

Poplar Farms Subdivision Transportation Impact Analysis

Located in
Knox County, Tennessee

Prepared For:

Home Development Incorporated

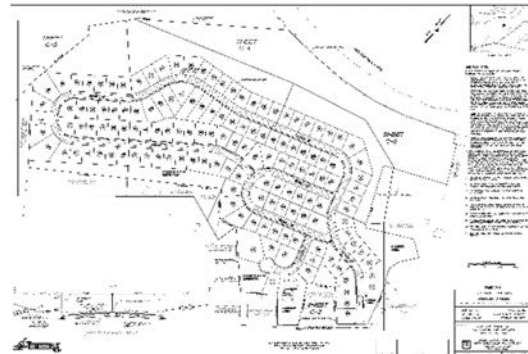
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Poplar Farms Subdivision Transportation Impact Analysis

Knox County, Tennessee

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This Traffic Impact Analysis
supercedes the previously sealed Analysis on
March 27, 2023

John Mark Teague, P.E.

March 30, 2023

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LIST OF ABBREVIATIONS

AADT	Annual average daily traffic
ADT	Average Daily Traffic
AM	Morning peak period
ARMs	Access and Roadside Management Standards
CBD	Central Business District
CIP	Capital Improvement Program
DOT	Department of Transportation
Driveway Manual	Policy on Street and Drive Access to North Carolina Highways
FAI	Functional Area of the Intersection:
FC	Functional Classification
ft. or ‘	Foot
HCM	Highway Capacity Manual
in. or ”	Inch
KSF	Thousand Square Feet
LOS	Level of Service
LUC	Land Use Code
MUTCD	Manual On Uniform Traffic Control Devices
NCDOT	The North Carolina Department of Transportation
PHF	Peak Hour Factor (a measure of traffic variability)
PM	Afternoon peak period
q	Flow rate (vehicle/hour)
Q	Queue Length in feet
Q95	95th Percentile Queue in feet
RIRO	Right-in/Right-out
SCDOT	The South Carolina Department of Transportation
sec.	Second
SimTraffic	A traffic simulation extension of the Synchro Package that randomly simulates intersection operations
STIP	State Transportation Improvement Program
Subdivision Roads	Subdivision Roads Minimum Construction Standards (NCDOT)
SYNCHRO	A dedicated analysis package that implements the HCM
T	Trips
TDOT	The Tennessee Department of Transportation
TWLTL	Two-way Left Turn Lane
v/c	Volume over capacity ratio

INTRODUCTION

Home Development Incorporated proposes to build a one hundred forty-two (142) unit single-family development on the undeveloped property in Knox County adjacent to West Emory Road. The Poplar Farms community is expected to generate a total of 1,393 trips per day, with 102 morning trips and 138 evening trips. The number of trips produced triggers Knoxville-Knox County Plannings Traffic Impact Requirements. This report summarizes the findings of the Transportation Impact Analysis (TIA) performed for the proposed Poplar Farms Development. The site consists of 2 parcels which add together to approximately 69 acres located in Knox County, Tennessee. The developer wishes to develop a 50-acre single-family home subdivision from the two parcels. Figure 1 shows the location of the site.



Figure 1: Poplar Farms Development Site

A copy of the TIA scoping form is included in Appendix A.

PROJECT DESCRIPTION

Figure 2 is the site plan for the Poplar Farms Development. Poplar Farms is proposed to be one hundred forty-two (142) unit single-family community (see Figure 2) on approximately 50 acres of vacant land off West Emory Road in the unincorporated portion of Knox County, Tennessee. The site is northeast of the intersection of Oak Ridge Highway (SR 62) and West Emory Road and will have 1 access point on West Emory Road.

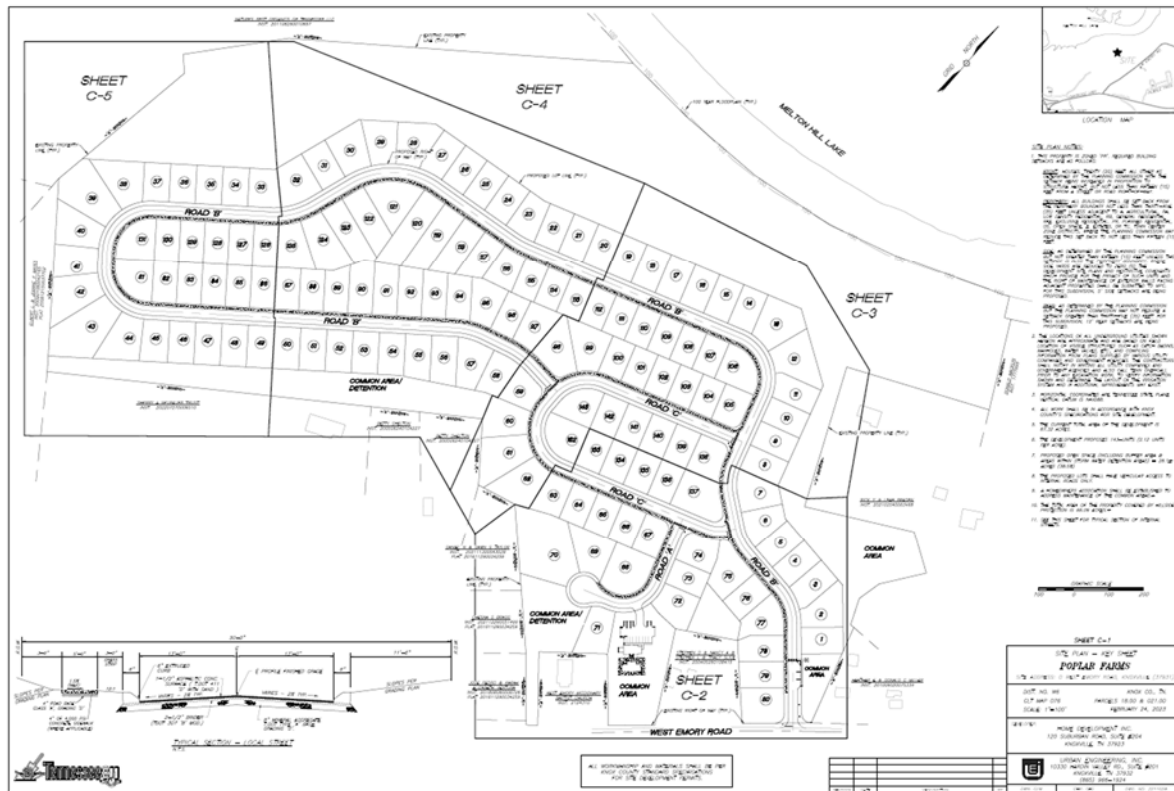


Figure 2: Site Plan – Poplar Farms Subdivision (Source: Urban Engineering Inc.)

Project Schedule and Stages

Home Development Inc. anticipates completing construction in 2025. There is only one project phase. No follow-on construction is expected.

Agency Coordination

In preparing this report, J. M. Teague Engineering and Planning coordinated with Home Development Incorporated and Knoxville-Knox County Planning to ensure that the report meets Knoxville-Knox County Planning requirements.

Section 2 of the Knoxville-Knox County Planning Commission Transportation Impact Analysis Guidelines lists the following condition under which a Transportation Impact Analysis is required:

“All applications are subject to review to determine if a transportation impact analysis will be required. The requirement for a transportation impact analysis is primarily driven by the expected number of motor-vehicle trips, i.e., “traffic”, that will be generated by a proposed development in a 24-hour period with a specific minimum threshold of 750 generated trips. There may be other special circumstances related to factors including, but not limited to, the location of the development, current traffic patterns, safety-related issues or previous development on the property that warrant an analysis of transportation impacts. The volume of expected traffic also affects the level of analysis that is required, with higher volumes of traffic necessitating greater study scopes

and detail. For more information on the thresholds and levels of a transportation impact analysis, go to Section 3 – Types and Levels of Transportation Analysis.”

The scoping form prepared by Knoxville-Knox County Planning is included in Appendix A of this report.

Per Knoxville-Knox County Requirements Traffic Impact Letter (TIL) was prepared for this site at the rezoning stage. The TIL dated November 23, 2022 found that the proposed Poplar Farms Road residential subdivision “. . . will cause no significant deterioration of Oak Ridge Highway, West Emory Road, or Karns Valley Drive.”. A copy of the TIL is included in Appendix A.

Deviations from the Approved Scope

Home Development incorporated made two changes to the site plan that are considered deviations from the approved scope:

- The number of proposed dwelling units decreased from 161 to 142, and
- The number of access points on West Emory Road was reduced from two to one.

Both deviations are accounted for in this TIA.

Analysis Requirements

Based upon the scoping form, the analysis uses a two (2.0) percent annual growth rate with a design (build-out) year of 2025.

Growth Rate

Figure 3, below, shows the historic traffic growth trends at three of TDOT’s traffic count stations in the Karns area. The historic record at each station covers four (4) years. However, only some count stations are counted each year, so there are gaps in the information. A straight-line trend and a second-order polynomial (parabola) trend were considered for each count station. In each case, polynomials produced a better fit for the data. For each count station, the AADT is shown with a unique marker. The trend line at each station is shown with a unique line type and color.

In consultation with Knoxville-Knox County Planning, a two (2.0) percent per year growth rate was selected for use in this TIA.

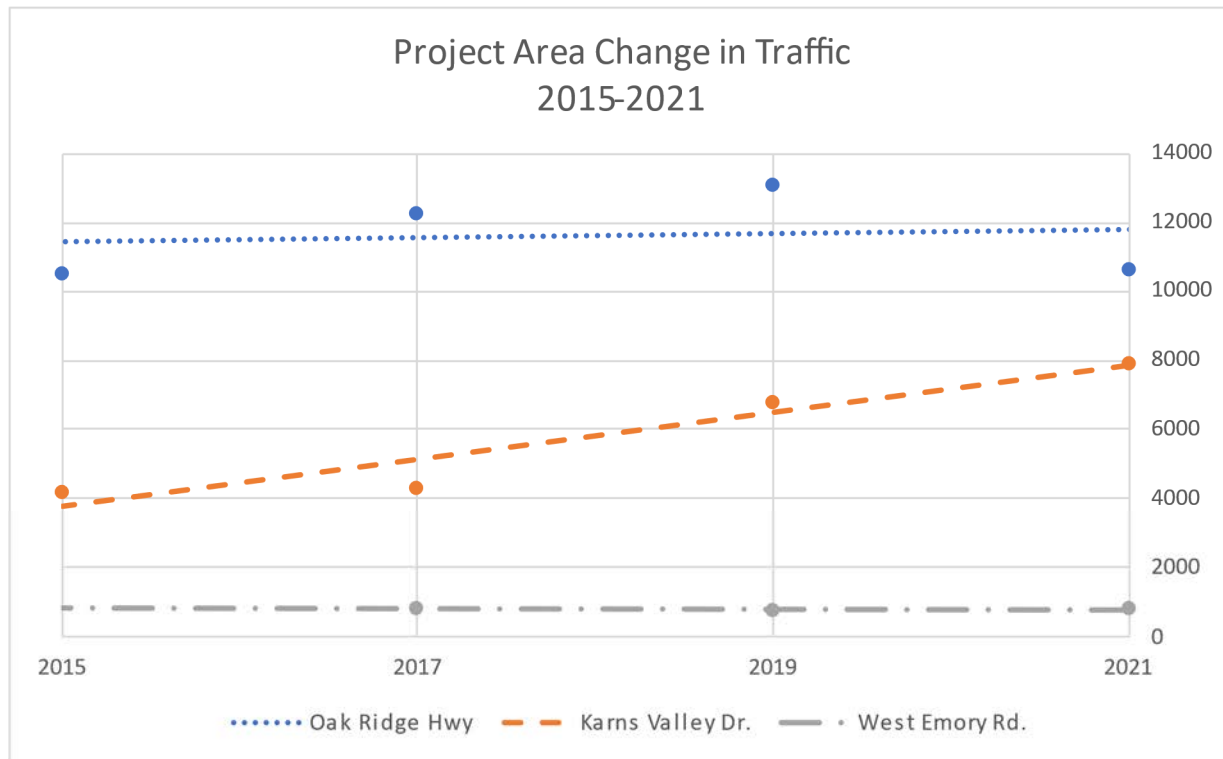


Figure 3: Project Area Change in Traffic

Design Years(s)

The development team anticipates that the Poplar Farms Development will be complete by 2025 and that there will be no additional phases for this development.

Other Developments

No other developments have been approved in the immediate project area.

EXISTING CONDITIONS

Existing Roadway Network

Table 1 summarizes the operational characteristics of the roadway network in the immediate area of the project. The information includes the federal functional classification, cross-section, available AADT, and posted speed limit.

Table 1: Existing Roadway Network

Roadway	Functional Classification	Cross- Section	AADT (2021)	Posted Speed Limit
Oak Ridge Highway	Principal Arterial	2 Lane 2-Way	10,611	55 mph
West Emory Road	Minor Collector	2 Lane 2-Way	818	30 mph
Karns Valley Drive	Minor Arterial	2 Lane 2-Way	7,904	45 mph
Mountain Vista Road	Local	2 Lane 2-Way	NA	Not Posted

Nearby Land-uses

This section of the report discusses existing land-use near the project and existing street conditions near the project. The structure and function of the street network are discussed, as is the potential for alternative travel modes (transit, bicycle, and pedestrian) and the crash history (if applicable).

Traffic Control Devices

Table 2 summarizes the existing traffic control devices in the study area.

Table 2: Traffic Control Devices

Major Street	Minor Street	Traffic Control	Phases
West Emory Road	Access #1	Proposed Stop	NA

Intersection Geometry

Figure 4 on the following page shows the available turn lanes at each studied intersection. Through lanes are assumed to be continuous between intersections and are not dimensioned. Turn lanes are measured from the stop bar to the approximate beginning of the taper. Dimensions are given to the nearest vehicle length (25 feet).

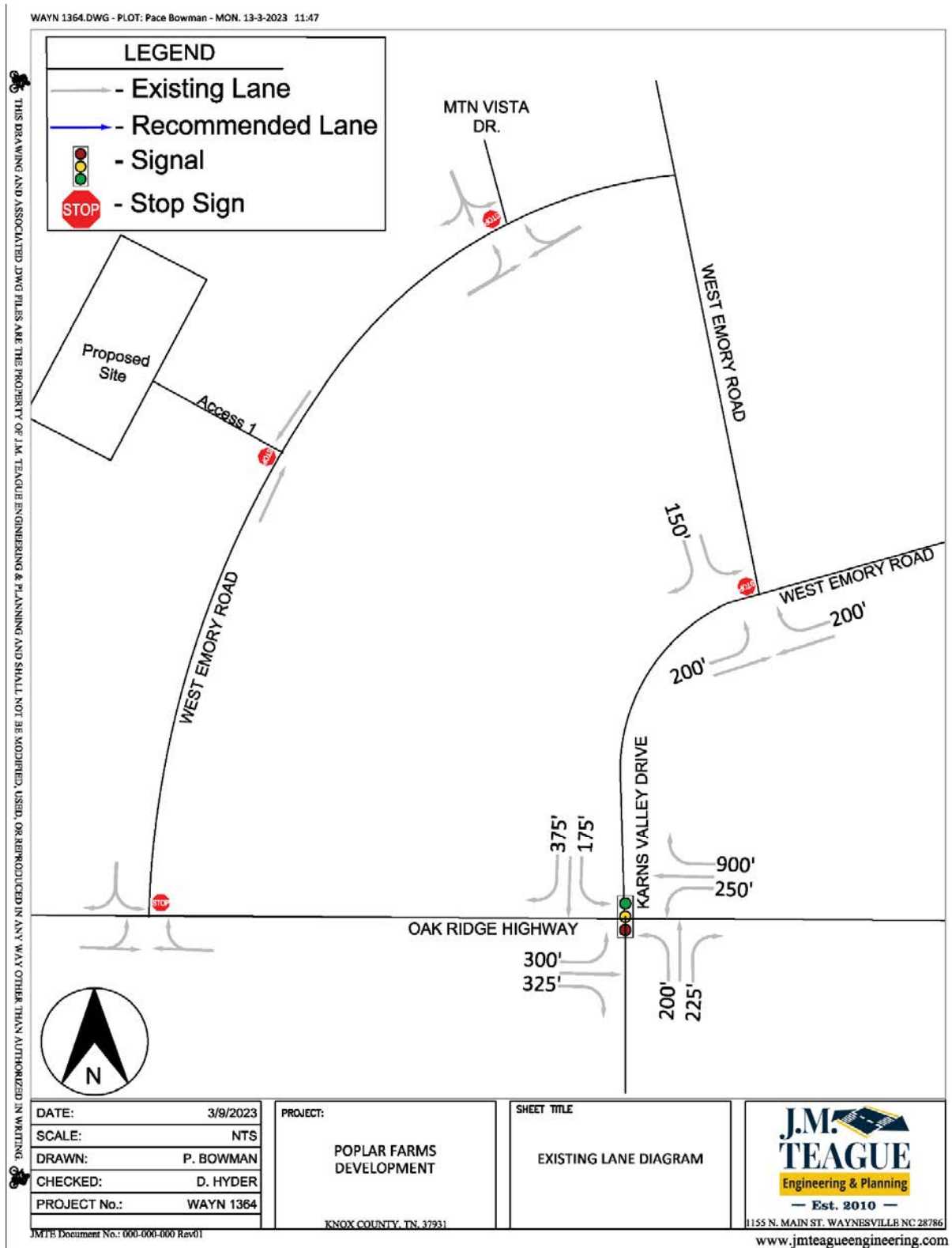


Figure 4: Existing (2023) Lane Diagram

Safety

For this review, safety is composed of the roadway, street safety, and emergency response.

Crash Review

Knoxville-Knox County Planning staff did not require crash history.

Sight Distance

Per the *Knoxville-Knox County Subdivision Regulations section 3.04.j.5*, the minimum required sight distance for a road with a posted speed limit of 30 mph is 300 feet in each direction. During the site visit, The Consultant was not able to get an accurate sight distance from the proposed entrances due to the terrain and vegetation. From the edge of pavement it appears that the roadway profile and horizontal alignment will provide adequate sight distance. However, it is the affirmative responsibility of the developer (Home Development Incorporated) to ensure that sight distance is adequate throughout construction and after construction is complete.

Figure 5 shows existing conditions at the approximate location of Access 1.



Looking towards Karns Valley Drive



Looking towards Oak Ridge Highway

Figure 5: Access 1 Approximate Location (Source: JMTE)

Alternative Modes of Travel

Bicycle and Pedestrian

No sidewalks or bicycle facilities are present in the immediate area of the project.

Transit

There is no fixed route transit within the study area. No buses or shelters are present in the immediate area of the project.

TRAVEL DEMAND



The flow diagram shows the general process of developing the estimated traffic used in the TIA. This section of the report discusses each component of traffic development to give the reader a sense of the process.

Existing Traffic



The existing traffic is the travel demand upon the street system today. Existing traffic is estimated from traffic counts taken at the site. The existing traffic is used to estimate the area's peak travel periods, the traffic's variability within the peak period, and the through movements and turning movements at each intersection. A TIA intends to estimate conditions on a “typical day” in a project's horizon year. To accomplish this intent, the traffic counts are taken during midweek with school in session.

Existing Traffic Counts

Figure 6 shows the AM and PM turning movements derived from traffic counts taken and (included in Appendix C) to ensure that the TIA replicated a typical day the counts were taken mid-week with Knox County Schools in session.

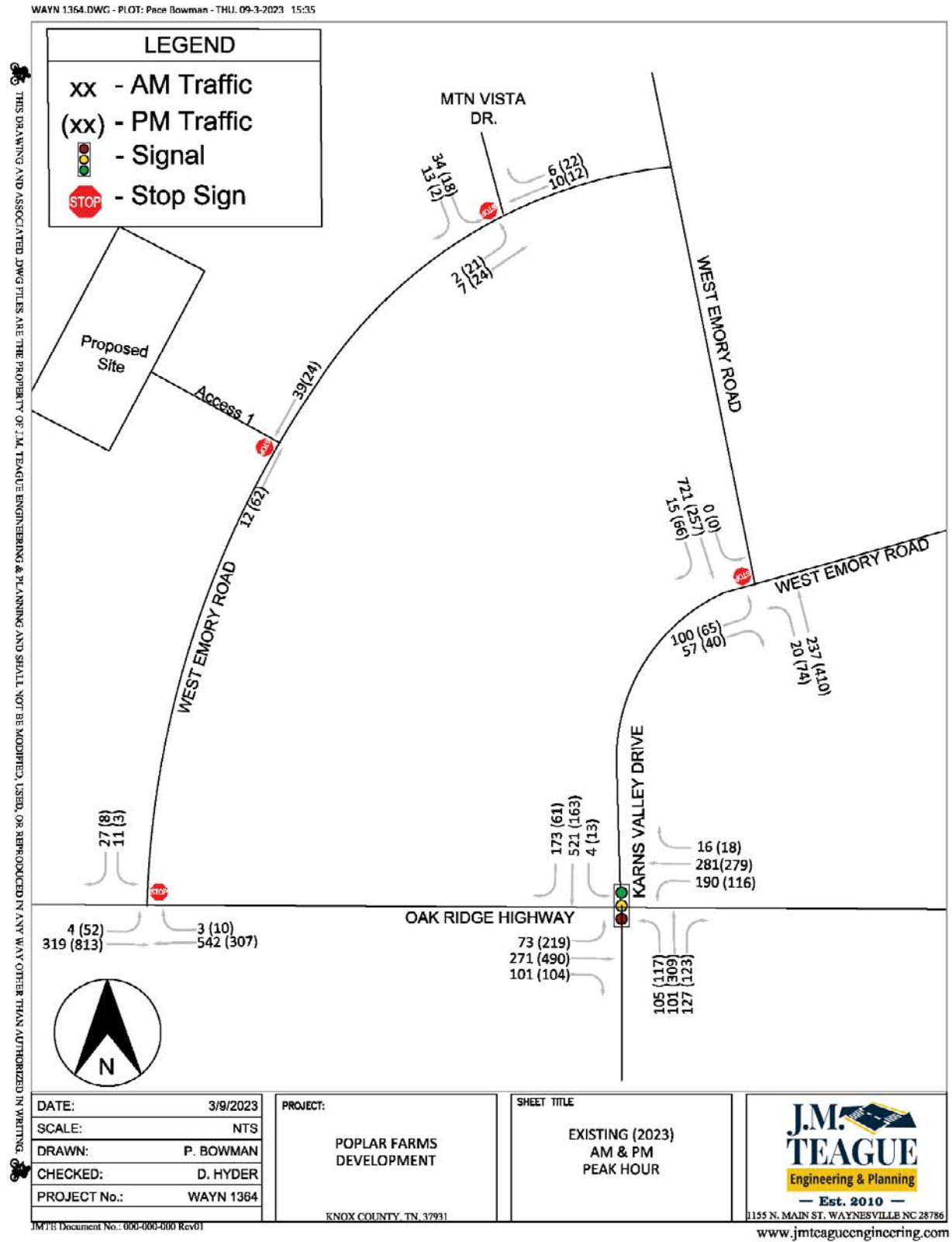


Figure 6: Existing (2023) AM and PM Peak Hour Traffic

Peak Period Traffic Volumes

Traffic may be discussed as Average Daily Traffic (ADT) or peak period traffic. In the TIA process and the street design process, it is more useful to identify the peak period traffic. This is the time at which the demand on the street is the heaviest. The peak hour of travel often accounts for ten percent of daily traffic on the street. In addition, there are two peak periods during each day. In the morning peak period, people are leaving home and driving to work. The morning peak has historically been a sharp peak that rises and falls quickly. During the afternoon, people are not only returning home from work but often perform other errands after work.

Natural Growth



Figure 7 shows the natural growth in the study area. Natural growth is traffic that will be present on the surrounding roadway network in the build-out year of the project caused by population growth in the region. The project build-out year is 2025. Using historic data in the area, it was determined that a growth rate of two (2.0) percent per year was reasonable. Each traffic count for 2023 was multiplied by 1.04 and then balanced to estimate the typical 2025.

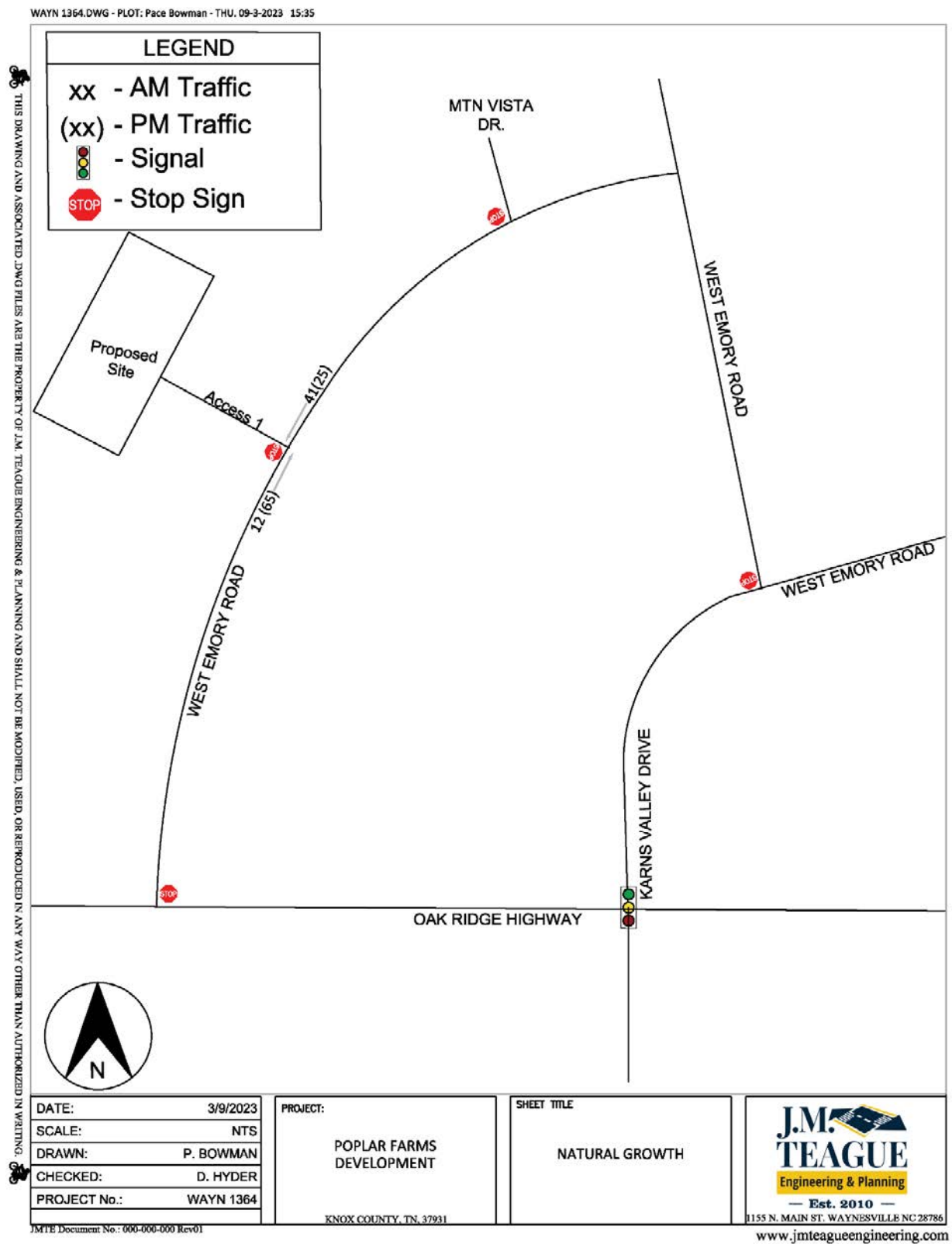


Figure 7: Natural Growth (2025)

Other Approved Developments in the Area



The scoping process revealed no other approved project in the study area.

Background Traffic

Figure 8 shows the background traffic in the study area. Background traffic is composed of the traffic caused by natural growth and the traffic added to the network by other developments in the project area that are reasonably foreseeable. A reasonably foreseeable project is one that has already been approved by the board (e.g., City Council or County Commission) and that should be completed before the analyzed project is completed. Background traffic adds the two components together to arrive at the background conditions without the project.

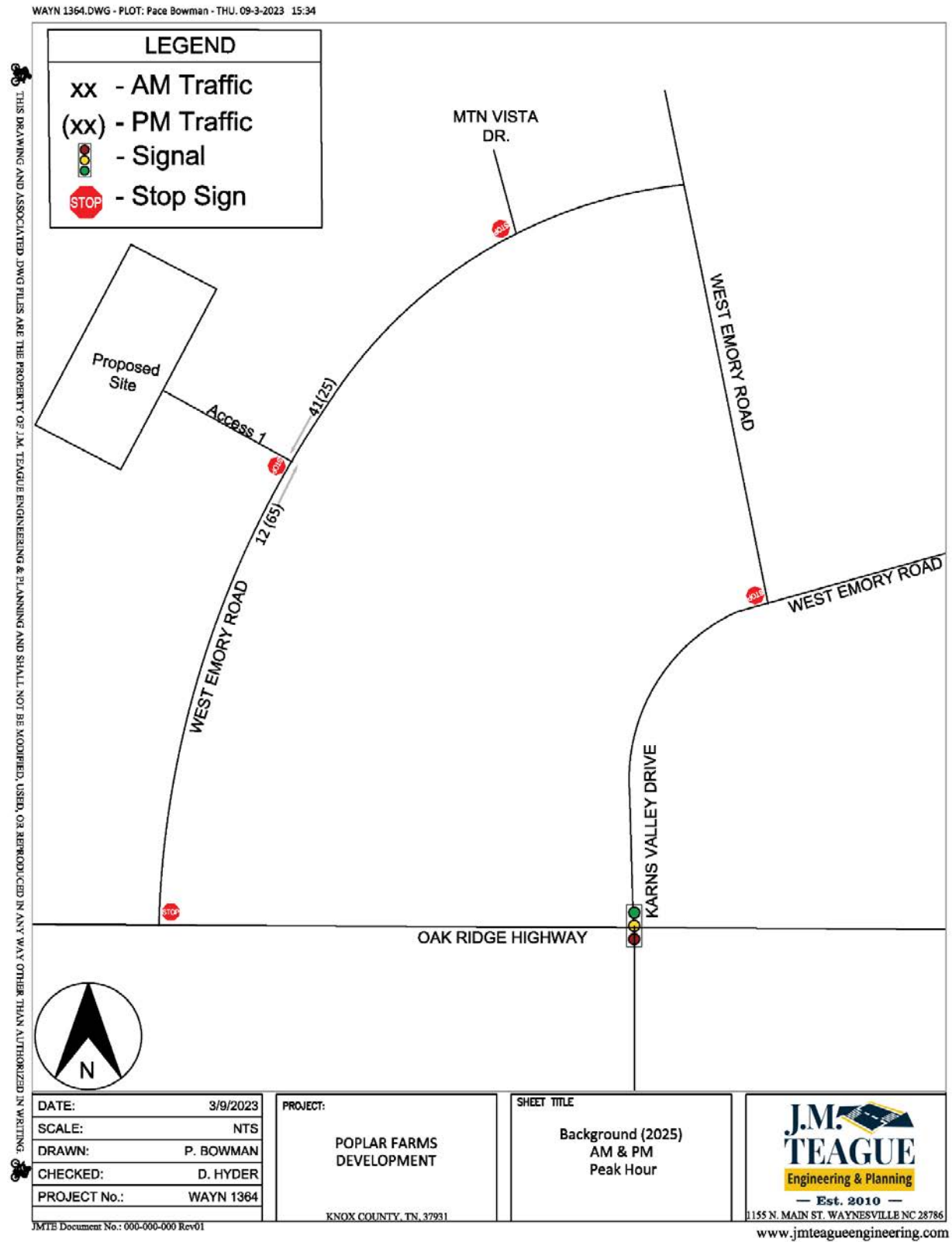


Figure 8: Background (2025) AM & PM Peak Hour Traffic

Effect of TDOT Projects

The Tennessee Department of Transportation has one roadway improvement project in the project area (Project # 123073.00) (see Figure 9). The scope of said project is to reconstruct the interchange of Oak Ridge Hwy (SR-62) and Pellissippi Pkwy (SR-162) to a Single Point Urban Interchange and provide a connection to Solway Road.

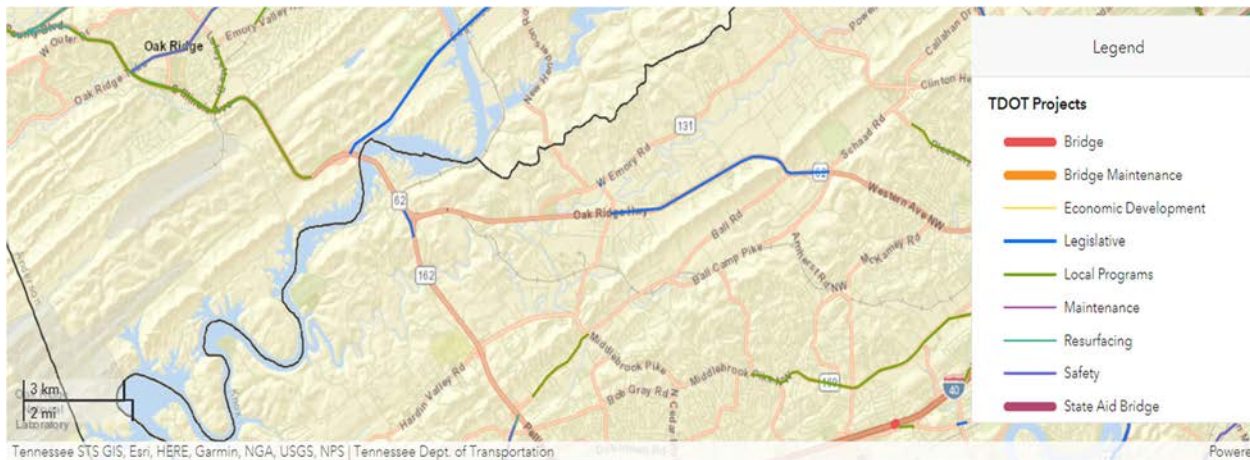
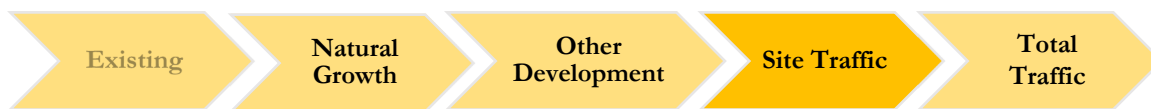


Figure 9 TDOT Roadway Improvement Projects

Site Traffic



Site traffic is the traffic that the proposed project is expected to contribute to traffic in the area. Site traffic is estimated (generated) using the *ITE Trip Generation Manual* (11th ed.). The Trip Generation Manual is a nationally accepted source for estimating travel from various land-uses.

Trip Distribution

Trip distribution is the assignment of project traffic throughout the road network as it enters and exits the site. The estimated trip distribution is based on the following assumptions:

- The trip distribution for the project will match the existing trip distribution in the project area,
- That the percentage of trips at the study area boundary roughly approximates the percentage of trips to and from the site,
- That on a typical day, inbound site trips balance outbound site trips, and
- That a reasonable origin-to-destination matrix can be estimated by these assumptions.

Using these assumptions, the trip distribution was estimated using the following steps:

1. The percentage of site trips (origins) using each access point (driveway) is estimated,

2. The percentage of site trips exiting the project area at each network boundary is estimated based on historic traffic counts,
3. An unbalanced “seed” matrix is created using the information from step 1 and step 2,
4. Use a double constraint method to balance (i.e., the sum of the rows equals the sum of the columns) the trip percentages in the matrix, creating Table 3.

The pathway is assigned to show the traffic as it travels through the study area intersections. The trip distribution for this development was estimated from the existing traffic volume patterns within the surrounding roadway network, the surrounding population densities, the location of the proposed development, and engineering judgment.

Table 3: Trip Distribution Final Balanced Matrix

		From DOT Counts			
Location		Oak Ridge Hwy (W)	Karns Valley (N)	Oak Ridge Hwy (E)	Karns Valley (S)
ADT		10,611	7000	14,700	7430
Access 1	100%	27%	17%	37%	19%
% Entering/Exiting		27%	17%	37%	19%

Once the balanced trip matrix is complete, the trips from Trip Generation can be assigned to the network. Figure 10 shows the trip distribution percentages as applied to the street network.

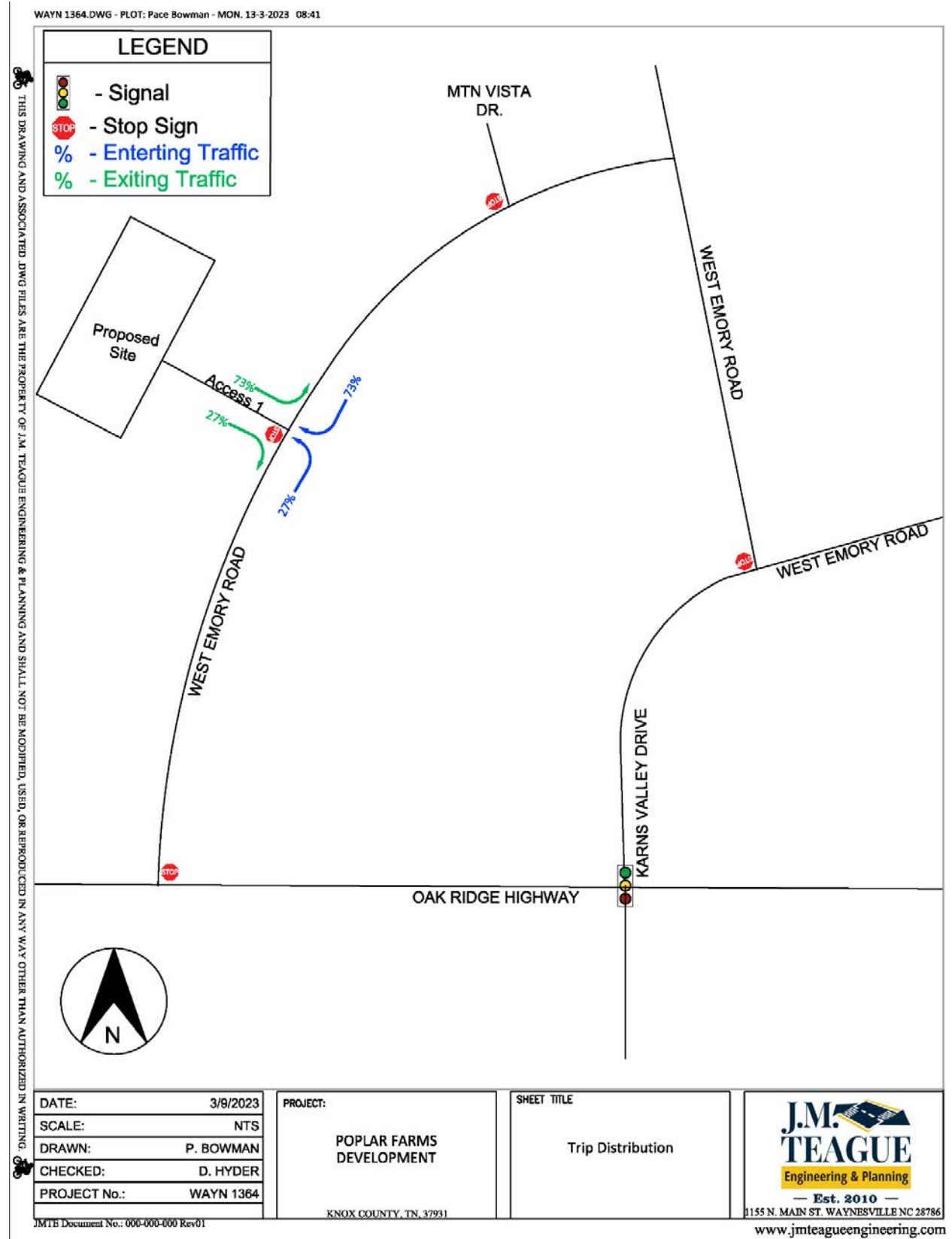


Figure 10: Poplar Farms Trip Distribution

Trip Generation

Trip generation is the assignment of project traffic throughout the road network as it enters and exits the site. The pathway is assigned to show the traffic as it travels through the study area intersections. The trip distribution for this development was estimated from the existing traffic volume patterns within the surrounding roadway network, the surrounding population densities, the location of the proposed development, and engineering judgment. Table 4 below shows the land-use and the traffic volumes.

Table 4: Trip Generation

<i>ITE LUC</i>	<i>Proposed Land Use</i>	<i>Size</i>	<i>Daily</i>	<i>AM Peak Hour</i>			<i>PM Peak Hour</i>		
				Enter	Exit	Total	Enter	Exit	Total
210	Single Family Detached Housing	142 DU	1393	26	76	102	87	51	138
<i>Total</i>		142 DU	1393	26	76	102	87	51	138

Morning Trips (AM)

AM Trips from the Multi-Family housing were estimated using the equation below. Based on the ITE Trip Generation Manual, 26% of trips were arriving, and 74% of trips were departing. The number of trips is based on the number of dwelling units at build-out:

$$\ln(T) = 0.91 \ln(DU) + 0.12$$

Evening Trips (PM)

PM Trips from the Multi-Family housing were estimated using the equation below. Based on the ITE Trip Generation Manual, 63% of trips were arriving, and 37% of trips were departing. The number of trips is based on the number of dwelling units at build-out:

$$\ln(T) = 0.94 \ln(DU) + 0.27$$

The number of trips is rounded to the nearest vehicle.

Entering and Exiting Trips

The entering trips for each land-use is based on the ITE Trip Generation Manual. The overall entering and exiting trips are the sums of the entering trips for the land-use. In the AM peak period, 34% of vehicles are arriving, and 66% of vehicles are departing. In the PM peak period, 58% of vehicles are entering and 42% departing.

Build-Out Traffic



Build-out traffic is all traffic that will be present on the surrounding roadway network when the project is complete and fully occupied (2025).

Project Schedule and Stages

The development team anticipates this project to be completed by the year 2025. No follow-on phases are anticipated.

Build-out traffic is the sum of background traffic and the proposed site trips, illustrated respectively in Figure 8 and Figure 11. The anticipated build-out AM and PM Peak Hour traffic is shown in Figure 12.

Trip Assignment

In Trip Assignment, the trips from the trip generation step are assigned to the network using the percentages in Figure 10. Figure 11 shows the results of the trip assignment.

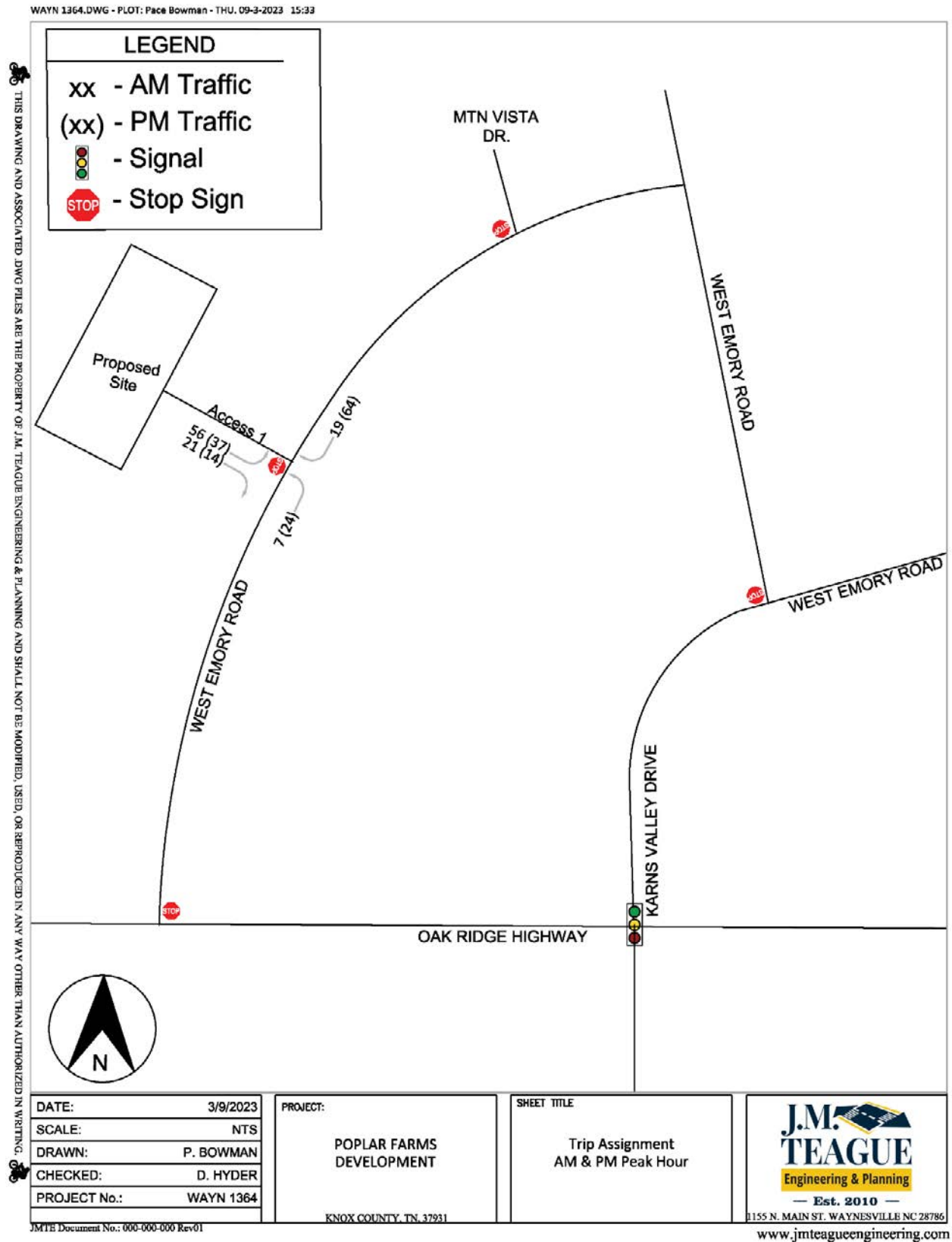


Figure 11: Trip Assignment (2025) AM & PM Ingress & Egress

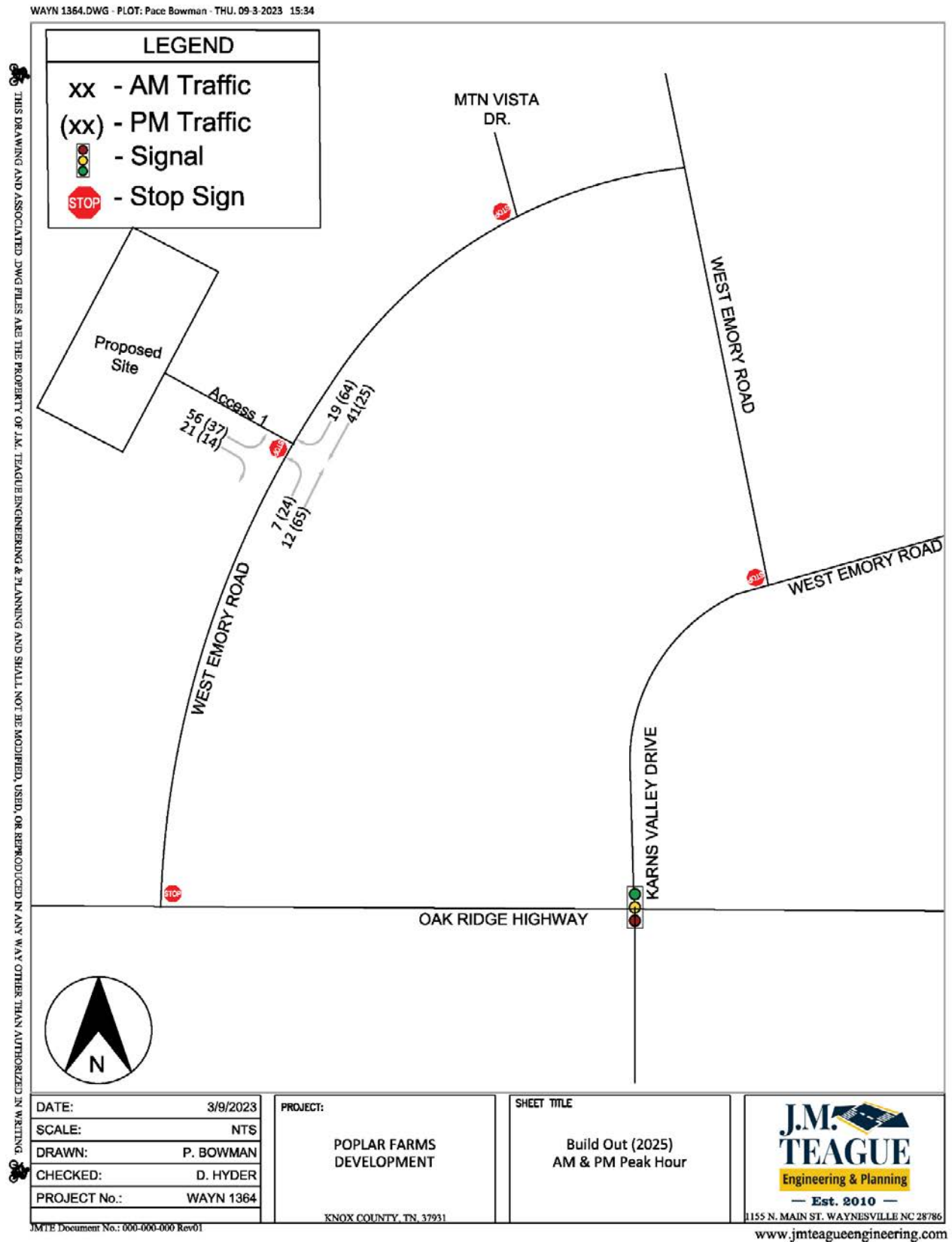


Figure 12: Build-Out Traffic (2025) AM and PM Peak Hour Traffic

OPERATIONAL AND CAPACITY ANALYSIS

The analysis for background conditions was based on methodologies presented in Knoxville-Knox County Plannings Transportation Impact Analysis Guidelines. To estimate the background LOS, delay, v/c ratio, and queue at the study intersections, the background traffic was analyzed using existing lane configurations and traffic control conditions. The results are provided in a Peak Hour Factor (PHF) of 0.90 and were used for all background conditions in accordance with Knoxville-Knox County Planning guidelines. Based on HCM and Knoxville-Knox County Plannings guidance, the free-flow movements/approaches were not analyzed for background conditions. The 0.90 PHF is used by traffic engineering companies and Knoxville-Knox County Planning to simulate worst-case scenarios for LOS calculations. The worst-case PHF assumption can sometimes create fluctuations in LOS and delay readings without any change in the traffic volumes.

ANALYSIS OF EXISTING CONDITIONS

Traffic Capacity Discussion

The HCM defines capacity as “the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point during a given period under prevailing roadway, traffic, and control conditions.” Level of Service (LOS) is a term used to represent different driving conditions concerning traffic congestion. It is defined as a “qualitative measure describing operational and perceptual conditions within a traffic stream.” LOS “A” represents free-flow traffic conditions with no congestion. LOS “F” represents severely impacted traffic flow due to vehicle congestion. LOS is generally determined by the total “Control Delay” experienced by drivers (Control delay is vehicle delay that is ultimately caused by the traffic control device. This includes deceleration delay, queue move-up time delay, stopped delay, and acceleration delay). Figure 13 shows typical delays associated with each Level of Service for intersections.

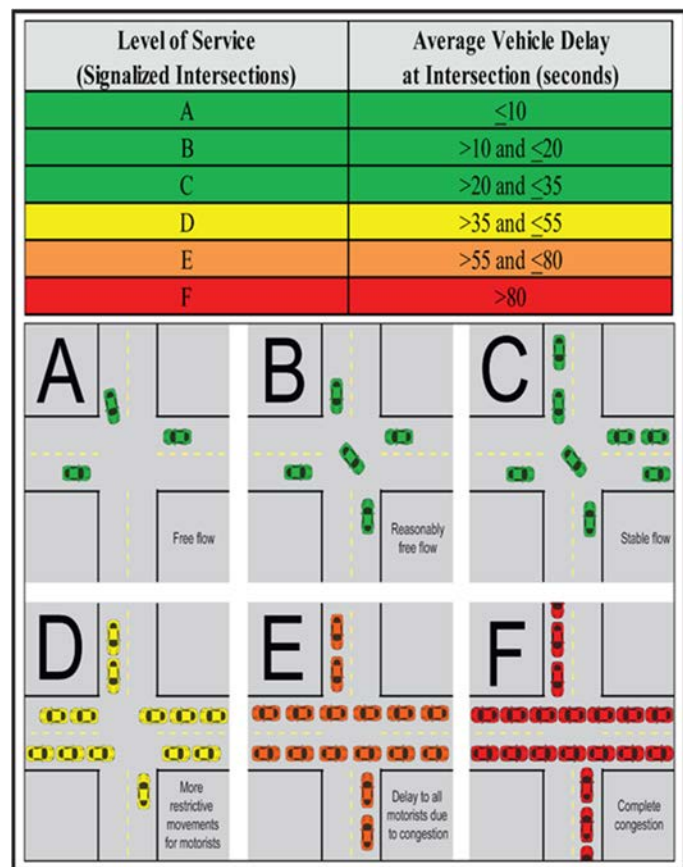


Figure 13: Level of Service Table

The Highway Capacity Manual analysis for unsignalized intersections can project very high delays on the minor side street. Thus, it is recommended to use LOS measurements as a comparative tool rather than a design tool. The 95th

percentile queue is the vehicle queue (backup) that has a 5% probability of being exceeded during the analysis period. At unsignalized intersections, p_0 (queue-free percent) is the probability of there being no backup.

The Q_{95} is the greater of the queue reported from SYNCHRO or SIMTRAFFIC. The existing traffic volumes from the AM & PM peak hours were analyzed using existing lane configurations and traffic control conditions. Since existing turning movement count data was collected, the existing peak hour factor (PHF) was used for analyzing existing conditions. Based on HCM the free-flow movements/approaches were not analyzed for existing conditions. The capacity analysis (Synchro) reports for the existing conditions are in Appendix B.

Thresholds for Identifying Mitigations

After coordinating with the Knoxville-Knox County Planning department, mitigation needs to be addressed at the access point (turn lane warrant) and/or if a level of service drops to a F.

Measures of Effectiveness

For ease of use, each intersection's operational and capacity analysis is treated separately. Each intersection includes a table showing the morning and evening level of service, delay, and queuing for the background, build-out, and mitigation at that location.

Level of Service

The LOS is reported using letters A, B, C, D, E, or F for each movement.

Delay

The Delay (in seconds) was calculated for the studied intersections by approach and lane movement for each existing background and build-out case. The traffic volumes from the AM & PM peak hours were analyzed using existing lane configurations and traffic control conditions. The difference between the background and build-out cases is shown in the Difference column. Percent Change calculated as:

$$\%Change = \left(\frac{Difference}{Background Delay} \right) \times 100$$

Percent change in the delay is shown in the righthand column.

Queuing

Queuing analyses were performed to determine the effect of the build-out traffic on intersection traffic queues. Turning movements at which, the queues exceed the available storage are noted in the queuing table for each intersection.

ANALYSIS RESULTS

The next section of this report presents the analysis of each intersection and driveway. The intersection numbers are consistent with the numbers used in the Synchro analysis.

Intersections 1 – 4 have been removed from this report per request of Knoxville-Knox County Plannings Staff.

Intersection 5: West Emory Road & Access 1

Figure 14 shows the proposed intersection of West Emory Road and Access 1.

Table 5 shows the Traffic Volumes for each analyzed case, period, and approach. It also shows how the components of the total volumes come together.

Table 6 shows West Emory Road and Access 1 operate at a level of service A in the build-out case.

Table 7 shows the queuing for each analyzed case, period, and approach.

Table 8 shows the turn lane warrant analysis performed since this is a proposed access point.



Figure 14: Intersection 5 West Emory Road & Access 1

Table 5: Intersection 5 West Emory Road & Access 1 Traffic Volumes

	Approach Dir (N/S/E/W)	L/T/R/U	Base Vol.	Projected Vol.	Adjacent Development	Background Vol.	Trip Gen.	Future Vol.
AM	Eastbound	Left	0	0	0	0	56	56
AM	Eastbound	Right	0	0	0	0	21	21
AM	Eastbound	Through	0	0	0	0	0	0
AM	Eastbound	U-Turn	0	0	0	0	0	0
AM	Northbound	Left	0	0	0	0	7	7
AM	Northbound	Right	0	0	0	0	0	0
AM	Northbound	Through	12	12	0	12	0	12
AM	Northbound	U-Turn	0	0	0	0	0	0
AM	Southbound	Left	0	0	0	0	0	0
AM	Southbound	Right	0	0	0	0	19	19
AM	Southbound	Through	39	41	0	41	0	41
AM	Southbound	U-Turn	0	0	0	0	0	0
AM	Westbound	Left	0	0	0	0	0	0
AM	Westbound	Right	0	0	0	0	0	0
AM	Westbound	Through	0	0	0	0	0	0
AM	Westbound	U-Turn	0	0	0	0	0	0
PM	Eastbound	Left	0	0	0	0	37	37
PM	Eastbound	Right	0	0	0	0	14	14
PM	Eastbound	Through	0	0	0	0	0	0
PM	Eastbound	U-Turn	0	0	0	0	0	0
PM	Northbound	Left	0	0	0	0	24	24
PM	Northbound	Right	0	0	0	0	0	0
PM	Northbound	Through	62	65	0	65	0	65
PM	Northbound	U-Turn	0	0	0	0	0	0
PM	Southbound	Left	0	0	0	0	0	0
PM	Southbound	Right	0	0	0	0	64	64
PM	Southbound	Through	24	25	0	25	0	25
PM	Southbound	U-Turn	0	0	0	0	0	0
PM	Westbound	Left	0	0	0	0	0	0
PM	Westbound	Right	0	0	0	0	0	0
PM	Westbound	Through	0	0	0	0	0	0
PM	Westbound	U-Turn	0	0	0	0	0	0

Table 6: Intersection 5 West Emory Road and Access 1 Comparison Table

Intersection 5: West Emory Road & Access 1												
Background vs. Build-Out												
Period	Approach	LOS					Delay in Seconds				Percent Change	
		Background	Build-Out	Mitigated	Build-out Change	Mitigated Change	Background	Build-Out	Change	Mitigated	Build-Out	Mitigated
AM	EB-Left		A					8.5				
AM	EB-Right		A					8.5				
AM	NB-Left/Thru		A					7.2				
AM	SB-Thru/Right		A					0				
PM	EB-Left		A					9.1				
PM	EB-Right		A					9.1				
PM	NB-Left/Thru		A					7.4				
PM	SB-Thru/Right		A					0				

Table 7: Intersection 5 West Emory Road & Access 1 Queuing

Intersection 5: West Emory Road & Access 1								
Period	Approach	Storage (ft)	Background Queue (ft)	Build-out Queue (ft)	Difference (ft)	Mitigation Needed	Que After Mitigation (ft)	Mitigated Difference (ft)
AM	EB-Left			0	0	0		
AM	EB-Right			0	0	0		
AM	NB-Left/Thru			0	0	0		
AM	SB-Thru/Right			0	0	0		
PM	EB-Left			0	0	0		
PM	EB-Right			0	0	0		
PM	NB-Left/Thru			0	0	0		
PM	SB-Thru/Right			0	0	0		

As shown in Table 8 from *Knox County Department of Engineering and Public Works Handbook, "Access Control and Driveway Design Policy (1996)"*, the combination of turning volumes and opposing through volumes are below the thresholds needed to justify a turn lane at this location.

Table 8: Intersection 5 Right Turn Lane Warrant Analysis

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25	AM: PM:					
25 - 49	41 Thru 25 Thru					
50 - 99	19 Right 64 Right					
100 - 149						
150 - 199						
200 - 249						
250 - 299						Yes
300 - 349					Yes	Yes
350 - 399				Yes	Yes	Yes
400 - 449			Yes	Yes	Yes	Yes
450 - 499			Yes	Yes	Yes	Yes
500 - 549		Yes	Yes	Yes	Yes	Yes
550 - 599		Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

No right turn lane is needed.

Table 9: Intersection 5 Left Turn Lane Warrant Analysis

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

During the AM peak hour there are 12 through vehicles and 60 opposing vehicles. This is not shown on the chart.

During the PM peak hour there are 65 through vehicles and 89 opposing vehicles. This is not shown on the chart.

Considering neither the AM nor PM peak hour volumes are shown on the chart, no left turn lane is warranted. Also, no other mitigation is warranted at this intersection.

MITIGATION

This section discusses the proposed mitigations at each intersection and access point. If no mitigations are proposed, that too is noted.

Intersection 5: West Emory Road & Access 1

No mitigation is recommended at this intersection. However, Home Development Incorporated is responsible for ensuring that sight distance at this location is adequate to provide safe access for vehicles entering or leaving the site.

EFFECT OF THE PROJECT ON ALTERNATE MODES

The project will not affect alternative modes in the area.

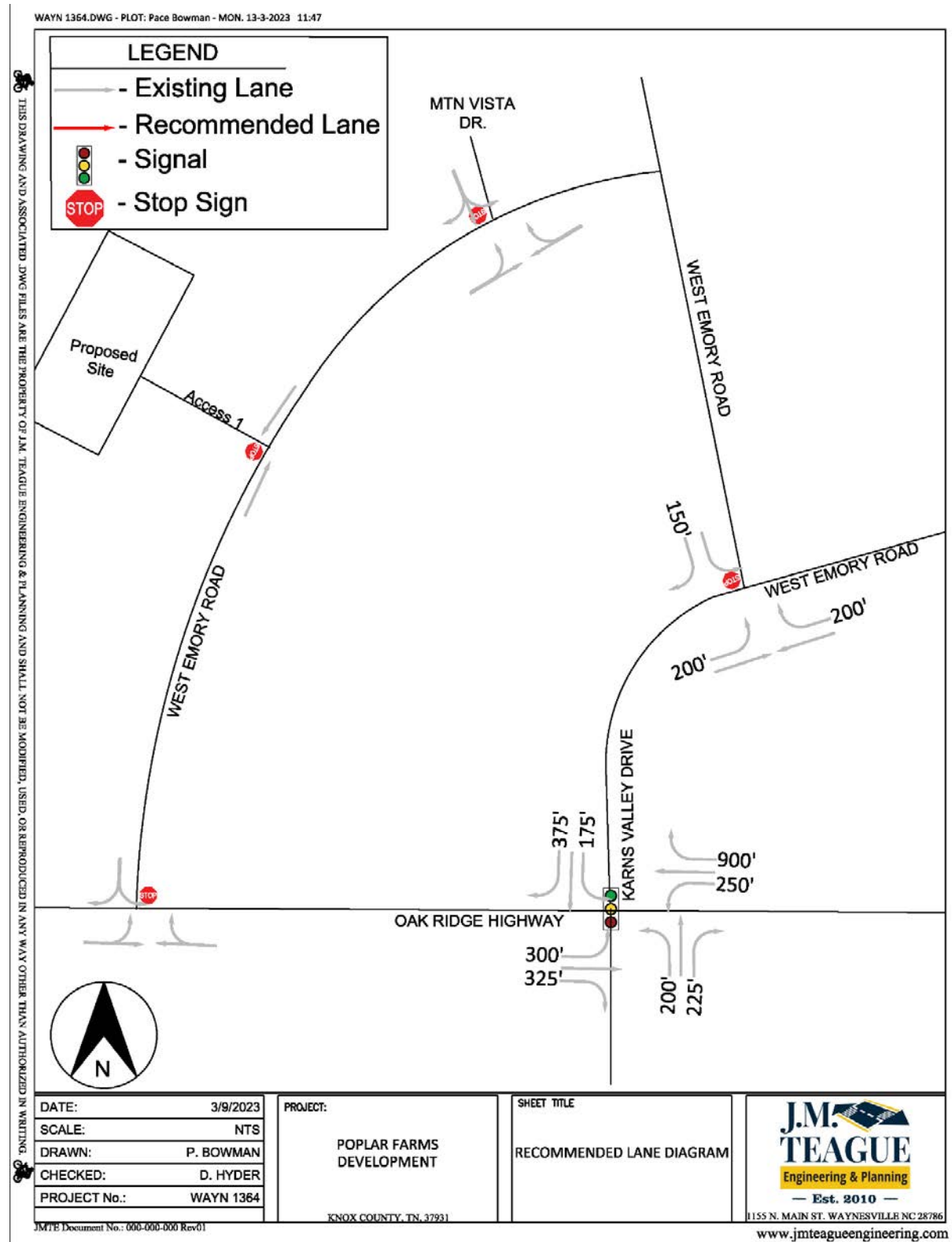


Figure 15: Recommended Lane Diagram

CONCLUSION

In accordance with the Knoxville-Knox County Plannings Transportation Impact Analysis Guidelines, this TIA was performed because the development is proposed to generate more than 750 trips per day.

Based on the analysis presented in the report, the operational problems caused by the project can be successfully mitigated. Also, there is no material impact on public health and safety, nor does the proposed project negatively impact planned public expenditures.

APPENDIX A: SCOPING



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March 30, 2023

Mike Conger, P.E.
Knoxville-Knox County Planning
400 Main Street, Suite 403
Knoxville, TN 37902

Re: Poplar Farms Subdivision – Transportation Impact Analysis

Dear Mr. Conger,

On behalf of Home Development Incorporated, we are pleased to submit the requested additional information for your review and approval. The comments identified from your office dated March 9, 2023, and the associated responses are listed below.

Agency Comment	Response
This study included the analysis of several locations that were not requested per the required scope that was provided on 1/24/2023, which specified only an analysis of the proposed development access points. Following our review of the analysis provided which has raised multiple questions about assumptions and conclusions made at the “non-required” intersections it is our preference that all sections of the TIS that are not specific to the analysis of the development access point be removed with the exception of leaving a copy of the turning movement count data sheets for all locations in the appendix.	Per your request, Intersections 1-4 have been removed (see page 25).
This study should make reference to the fact that a previous “TIL” was prepared for this site at the rezoning stage and provide a summary of its conclusions as well as noting any significant differences between the proposed development at rezoning versus concept plan stage such as the reduction of lots and removal of an access point. Please also include data that was collected for the previous study in this report such as the 24-hour hose counts that were conducted on West Emory Rd.	The following statement has been added on page 2 of the Traffic Impact Analysis Report: “Per Knoxville-Knox County Requirements Traffic Impact Letter (TIL) was prepared for this site at the rezoning stage. The TIL dated November 23, 2022 found that the proposed Poplar Farms Road residential subdivision will cause no significant deterioration of Oak Ridge Highway, West Emory

Agency Comment	Response
	Road, or Karns Valley Drive.”. A copy of the TIL is included in Appendix A.”
Please add a P.E. stamp to the cover sheet of the TIS.	As discussed with Knoxville-Knox County Planning JMTE provided an unsealed report to ensure allow for any revisions. A seal page has been added to the report.
Page 2 – opening paragraph numbers shown for trip generation are not correct and do not match those shown in Table 5, please review and correct as necessary.	The trip generation estimates on page 1, the first paragraph of the Introduction has been revised to be consistent with Table 4.
Page 2 and other – most instances that reference “Knox County” should instead say “Knoxville-Knox County Planning”.	All references (page 2, 3, 11, & 24) have been revised.
Page 6 – Table 2 lists two development access points, need to remove one.	Access #2 has been removed from Table 2 on page 5.
Page 8 and throughout – Please update the network schematic to be more reflective of actual roadway geometry. The current schematic is confusing because it lists Karns Valley Dr as forming 2 legs at the intersection of West Emory Rd whereas West Emory Rd actually forms 2 legs. Additionally, Karns Valley Dr has more of an east-west orientation than north-south as depicted at this location. It would also be preferred to orient the graphic with the north arrow facing straight up.	The network schematic has been revised to better reflect the roadway geometry more accurately. All drawings have also been oriented so that the north arrow faces the top of the page.
Page 9 – posted speed limit is 30 mph on West Emory Rd, not 35 mph as referenced here. It is understood that current site vegetation and topography prevent the ability to check intersection sight distance from the required distance back from the road however we request that the engineer still check sight distance at the edge of pavement to see if the roadway profile or horizontal alignment will provide adequate sight distance before any site grading is taken into account. Also, the report states that sight distance must be available by the end of construction. However, sight distance must be provided throughout construction so that construction traffic does not create a safety hazard.	Page 7 (renumbered from page 9) has been revised to reflect this information.
Page 10 – remove reference to fire code since this is single-family and not multi-family and therefore not applicable.	The International Fire Code reference has been removed from the report.
Page 11 – would be helpful to reference here that raw turning movement count data is included in Appendix.	This reference has been added on page 11 (renumbered to page 8).

Agency Comment	Response
Page 12 – the existing traffic volumes can remain on the schematic even though no further analysis of non-development access points are required. Please also show the through volumes at the site access point, either as derived from the turning movement count done at nearby intersections such as Mountain Vista Dr or from the previous 24-hour hose count that was done at the rezoning stage if it was in a proper location.	Figure 6 has been revised to show through movements at the access point (renumbered to page 9).
Page 18 – the TDOT STIP is not applicable in this area because it only includes projects in rural (non-MPO) areas of the state. The correct project reference would be the TDOT iTrip application at: https://www.arcgis.com/apps/dashboards/e14888bce2954050a10df5e949a1bc1 , the TDOT project to improve the interchange of Oak Ridge Hwy (SR-62) at Pellissippi Pkwy (SR-162) should be referenced.	The TDOT project to improve this interchange has been referenced on page 15 (renumbered to page 14) of the TIA report.
Page 18 – there was no consultation with the reviewing agencies regarding the land-uses that was referenced, please remove this.	This reference has been removed from the report.
Page 19 – the trip distribution section should be completely revised and since adjoining intersections are no longer part of subsequent analyses a simple assumption can be made that the trip distribution pattern for this development’s access point will match exactly the observed distributions for AM and PM peak at the intersection of West Emory Rd at Mountain Vista Dr since they are identical types of land use that are relatively close to one another.	The trip distribution has been revised to match the distribution of West Emory Road and Mountain Vista Dr. Also, all intersections except Access 1 have been removed. (shown in Figure 10 on page 15).
Page 21 – Proposed Land Use in Table 5 should state “Single-Family Detached Housing” rather than “Proposed Land Use”. Additionally, please include the applicable ITE Trip Generation pages in the Appendix for reference.	This has been revised in Table 5. Also, the trip generation pages will be added in appendix A.
Page 21 – correct the text throughout where it references apartments and two land-uses.	All references to two land-uses or apartments have been removed. Page 17(renumbered) and Table 4 now references only single-family detached housing.
Page 24, figure 13 – again, some estimate needs to be provided for the through trips at the development’s proposed access point and needs to be included in the capacity and turn-lane warrant analyses.	Figure 12 (page 20) includes an estimate of through trips at Access 1. This estimate is included in the capacity and turn lane warrant analysis (Table 8, page 26).
Page 26 – strike reference to NCDOT guidance which is not applicable.	The NCDOT reference has been removed.

Agency Comment	Response
Page 38, 39 – these tables need to be revised with analysis including through volumes on West Emory Rd.	The Traffic Volume table on page 25 has been revised to include the through volumes.
Page 40 – provide reference for turn lane warrant analysis and show actual volumes, again some estimate needs to be made for through volumes on West Emory Rd.	The reference for the turn lane warrant analysis <i>Knox County Department of Engineering and Public Works Handbook, "Access Control and Driveway Design Policy (1996)"</i> has been added on page 26.
Appendix A contains the incorrect scoping form that was provided at the rezoning stage, instead use the revised scoping form for Concept Plan review stage that was sent by email on 1/24/2023. Additionally, need to remove the comment-response document from this report as that was associated with the TIL review done at the rezoning stage.	<p>The scoping form originally included in Appendix A is the one that we received. Per your request we have replaced that scoping form with the current one.</p> <p>The comment response letter from the TIL has been removed from Appendix A. However, the body of the TIL is included for reference.</p>

Additional comments received on 3/29/2023 and associated responses are listed below.

Agency Comment	Response
Page 1 –lists there being 2 access points, please correct this to say 1 access point.	The reference to 2 Access points has been revised.
Page – 14 please use the singular TDOT pin# (123073.00) instead of multiple project #s shown for the TDOT project referenced.	The singular TDOT pin # has been referenced.
Page 26 – the turn lane warrant sheet provided appears to only be for a right turn lane warrant and it does not show the correct volumes for that scenario. The TIS needs to include the left turn lane warrant sheet as well and use the correct traffic volumes based on the build -out scenario at the access point.	The left turn lane warrant has been added and both charts show the correct volumes. Also, these charts are now included in Appendix D.

If you should have any questions or comments regarding this submittal, please do not hesitate to contact our office.

Sincerely,

J. Mark Teague, P.E., CPM

Owner and Principal Engineer

ATTACHMENT B: Pre-Submittal Transportation Impact Analysis (TIA) Scope Determination Form

DEVELOPMENT INFORMATION		
Project name:		
Project Description:		
Project Location		
Existing Zoning:		
Development Name:		
Developer name & address:		
Telephone number:		
Email:		
Tax Map & Parcel #:	076 021	
CHECKLIST (All items should be available at the time of discussion)		
Complete description of the development that includes:		
	Site Map details (this should be <u>attached</u>):	
<input type="checkbox"/>	Building footprints	
<input type="checkbox"/>	Number of units/unit size	
<input type="checkbox"/>	Access points	
<input type="checkbox"/>	Internal roadways (if any)	
<input type="checkbox"/>	Adjacent streets	
<input type="checkbox"/>	Proposed sidewalks and bicycle facilities, and	
<input type="checkbox"/>	Location and number of proposed parking spaces (if applicable)	
	Phasing plan (if applicable) that includes:	
<input type="checkbox"/>	Phase size, location, & timing	

BELOW TO BE FILLED OUT BY KNOXVILLE-KNOX COUNTY PLANNING STAFF

- ☐ Pre-study scope meeting **needed**
- ☐ Pre-study scope meeting **not needed**

Intersection(s) to study:

Level of Analysis:

Notes:



Signature

Date

Query

Filter

DATA SOURCE:

Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:

210

LAND USE GROUP:

(200-299) Residential

LAND USE:

210 - Single-Family Detached Housing

LAND USE SUBCATEGORY:

All Sites

SETTING/LOCATION:

General Urban/Suburban

INDEPENDENT VARIABLE (IV):

Dwelling Units

TIME PERIOD:

Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:

Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:

142

Calculate

DATA STATISTICS

Land Use:

Single-Family Detached Housing (210) [Click for Description and Data Plots](#)

Independent Variable:

Dwelling Units

Time Period:

Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:

General Urban/Suburban

Trip Type:

Vehicle

Number of Studies:

192

Avg. Num. of Dwelling Units:

228

Average Rate:

0.70

Range of Rates:

0.27 - 2.27

Standard Deviation:

0.24

Fitted Curve Equation:

$\ln(T) = 0.91 \ln(X) + 0.12$

R^2 :

0.90

Directional Distribution:

25% entering, 75% exiting

Calculated Trip Ends:

Average Rate: 99 (Total), 25 (Entry), 74 (Exit)
Fitted Curve: 102 (Total), 26 (Entry), 76 (Exit)

Data Plot and Equation

X = Number of Dwelling Units

X Study Site — Fitted Curve - - - Average Rate

Reset Zoom Restore

Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

QueryFilter

DATA SOURCE:

Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:

210

LAND USE GROUP:

(200-299) Residential

LAND USE:

210 - Single-Family Detached Housing

LAND USE SUBCATEGORY:

All Sites

SETTING/LOCATION:

General Urban/Suburban

INDEPENDENT VARIABLE (IV):

Dwelling Units

TIME PERIOD:

Weekday, Peak Hour of Adjacent Street Traffic

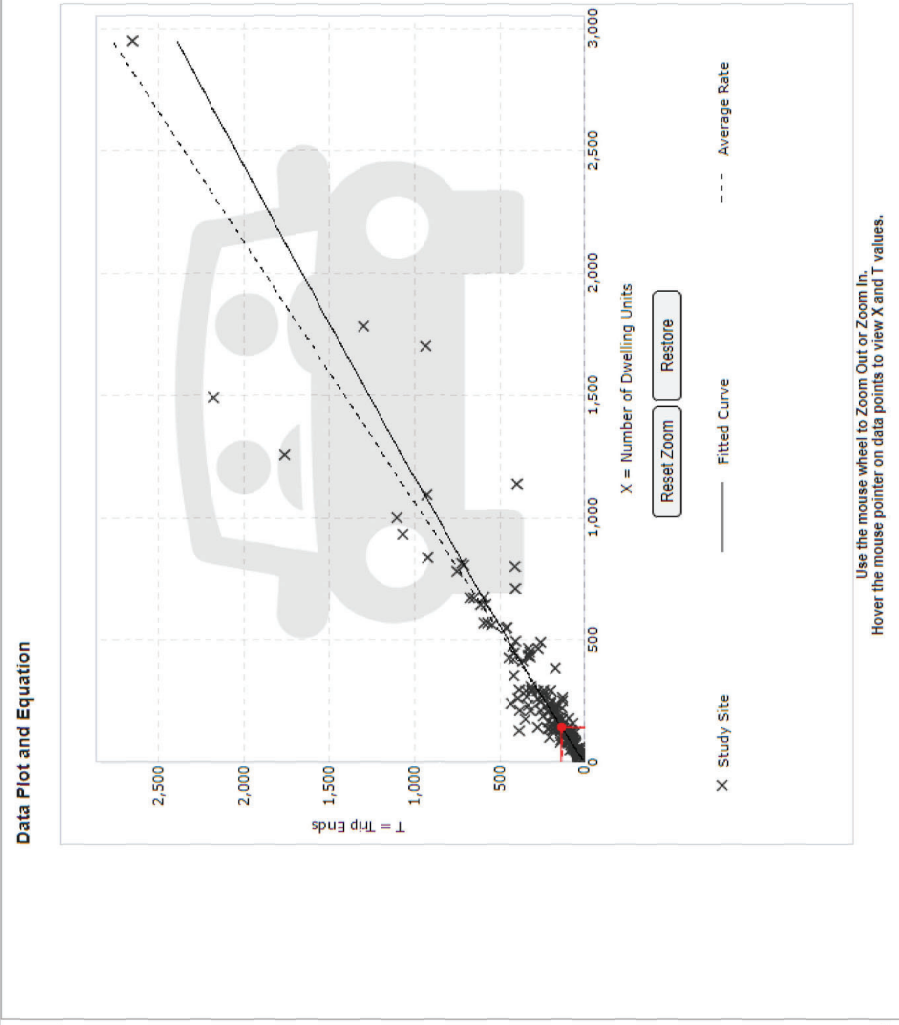
TRIP TYPE:

Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:

142

Calculate



DATA STATISTICS	
Land Use:	Single-Family Detached Housing (210). Click for Description and Data Plots
Independent Variable:	Dwelling Units
Time Period:	Weekday
Setting/Location:	Peak Hour of Adjacent Street Traffic
General Urban/Suburban	One Hour Between 4 and 6 p.m.
Trip Type:	Vehicle
Number of Studies:	206
Avg. Num. of Dwelling Units:	248
Average Rate:	0.94
Range of Rates:	0.35 - 2.98
Standard Deviation:	0.31
Fitted Curve Equation:	$\ln(T) = 0.94 \ln(X) + 0.27$
R ² :	0.92
Directional Distribution:	63% entering, 37% exiting
Calculated Trip Ends:	Average Rate: 133 (Total), 84 (Entry), 49 (Exit)
Fitted Curve:	138 (Total), 87 (Entry), 51 (Exit)



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JMTE WAYN 1364

TECHNICAL MEMORANDUM

DECEMBER 20, 2022

To: Rebecca Walls
120 Suburban Road,
Suite 204
Knoxville, TN 31923
Becca@hditn.com

From: David W. Hyder, P.E., Engineering Director
J.M. Teague Engineering & Planning

SUBJECT: Traffic Impact Letter for Poplar Farms (WAYN 1364)

J.M. Teague Engineering and Planning (JMTE) has prepared a Traffic Impact Letter documenting the impacts of Home Development Incorporated's Poplar Farms development. Poplar Farms is a one hundred and fifty (150) unit single-family residential development off West Emory Road on approximately 68 acres in the unincorporated portion of Knox County Tennessee (Figure 1). The Knox County Development Ordinance provides for a two-phase process for getting development approval. The first phase of the process is developing a Traffic Impact Letter addressing the impacts of the "maximum potential use" for the proposed parcel. The second phase of the process is preparing a formal traffic impact study of the specific project and its immediate area.

Based on the Growth Policy Plan and the current zoning regulations, 204 dwelling units is the maximum number of dwelling units allowed on this 68 acre site.

Poplar Farms Subdivision

Technical Memorandum

Knoxville, Tennessee

Documentation Prepared by:



1155 North Main Street
Waynesville, NC 28786
(P) 828-456-8383



J. Mark Teague, P.E.

December 20, 2022



Figure 1: Site (Poplar Farms) Location (source Knox County GIS)

This Traffic Impact Letter (TIL) includes a project description, an assessment of existing conditions, proposed site access information, and information on trip demand. Based on our fieldwork and capacity analysis, we believe that a development of up to 204 dwelling units will not cause or contribute to a significant decline in traffic operations or safety on the affected roads or at the affected intersections.

EXISTING SITE CONDITIONS

JMTE visited Oak Ridge Highway and West Emory Road on the afternoon of November 16, 2022, and November 21, 2022. The site visits included driving on West Emory Road from the intersection with Oak Ridge Highway to the intersection with Karns Valley Drive. The conditions observed during the site visit are described below.

OAK RIDGE HIGHWAY – Oak Ridge Highway (TN 62) is a publicly maintained, two-lane 24-foot-wide paved highway with a 6-foot paved shoulder with a guardrail on both sides. The posted speed limit near the intersection with West Emory Road is 55 mph. The cross-section, vertical alignment, and horizontal alignment are typical of 2-lane rural, medium-volume, highways in east Tennessee. The condition of the asphalt and the width of the road indicate a medium to high traffic volume.



Figure 1: Site (Poplar Farms) Location (source Knox County GIS)

This Traffic Impact Letter (TIL) includes a project description, an assessment of existing conditions, proposed site access information, and information on trip demand. *Based on our fieldwork and capacity analysis, we believe that the development of up to 204 dwelling units will not cause or contribute to a significant decline in traffic operations or safety on the affected roads or at the affected intersections*

EXISTING SITE CONDITIONS

JMTE visited Oak Ridge Highway and West Emory Road on the afternoon of November 16, 2022, and November 21, 2022. The site visits included driving on West Emory Road from the intersection with Oak Ridge Highway to the intersection with Karns Valley Drive. The conditions observed during the site visit are described below.

OAK RIDGE HIGHWAY – Oak Ridge Highway (TN 62) is a publicly maintained, two-lane 24-foot-wide paved highway with a 6-foot paved shoulder with a guardrail on both sides. The posted speed limit near the intersection with West Emory Road is 55 mph. The cross-section, vertical alignment, and horizontal alignment are typical of 2-lane rural, medium-volume, highways in east Tennessee. The condition of the asphalt and the width of the road indicate a medium to high traffic volume.

The intersection of Oak Ridge Highway and West Emory Road is a 'T' intersection. The intersection is approximately sixty-five (65) feet wide and has no dedicated turn lanes on any approach. West Emory Road is the minor approach and is controlled by a stop sign. Figure 2 and Figure 3 show the intersection of Oak Ridge Highway with West Emory Road. Figure 4 shows the measured sight distances at the intersection of Oak Ridge Highway and West Emory Road. The shortest measured sight distance is nine hundred seventy (970) feet; exceeding AASHTO's recommended sight distance (of 610 feet) by three hundred sixty (360) feet.



Figure 2: Oak Ridge Highway at W. Emory Rd (looking east)



Figure 3: Oak Ridge Highway at W. Emory Rd. (looking west)

WEST EMORY ROAD - Beginning at the intersection with Oak Ridge Highway, West Emory Road is a two-lane paved road approximately three miles in length between Oak Ridge Highway and Karns Valley Drive. The travel way consists of asphalt paving, the width is approximately 20 feet wide near the connection to Oak Ridge Highway narrowing to approximately eighteen (18) feet in width near the proposed Poplar Farm entrances. The grades on

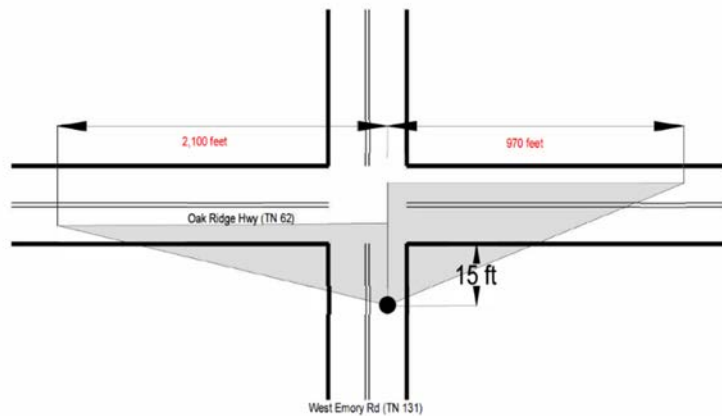


Figure 4: Sight Distance (Oak Ridge Highway & Emory Road)

West Emory Road vary and the terrain is considered rolling, the longitudinal grade near the proposed subdivision entrances is approximately 5.5%. On the north side of the road, the shoulder falls off immediately from the edge of the pavement into the drainage ditch (i.e., there is no recovery area). On the south side of the road, the shoulder is approximately two-feet wide between the edge of the pavement and the top of the embankment. The

posted speed limit is 30 mph (Figure 5). The distance from the intersection of Oak Ridge Highway to the first proposed entrance is approximately 0.8 miles (4,224 feet) and the second entrance is approximately 0.9 miles (4,752 feet) from the intersection of Oak Ridge Highway and West Emory Road. There is a “Hill Blocks View Next 1.2 Miles” sign (Figure 6). Both proposed entrances are within that 1.2 miles.



Figure 5: West Emory Road (Posted Speed Limit)



Figure 6: Hill Blocks View Sign on West Emory Road

KARNS VALLEY DRIVE – Karns Valley Drive is a paved road approximately one mile east from the intersection with Oak Ridge Highway to the intersection with West Emory Road. The three-lane cross-section includes two twelve (12) foot travel lanes separated by a two-way turn lane plus an eight-foot paved shoulder on each side (Figure 7). The posted speed limit for this section of Karns Valley Road is roadway is 45 mph (Figure 8).



Figure 7: Karns Valley Drive at West Emory Road



Figure 8: Karns Valley Drive (Posted Speed Limit)

Figure 10 shows the measured sight distances at the intersection of Karns Valley Drive and West Emory Road. The shortest measured sight distance is seven hundred (700) feet; exceeding AASHTO's recommended sight distance (of 500 feet) by two hundred (200) feet. Figure 10 shows the measured sight distances at the intersection of Oak Ridge Road and Karns Valley Drive. The shortest measured sight

distance is seven hundred seventy (700) feet; exceeding AASHTO’s recommended sight distance (of 610 feet) by ninety (90) feet.

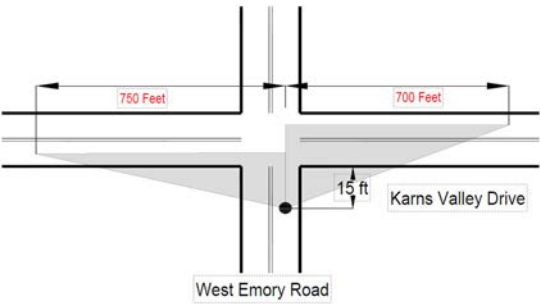


Figure 10: Sight Distance (Karns Valley Drive & West Emory Road)

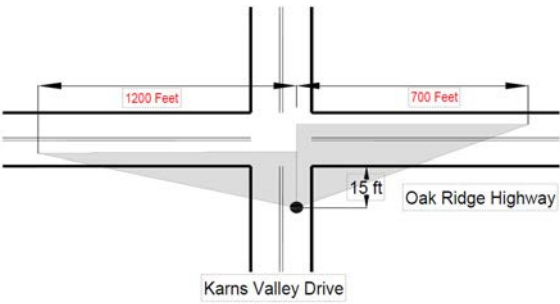


Figure 9: Sight Distance (Oak Ridge Highway & Karns Valley Drive)

Table 1 estimates the existing Level of Service (LOS) for each studied roadway using the Florida Department of Transportation (FDOT) method. The estimated LOS is based on Table 4-3 of the FDOT capacity guidance (See Appendix B). Each studied roadway section is assumed to be a rural uninterrupted two-lane roadway. Using these assumptions all the studied roadways operate at or above LOS C.

Existing Travel Demand

JMTE installed a pneumatic tube volume counter between the two proposed access points. The count began on Wednesday, November 16th at 1 PM and ended Saturday, November 19th at 1 pm. The three-day average daily traffic at that location was 535 vehicles with the AM peak hour being 48 vehicles and the PM peak hour at 79 vehicles. (See attached Appendix A). An equipment failure Sunday, November 20th, 2022, resulted in a shorter-than-expected count.

Figure 11 below shows the location of the Tennessee DOT average daily traffic count stations. Table 1 shows the counts of each location for the year 2021.



Figure 11: TDOT Traffic Count Stations

Table 1 Current Roadway Operating Conditions

Roadway Name	FDOT Class	Count Station ID	Average Daily Traffic	Next FDOT Capacity	Highest Capacity	Level of Service
Oak Ridge Highway	Rural Uninterrupted Flow Highways	47000364	10,611		13,800	C
West Emory Road	Rural Uninterrupted Flow Highways	47000582	818		2,600	A
Karns Valley Drive	Rural Uninterrupted Flow Highways	47000468	7,904		8,600	C

Differences in Travel Demand

JMTE used the *ITE Trip Generation Manual* (11th ed.) to estimate the daily, morning, and afternoon weekday trips for the proposed Development as it is currently zoned (1 dwelling unit per acre) and proposed zoning (3 dwelling units per acre. Table 2 summarized the results of the trip generation calculation. The housing trips for the development are shown below and are based on the proposed 150 single-family detached housing units.

Table 2: Poplar Farms Trip Generation

ITE LUC	Proposed Land Use	Size	Trip Rate	Daily	AM Peak Hour			PM Peak Hour		
					Enter	Exit	Total	Enter	Exit	Total
210	Proposed Zoning	204 DU		1944	37	106	143	122	72	194
	Existing Zoning	68 DU		708	14	38	52	43	26	69
Difference		136 DU		1236	23	68	91	79	46	125

Table 4 estimates the effects of Poplar Farms on the studied roadways. One hundred percent of the trips generated by Poplar Farms are assumed to use West Emory Road. Sixty percent (Table 3) of the trips generated by Poplar Farms are assumed to use Oak Ridge Highway and the remaining forty percent (Table 3) of trips are assumed to use Karns Valley Drive (Figure 12). The trip distribution on West Emory is assumed to be proportional to the traffic volumes in Table 1 and Table 3. This proposed development does not change the trip distribution in this region. The Average Daily Traffic column of Table 1 shows the existing traffic, the added traffic, and the total traffic at build-out. *Comparing Table 1 with Table 4 shows no significant change in the Levels of Service.*

Table 3: Trip Distribution Calculations

Road Name	AADT	Portion	Rounded
Oak Ridge Highway	10,611	0.57	60%
Karns Valley Drive	7,904	0.43	40%
Totals	18,515	1.00	100%

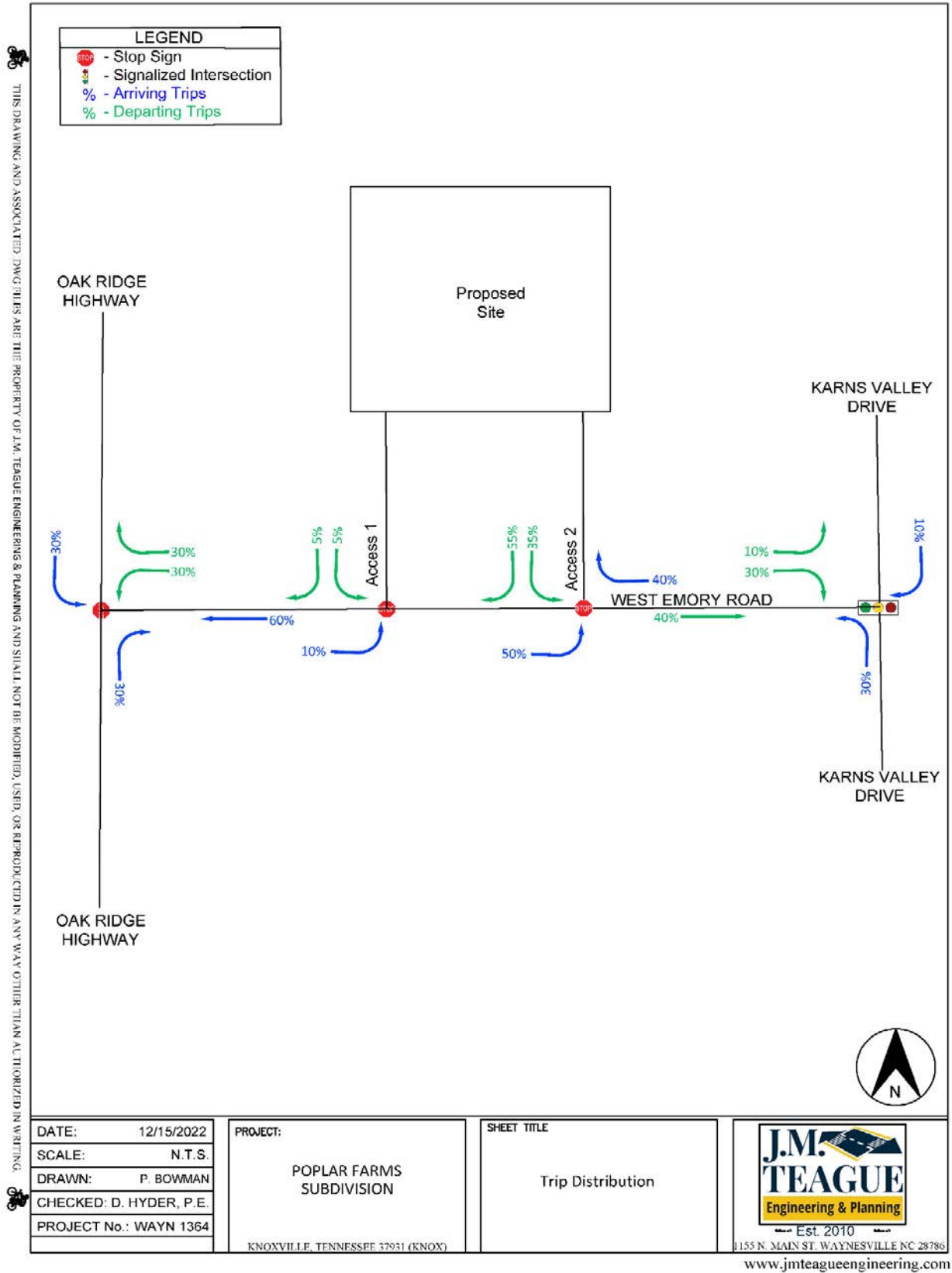


Figure 12: Trip Distribution Diagram

Table 4: Estimated Effect of Poplar Farms on Traffic Operations

Roadway Name	FDOT Class	Count Station ID	Average Daily Traffic		Next Highest FDOT Capacity	Level of Service
Oak Ridge Highway	Rural Uninterrupted Flow Highways	47000364	Existing	10,611	13,800	C
			Added	879		
			Total	11,490		
West Emory Road	Rural Uninterrupted Flow Highways	47000582	Existing	818	2,600	A
			Added	1,465		
			Total	2,283		
Karns Valley Drive	Rural Uninterrupted Flow Highways	47000468	Existing	7,904	8,600	C
			Added	586		
			Total	8,490		

SITE ACCESS

Safe access to and from the roadway is critical in the development process. This section of the TIL addresses sight distance, the need for turn lanes, and the ability of emergency vehicles to access the sight. Figure 13 and Figure 14 are photographs taken at the approximate location of Access 1. Figure 15 and Figure 16 are photographs taken at the approximate location of Access 2.





Figure 15 Access 2 looking northeast



Figure 16 Access 2 looking southwest

Sight Distance

Per the Knoxville-Knox County *Subdivision Regulations* section 3.04.j.5. The minimum required sight distance for a road with a posted speed limit of 35 mph is 350 feet in each direction. During the site visit, JMTE was not able to get an accurate sight distance from the proposed entrances due to the terrain and vegetation. It appears that the sight distance may be acceptable. However, it is the affirmative responsibility of the developer to ensure that sight distance is adequate when construction is complete.

Turn lane Warrant

The Knox County Department of Engineering and Public Works handbook, “*Access Control and Driveway Design Policy*,” was used to determine if a northbound left turn lane or a southbound right turn lane is warranted at either of the proposed entrances. With an AM peak of 48 vehicles per hour (vph) and a PM peak of 79 vph, turn lanes are not warranted at either proposed driveway connection. (See Table 5). The red block indicates where these unwarranted values fall.

Table 5: Knox County Left Turns Thresholds for 2-lane Roads (source Knox County)

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

Emergency Access

Emergency access will be available through the intersection of Oak Ridge Highway and West Emory Road. The width and condition of West Emory Road at the proposed access point would not hamper emergency vehicle access to the site. The National Fire Protection Association's Brian O'Connor summarizes the needed fire access requirements at <https://www.nfpa.org/News-and-Research/Publications-and-media/Blogs-Landing-Page/NFPA-Today/Blog-Posts/2021/01/08/Fire-Apparatus-Access-Roads> Fire Departments need 20 feet of unobstructed width and 13.5 feet of vertical clearance.

Appendix D of the 2012 *International Fire Code* requires multiple-family residential projects having more than 100 dwelling units to be equipped with two separate and approved fire access roads. The code also requires these roads to be spaced not less than one-half the length of the longest diagonal dimension of the area to be served. If the developer cannot meet the spacing requirement Appendix D provides for other methods to ensure the safety of lives and property.

CRASH HISTORY

Knox County staff did not require crash history.

OTHER CONDITIONS

Knox County staff reported no special considerations.

CONCLUSION

Poplar Farms Subdivision will cause no significant deterioration of Oak Ridge Highway, West Emory Road, or Karns Valley Drive. Oak Ridge Highway operates at LOS C, West Emory Road operates at LOC A and Karns Valley Drive operates at LOS C. After the construction of the proposed Poplar Farms Subdivision,




it is expected that the Levels of Service on all studied roadways will maintain the same LOS. The sight distances at the existing intersections are adequate. The sight distance at the proposed intersections could not be evaluated because of the terrain and vegetation. The developer will be responsible for achieving the required sight distance from both proposed entrances and getting approval for these entrances from Knox County. The developer is also responsible for ensuring proper stem length to prevent blockage of internal intersections.

APPENDIX B: SYNCHRO AND SIM TRAFFIC

5: W Emory Rd & Access 1
Build-Out AM

Timing Plan: Year 2025

02/21/2023

Intersection						
Int Delay, s/veh	7.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	56	21	7	0	0	19
Future Vol, veh/h	56	21	7	0	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	62	23	8	0	0	21
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	27	11	21	0	-	0
Stage 1	11	-	-	-	-	-
Stage 2	16	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	988	1070	1595	-	-	-
Stage 1	1012	-	-	-	-	-
Stage 2	1007	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	983	1070	1595	-	-	-
Mov Cap-2 Maneuver	983	-	-	-	-	-
Stage 1	1007	-	-	-	-	-
Stage 2	1007	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	8.9	7.3		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1595	-	1005	-	-	
HCM Lane V/C Ratio	0.005	-	0.085	-	-	
HCM Control Delay (s)	7.3	0	8.9	-	-	
HCM Lane LOS	A	A	A	-	-	
HCM 95th %tile Q(veh)	0	-	0.3	-	-	




5: W Emory Rd & Access 1
Build-Out PM

Timing Plan: Year 2025

02/21/2023

Intersection

Int Delay, s/veh 4.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	37	14	24	0	0	64
Future Vol, veh/h	37	14	24	0	0	64
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	41	16	27	0	0	71

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	90	36	71
Stage 1	36	-	-
Stage 2	54	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	910	1037	1529
Stage 1	986	-	-
Stage 2	969	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	894	1037	1529
Mov Cap-2 Maneuver	894	-	-
Stage 1	968	-	-
Stage 2	969	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.1	7.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1529	-	929	-	-
HCM Lane V/C Ratio	0.017	-	0.061	-	-
HCM Control Delay (s)	7.4	0	9.1	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection: 5: W Emory Rd & Access 1

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	60	18
Average Queue (ft)	30	1
95th Queue (ft)	53	8
Link Distance (ft)	1107	384
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: W Emory Rd & Access 1

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	59	35
Average Queue (ft)	28	3
95th Queue (ft)	51	18
Link Distance (ft)	1107	384
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

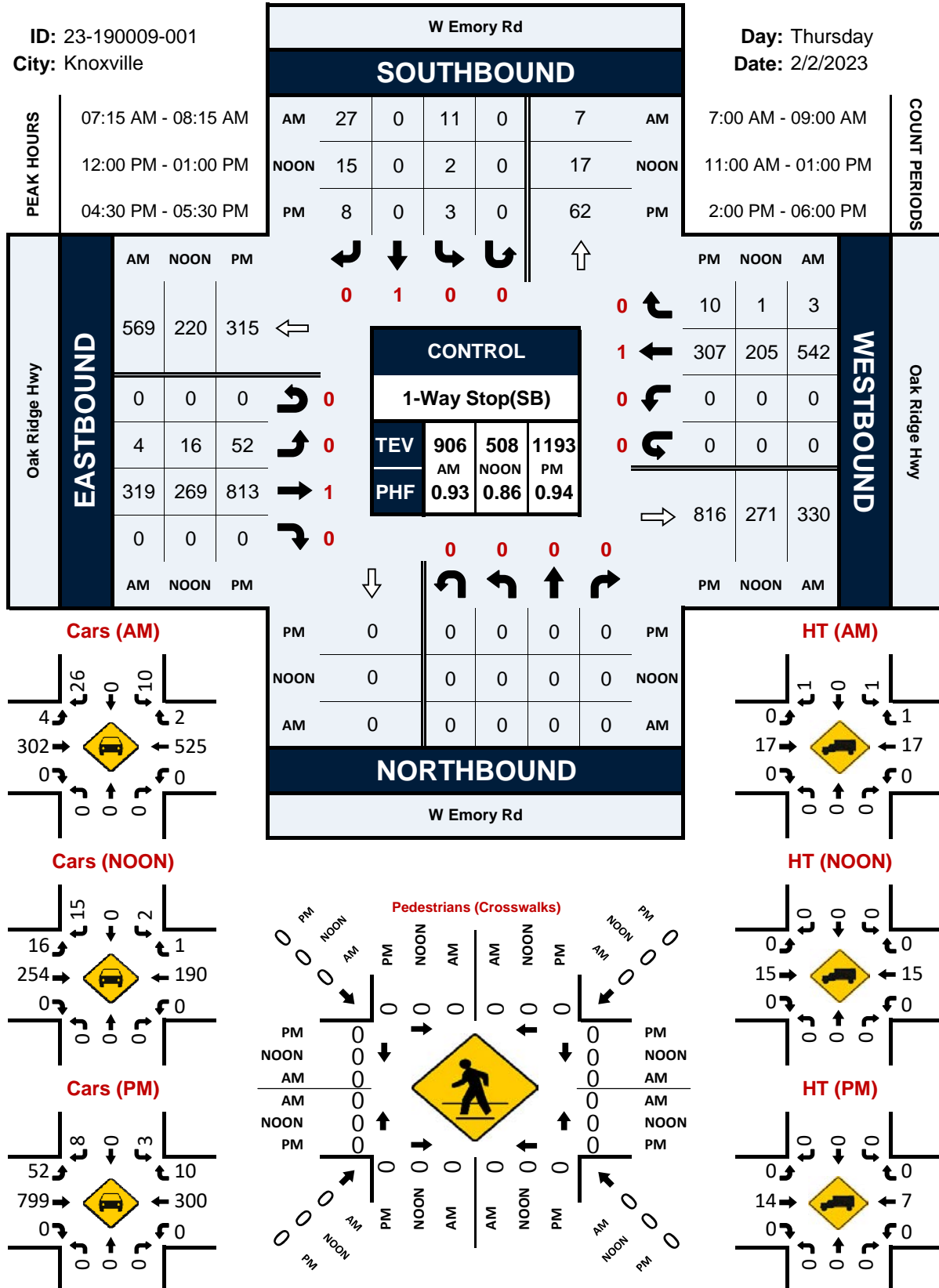
APPENDIX C: TURNING MOVEMENT COUNTS

W Emory Rd & Oak Ridge Hwy

Peak Hour Turning Movement Count

ID: 23-190009-001
City: Knoxville

Day: Thursday
Date: 2/2/2023

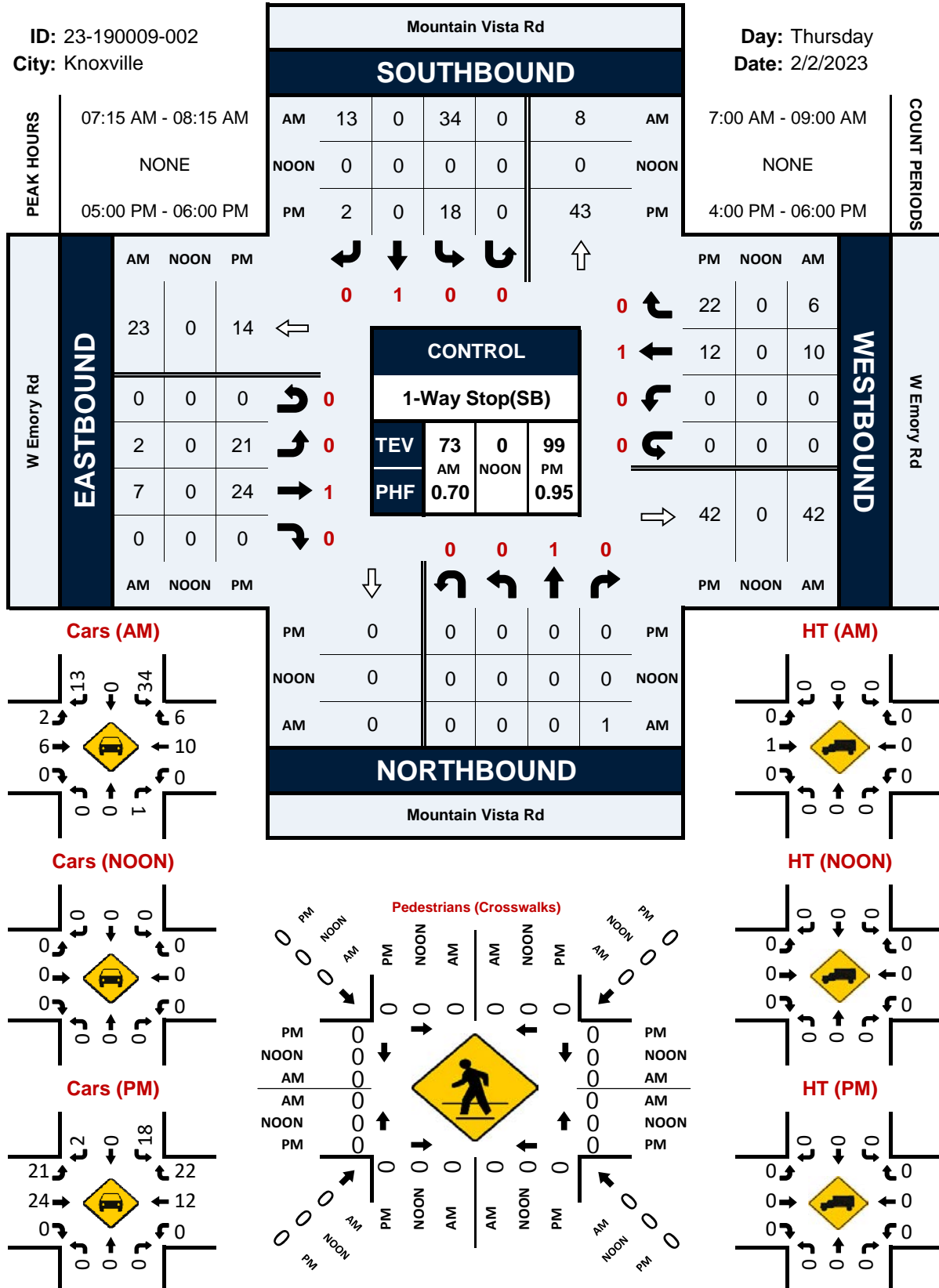


Mountain Vista Rd & W Emory Rd

Peak Hour Turning Movement Count

ID: 23-190009-002
City: Knoxville

Day: Thursday
Date: 2/2/2023

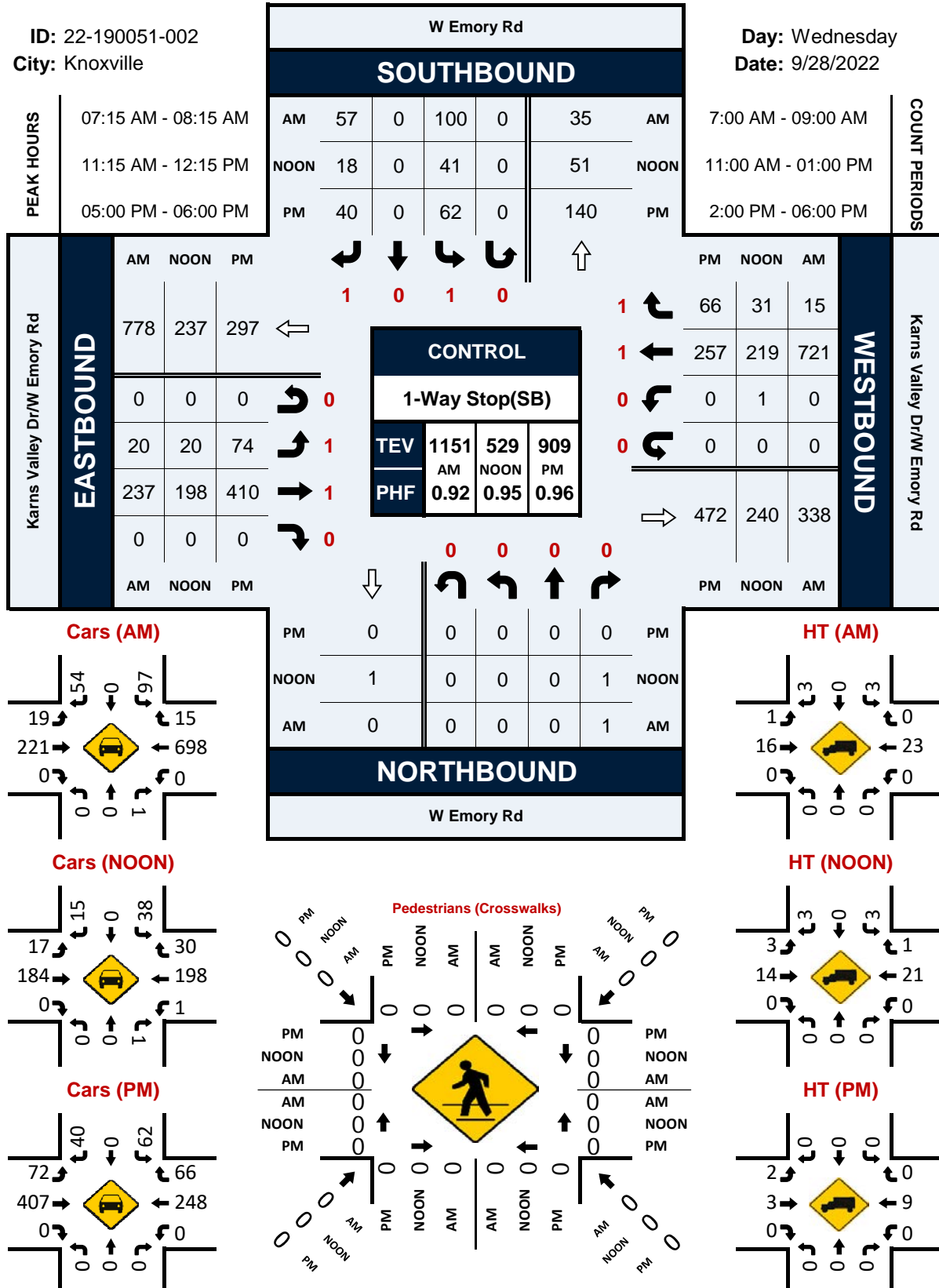


W Emory Rd & Karns Valley Dr/W Emory Rd

Peak Hour Turning Movement Count

ID: 22-190051-002
City: Knoxville

Day: Wednesday
Date: 9/28/2022

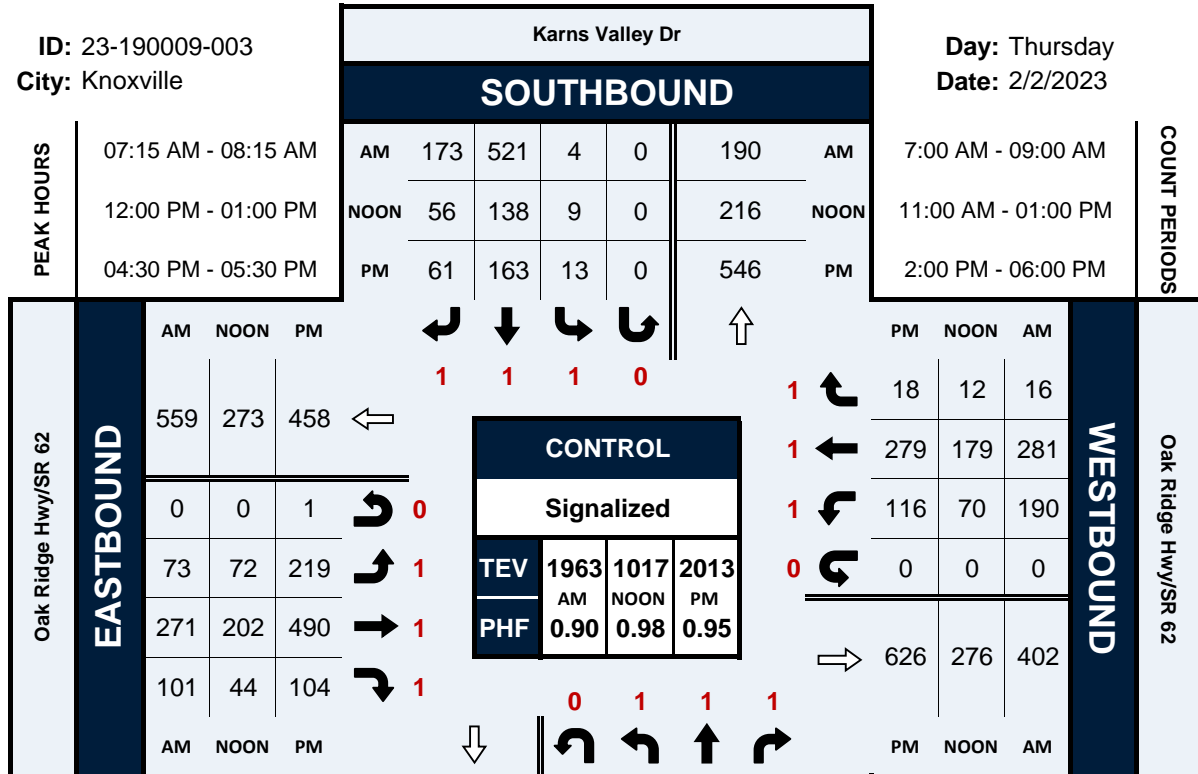


Karns Valley Dr & Oak Ridge Hwy/SR 62

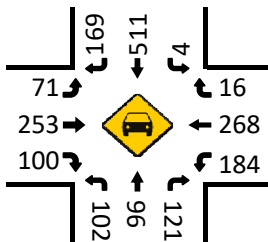
Peak Hour Turning Movement Count

ID: 23-190009-003
City: Knoxville

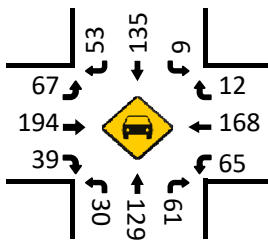
Day: Thursday
Date: 2/2/2023



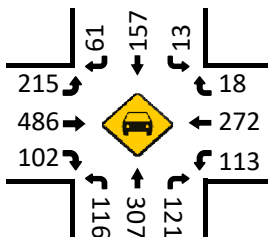
Cars (AM)



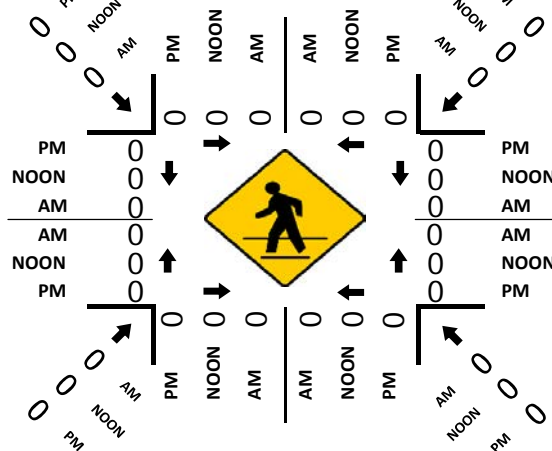
Cars (NOON)



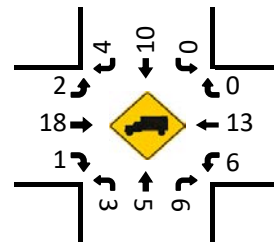
Cars (PM)



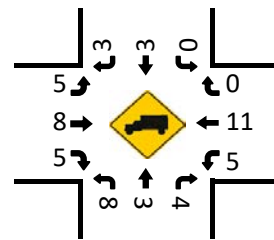
Pedestrians (Crosswalks)



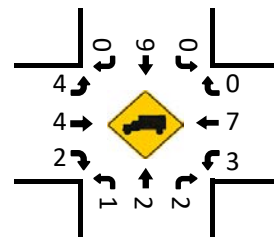
HT (AM)



HT (NOON)



HT (PM)



Daily Vehicle Volume Report

Study Date: Wednesday, 11/16/2022 / Thursday, 11/17/2022

Unit ID: 0453

Location: WAYN 1364

	Southbound Volume	Northbound Volume	Total Volume
13:00 - 13:59	12	11	23
14:00 - 14:59	27	22	49
15:00 - 15:59	16	23	39
16:00 - 16:59	8	25	33
17:00 - 17:59	10	53	63
18:00 - 18:59	20	63	83
19:00 - 19:59	8	25	33
20:00 - 20:59	6	21	27
21:00 - 21:59	5	14	19
22:00 - 22:59	9	7	16
23:00 - 23:59	1	3	4
00:00 - 00:59	3	7	10
01:00 - 01:59	2	2	4
02:00 - 02:59	0	0	0
03:00 - 03:59	0	2	2
04:00 - 04:59	1	0	1
05:00 - 05:59	8	0	8
06:00 - 06:59	16	1	17
07:00 - 07:59	24	3	27
08:00 - 08:59	49	12	61
09:00 - 09:59	35	12	47
10:00 - 10:59	23	14	37
11:00 - 11:59	15	21	36
12:00 - 12:59	17	15	32
Totals	315	356	671
AM Peak Time	08:22 - 09:21	10:59 - 11:58	08:24 - 09:23
AM Peak Volume	58	21	75
PM Peak Time	14:08 - 15:07	17:29 - 18:28	17:33 - 18:32
PM Peak Volume	28	73	91

Daily Vehicle Volume Report

Study Date: Thursday, 11/17/2022 / Friday, 11/18/2022

Unit ID: 0453

Location: WAYN 1364

	Southbound Volume	Northbound Volume	Total Volume
13:00 - 13:59	15	18	33
14:00 - 14:59	15	26	41
15:00 - 15:59	18	24	42
16:00 - 16:59	14	36	50
17:00 - 17:59	11	57	68
18:00 - 18:59	18	63	81
19:00 - 19:59	7	23	30
20:00 - 20:59	3	24	27
21:00 - 21:59	5	11	16
22:00 - 22:59	4	8	12
23:00 - 23:59	0	2	2
00:00 - 00:59	0	4	4
01:00 - 01:59	1	1	2
02:00 - 02:59	0	0	0
03:00 - 03:59	0	2	2
04:00 - 04:59	3	0	3
05:00 - 05:59	7	0	7
06:00 - 06:59	7	2	9
07:00 - 07:59	17	4	21
08:00 - 08:59	36	6	42
09:00 - 09:59	14	11	25
10:00 - 10:59	17	9	26
11:00 - 11:59	20	12	32
12:00 - 12:59	15	18	33
Totals	247	361	608
AM Peak Time	07:43 - 08:42	10:41 - 11:40	08:03 - 09:02
AM Peak Volume	38	13	45
PM Peak Time	14:17 - 15:16	17:37 - 18:36	17:37 - 18:36
PM Peak Volume	22	74	89

Daily Vehicle Volume Report

Study Date: Friday, 11/18/2022 / Saturday, 11/19/2022

Unit ID: 0453

Location: WAYN 1364

	Southbound Volume	Northbound Volume	Total Volume
13:00 - 13:59	7	10	17
14:00 - 14:59	13	6	19
15:00 - 15:59	15	6	21
16:00 - 16:59	18	0	18
17:00 - 17:59	18	16	34
18:00 - 18:59	11	33	44
19:00 - 19:59	15	18	33
20:00 - 20:59	7	4	11
21:00 - 21:59	4	0	4
22:00 - 22:59	5	0	5
23:00 - 23:59	3	0	3
00:00 - 00:59	4	3	7
01:00 - 01:59	0	0	0
02:00 - 02:59	0	1	1
03:00 - 03:59	0	0	0
04:00 - 04:59	1	0	1
05:00 - 05:59	2	0	2
06:00 - 06:59	8	3	11
07:00 - 07:59	4	0	4
08:00 - 08:59	12	2	14
09:00 - 09:59	17	2	19
10:00 - 10:59	17	2	19
11:00 - 11:59	18	3	21
12:00 - 12:59	19	0	19
Totals	218	109	327
AM Peak Time	09:31 - 10:30	00:00 - 00:59	09:12 - 10:11
AM Peak Volume	22	3	23
PM Peak Time	16:29 - 17:28	17:46 - 18:45	17:46 - 18:45
PM Peak Volume	21	40	56

APPENDIX D: SYSTEM REFERENCE

AM: 12 through Vehicles and 60 opposing vehicles (not on chart)
 PM: 65 through Vehicles and 89 opposing vehicles (not on chart)

Table 4A. Left-Turn Lane Volume Thresholds
 For Two-Lane Roadways with a Prevailing Speed of 35 MPH or Less

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

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

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

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

Table 4B. Right-Turn Lane Volume Thresholds
For Two-Lane Roadways with a Prevailing Speed of 35 MPH or Less

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME*					
	<100	100 -199	200 - 249	250 -299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99	AM: 41 Thru 19 Right PM: 25 Thru 64 Right					
100 - 149 150 - 199						
200 - 249 250 - 299						Yes
300 - 349 350 - 399				Yes	Yes Yes	Yes Yes
400 - 449 450 - 499			Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

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

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