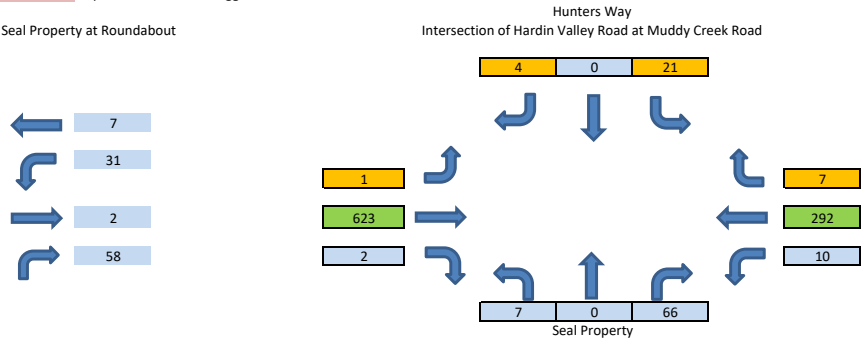
Massey Creek
Intersection of Hardin Valley Road at Mission Hill Lane



2025 AM PEAK HOUR

- Addition and Subtractions Only
- Trip Generation
- Trip Generation from Seal Property
- Trip Generation from Briggs Station

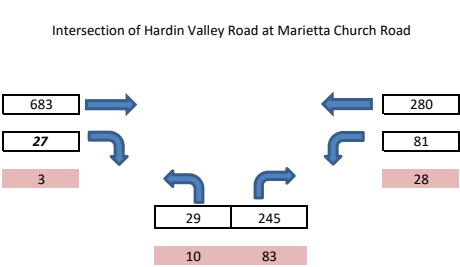
Seal Property at Roundabout



#210	Hunters Way (2025)	40 Houses	AM			PM		
			Enter	Exit		Enter	Exit	
			25%	75%		63%	37%	
			8	25	33	26	16	42
#210	Massey Creek (2025)	95 Houses	AM			PM		
			Enter	Exit		Enter	Exit	
			25%	75%		63%	37%	
			18	54	72	61	36	97
#210	Vining Mill (2025)	190 Houses	AM			PM		
			Enter	Exit		Enter	Exit	
			25%	75%		63%	37%	

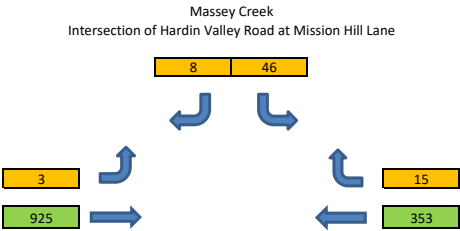
Trip Distribution for Hunters Way Massey Creek	5%	Hickory Creek Road (West)
	10%	Marietta Church Road (South)
	85%	Hardin Valley Road (East)
Trip Distribution for Vining Mill	5%	Hickory Creek Road (West)
	5%	Marietta Church Road (South)
	90%	Hardin Valley Road (East)
Trip Distribution for Seal Property	10%	Hickory Creek Road (West)
	5%	Marietta Church Road (South) - Assumed
	85%	Hardin Valley Road (East)

Intersection of Hardin Valley Road at Marietta Church Road

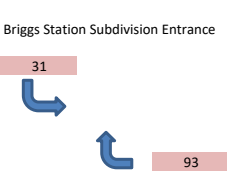


* Bold Italic = Hard Coded to Balance

Massey Creek
Intersection of Hardin Valley Road at Mission Hill Lane



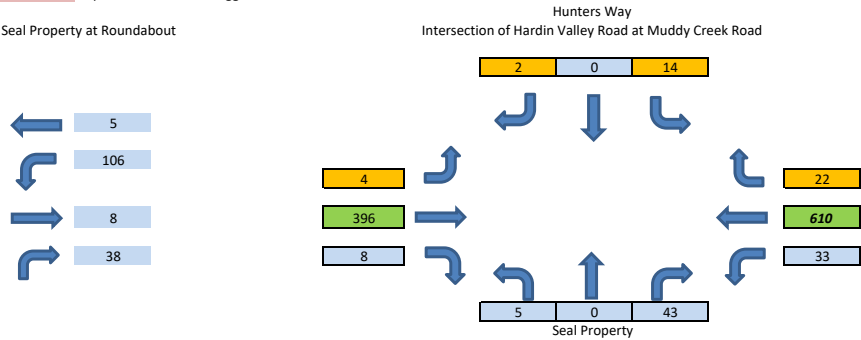
Briggs Station Subdivision Entrance



2025 PM PEAK HOUR

- Addition and Subtractions Only
- Trip Generation
- Trip Generation from Seal Property
- Trip Generation from Briggs Station

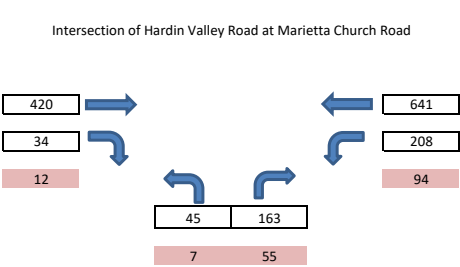
Seal Property at Roundabout



			AM			PM		
			Enter	Exit		Enter	Exit	
#210	Hunters Way (2025)	40 Houses	25%	75%		63%	37%	
			8	25	33	26	16	42
			AM			PM		
			Enter	Exit		Enter	Exit	
#210	Massey Creek (2025)	95 Houses	25%	75%		63%	37%	
			18	54	72	61	36	97
			AM			PM		
			Enter	Exit		Enter	Exit	
#210	Vining Mill (2025)	190 Houses	25%	75%		63%	37%	

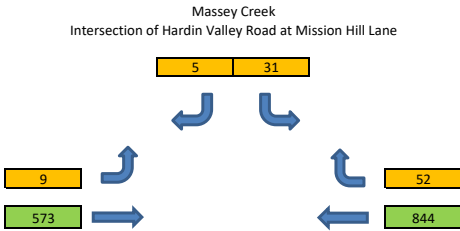
Trip Distribution for Hunters Way Massey Creek	5%	Hickory Creek Road (West)
	10%	Marietta Church Road (South)
	85%	Hardin Valley Road (East)
Trip Distribution for Vining Mill	5%	Hickory Creek Road (West)
	5%	Marietta Church Road (South)
	90%	Hardin Valley Road (East)
Trip Distribution for Seal Property	10%	Hickory Creek Road (West)
	5%	Marietta Church Road (South) - Assumed
	85%	Hardin Valley Road (East)

Intersection of Hardin Valley Road at Marietta Church Road

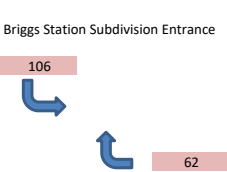


* Bold Italic = Hard Coded to Balance

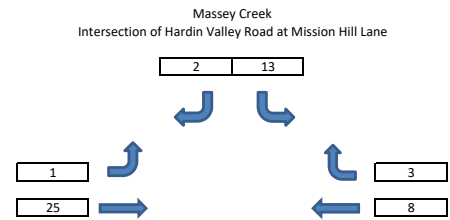
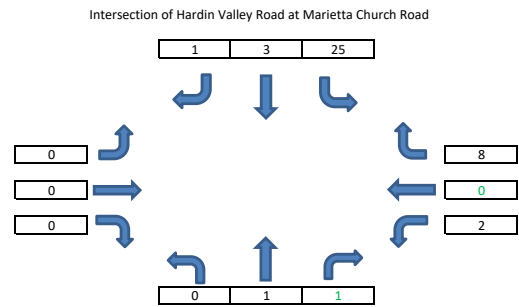
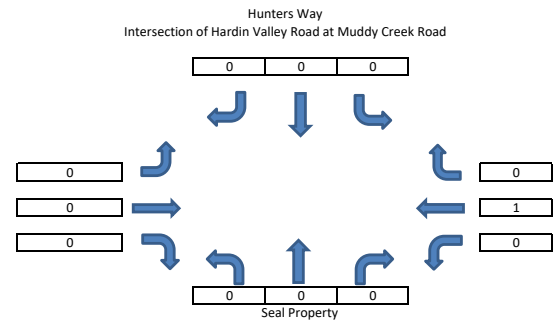
Massey Creek
Intersection of Hardin Valley Road at Mission Hill Lane



Briggs Station Subdivision Entrance



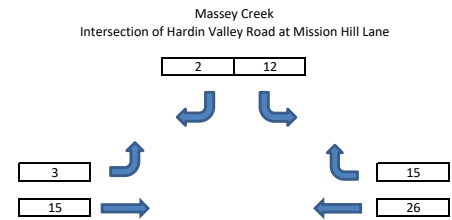
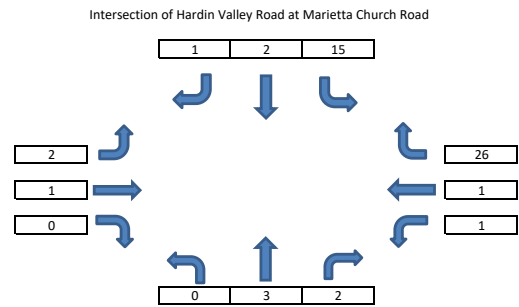
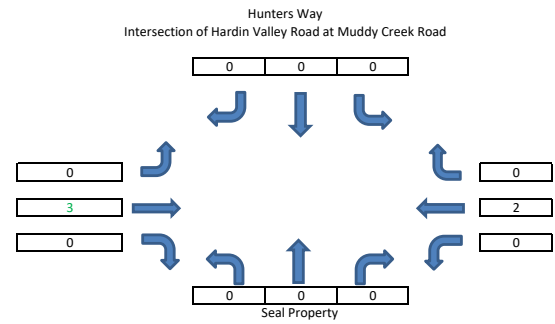
2025 AM PEAK HOUR WITH PROJECT
ASSIGNMENT



			AM		
#210	Hoppe Property (2025)	47 Houses	Enter	Exit	
			25%	75%	
			9	29	38
			AM		
Local Rate	Hoppe Property (2025)	(Red) 33 Townhouses	Enter	Exit	
			22%	78%	
			4	15	19

Trip Distribution for Hoppe Property + S & E Property	5%	Hickory Creek Road (West)
	10%	Marietta Church Road (South)
	85%	Hardin Valley Road (East)

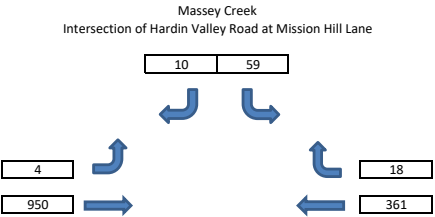
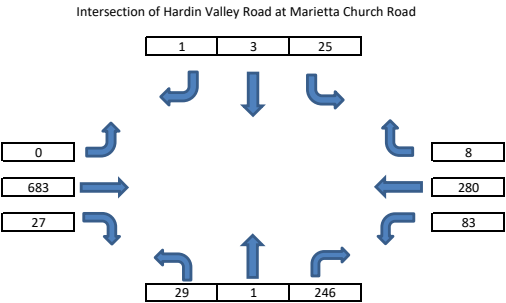
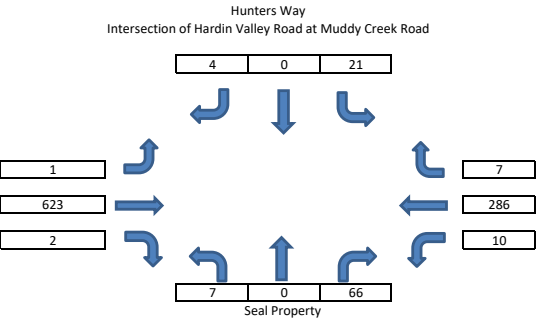
2025 PM PEAK HOUR WITH PROJECT
ASSIGNMENT



			PM		
			Enter	Exit	
#210	Hoppe Property (2025)	47 Houses	63%	37%	
			31	18	49
			PM		
			Enter	Exit	
Local Rate	Hoppe Property (2025)	(Red) 33 Townhouses	55%	45%	
			18	14	32

Trip Distribution for		5%	Hickory Creek Road (West)
Hoppe Property +		10%	Marietta Church Road (South)
S & E Property		85%	Hardin Valley Road (East)

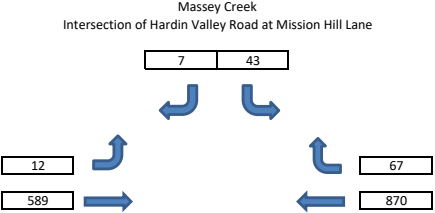
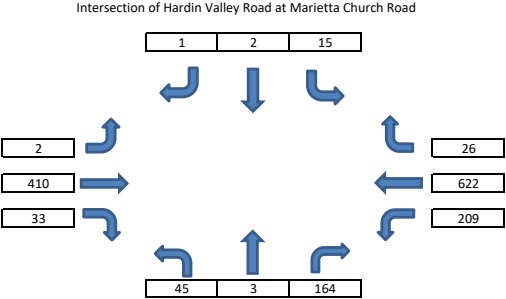
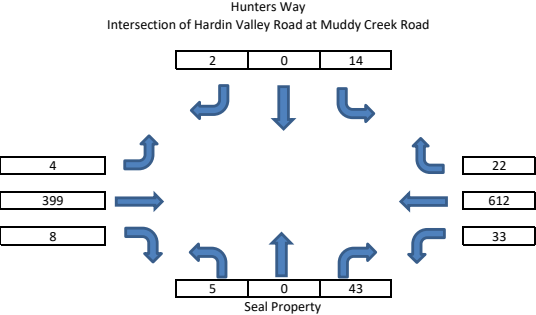
2025 AM PEAK HOUR WITH PROJECT



				AM		
				Enter	Exit	
#210	Hunters Way (2025)	40 Houses		25%	75%	
				8	25	33
				AM		
				Enter	Exit	
#210	Massey Creek (2025)	95 Houses		25%	75%	
				18	54	72
				AM		
				Enter	Exit	
#210	Hoppe Property (2025)	47 Houses		25%	75%	
				9	29	38
				AM		
				Enter	Exit	
Local Rate	Hoppe Property (2025)	(Red) 33 Townhouses		22%	78%	
				4	15	19

Trip Distribution for		5%	Hickory Creek Road (West)
Hoppe Property +		10%	Marietta Church Road (South)
S & E Property		85%	Hardin Valley Road (East)

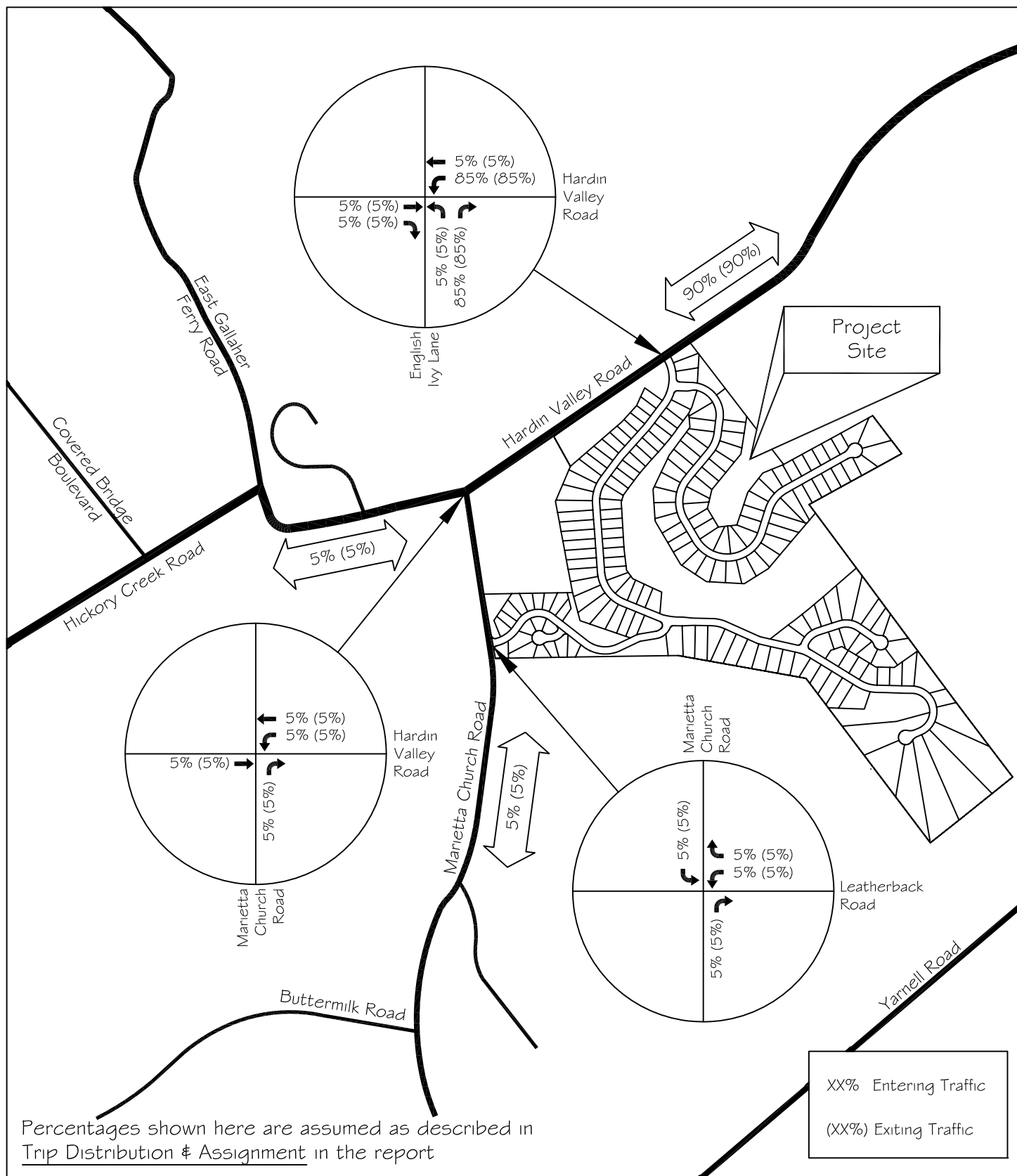
2025 PM PEAK HOUR WITH PROJECT



			PM		
#210	Hunters Way (2025)	40 Houses	Enter	Exit	
			63%	37%	
			26	16	42
			PM		
#210	Massey Creek (2025)	95 Houses	Enter	Exit	
			63%	37%	
			61	36	97
			PM		
#210	Hoppe Property (2025)	47 Houses	Enter	Exit	
			63%	37%	
			31	18	49
			PM		
Local Rate	Hoppe Property (2025)	(Red) 33 Townhouses	Enter	Exit	
			55%	45%	
			18	14	32

Trip Distribution for
Hoppe Property +
S & E Property

5% Hickory Creek Road (West)
10% Marietta Church Road (South)
85% Hardin Valley Road (East)



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

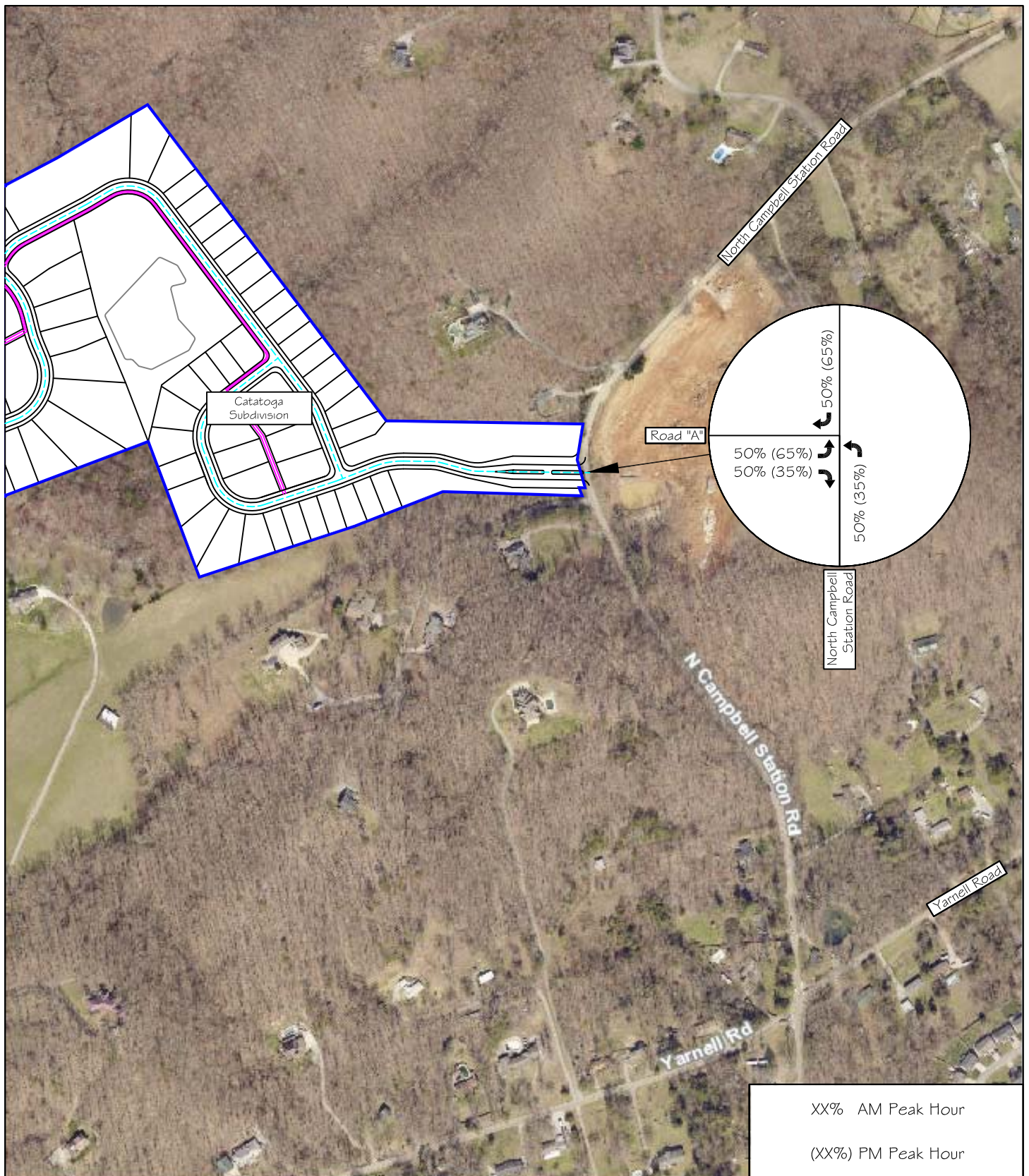
NOT TO SCALE



FIGURE 5

Vining Mill Subdivision

Directional Distribution of
Generated Traffic for Vining Hill



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

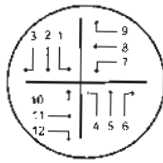
NOT TO SCALE



FIGURE 6

Catatoga Subdivision

Directional Distribution of Generated Traffic during AM and PM Peak Hour



INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: HARDEN VALLEY & CAMPBELL STATION
 DATE: 9/25/2018
 RECORDER: ZHIWAR RASHIO
 NOTES:

LOCATION TIME	Southbound CAMPBELL STATION			Northbound CAMPBELL STATION			Westbound HARDEN VALLEY			Eastbound HARDEN VALLEY		
	L	T	R	L	T	R	L	T	R	L	T	R
6:00-6:15 AM	1			1	1	6	2	6		1	22	1
6:15-6:30						6	4	13			31	2
6:30-6:45			1	1	3	37	5	15	1	2	53	2
6:45-7:00	1		1			48	15	18		3	71	2
7:00-7:15	3	1	1		2	66	34	25		3	99	3
7:15-7:30	4	6	3	5	3	101	46	40	1	3	121	1
7:30-7:45	1	2	3	1	2	60	90	38		3	86	6
7:45-8:00	2	2	1	2	1	74	71	41			84	4
8:00-8:15			1	1	1	95	65	33		4	78	9
8:15-8:30		2	4	4		63	60	30		1	84	8
8:30-8:45	1	4	1	3	1	54	21	25	1	4	60	4
8:45-9:00	1	1	3	2	1	82	23	27		3	82	5
9:00-9:15												
9:15-9:30												
9:30-9:45												
9:45-10:00												
10:00-10:15												
10:15-10:30												
10:30-10:45												
10:45-11:00												
11:00-11:15												
11:15-11:30												
11:30-11:45												
11:45-12:00 PM												
12:00-12:15												
12:15-12:30												
12:30-12:45												
12:45-1:00												
1:00-1:15												
1:15-1:30												
1:30-1:45												
1:45-2:00												
2:00-2:15	1	4	1	2	2	29	79	53		6	34	1
2:15-2:30	2	4	2	3	4	38	40	29	1	4	40	1
2:30-2:45	2	2	5	2	5	42	26	32		3	33	2
2:45-3:00	5	1	3	3	2	65	57	53	1	3	58	4
3:00-3:15		4	4	4	4	35	47	42		1	44	2
3:15-3:30		2	2	7	7	53	44	44		1	46	4
3:30-3:45	2	2	6	3	6	42	100	59	1	6	60	2
3:45-4:00	2	10	14	2	5	35	103	90	1	7	28	2
4:00-4:15	2	4	7	4	3	30	49	65	1	3	44	3
4:15-4:30	2	3	6	3	5	34	35	57	2	7	42	3
4:30-4:45		2	8	2	9	39	37	80	1	2	59	5
4:45-5:00	2	2	12	5	7	55	44	65	2	4	43	2
5:00-5:15	1	5	8	5	3	69	67	76	1	3	67	4
5:15-5:30	1	5	7	5	6	61	73	76	2	3	77	1
5:30-5:45	1	2	8	5	6	51	51	71	2	5	70	7
5:45-6:00	3	2	8	5	5	68	45	60	1	3	61	3
6:00-6:15												
6:15-6:30												
6:30-6:45												
6:45-7:00												
7:00-7:15												
7:15-7:30												
7:30-7:45												
7:45-8:00												
8:00-8:15												
8:15-8:30												
8:30-8:45												
8:45-9:00												
9:00-9:15												
9:15-9:30												
9:30-9:45												
9:45-10:00 PM												
TOTAL	40	72	120	80	94	1,439	1,333	1,263	19	88	1,677	93
AM PK HR	7	10	8	9	7	330	272	152	1	10	369	20
MD PK HR	5	10	8	7	11	109	145	114	1	13	107	4
PM PK HR	6	14	31	20	20	249	236	283	6	14	275	15

376
572
850
1,022
1,145
1,195
1,117
1,004
952
665
409
230

212
380
534
789
765
807
942
986
1,013
1,002
957
901
995
1,113
1,148
1,169
860
543
264

7:15 AM - 8:15 AM
 5:00 PM - 6:00 PM

↓ ↑ ← →
 2.6% 2% 95.4% | 346 2.5% 92.5% 5% AM | 399
 7% 7% 86% | 289 4.6% 90.4% 5% PM | 304
 ↙ ↑ ↘ ↗ ↘

HCM 2010 TWSC
5: English Ivy Road & Hardin Valley Road

11/4/2021

Intersection						
Int Delay, s/veh	1.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1009	3	26	379	9	74
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	-2	-2	-
Peak Hour Factor	83	90	90	83	90	90
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	1216	3	29	457	10	82
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1219	0	1731	1217
Stage 1	-	-	-	-	1217	-
Stage 2	-	-	-	-	514	-
Critical Hdwy	-	-	4.1	-	6	6
Critical Hdwy Stg 1	-	-	-	-	5	-
Critical Hdwy Stg 2	-	-	-	-	5	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	579	-	119	238
Stage 1	-	-	-	-	324	-
Stage 2	-	-	-	-	640	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	579	-	113	238
Mov Cap-2 Maneuver	-	-	-	-	113	-
Stage 1	-	-	-	-	324	-
Stage 2	-	-	-	-	608	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.7		34.2	
HCM LOS					D	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	213	-	-	579	-	
HCM Lane V/C Ratio	0.433	-	-	0.05	-	
HCM Control Delay (s)	34.2	-	-	11.5	-	
HCM Lane LOS	D	-	-	B	-	
HCM 95th %tile Q(veh)	2	-	-	0.2	-	

HCM 2010 TWSC
5: English Ivy Road & Hardin Valley Road

11/4/2021

Intersection						
Int Delay, s/veh	1.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	632	9	86	937	6	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	2	-	-	-2	-2	-
Peak Hour Factor	92	90	90	88	90	90
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	687	10	96	1065	7	56
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	697	0	1948	692
Stage 1	-	-	-	-	692	-
Stage 2	-	-	-	-	1256	-
Critical Hdwy	-	-	4.1	-	6	6
Critical Hdwy Stg 1	-	-	-	-	5	-
Critical Hdwy Stg 2	-	-	-	-	5	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	909	-	89	465
Stage 1	-	-	-	-	540	-
Stage 2	-	-	-	-	311	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	909	-	80	465
Mov Cap-2 Maneuver	-	-	-	-	80	-
Stage 1	-	-	-	-	540	-
Stage 2	-	-	-	-	278	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.8		19.7	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	307	-	-	909	-	
HCM Lane V/C Ratio	0.203	-	-	0.105	-	
HCM Control Delay (s)	19.7	-	-	9.4	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q(veh)	0.7	-	-	0.4	-	

Intersection

Int Delay, s/veh 1.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	42	52	18	398	406	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	5	-5	-
Peak Hour Factor	90	90	90	88	79	90
Heavy Vehicles, %	0	0	0	2	2	0
Mvmt Flow	47	58	20	452	514	16

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1006	514	0
Stage 1	514	-	-
Stage 2	492	-	-
Critical Hdwy	6.4	6.2	4.1
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	2.2
Pot Cap-1 Maneuver	270	564	1062
Stage 1	605	-	-
Stage 2	619	-	-
Platoon blocked, %			-
Mov Cap-1 Maneuver	265	564	1062
Mov Cap-2 Maneuver	265	-	-
Stage 1	605	-	-
Stage 2	607	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.3	0.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1062	-	375	-	-
HCM Lane V/C Ratio	0.019	-	0.279	-	-
HCM Control Delay (s)	8.5	-	18.3	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.1	-	-

Intersection

Int Delay, s/veh 1.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	37	27	46	322	569	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	5	-5	-
Peak Hour Factor	90	90	90	79	75	90
Heavy Vehicles, %	0	0	0	2	2	0
Mvmt Flow	41	30	51	408	759	69

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1269	759	0
Stage 1	759	-	-
Stage 2	510	-	-
Critical Hdwy	6.4	6.2	4.1
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	2.2
Pot Cap-1 Maneuver	188	410	862
Stage 1	466	-	-
Stage 2	607	-	-
Platoon blocked, %			-
Mov Cap-1 Maneuver	177	410	862
Mov Cap-2 Maneuver	177	-	-
Stage 1	466	-	-
Stage 2	571	-	-

Approach	EB	NB	SB
HCM Control Delay, s	27.1	1.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	862	-	233	-	-
HCM Lane V/C Ratio	0.059	-	0.305	-	-
HCM Control Delay (s)	9.4	-	27.1	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0.2	-	1.2	-	-

TABLE 6A

**LEFT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 46 TO 55 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	200	140	100	75	60	50
150 - 199	175	120	85	65	55	45
200 - 249	150	100	75	60	50	40
250 - 299	130	85	65	55	45	35
300 - 349	110	75	60	50	40	30
350 - 399	95	65	55	45	35	25
400 - 449	80	60	50	40	30	25
450 - 499	70	55	45	35	25	20
500 - 549	60	50	40	30	25	20
550 - 599	50	45	35	25	20	20
600 - 649	45	40	30	25	20	20
650 - 699	40	35	30	20	20	20
700 - 749	35	35	25	20	20	15
750 or More	35	35	25	20	15	15

1009 + 3 = 1012

379

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	=/ > 600
100 - 149	50	45	40	35	30	25
150 - 199	45	40	35	30	30	25
200 - 249	40	35	30	25	25	20
250 - 299	35	35	30	25	25	20
300 - 349	30	<div style="border: 1px solid green; border-radius: 15px; padding: 10px; text-align: center;"> Hardin Valley Road at English Ivy Lane 2026 Projected AM WB Left Turns = 26 Turn Lane Warranted </div>		25	20	20
350 - 399	25			20	20	15
400 - 449	25			20	20	15
450 - 499	20			20	20	15
500 - 549	20			20	15	15
550 - 599	20			15	15	15
600 - 649	20			15	15	15
650 - 699	20	15	15	15	15	15
700 - 749	15	15	15	15	15	15
750 or More	15	15	15	15	15	15

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

TABLE 6B

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

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

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	1009 + / > 600
3 Fewer Than 25 25 - 49 50 - 99						Yes Yes
100 - 149 150 - 199	Yes	Yes 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

Hardin Valley Road at English Ivy Lane
2026 Projected AM EB Right Turns = 3
Turn Lane NOT Warranted

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

TABLE 6A

**LEFT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 46 TO 55 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	200	140	100	75	60	50
150 - 199	175	120	85	65	55	45
200 - 249	150	100	75	60	50	40
250 - 299	130	85	65	55	45	35
300 - 349	110	75	60	50	40	30
350 - 399	95	65	55	45	35	25
400 - 449	80	60	50	40	30	25
450 - 499	70	55	45	35	25	20
500 - 549	60	50	40	30	25	20
550 - 599	50	45	35	25	20	20
600 - 649	45	40	30	25	20	20
650 - 699	40	35	30	20	20	20
700 - 749	35	35	25	20	20	15
750 or More	35	35	25	20	15	15

632 + 9 = 641

937

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	=/ > 600
100 - 149	50	45	40	35	30	25
150 - 199	45	40	35	30	30	25
200 - 249	40	Hardin Valley Road at English Ivy Lane 2026 Projected PM WB Left Turns = 86 Turn Lane Warranted	30	25	25	20
250 - 299	35		30	25	25	20
300 - 349	30		25	25	20	20
350 - 399	25		25	20	20	20
400 - 449	25		20	20	20	15
450 - 499	20		20	20	20	15
500 - 549	20		20	20	15	15
550 - 599	20		20	15	15	15
600 - 649	20		15	15	15	15
650 - 699	20		15	15	15	15
700 - 749	15		15	15	15	15
750 or More	15		15	15	15	15

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

TABLE 6B

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

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

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	632 + / > 600
9 Fewer Than 25 25 - 49 50 - 99						Yes Yes
100 - 149 150 - 199	Yes	Yes 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

Hardin Valley Road at
English Ivy Lane

2026 Projected PM
EB Right Turns = 9

Turn Lane NOT
Warranted

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

TABLE 5A

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

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

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

$$406 + 14 = 420$$

398

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

North Campbell
Station Road at
Road "A"

2026 Projected AM
NB Left Turns = 18

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**

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
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

406

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

North Campbell
Station Road at
Road "A"

2026 Projected AM
SB Right Turns = 14

Turn Lane NOT
Warranted

* 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)

569 + 62 = 631
322

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

North Campbell
Station Road at
Road "A"

2026 Projected PM
NB Left Turns = 46

Turn Lane
Warranted

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

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

TABLE 5B

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

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

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

Queuing and Blocking Report
Vining Mill-Catatoga Road Connection

11/4/2021

Intersection: 5: English Ivy Road & Hardin Valley Road

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	51	120
Average Queue (ft)	16	45
95th Queue (ft)	42	87
Link Distance (ft)		200
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	100	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
Vining Mill - Catatoga Road Connection

11/4/2021

Intersection: 5: English Ivy Road & Hardin Valley Road

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	60	68
Average Queue (ft)	27	29
95th Queue (ft)	51	56
Link Distance (ft)	200	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	100	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
Vining Mill - Catatoga Road Connection

11/1/2021

Intersection: 2: North Campbell Station Road & Catatoga Subdivision Road "A"

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	70	34
Average Queue (ft)	32	7
95th Queue (ft)	58	28
Link Distance (ft)	389	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		50
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Queuing and Blocking Report
Vining Mill - Catatoga Road Connection

11/1/2021

Intersection: 2: North Campbell Station Road & Catatoga Subdivision Road "A"

Movement	EB	NB	NB	SB
Directions Served	LR	L	T	R
Maximum Queue (ft)	63	46	9	4
Average Queue (ft)	26	18	0	0
95th Queue (ft)	52	45	9	3
Link Distance (ft)	389		349	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		50		50
Storage Blk Time (%)		0		
Queuing Penalty (veh)		1		

Iteration for Determination of Turn Lane Thresholds

N. Campbell Station Road							NB Opposing Volumes	Lt. Turn Lane	RT Turn Lane
Year	Houses	Generated Trips	NB Volume	SB Volume	NB Left Turns (Enter)	SB Right Turns (Enter)	(Heading SB)	Warranted?	Warranted?
2021	0	0	214	378	0	0	378	NO	NO
2022	32	19	236	416	7	12	429	NO	NO
2023	63	38	257	454	13	25	479	NO	NO
2024	95	58	279	493	20	37	530	NO	NO
2025	126	77	300	531	27	50	581	NO	YES
2026	158	96	322	569	34	62	631	YES	YES
Rates/Year:	31.6	19.2			6.72	12.48			
5 Year Change:			108	191					

N. Campbell Station Road							NB Opposing Volumes	Lt. Turn Lane
Year	Houses	Generated Trips	NB Volume	SB Volume	NB Left Turns (Enter)	SB Right Turns (Enter)	(Heading SB)	Warranted?
2025	126	77	300	531	27	50	581	NO
	134	83	305	541	29	54	595	NO
	136	84	307	543	29	55	598	NO
	138	85	308	545	30	55	600	YES
	142	87	311	550	30	57	607	YES
2026	158	96	322	569	34	62	631	YES



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

November 15, 2021

PROJECT NAME: Vining Mill-Catatoga Proposed Road Connection TIL

TO: Knoxville-Knox County Planning

**SUBJECT: TIL Comment Response Document for Vining Mill-Catatoga Proposed Road Connection
Review Comments dated November 12, 2021**

Dear Knoxville-Knox County Planning Staff:

The following comment response document is submitted to address comments from an email from Mike Conger, PE, dated November 12, 2021. This letter is added to the end of the revised report in the Appendix.

- 1. On Page 6, include that the projected 2026 volumes from the April 2021 TIS are 2021 volumes plus a 20% COVID Factor and 5% growth for 5 years.**

Response: On Page 6, this comment has been added to the discussion in the 2nd paragraph.

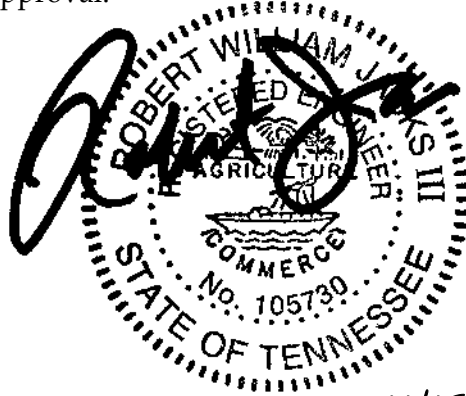
In addition to the requested revisions listed above, other changes in the report include the following:

- Updated Title Page
- Updated Letter Opening of TIL
- Updated Page Headers
- All pages have been updated past Page 6 due to the comment added in the 2nd paragraph on Page 6
- Added this response letter to the Appendix

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.



11/15/2021

Ajax Engineering, LLC
11812 Black Road
Knoxville, TN 37932
ajaxengineering@gmail.com
© 2021 Ajax Engineering, LLC

