

TRAFFIC STUDY
FOR PROPOSED MULTIFAMILY RESIDENTIAL
DEVELOPMENT LOCATED AT 1392 S
WILLIAMS LAKE RD
WHITE LAKE TOWNSHIP, MICHIGAN 48386

Prepared for
WHITE LAKE TOWNSHIP
PLANNING DEPARTMENT

By
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Revised April 2022

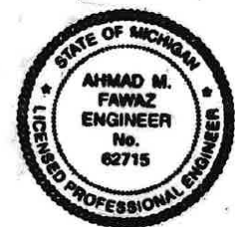


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INTRODUCTION

This study examines the potential traffic impacts on the adjacent streets of a proposed multifamily residential development located at 1392 S Williams Lake Rd between Elizabeth Lake Rd and Cooley Lake Rd in White Lake Township, Michigan. The development includes four multifamily residential buildings. The intent of this report is to present traffic volumes likely generated by the proposed development and consider potential impacts to the adjacent roadway network. In addition to this introductory paragraph, the report includes the following sections:

- A Site Description and Access
- Road Network
- Existing Traffic Volume
- Vehicle Trip Generation
- Adjustments To Trip Generation Rates
- Trip Generation Distribution And Assignment
- Development Impacts
- Conclusion

SITE DESCRIPTION AND ACCESS

Land for the development has currently one ranch house which will be demolished to construct the four buildings. The site of proposed development is approximately 2.47 acres, and it is surrounded by residential subdivisions. It will include eighty-one parking spaces while the required are seventy-seven parking spaces. The residential development consists of 56 dwelling units distributed on four buildings:

Building 'A' is two stories and has an area of 7,996 square feet per each floor. It consists of eight (1) bedroom units and eight (2) bedroom units.

Building 'B' is two stories and has an area of 4,605 square feet per each floor. It consists of eight (2) bedroom units.



Figure 1: General site plan and access location point

Building 'C' is two stories and has an area of 6,802 square feet per each floor. It consists of sixteen (1) bedroom units.

Building 'D' is two stories and has an area of 8,000 square feet per each floor. It consists of eight (1) bedroom units and eight (2) bedroom units.

Development site traffic is accommodated by two full movement access points from S Williams Lake Rd. The proposed driveways are 24 ft wide, and they operate as stop-controlled intersections. The adjacent driveways are access roads for residential subdivisions and single houses.

ROAD NETWORK

According to SEMCOG database, all the streets leading to the development are under Oakland County jurisdiction. S Williams Lake Rd is classified as a principal arterial. It is a three lanes road, one travel lane in each direction and a center left turn lane. It has a posted speed limit of 50 mph and an annual average daily traffic (AADT) of 16,180 vpd as per traffic volume data collected in 2016. Cooley Lake Rd is classified as a principal arterial located around 1000 feet south of the development. It is a three lanes road, one travel lane in each direction and a center left turn lane. It has a posted speed limit of 40 mph and an annual average daily traffic (AADT) of 20,321 vpd as per traffic volume data collected in 2021. Elizabeth Lake Rd is classified as a minor arterial located around 1.82 mile north of the development. It is a two lanes road, one travel lane in each direction. It has a posted speed limit of 45 mph and an annual average daily traffic (AADT) of 7,310 vpd as per traffic volume data collected in 2015.

The intersection of S Williams Lake Rd and Cooley Lake Rd is controlled by box span-wire traffic signal with a protected left turn phase for eastbound direction. The intersection between S Williams Lake Rd and Elizabeth Lake Rd is controlled by two diagonal span wire traffic signals.

EXISTING TRAFFIC VOLUME

The source of the traffic volumes used in this report is from SEMCOG database and it is adjusted in this report by applying the recommended SEMCOG annual growth rate.

The most up to date traffic counts reported on SEMCOG traffic count database system were for data collected on December 8 and 9, 2021 by Oakland County Sydney Coordinated Adaptive Traffic System (SCATS) and they are presented in table 1. The southbound traffic volume was obtained from SCATS system at the intersection between Cooley Lake Rd and S Williams Lake Rd and the northbound traffic volume was obtained from SCATS system at the intersection between Elizabeth Lake Rd and S Williams Lake Rd. The data was compared to traffic volume collected by tube traffic volume counter on July 08, 2021. It was found that there is no major difference in the results. There was no need to apply an annual growth rate to the collected traffic volume data because it is up to date. The hourly traffic volume counts presented in table 1 show that the AM peak hour is between 8:00 am and 9:00 am and the PM peak hour is between 4:00 pm and 5:00 pm.

VEHICLE TRIP GENERATION

Standard traffic generation characteristics compiled by the Institute of Transportation Engineers (ITE) in their report entitled Trip Generation, 10th Edition, were applied to the proposed land use in order to estimate the average daily traffic (ADT) and peak hour vehicle trips. A vehicle trip is defined as a one-way vehicle movement from point of origin to point of destination.

Table 2 presents average trip generation rates for the proposed development. Use of average trip generation rates presents a conservative analysis. ITE land use code 220 Multifamily Housing (Low-Rise) was used for analysis because of its best fit to the proposed land use.

Table 3 summarizes the projected average daily traffic (ADT) and peak hour traffic volumes likely generated by the proposed land use. As Table 3 shows, the proposed development area has the potential to generate approximately 410 daily trips with 26 of those occurring during the morning peak hour and 32 during the afternoon peak hour.

Table 1: Hourly Traffic Volume Counts from SEMCOG Database for Williams Lake Rd

| WILLIAMS LAKE TRAFFIC COUNT BETWEEN COOLEY LAKE AND ELIZABETH LAKE | | | |
|---|------------------------|------------------------|-----------------------------|
| INTERVAL:60-MIN (Wed 12/8/2021 and Thu 12/9/2021) | | | |
| Time | SB Hourly Count | NB Hourly Count | Two Way Hourly Count |
| 0:00-1:00 | 42 | 64 | 106 |
| 1:00-2:00 | 18 | 25 | 43 |
| 2:00-3:00 | 31 | 44 | 75 |
| 3:00-4:00 | 69 | 32 | 101 |
| 4:00-5:00 | 124 | 134 | 258 |
| 5:00-6:00 | 296 | 419 | 715 |
| 6:00-7:00 | 408 | 318 | 726 |
| 7:00-8:00 | 417 | 525 | 942 |
| 8:00-9:00 | 506 | 561 | 1067 |
| 9:00-10:00 | 432 | 533 | 965 |
| 10:00-11:00 | 428 | 546 | 974 |
| 11:00-12:00 | 408 | 583 | 991 |
| 12:00-13:00 | 364 | 568 | 932 |
| 13:00-14:00 | 352 | 574 | 926 |
| 14:00-15:00 | 379 | 644 | 1023 |
| 15:00-16:00 | 440 | 812 | 1252 |
| 16:00-17:00 | 438 | 874 | 1312 |
| 17:00-18:00 | 407 | 896 | 1303 |
| 18:00-19:00 | 290 | 768 | 1058 |
| 19:00-20:00 | 210 | 493 | 703 |
| 20:00-21:00 | 194 | 392 | 586 |
| 21:00-22:00 | 181 | 315 | 496 |
| 22:00-23:00 | 112 | 208 | 320 |
| 23:00-24:00 | 70 | 121 | 191 |
| Total | 6,616 | 10,449 | 17,065 |

| Table 2: Trip Generation Rates | | | | | | | | | |
|--------------------------------|--------------------------------|------|---------|--------------|------------|-------|--------------|------------|-------|
| ITE Code | Land Use | Unit | 24 Hour | AM Peak Hour | | | PM Peak Hour | | |
| | | | | Enter | Exit | Total | Enter | Exit | Total |
| 220 | Multifamily Housing (Low-Rise) | DU | 7.32 | 0.11 (23%) | 0.35 (77%) | 0.46 | 0.35 (63%) | 0.21 (37%) | 0.56 |

Key : DU = Dwelling Unit

| Table 3: Trip Generation Summary | | | | | | | | | |
|----------------------------------|--------------------------------|-------|---------|--------------|------|-------|--------------|------|-------|
| ITE Code | Land Use | Unit | 24 Hour | AM Peak Hour | | | PM Peak Hour | | |
| | | | | Enter | Exit | Total | Enter | Exit | Total |
| 220 | Multifamily Housing (Low-Rise) | 56 DU | 410 | 6 | 20 | 26 | 20 | 12 | 32 |

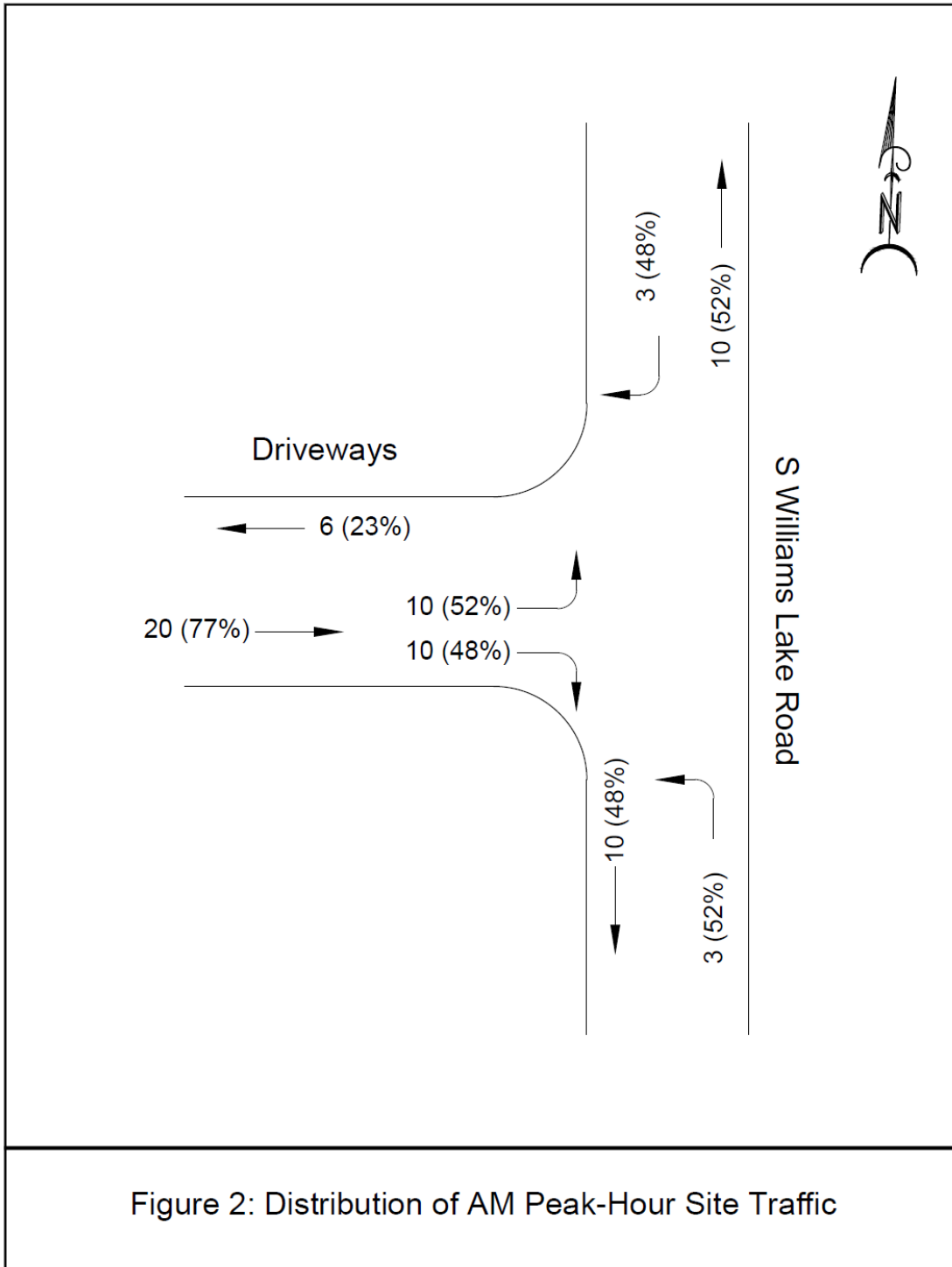
Adjustments to Trip Generation Rates

A development of this type is not likely to attract trips from within area land uses nor pass-by or diverted link trips from the adjacent roadway system, therefore no trip reduction/adjustment was taken in this analysis.

Trip Generation Distribution and Assignment

Overall directional distribution of site-generated traffic was determined by examining current traffic patterns in the study area and assessing how well those patterns can be expected to represent the new site traffic, subject to the site access plan and professional judgment. Site-generated traffic is anticipated to be distributed through the access points along S Williams Lake Road. Traffic assignment is how the site-generated and distributed trips are expected to be loaded on the roadway network. For this development, the existing traffic volumes were used to develop a trip distribution model for the AM and PM peak hours for traffic generated by the proposed development. The trips were assigned to northbound and southbound S Williams Lake Road. Figure 2 through 5 in the next pages present the distribution of the site traffic in the AM

and PM peak hours. They also present the total projected traffic volumes at the main access points of the development.



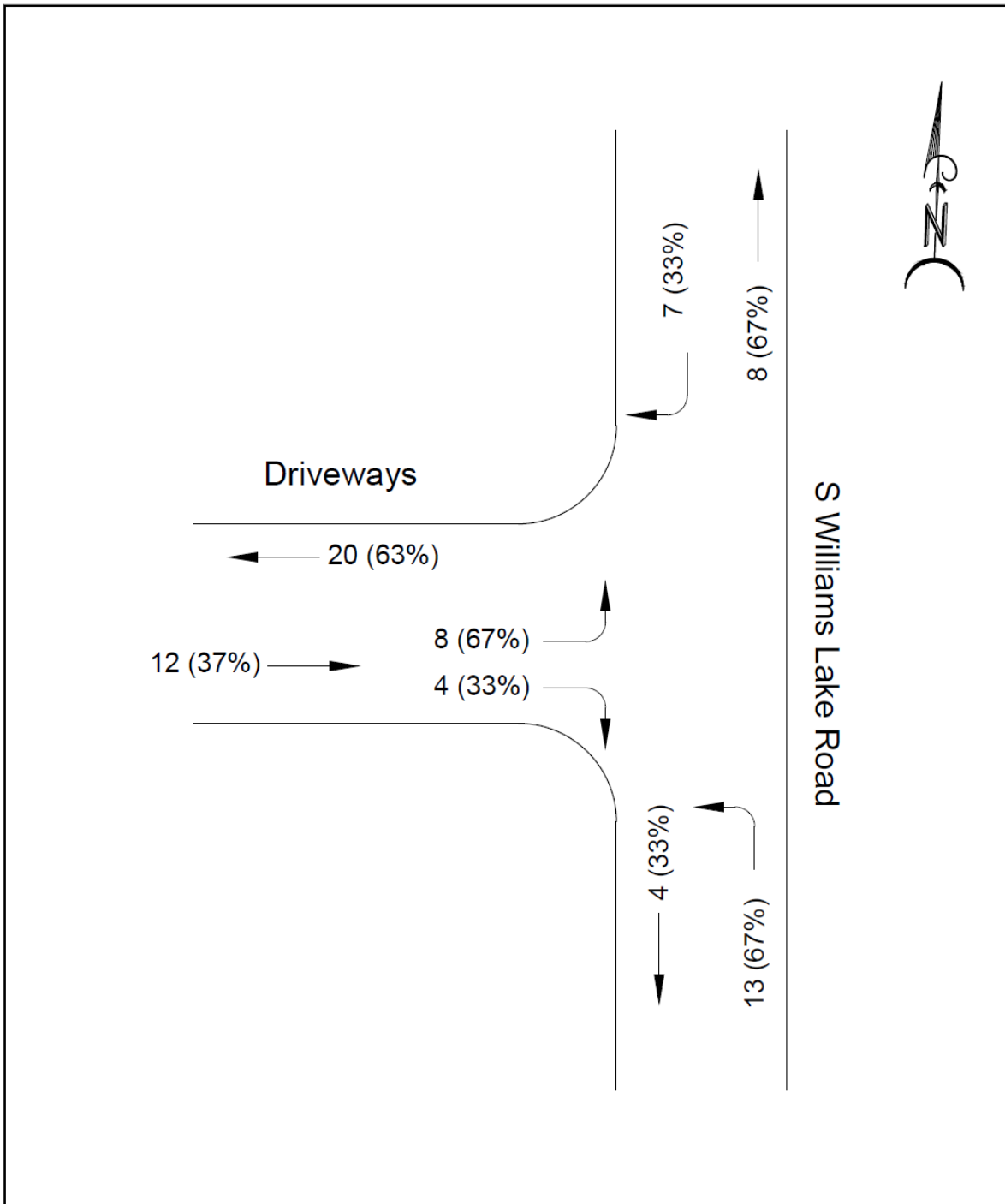


Figure 3: Distribution of PM Peak-Hour Site Traffic

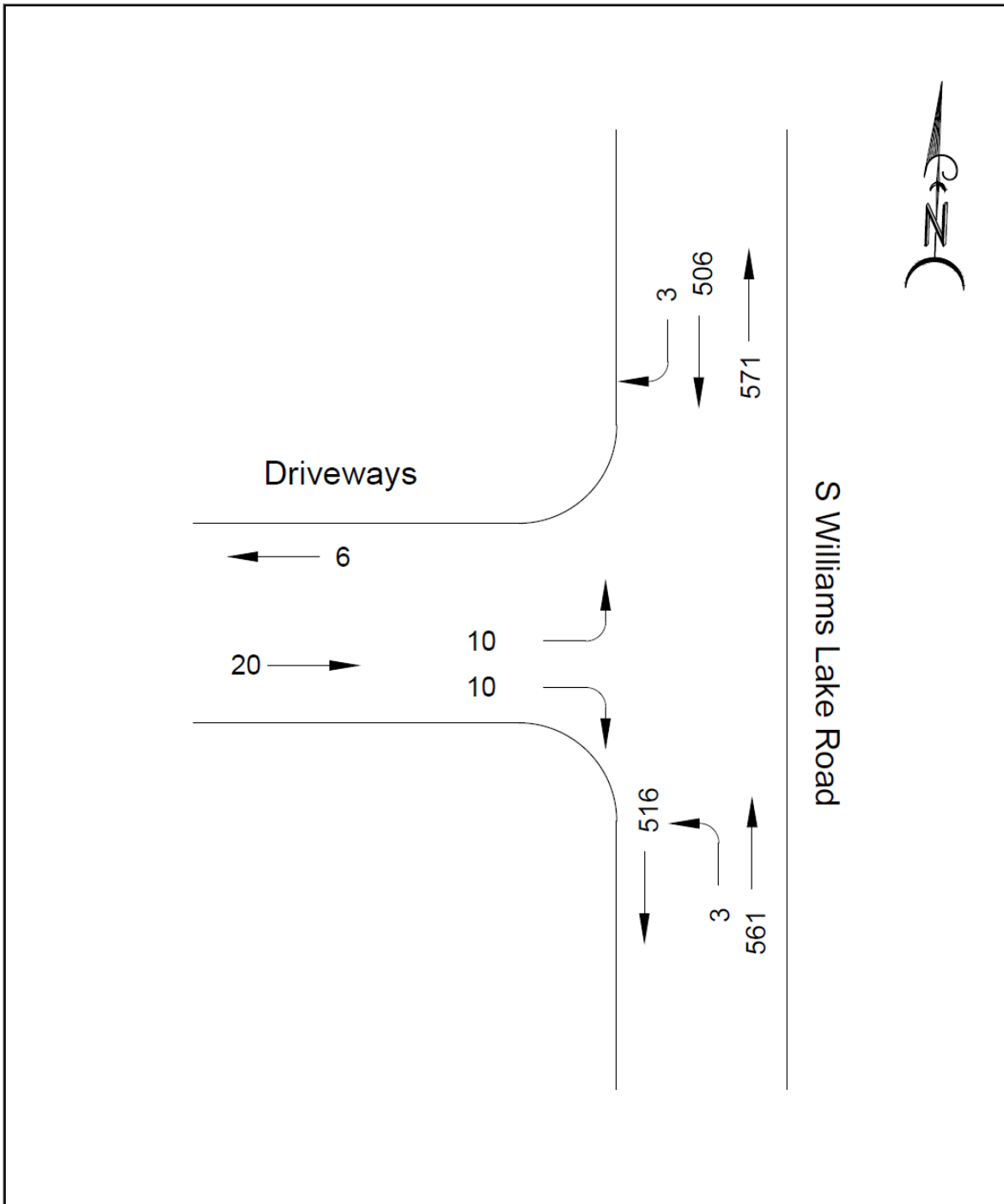


Figure 4: Total AM Peak-Hour Traffic Volume

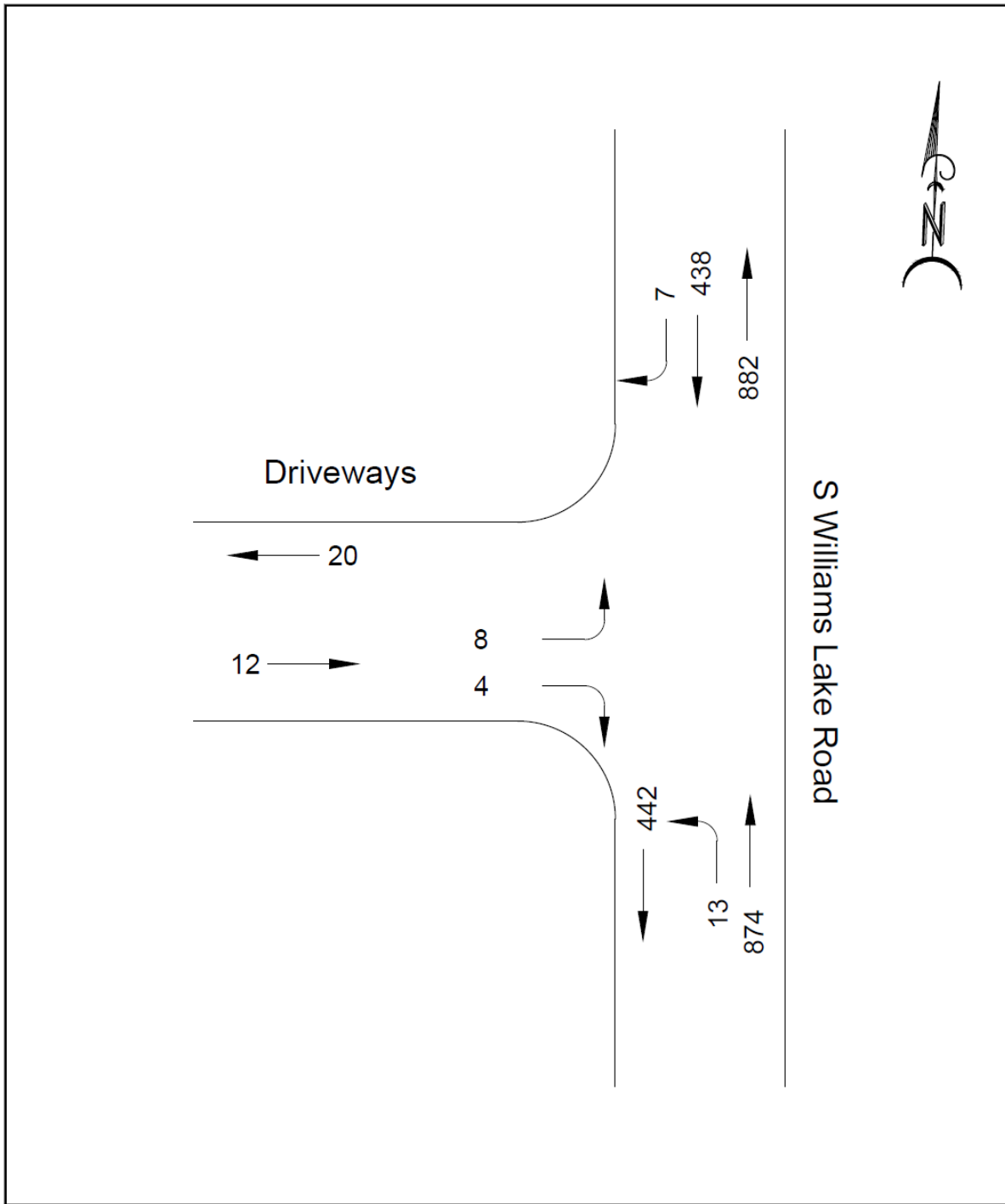


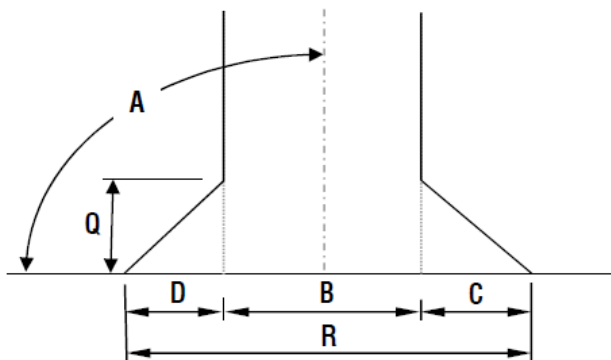
Figure 5: Total PM Peak-Hour Traffic Volume

Warrant Study for Turn Lanes

The section of Williams Lake Rd has a center left turn lane where the development is located. The maximum peak hour right turns are 10 vph and they are divided on two driveways. Around 5 right turns per hour per driveway. According to the Road Commission for Oakland County (RCOC) permit rules, specifications and guidelines, warrant for right turn deceleration lane or taper is presented in Figure 6-3 of the guidelines. Because, the peak hour right turns are less than 10 vph per driveway and the two-way traffic volume is 17,065 vpd, adding taper or right turn lane/deceleration lane are not warranted. The driveway will be designed according to table 6-3 of the guidelines which is presented below:

**Table 6-3:
Residential Driveway - Subdivision
Design Features**

| | | <u>Typical</u> | <u>Range</u> |
|----------------------|---|----------------|--------------|
| Intersecting Angle | A | 90° | 60° to 90° |
| Driveway Width | B | 16' | 10' to 25' |
| Entering Taper Width | C | 6' | 2' to 15' |
| Exiting Taper Width | D | 6' | 2' to 15' |
| Taper Depth | Q | 10' | 10' to 20' |
| Total Opening | R | 24' | 14' to 55' |
| B+C+D= | | | |



NOTE:
The TYPICAL dimension shall be used unless the Permits Division specifies or the Applicant shows cause for, and the Permits Division approves, a different value. The RANGE in dimensions indicates the working value for each design feature.

Comparison of Trip Generation Between Existing and Proposed Developments

The current zoning of the parcel is agricultural (AG). The parcel currently has a one ranch style home (1,551 sq ft) on a 2.5 acres land. ITE land use code 210 Single-family Housing was used for analysis because of its best fit to the existing land use. The proposed zoning is attached single family residential (RM-1). ITE land use code 220 Multifamily Housing (Low-Rise) was used for

analysis because of its best fit to the proposed land use. Table 4 presents average trip generation rates for the existing and proposed developments. Table 5 presents a comparison of trip generation between the existing and proposed developments.

| Table 4: Trip Generation Rates | | | | | | | | | |
|--------------------------------|---|------|---------|--------------|-------------|-------|--------------|-------------|-------|
| ITE Code | Land Use | Unit | 24 Hour | AM Peak Hour | | | PM Peak Hour | | |
| | | | | Enter | Exit | Total | Enter | Exit | Total |
| 210 | Existing Development Single-Family Detached Housing | DU | 9.44 | 0.19 25% | 0.55 75% | 0.74 | 0.63 63% | 0.37 37% | 0.99 |
| 220 | Proposed Development Multifamily Housing (Low-Rise) | DU | 7.32 | 0.11 23% | 0.35 77% | 0.46 | 0.35 63% | 0.21 37% | 0.56 |

Key : DU = Dwelling Unit

| Table 5: Comparison of Trip Generation Between Existing and Proposed Developments | | | | | | | | | |
|---|--------------------------------|-------|---------|--------------|------|-------|--------------|------|-------|
| ITE Code | Land Use | Unit | 24 Hour | AM Peak Hour | | | PM Peak Hour | | |
| | | | | Enter | Exit | Total | Enter | Exit | Total |
| 210 | Single-Family Detached Housing | 1 DU | 9.4 | 0.1 | 0.6 | 0.7 | 0.6 | 0.4 | 1 |
| 220 | Multifamily Housing (Low-Rise) | 56 DU | 409.9 | 5.9 | 19.8 | 25.8 | 19.8 | 11.6 | 31.4 |
| Difference of Trip Generation Between Existing and Proposed Developments | | | 400 | 6 | 19 | 25 | 19 | 11 | 30 |

Development Impacts

According to White Lake Township Zoning Ordinance, a Traffic Impact Assessment (TIA) is required if the proposed use(s) would generate 500-749 driveway trips per day, or 50-99 peak-hour, peak-direction driveway trips. A Traffic Impact Statement (TIS) is required if the proposed use(s) would generate 750 or more driveway trips per day, or 100 or more peak-hour, peak direction driveway trips. The trips generated by the development are less than the threshold for TIA or TIS requirements. As Figures 2 through 5 show, there is an increase in peak hour traffic volumes anticipated from the proposed development, but they are considered minor. These minor volumes are not likely to negatively impact traffic operations in the area. The level of service and the delay of the nearby intersections will have unnoticeable change.

CONCLUSION

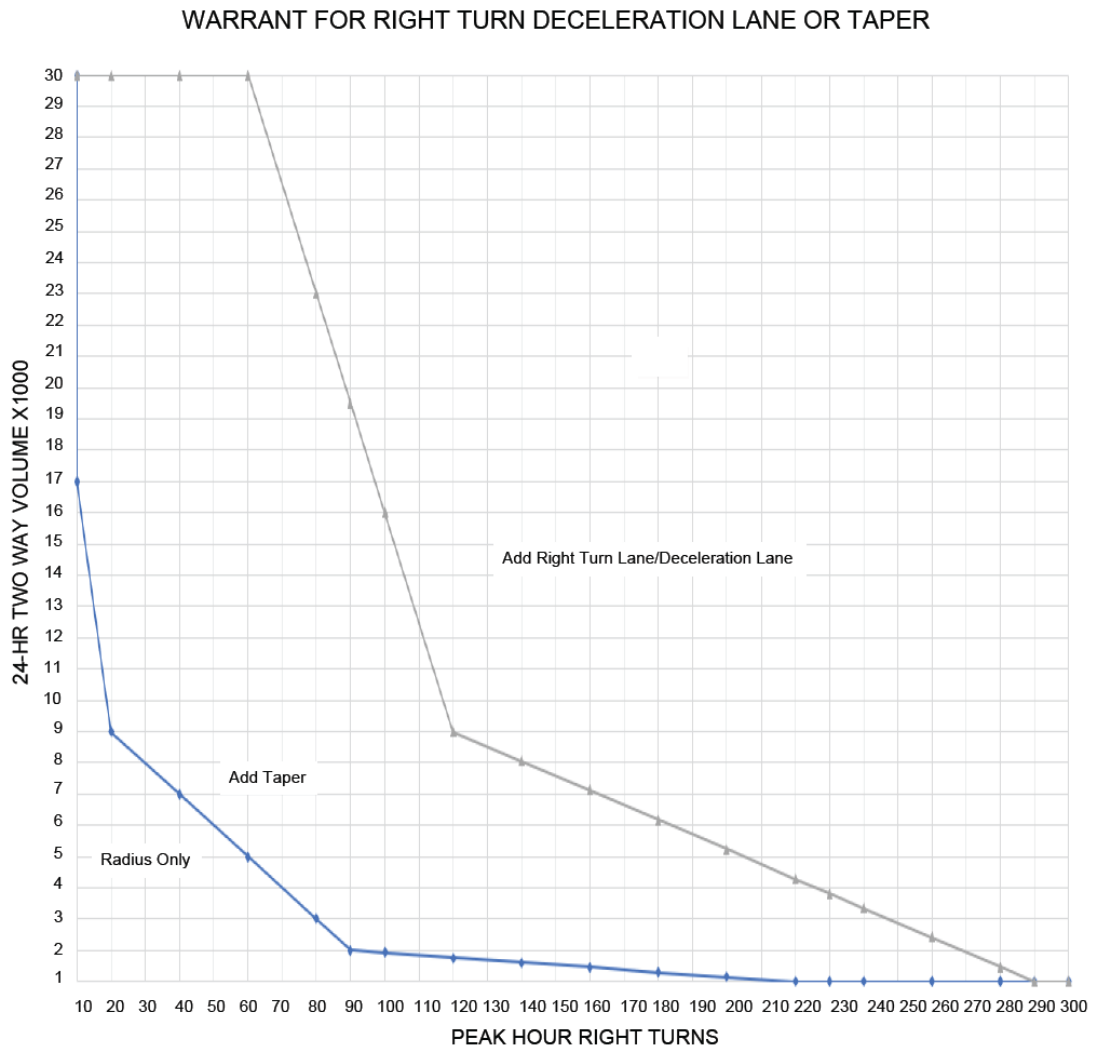
This analysis assessed traffic generation for the proposed multifamily residential development located at 1392 S Williams Lake Rd and potential impacts to the adjacent roadway network. It is our professional opinion that the proposed site-generated traffic is expected to create no negative impact to traffic operations for the surrounding roadway network. Analysis of site-generated traffic concludes that proposed development traffic volumes are minor. We trust that our findings will assist in the planning and approval of this proposed development.

APPENDICES

| WILLIAMS LAKE SB TRAFFIC COUNT NORTH OF COOLEY LAKE | | | | | |
|---|-----------------|-----|-----|-----|--------------|
| INTERVAL:15-MIN (Wed 12/8/2021 and Thu 12/9/2021) | | | | | |
| Time | 15-min Interval | | | | Hourly Count |
| | 1st | 2nd | 3rd | 4th | |
| 0:00-1:00 | 12 | 15 | 3 | 12 | 42 |
| 1:00-2:00 | 8 | 6 | 3 | 1 | 18 |
| 2:00-3:00 | 9 | 7 | 6 | 9 | 31 |
| 3:00-4:00 | 14 | 13 | 33 | 9 | 69 |
| 4:00-5:00 | 29 | 28 | 32 | 35 | 124 |
| 5:00-6:00 | 61 | 80 | 76 | 79 | 296 |
| 6:00-7:00 | 109 | 112 | 96 | 91 | 408 |
| 7:00-8:00 | 92 | 90 | 117 | 118 | 417 |
| 8:00-9:00 | 126 | 130 | 135 | 115 | 506 |
| 9:00-10:00 | 98 | 111 | 113 | 110 | 432 |
| 10:00-11:00 | 89 | 127 | 111 | 101 | 428 |
| 11:00-12:00 | 98 | 95 | 109 | 106 | 408 |
| 12:00-13:00 | 111 | 72 | 78 | 103 | 364 |
| 13:00-14:00 | 56 | 89 | 106 | 101 | 352 |
| 14:00-15:00 | 101 | 91 | 94 | 93 | 379 |
| 15:00-16:00 | 115 | 102 | 96 | 127 | 440 |
| 16:00-17:00 | 109 | 101 | 120 | 108 | 438 |
| 17:00-18:00 | 114 | 96 | 111 | 86 | 407 |
| 18:00-19:00 | 77 | 80 | 82 | 51 | 290 |
| 19:00-20:00 | 58 | 55 | 48 | 49 | 210 |
| 20:00-21:00 | 39 | 37 | 59 | 59 | 194 |
| 21:00-22:00 | 45 | 44 | 43 | 49 | 181 |
| 22:00-23:00 | 34 | 25 | 30 | 23 | 112 |
| 23:00-24:00 | 19 | 17 | 26 | 8 | 70 |
| Total | | | | | 6,616 |

| WILLIAMS LAKE NB TRAFFIC COUNT SOUTH ELIZABETH LAKE | | | | | |
|--|------------------------|------------|------------|------------|---------------------|
| INTERVAL:15-MIN (Wed 12/8/2021 and Thu 12/9/2021) | | | | | |
| Time | 15-min Interval | | | | Hourly Count |
| | 1st | 2nd | 3rd | 4th | |
| 0:00-1:00 | 18 | 17 | 15 | 14 | 64 |
| 1:00-2:00 | 7 | 5 | 10 | 3 | 25 |
| 2:00-3:00 | 3 | 8 | 19 | 14 | 44 |
| 3:00-4:00 | 6 | 6 | 3 | 17 | 32 |
| 4:00-5:00 | 11 | 23 | 27 | 73 | 134 |
| 5:00-6:00 | 110 | 115 | 121 | 73 | 419 |
| 6:00-7:00 | 58 | 84 | 76 | 100 | 318 |
| 7:00-8:00 | 105 | 149 | 130 | 141 | 525 |
| 8:00-9:00 | 119 | 125 | 158 | 159 | 561 |
| 9:00-10:00 | 121 | 160 | 125 | 127 | 533 |
| 10:00-11:00 | 146 | 123 | 132 | 145 | 546 |
| 11:00-12:00 | 138 | 131 | 147 | 167 | 583 |
| 12:00-13:00 | 140 | 129 | 165 | 134 | 568 |
| 13:00-14:00 | 168 | 131 | 147 | 128 | 574 |
| 14:00-15:00 | 167 | 139 | 165 | 173 | 644 |
| 15:00-16:00 | 195 | 196 | 204 | 217 | 812 |
| 16:00-17:00 | 209 | 198 | 246 | 221 | 874 |
| 17:00-18:00 | 244 | 220 | 210 | 222 | 896 |
| 18:00-19:00 | 210 | 222 | 183 | 153 | 768 |
| 19:00-20:00 | 132 | 134 | 114 | 113 | 493 |
| 20:00-21:00 | 120 | 113 | 90 | 69 | 392 |
| 21:00-22:00 | 80 | 78 | 94 | 63 | 315 |
| 22:00-23:00 | 81 | 48 | 37 | 42 | 208 |
| 23:00-24:00 | 38 | 39 | 16 | 28 | 121 |
| Total | | | | | 10,449 |

FIGURE 6-3



Single-Family Detached Housing (210)

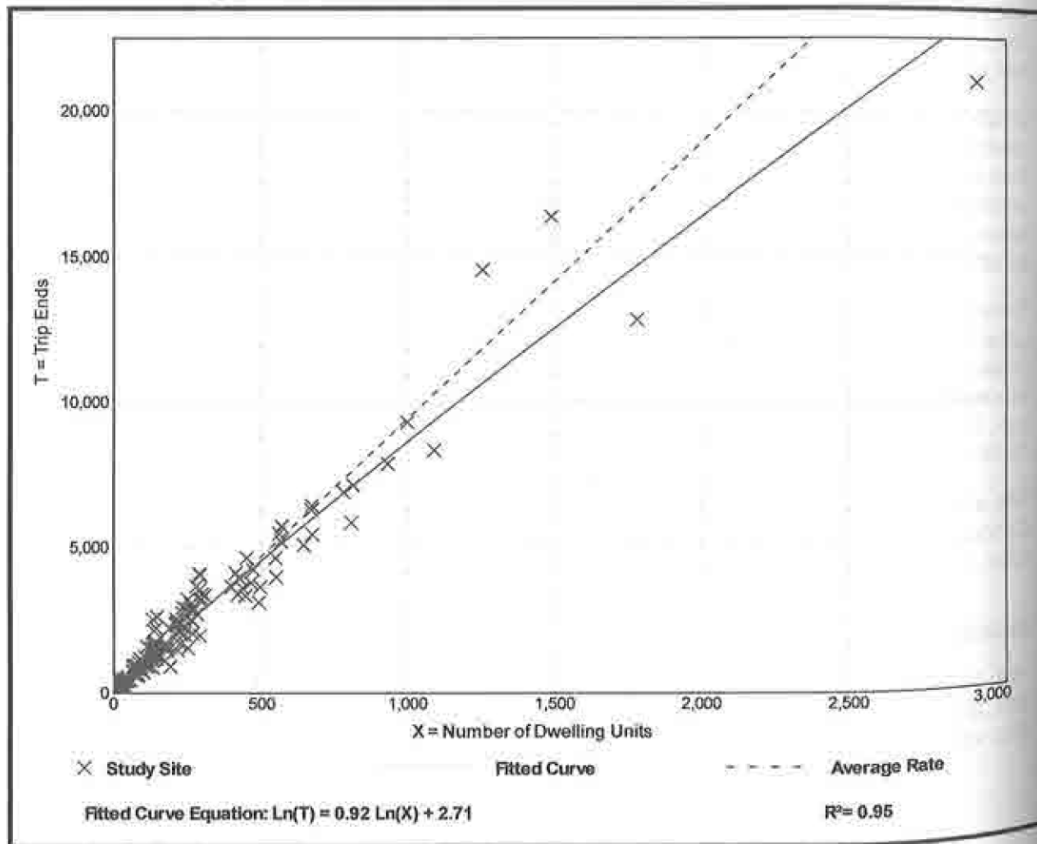
Vehicle Trip Ends vs: Dwelling Units
On a: **Weekday**

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



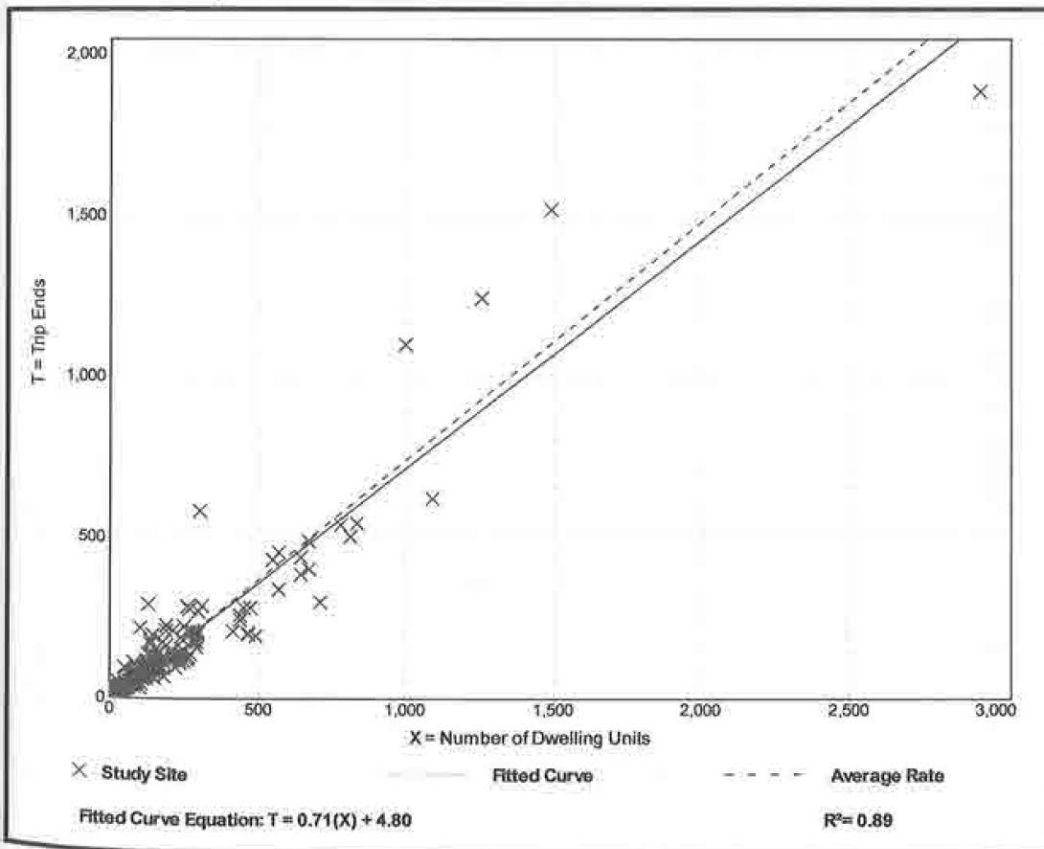
Single-Family Detached Housing (210)

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



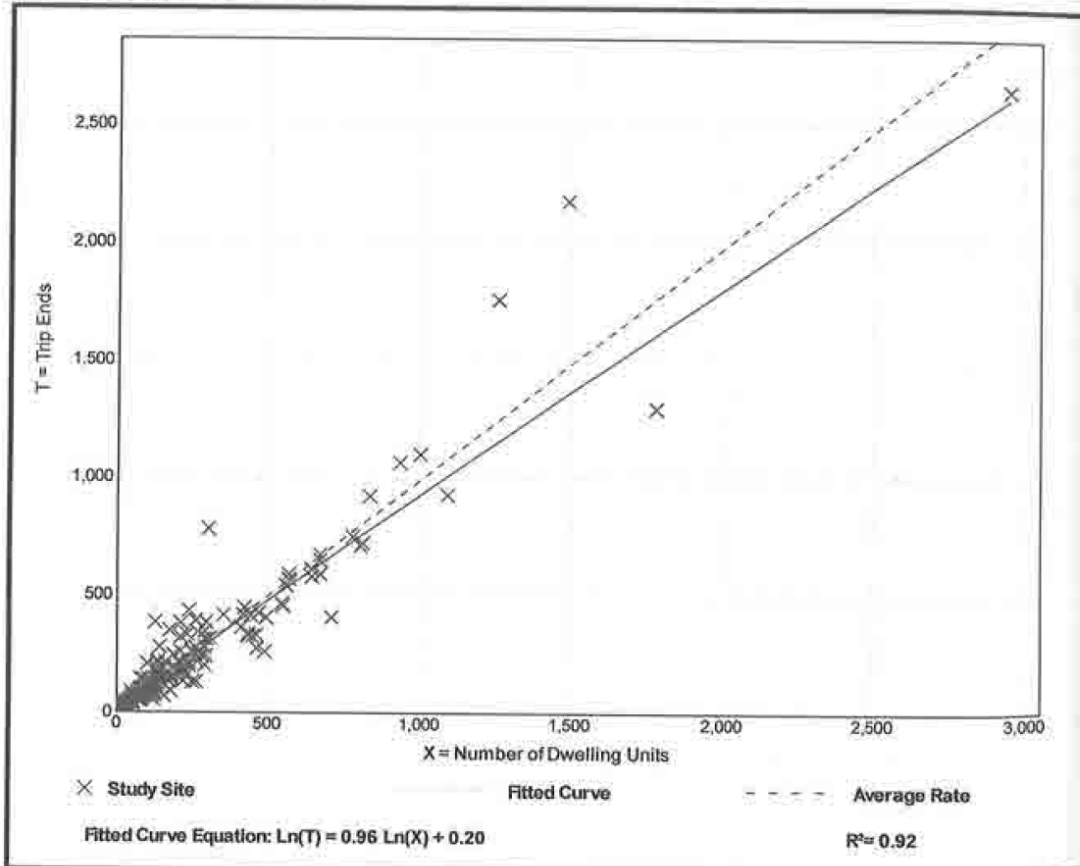
Single-Family Detached Housing (210)

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



Multifamily Housing (Low-Rise) (220)

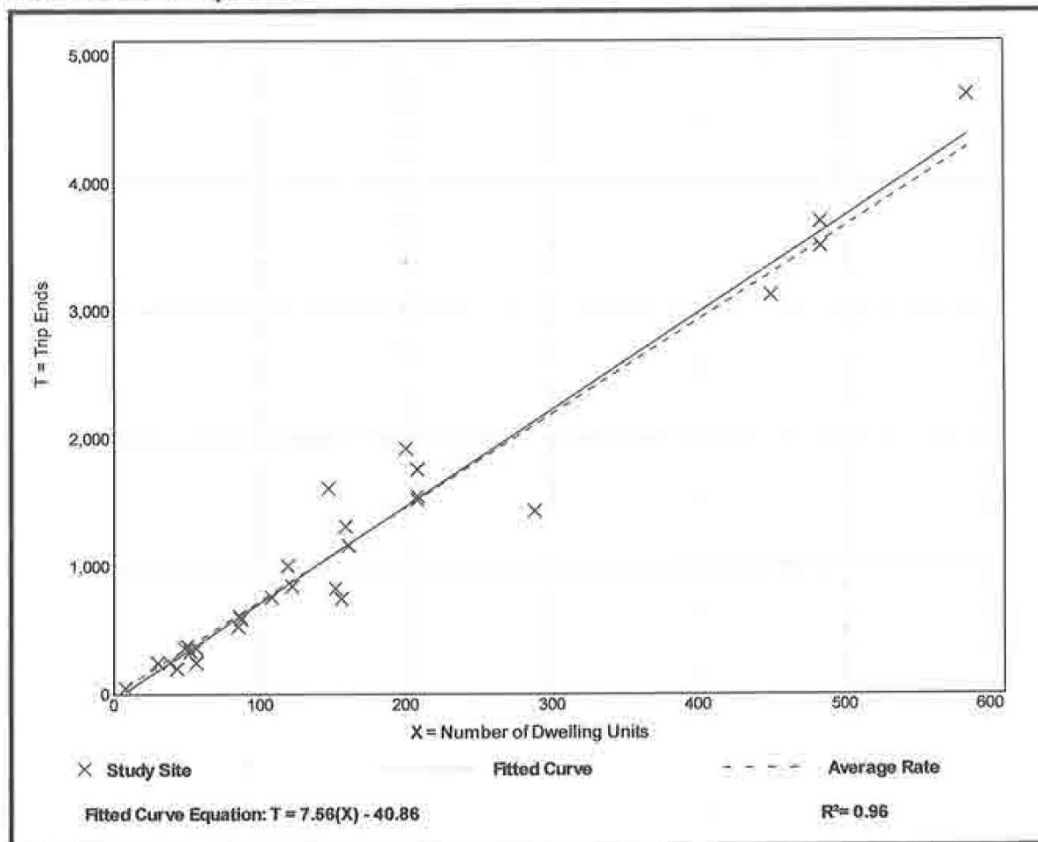
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 29
Avg. Num. of Dwelling Units: 168
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

| Average Rate | Range of Rates | Standard Deviation |
|--------------|----------------|--------------------|
| 7.32 | 4.45 - 10.97 | 1.31 |

Data Plot and Equation



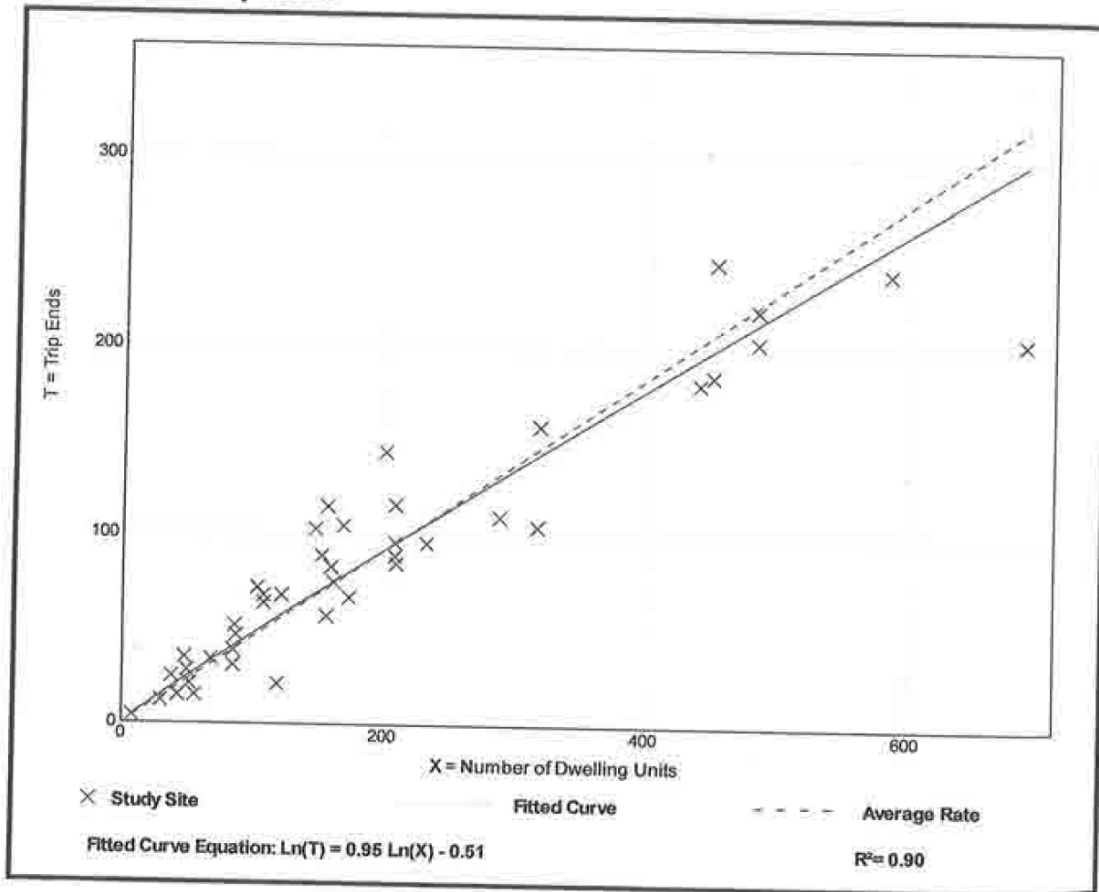
Multifamily Housing (Low-Rise) (220)

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: 42
 Avg. Num. of Dwelling Units: 199
 Directional Distribution: 23% entering, 77% exiting

Vehicle Trip Generation per Dwelling Unit

| Average Rate | Range of Rates | Standard Deviation |
|--------------|----------------|--------------------|
| 0.46 | 0.18 - 0.74 | 0.12 |

Data Plot and Equation



Multifamily Housing (Low-Rise) (220)

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: 50
 Avg. Num. of Dwelling Units: 187
 Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

| Average Rate | Range of Rates | Standard Deviation |
|--------------|----------------|--------------------|
| 0.56 | 0.18 - 1.25 | 0.16 |

Data Plot and Equation

