



February 3, 2021

Ms. Tarren Barrett
Knoxville-Knox County Planning
400 Main St, Suite 403
Knoxville, TN 37902

Re: Traffic Letter for 12041 Hardin Valley Road Subdivision

Dear Ms. Barrett:

12041 Hardin Valley Road Subdivision is located between the intersection of Mission Hill Lane and Marietta Church Road on Hardin Valley Road in Knox County, Tennessee. The development will include approximately 24 single family lots and have a single driveway connection to Hardin Valley Road. Construction is proposed to take place this year and this analysis assumes full build out for the development will occur in 2024.

The purpose of this traffic analysis is to evaluate the driveway access to Hardin Valley Road and determine the need for exclusive turn lanes.

Hardin Valley Road at the intersection of Mission Hill Lane is a two-lane road. The Knoxville-Knox County Planning Commission classifies Hardin Valley Road as a Minor Arterial with a 70 feet right-of-way per the Major Road Plan. The posted speed limit on Hardin Valley Road is 40 mph. Hardin Valley Road in this area is relatively flat with a less than 1% grade between Mission Hill Lane and Marietta Church Road and there are no existing sidewalks or designated bike lanes in the vicinity of the proposed development. An aerial photo of the property is included in the attachments.

Due to the altered traffic patterns from COVID-19 FMA did not collect any new turning movement counts. Ajax Engineering conducted a peak hour turning movement count at the intersection of Hardin Valley Road at Marietta Church Road on Tuesday November 1, 2016 from 7:00 a.m. to 9:00 a.m. and from 2:00 p.m. to 6:00 p.m. The AM peak hour at this intersection occurred between 7:15 a.m. and 8:15 a.m. and the PM peak hour occurred between 5:00 p.m. and 6:00 p.m.

In order to calculate existing traffic conditions FMA estimated the growth rate from the 2016 turning movement count to the projected existing 2021 traffic conditions. The growth rate was determined by analyzing nearby traffic counts provided by the Knoxville Regional Transportation Planning Organization or TPO in the vicinity of the proposed development. FMA assumed an average growth rate of 10% for the intersection of Hardin Valley Road at Marietta Church Road. Figure 1: 2021 Existing Peak Hour Traffic, the ADT trend line growth charts and the count data collected are included in the attachments.

The Knoxville Regional TPO maintains count stations in the vicinity of the proposed development. TPO count station ID: 093M353 is located on Hardin Valley Road east of Marietta Church Road and TPO count station ID: 093M275 is located on Marietta Church Road south of Hardin Valley Road. The annual growth rate for station ID: 093M353 between 2006 and 2019 is approximately 10.11% and the 2019 ADT was 6,920 vehicles per day. The annual growth rate for station ID: 093M275 between 2005 and 2019 is approximately 7.30% and the 2019 ADT was 2,050 vehicles per day. For the purpose of this study, an annual growth rate of 10% was assumed for traffic at the intersection of Hardin Valley Road at Marietta Church Road until full occupancy is reached in 2024. Figure 2: 2024 Background Peak Hour Traffic is included in the attachments.

The trip generation was calculated using the fitted curve equations where provided from *Trip Generation, 10th Edition*, published by the Institute of Transportation Engineers. Single-Family Detached Housing or Land Use 210 was used to calculate the daily trips, AM and PM peak hour trips. The land use worksheets are included in the attachments. A trip generation summary is shown in Table 1 – Trip Generation Summary.

**Table 1 - Trip Generation Summary
 12041 Hardin Valley Road Subdivision**

| Land Use | Density | Daily Trips | AM Peak Hour | | PM Peak Hour | |
|--|---------|-------------|--------------|------|--------------|------|
| | | | Enter | Exit | Enter | Exit |
| Single-Family Detached Housing (LUC 210) | 24 Lots | 280 | 6 | 17 | 16 | 10 |

The total number of new trips generated by the 12041 Hardin Valley Road Subdivision will be 280 new daily trips, 23 trips during the AM peak hour and 26 trips during the PM peak hour.

Hardin Valley Road at the intersection with the proposed driveway has an existing trip distribution of 70% eastbound and 30% westbound during the AM peak hour and 40% eastbound and 60% westbound during the PM peak hour. FMA assumed that 85% of traffic would enter/exit from the direction of Pellissippi Parkway (SR 62) during both the AM and PM peak hours. Figure 3: Peak Hour Site Traffic and Figure 4: Full Buildout Peak Hour Traffic are included in the attachments.

Unsignalized intersection capacity analyses were performed using the Highway Capacity Software (HCS7) for the AM and PM peak hours to evaluate the traffic conditions at the intersection of Hardin Valley Road at the proposed driveway connection. After the completion of the subdivision the full buildout traffic conditions for the eastbound approach (Hardin Valley Road) operate at a LOS A during both the AM and PM peak hours and the southbound approach (driveway) operates at a LOS C during both the AM and PM peak hours. The HCS7 worksheets are included in the attachments.

The Knox County Department of Engineering and Public Works handbook, "Access Control and Driveway Design Policy," was used to determine if a right turn lane or left turn is warranted at the intersection of Hardin Valley Road at the proposed driveway connection. Due to the relatively low traffic entering and exiting the subdivision no turn lane warrants are met for either the AM or PM peak hour conditions. The turn lane worksheets and analysis are included in the attachments.

Hardin Valley Road is classified as a Minor Arterial per the Major Road Plan. The minimum intersection spacing required on an arterial is 400 feet per the "Knoxville-Knox County Subdivision Regulations" as amended through February 13, 2020. In order to meet the minimum required intersection spacing the proposed driveway connection will need to be located greater than 400 feet east of Marietta Church Road and greater than 400 feet west of Mission Hill Lane. In the event that the proposed driveway location does not meet the minimum requirement a variance can be requested and will need to be reviewed by the Knoxville-Knox County Planning Commission.

The minimum required sight distance for a road with a posted speed limit of 40 mph is 400 feet in each direction in accordance with the "Knoxville-Knox County Subdivision Regulations" amended through February 13, 2020. FMA recommends that the sight distance at the proposed intersection of Hardin Valley Road at the driveway connection be measured at 15 feet from the edge of pavement looking both eastbound and westbound in order to ensure that the proposed driveway location meets the minimum required sight distance per the subdivision regulations.

I hope that this is helpful. Please contact me if you have any questions.

Thank you,



Addie Kirkham, P.E.

Enclosure: Attachments

Attachments

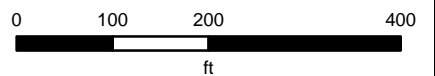


12041 Hardin Valley Road

Knoxville - Knox County - KUB Geographic Information System



Printed: 1/25/2021 at 11:58:14 AM



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TRAFFIC COUNT DATA

Major Street: Hardin Valley Road (EB-WB)
 Minor Street: Marietta Church Road (NB)
 Traffic Control: Stop Control on Minor Street

11/1/2016 (Tuesday)
 Warm/Sunny
 Conducted by: Ajax Engineering

Primary Movement Vehicles

| TIME BEGIN | WESTBOUND | | NORTHBOUND | | EASTBOUND | | VEHICLE TOTAL | PEAK HOUR |
|---------------|-----------|------|------------|-----|-----------|----|------------------|-------------------|
| | LT | THRU | LT | RT | THRU | RT | | |
| 7:00 AM | 4 | 13 | 2 | 17 | 36 | 1 | 93 | |
| 7:15 AM | 3 | 26 | 3 | 15 | 85 | 2 | 134 | 7:15 AM - 8:15 AM |
| 7:30 AM | 9 | 31 | 4 | 17 | 78 | 5 | 144 | |
| 7:45 AM | 7 | 26 | 3 | 23 | 54 | 3 | 116 | |
| 8:00 AM | 5 | 36 | 0 | 25 | 66 | 2 | 134 | |
| 8:15 AM | 6 | 35 | 2 | 19 | 50 | 1 | 113 | |
| 8:30 AM | 4 | 44 | 2 | 18 | 45 | 2 | 115 | |
| 8:45 AM | 3 | 20 | 1 | 10 | 52 | 1 | 87 | |
| TOTAL | 41 | 231 | 17 | 144 | 486 | 17 | 936 | |
| ----- | | | | | | | | |
| 2:00 PM | 11 | 41 | 5 | 5 | 32 | 1 | 95 | |
| 2:15 PM | 4 | 40 | 2 | 5 | 25 | 2 | 78 | |
| 2:30 PM | 5 | 27 | 5 | 5 | 38 | 2 | 82 | |
| 2:45 PM | 13 | 45 | 3 | 2 | 45 | 0 | 108 | |
| 3:00 PM | 13 | 40 | 4 | 10 | 28 | 3 | 96 | |
| 3:15 PM | 6 | 39 | 2 | 6 | 40 | 0 | 93 | |
| 3:30 PM | 16 | 36 | 7 | 8 | 25 | 2 | 96 | |
| 3:45 PM | 24 | 35 | 4 | 4 | 31 | 2 | 120 | |
| 4:00 PM | 14 | 42 | 3 | 3 | 28 | 6 | 96 | |
| 4:15 PM | 9 | 54 | 2 | 6 | 31 | 2 | 104 | |
| 4:30 PM | 9 | 48 | 3 | 6 | 37 | 7 | 110 | |
| 4:45 PM | 7 | 61 | 6 | 6 | 35 | 2 | 117 | |
| 5:00 PM | 13 | 60 | 2 | 19 | 37 | 3 | 134 | 5:00 PM - 6:00 PM |
| 5:15 PM | 16 | 66 | 5 | 17 | 46 | 0 | 150 | |
| 5:30 PM | 14 | 55 | 7 | 6 | 44 | 5 | 131 | |
| 5:45 PM | 12 | 72 | 5 | 9 | 43 | 2 | 143 | |
| TOTAL | 186 | 783 | 65 | 117 | 565 | 39 | 1755 | |

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

| TIME BEGIN | WESTBOUND | | NORTHBOUND | | EASTBOUND | |
|---------------|-----------|------|------------|------|-----------|------|
| | LT | THRU | LT | RT | THRU | RT |
| 7:15 AM | 3 | 26 | 3 | 15 | 85 | 2 |
| 7:30 AM | 9 | 31 | 4 | 17 | 78 | 5 |
| 7:45 AM | 7 | 26 | 3 | 23 | 54 | 3 |
| 8:00 AM | 5 | 36 | 0 | 25 | 66 | 2 |
| TOTAL | 24 | 119 | 10 | 80 | 283 | 12 |
| PHF | 0.67 | 0.53 | 0.63 | 0.80 | 0.83 | 0.60 |

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

| TIME BEGIN | WESTBOUND | | NORTHBOUND | | EASTBOUND | |
|---------------|-----------|------|------------|------|-----------|------|
| | LT | THRU | LT | RT | THRU | RT |
| 5:00 PM | 13 | 60 | 2 | 19 | 37 | 3 |
| 5:15 PM | 16 | 66 | 5 | 17 | 46 | 0 |
| 5:30 PM | 14 | 55 | 7 | 6 | 44 | 5 |
| 5:45 PM | 12 | 72 | 5 | 9 | 43 | 2 |
| TOTAL | 55 | 253 | 19 | 51 | 170 | 10 |
| PHF | 0.86 | 0.88 | 0.63 | 0.67 | 0.92 | 0.50 |

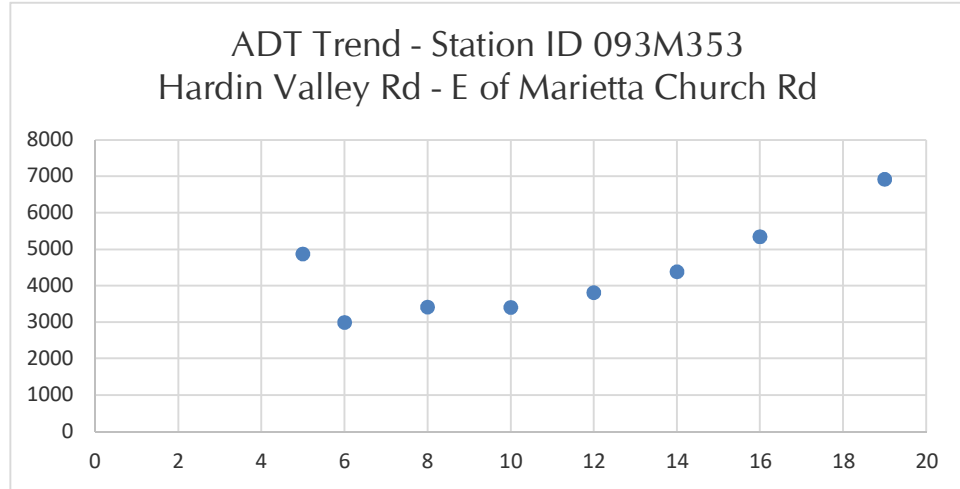
Project: 12041 Hardin Valley Road Subdivision
Intersection: Hardin Valley Road at Marietta Church Road
Date Conducted: 11/01/2016

| | | |
|--------------|-------------------|-----|
| AM Peak Hour | 7:15 AM - 8:15 AM | 528 |
| PM Peak Hour | 5:00 PM - 6:00 PM | 558 |

| Start | Hardin Valley Road Eastbound | | | Hardin Valley Road Westbound | | | Marietta Church Road Northbound | | | Int. Total |
|--|------------------------------|-------|-------|------------------------------|-----------|-------|---------------------------------|-----------|-------|------------|
| | Thru | Right | Total | Left | Thru | Total | Left | Right | Total | |
| Peak Hour Analysis from 7:00 AM to 9:00 AM | | | | | | | | | | |
| AM Peak Hour begins at 7:15 AM | | | | | | | | | | |
| 7:15 AM | 85 | 2 | 87 | 3 | 26 | 29 | 3 | 15 | 18 | 134 |
| 7:30 AM | 78 | 5 | 83 | 9 | 31 | 40 | 4 | 17 | 21 | 144 |
| 7:45 AM | 54 | 3 | 57 | 7 | 26 | 33 | 3 | 23 | 26 | 116 |
| 8:00 AM | 66 | 2 | 68 | 5 | 36 | 41 | 0 | 25 | 25 | 134 |
| Total Volume | 283 | 12 | 295 | 24 | 119 | 143 | 10 | 80 | 90 | 528 |
| Existing (10% over 5 yrs) | 456 | 19 | | 39 | 192 | | 16 | 129 | | 850 |
| Future (10% over 8 yrs) | 607 | 26 | | 51 | 255 | | 21 | 171 | | 1132 |
| PHF | 0.83 | 0.60 | | 0.67 | 0.83 | | 0.63 | 0.80 | | 0.92 |

| | | | | | | | | | | |
|--|-----------|------|-----|-----------|-----------|-----|------|-----------|----|------------|
| Peak Hour Analysis from 4:00 PM to 6:00 PM | | | | | | | | | | |
| PM Peak Hour begins at 5:00 PM | | | | | | | | | | |
| 5:00 PM | 37 | 3 | 40 | 13 | 60 | 73 | 2 | 19 | 21 | 134 |
| 5:15 PM | 46 | 0 | 46 | 16 | 66 | 82 | 5 | 17 | 22 | 150 |
| 5:30 PM | 44 | 5 | 49 | 14 | 55 | 69 | 7 | 6 | 13 | 131 |
| 5:45 PM | 43 | 2 | 45 | 12 | 72 | 84 | 5 | 9 | 14 | 143 |
| Total Volume | 170 | 10 | 180 | 55 | 253 | 308 | 19 | 51 | 70 | 558 |
| Existing (10% over 5 yrs) | 274 | 16 | | 89 | 407 | | 31 | 82 | | 899 |
| Future (10% over 8 yrs) | 364 | 21 | | 118 | 542 | | 41 | 109 | | 1196 |
| PHF | 0.92 | 0.50 | | 0.86 | 0.88 | | 0.68 | 0.67 | | 0.93 |

| Year | Adjusted Average Daily Traffic |
|------|--------------------------------------|
| 2001 | |
| 2002 | |
| 2003 | |
| 2004 | |
| 2005 | 4871 |
| 2006 | 2990 |
| 2007 | |
| 2008 | 3410 |
| 2009 | |
| 2010 | 3400 |
| 2011 | |
| 2012 | 3810 |
| 2013 | |
| 2014 | 4380 |
| 2015 | |
| 2016 | 5340 |
| 2017 | |
| 2018 | |
| 2019 | 6920 |

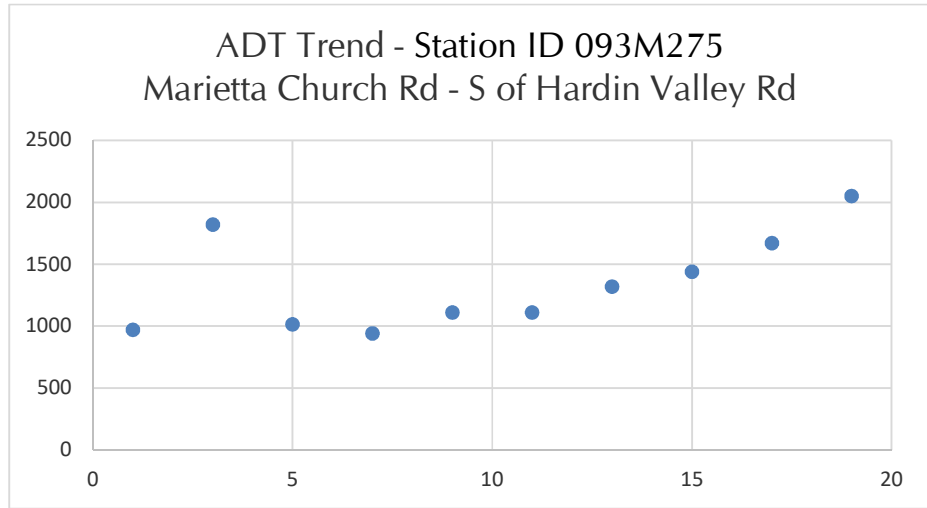


Most Recent Trend Line Growth

| Year | ADT |
|------|------|
| 2006 | 2990 |
| 2019 | 6920 |

Annual Percent Growth 10.11%

| Year | Adjusted Average Daily Traffic |
|------|--------------------------------|
| 2001 | 970 |
| 2002 | 1820 |
| 2003 | 1014 |
| 2004 | 940 |
| 2005 | 1110 |
| 2006 | 1110 |
| 2007 | 1320 |
| 2008 | 1440 |
| 2009 | 1670 |
| 2010 | 2050 |
| 2011 | |
| 2012 | |
| 2013 | |
| 2014 | |
| 2015 | |
| 2016 | |
| 2017 | |
| 2018 | |
| 2019 | |

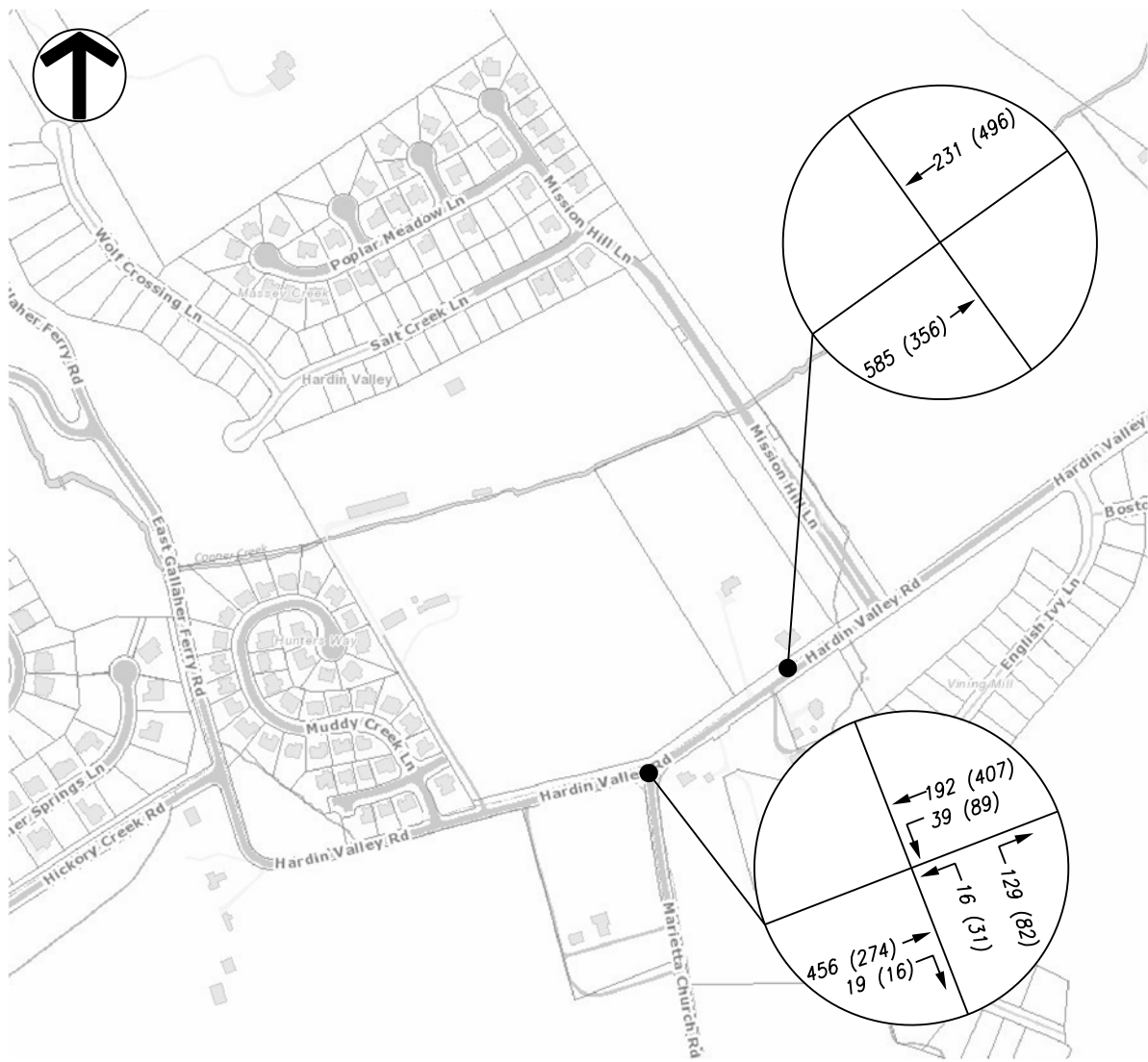


Most Recent Trend Line Growth

| Year | ADT |
|------|------|
| 2005 | 1014 |
| 2019 | 2050 |

Annual Percent Growth 7.30%

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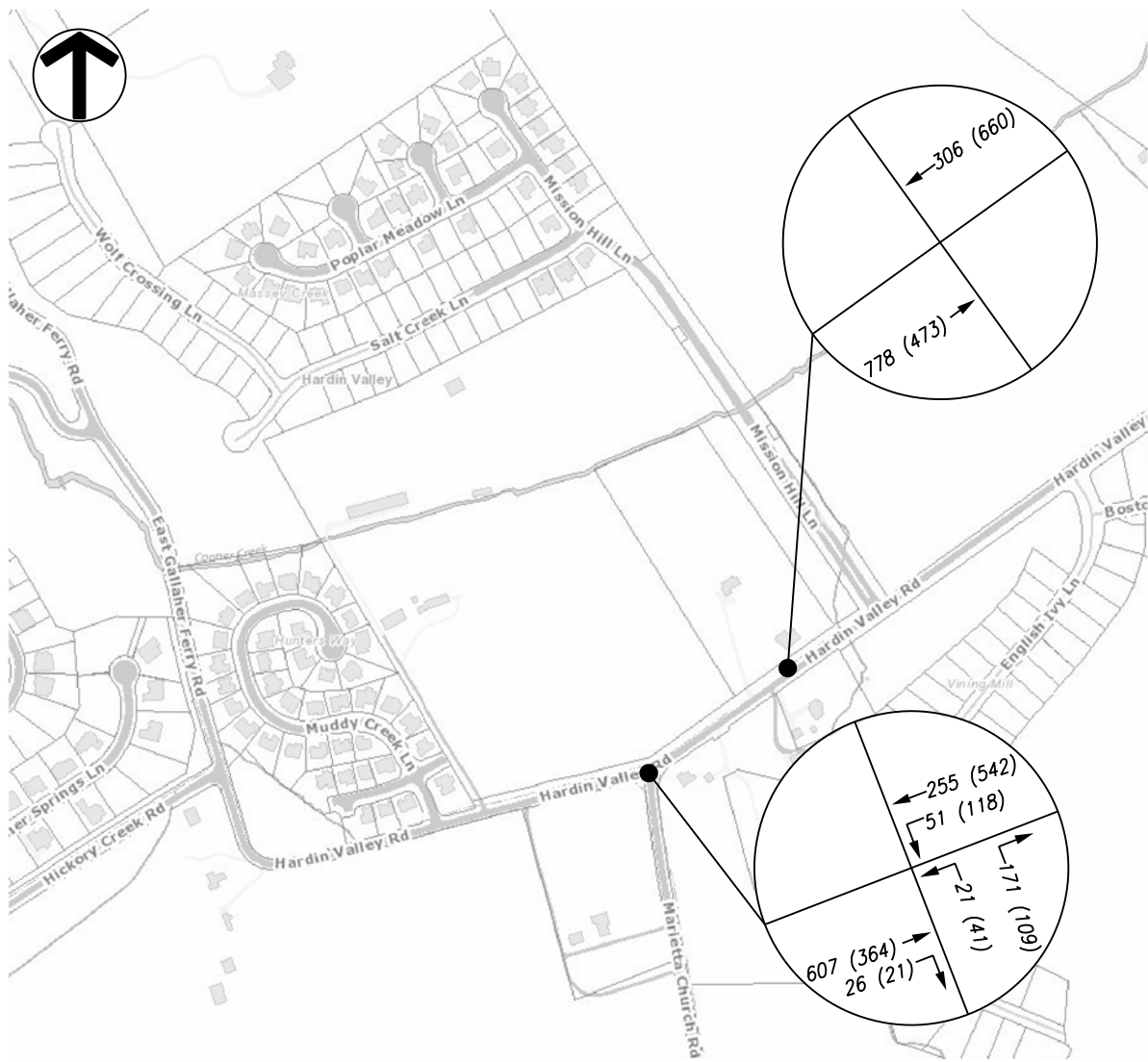


LEGEND:

← X (23) TURNING MOVEMENT VOLUME AM (PM)

Figure 1: 2021 Existing Peak Hour Traffic

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LEGEND:

← X (23) TURNING MOVEMENT VOLUME AM (PM)

Figure 2: 2024 Background Peak Hour Traffic

Trip Generation

Project: 12041 Hardin Valley Subdivision

Date Conducted: 1/25/2021

Single-Family Detached Housing (LUC 210)

24 Single Family Lots

Average Daily Traffic

$$\ln(T) = 0.92\ln(X) + 2.71$$

$$\ln(T) = 0.92\ln(24) + 2.71$$

$$T = 280$$

Peak Hour of Adjacent Street Traffic

One Hour Between 7 and 9 a.m.

$$T = 0.71(X) + 4.80$$

$$T = 0.71(24) + 4.80$$

$$T = 22$$

Peak Hour of Adjacent Street Traffic

One Hour Between 4 and 6 p.m.

$$\ln(T) = 0.96\ln(X) + 0.20$$

$$\ln(T) = 0.96\ln(24) + 0.20$$

$$T = 26$$

| Time Period | Total Trips | Percent | | Number | |
|--------------------|-------------|---------|------|--------|------|
| | | Enter | Exit | Enter | Exit |
| Weekday (24 hours) | 280 | 50% | 50% | 140 | 140 |
| AM Peak Hour | 22 | 25% | 75% | 6 | 17 |
| PM Peak Hour | 26 | 63% | 37% | 16 | 10 |

Single-Family Detached Housing (210)

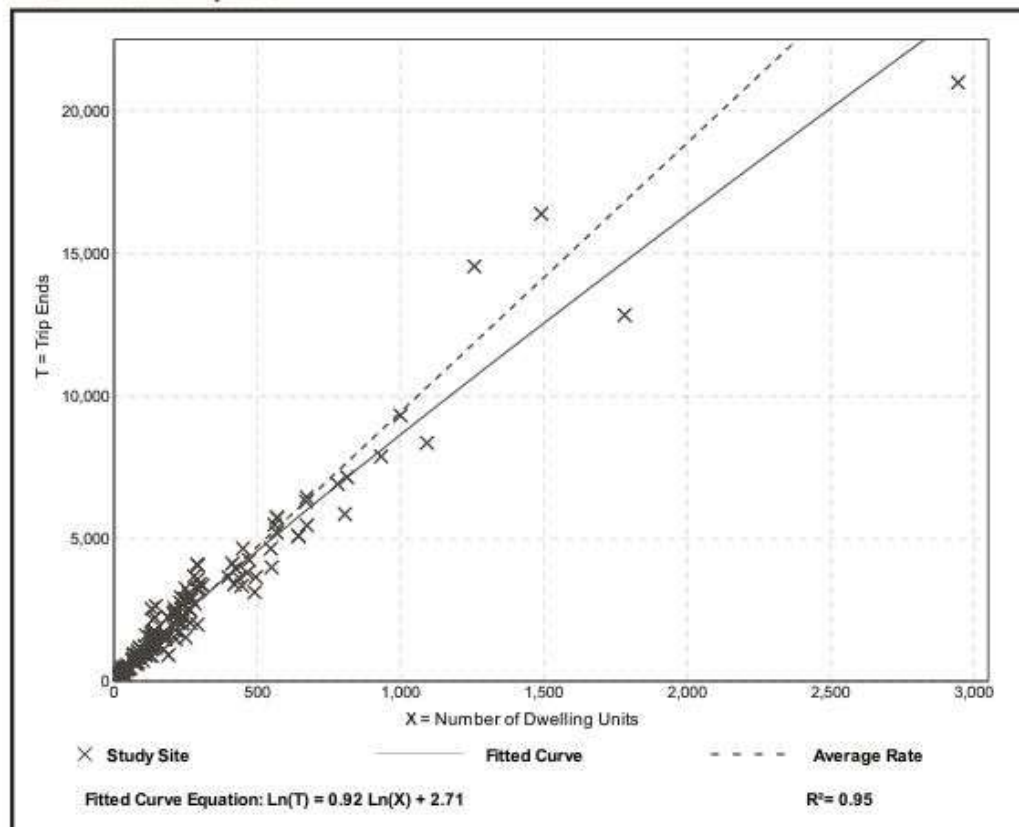
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

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

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



Single-Family Detached Housing (210)

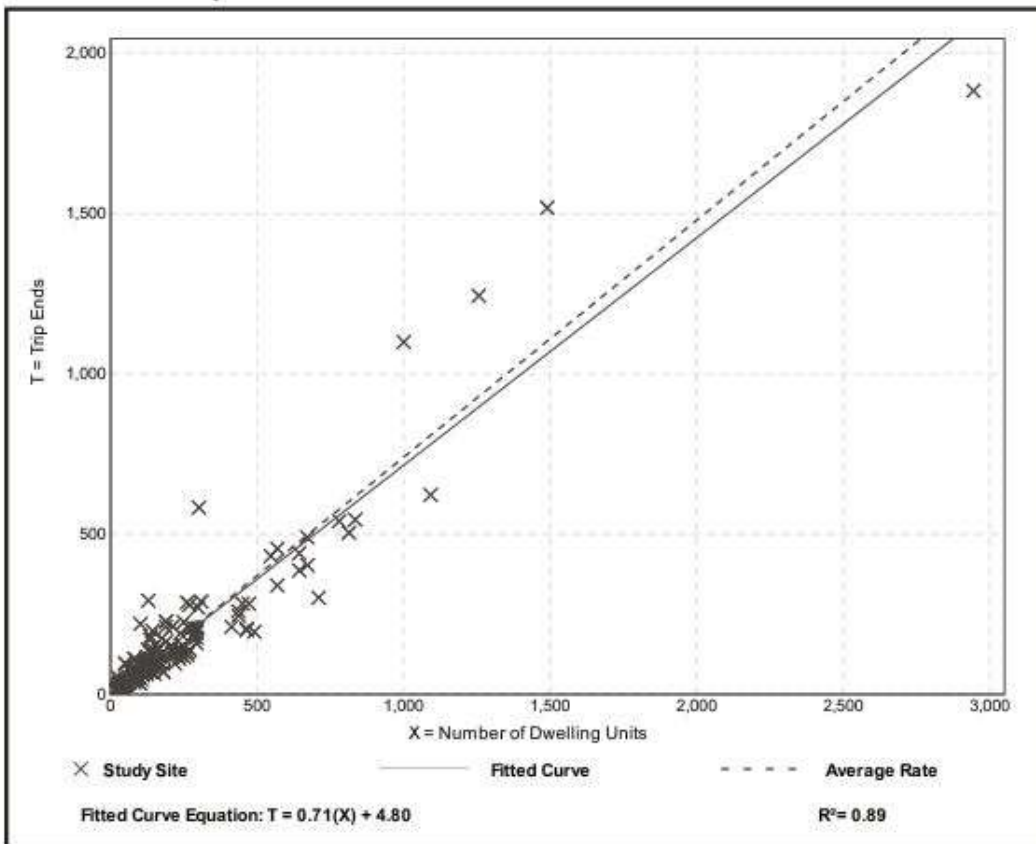
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban
 Number of Studies: 173
 Avg. Num. of Dwelling Units: 219
 Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



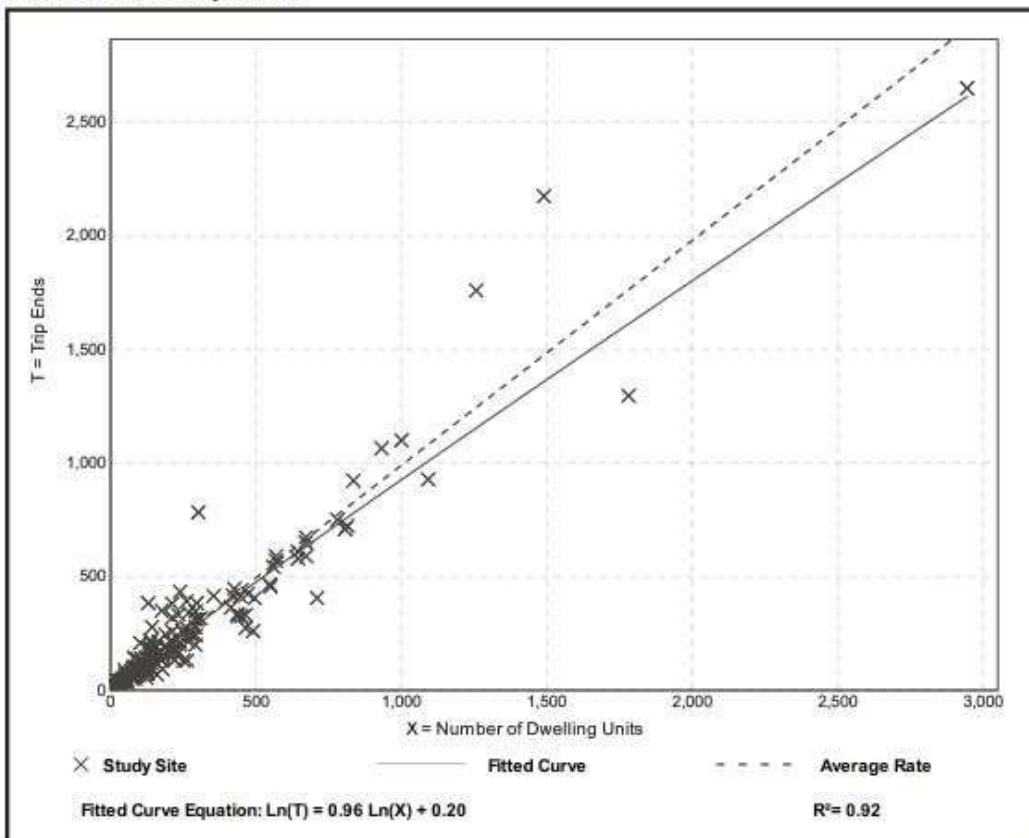
Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 190
 Avg. Num. of Dwelling Units: 242
 Directional Distribution: 63% entering, 37% exiting

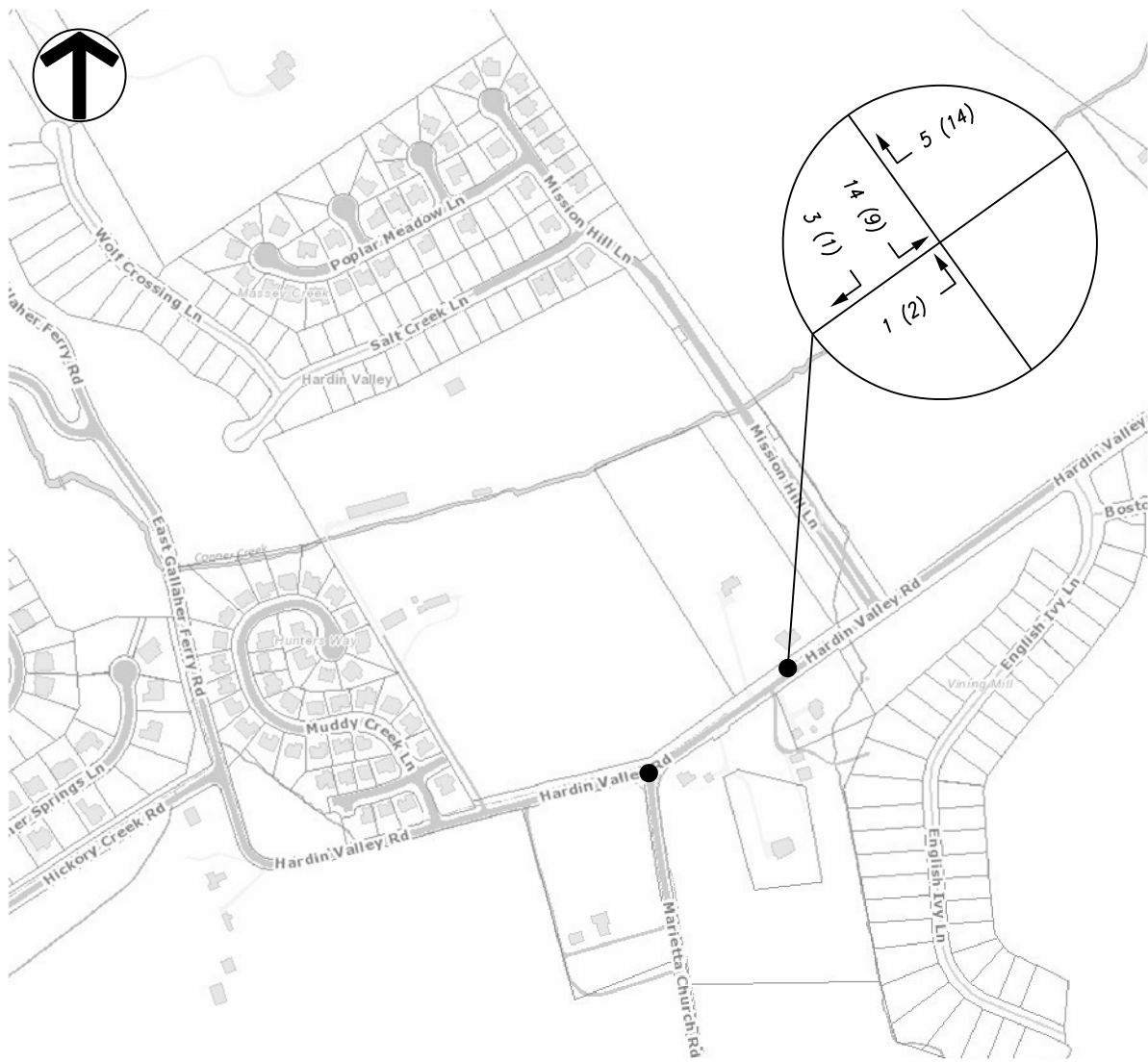
Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



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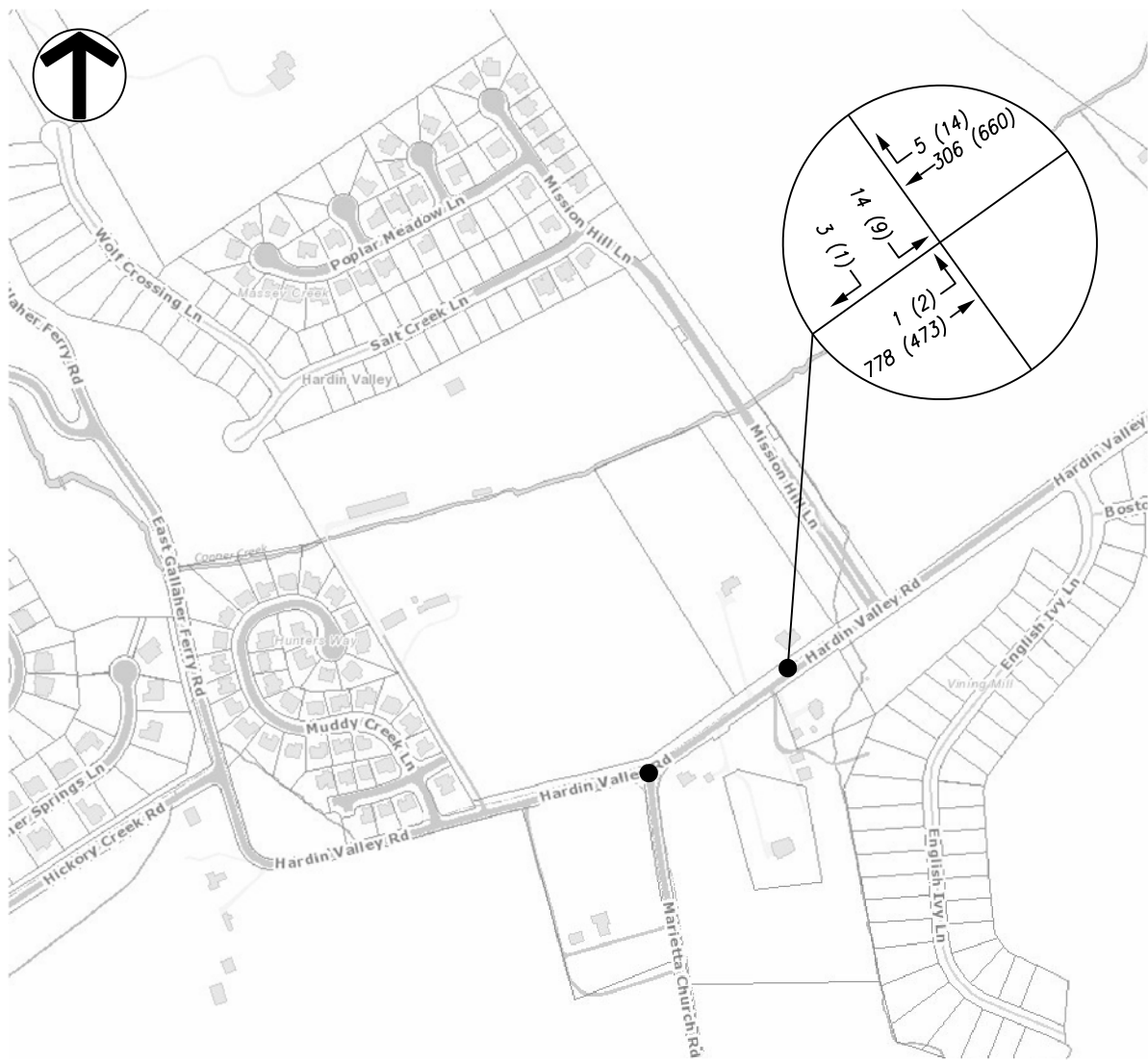


LEGEND:

← X (23) TURNING MOVEMENT VOLUME AM (PM)

Figure 3: Peak Hour Site Traffic

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LEGEND:

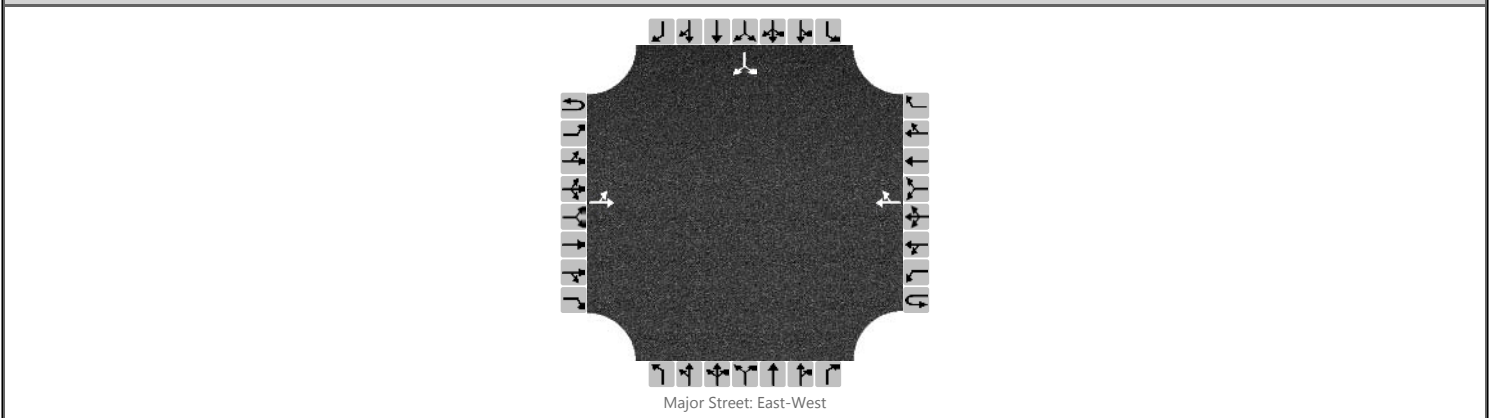
← X (23) TURNING MOVEMENT VOLUME AM (PM)

Figure 4: Full Buildout Peak Hour Traffic

HCS7 Two-Way Stop-Control Report

| General Information | | Site Information | |
|--------------------------|------------------------------|----------------------------|------------------------|
| Analyst | Addie Kirkham | Intersection | Hardin Valley at Drive |
| Agency/Co. | FMA | Jurisdiction | Knox County |
| Date Performed | 2/3/2021 | East/West Street | Hardin Valley Road |
| Analysis Year | 2024 | North/South Street | Driveway |
| Time Analyzed | Full Buildout AM Peak | Peak Hour Factor | 0.92 |
| Intersection Orientation | East-West | Analysis Time Period (hrs) | 0.25 |
| Project Description | 330.018 12041 HV Subdivision | | |

Lanes



Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|----------------------------|-----------|----|-----|---|-----------|---|-----|----|------------|---|---|---|------------|----|----|----|
| | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Movement | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 | | 7 | 8 | 9 | | 10 | 11 | 12 |
| Priority | | | | | | | | | | | | | | | | |
| Number of Lanes | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | 0 | 1 | 0 |
| Configuration | | LT | | | | | | TR | | | | | | | LR | |
| Volume, V (veh/h) | | 1 | 778 | | | | 306 | 5 | | | | | | 14 | | 3 |
| Percent Heavy Vehicles (%) | | 2 | | | | | | | | | | | | 2 | | 2 |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | | | | | | | | | | | | 0 | | | |
| Right Turn Channelized | No | | | | No | | | | No | | | | No | | | |
| Median Type/Storage | Undivided | | | | | | | | | | | | | | | |

Critical and Follow-up Headways

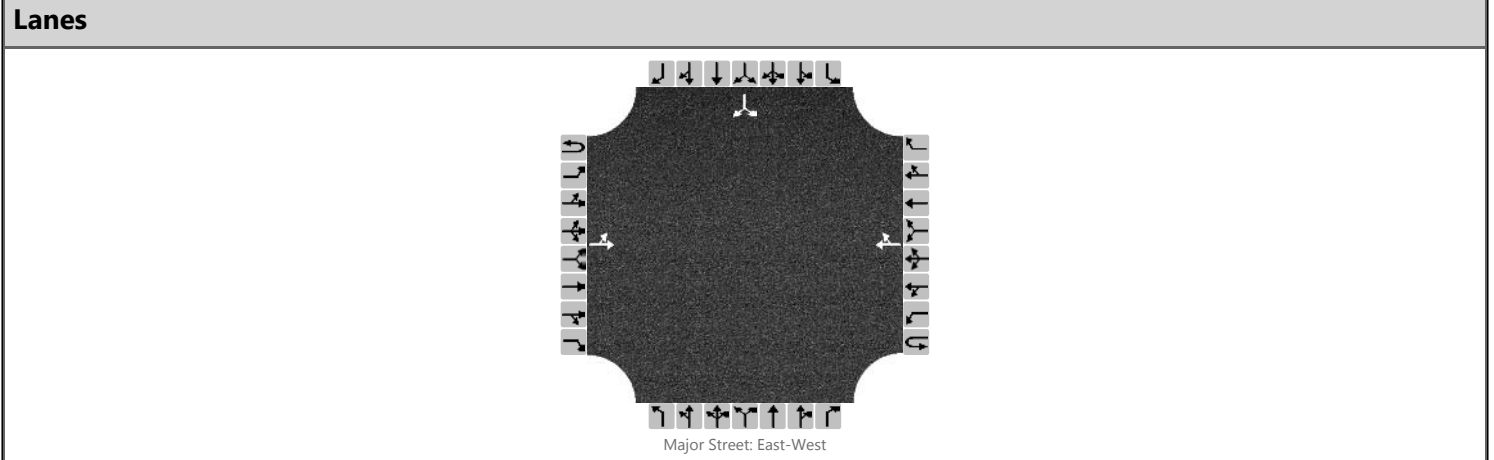
| | | | | | | | | | | | | | | | | |
|------------------------------|--|------|--|--|--|--|--|--|--|--|--|--|--|------|--|------|
| Base Critical Headway (sec) | | 4.1 | | | | | | | | | | | | 7.1 | | 6.2 |
| Critical Headway (sec) | | 4.12 | | | | | | | | | | | | 6.42 | | 6.22 |
| Base Follow-Up Headway (sec) | | 2.2 | | | | | | | | | | | | 3.5 | | 3.3 |
| Follow-Up Headway (sec) | | 2.22 | | | | | | | | | | | | 3.52 | | 3.32 |

Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|-----|------|--|--|--|--|--|--|--|--|--|--|------|--|--|------|
| Flow Rate, v (veh/h) | | 1 | | | | | | | | | | | | | | 18 |
| Capacity, c (veh/h) | | 1220 | | | | | | | | | | | | | | 237 |
| v/c Ratio | | 0.00 | | | | | | | | | | | | | | 0.08 |
| 95% Queue Length, Q ₉₅ (veh) | | 0.0 | | | | | | | | | | | | | | 0.2 |
| Control Delay (s/veh) | | 8.0 | | | | | | | | | | | | | | 21.5 |
| Level of Service, LOS | | A | | | | | | | | | | | | | | C |
| Approach Delay (s/veh) | 0.0 | | | | | | | | | | | | 21.5 | | | |
| Approach LOS | | | | | | | | | | | | | C | | | |

HCS7 Two-Way Stop-Control Report

| General Information | | Site Information | |
|--------------------------|------------------------------|----------------------------|------------------------|
| Analyst | Addie Kirkham | Intersection | Hardin Valley at Drive |
| Agency/Co. | FMA | Jurisdiction | Knox County |
| Date Performed | 2/3/2021 | East/West Street | Hardin Valley Road |
| Analysis Year | 2024 | North/South Street | Driveway |
| Time Analyzed | Full Buildout PM Peak | Peak Hour Factor | 0.93 |
| Intersection Orientation | East-West | Analysis Time Period (hrs) | 0.25 |
| Project Description | 330.018 12041 HV Subdivision | | |



Vehicle Volumes and Adjustments

| Approach | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | |
|----------------------------|-----------|----|-----|---|-----------|---|-----|----|------------|---|---|---|------------|----|----|----|
| | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Movement | 1U | 1 | 2 | 3 | 4U | 4 | 5 | 6 | | 7 | 8 | 9 | | 10 | 11 | 12 |
| Priority | | | | | | | | | | | | | | | | |
| Number of Lanes | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | 0 | 1 | 0 |
| Configuration | | LT | | | | | | TR | | | | | | | LR | |
| Volume, V (veh/h) | | 2 | 473 | | | | 660 | 14 | | | | | | 9 | | 1 |
| Percent Heavy Vehicles (%) | | 2 | | | | | | | | | | | | 2 | | 2 |
| Proportion Time Blocked | | | | | | | | | | | | | | | | |
| Percent Grade (%) | | | | | | | | | | | | | 0 | | | |
| Right Turn Channelized | No | | | | No | | | | No | | | | No | | | |
| Median Type/Storage | Undivided | | | | | | | | | | | | | | | |

Critical and Follow-up Headways

| | | | | | | | | | | | | | | | | |
|------------------------------|--|------|--|--|--|--|--|--|--|--|--|--|--|------|--|------|
| Base Critical Headway (sec) | | 4.1 | | | | | | | | | | | | 7.1 | | 6.2 |
| Critical Headway (sec) | | 4.12 | | | | | | | | | | | | 6.42 | | 6.22 |
| Base Follow-Up Headway (sec) | | 2.2 | | | | | | | | | | | | 3.5 | | 3.3 |
| Follow-Up Headway (sec) | | 2.22 | | | | | | | | | | | | 3.52 | | 3.32 |

Delay, Queue Length, and Level of Service

| | | | | | | | | | | | | | | | | |
|---|-----|------|--|--|--|--|--|--|--|--|--|--|------|--|--|------|
| Flow Rate, v (veh/h) | | 2 | | | | | | | | | | | | | | 11 |
| Capacity, c (veh/h) | | 877 | | | | | | | | | | | | | | 206 |
| v/c Ratio | | 0.00 | | | | | | | | | | | | | | 0.05 |
| 95% Queue Length, Q ₉₅ (veh) | | 0.0 | | | | | | | | | | | | | | 0.2 |
| Control Delay (s/veh) | | 9.1 | | | | | | | | | | | | | | 23.5 |
| Level of Service, LOS | | A | | | | | | | | | | | | | | C |
| Approach Delay (s/veh) | 0.1 | | | | | | | | | | | | 23.5 | | | |
| Approach LOS | | | | | | | | | | | | | C | | | |

Project: 12041 Hardin Valley Subdivision

Hardin Valley Road at Driveway Connection

**Hardin Valley Road
at Driveway Connection**

VOLUMES

| LEFT TURN | Opposing | Thru | LT | LT MAX | Warrant Met |
|-----------|----------|------|----|--------|-------------|
| AM | 311 | 778 | 1 | 25 | NO |
| PM | 674 | 473 | 2 | 20 | NO |

**Hardin Valley Road
at Driveway Connection**

VOLUMES

| RIGHT TURN | Thru | RT | RT MAX | Warrant Met |
|------------|------|----|--------|-------------|
| AM | 306 | 5 | 249 | NO |
| PM | 660 | 14 | 25 | NO |

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 |

| 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 | AM Peak 1 LT 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 | PM Peak 2 LT 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 | | | | AM Peak 5 RT ○ | | |
| 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 | | | | PM Peak 14 RT ○ | | |
| 100 - 149 150 - 199 | | Yes | Yes Yes | Yes Yes | Yes Yes | Yes Yes |
| 200 - 249 250 - 299 | Yes Yes | Yes Yes | Yes Yes | Yes Yes | Yes Yes | Yes Yes |
| 300 - 349 350 - 399 | Yes Yes | Yes Yes | Yes Yes | Yes Yes | Yes Yes | Yes Yes |
| 400 - 449 450 - 499 | Yes Yes | Yes Yes | Yes Yes | Yes Yes | Yes Yes | Yes Yes |
| 500 - 549 550 - 599 | Yes Yes | Yes Yes | Yes Yes | Yes Yes | Yes Yes | Yes Yes |
| 600 or More | Yes | Yes | Yes | Yes | Yes | Yes |

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



Date: February 3, 2021

Project Name: 12041 Hardin Valley Road Subdivision

To: Knox County Engineering & Public Works

Subject: Traffic Letter Review for 12041 Hardin Valley Road Subdivision

Dear Knox County Engineering staff,

The following comment response document is submitted to address comments dated January 29, 2021:

1. **Reviewer Comment:** Page 2 of report directly beneath Table 1, please change the number of AM site trips from 22 to 23 to match Table 1.

Response: Revised AM trips to 23 to match Table 1.

2. **Reviewer Comment:** The study assumes 5% annual growth, which is the same value used in the 2017 Vining Mill study. Based on the ADT data at the time of the Vining Mill study, 5% was an appropriate assumption. However, given the more recent traffic growth data cited in this study (over 10% per year on Hardin Valley Road and over 7% per year on Marietta Church Road) we would recommend that 10% annual traffic growth be assumed.

Response: Revised the growth rate to 10% and updated the figures and HCS7 reports to reflect the change.

Sincerely,



Addie Kirkham, P.E.