OHIO
HUDSON

COMMUNITY DEVELOPMENT ● 1140 Terex Road ● Hudson, Ohio 44236 ● (330) 342-1790

DATE: April 21, 2026

TO: Mayor Anzevino and Members of City Council

FROM: Katie Behnke, Economic Development Manager, Greg Hannan, CD Director

CC: Thom Sheridan, City Manager, Brian Griffith, Asst City Manager, Nick Sugar, City Planner

RE: District 11 – Discussion of traffic analysis

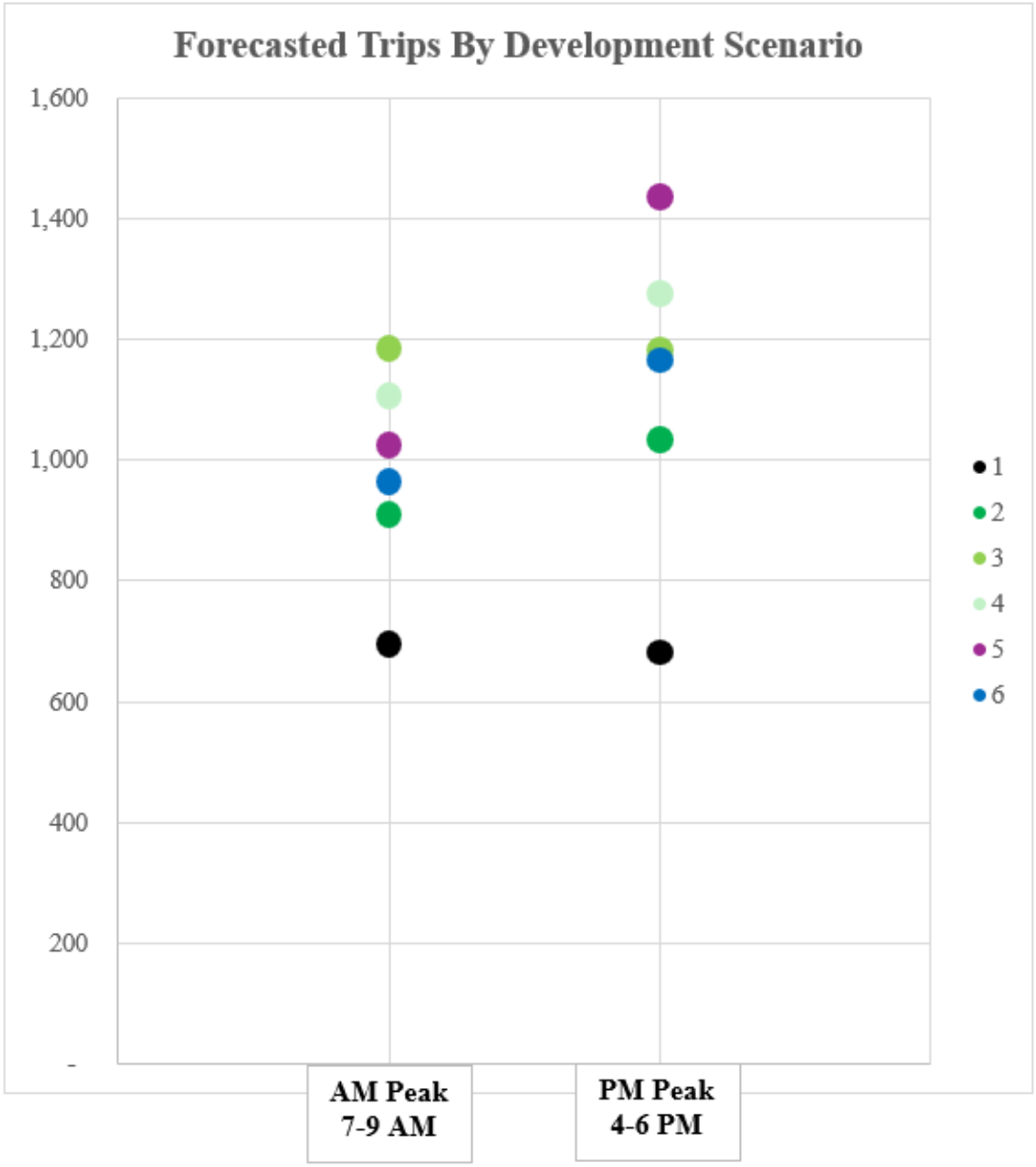
Staff engaged a consultant to model a limited number of traffic scenarios for City Council's discussions of proposed zoning district 11. Based on such staff offers the following summary comments:

1. Adjacent network has seen declining total traffic volume: Both Terex Road and ST Rt 91 have decreased in total traffic volumes in excess several thousand daily vehicles (30%+) since early 2000s.
2. Development scenarios are challenging to model as some scenarios are feasible under both the current D8 and the proposed D11 and appreciable assumptions must be made regarding the uses and associated ITE manual calculations rather that modeling to a specific proposal. In general:
    a. The highest scenario (refill existing plus outlot retail/restaurant) generates the highest peak hour traffic; however, the total peak hour traffic is well below the traffic levels present in the network pre-pandemic. This scenario is in general alignment with the uses supported by the Comprehensive Plan.
    b. Two hundred residential units (townhomes, apartments, or condos) generate comparable traffic to one 70,000 square foot office or two 10,000 square foot retail locations.
3. Proposed development plans must comply with City Standards proposed development would be required to prepare a detailed traffic impact study and fully fund any needed roadway improvements to maintain or improve the present level of service of an arterial or collector street.
4. The ODOT Traffic Forecasting Management System (TFMS) projects no to minimal (less than one percent) growth in Average Daily Traffic (ADT) for the study area.

Support pages:

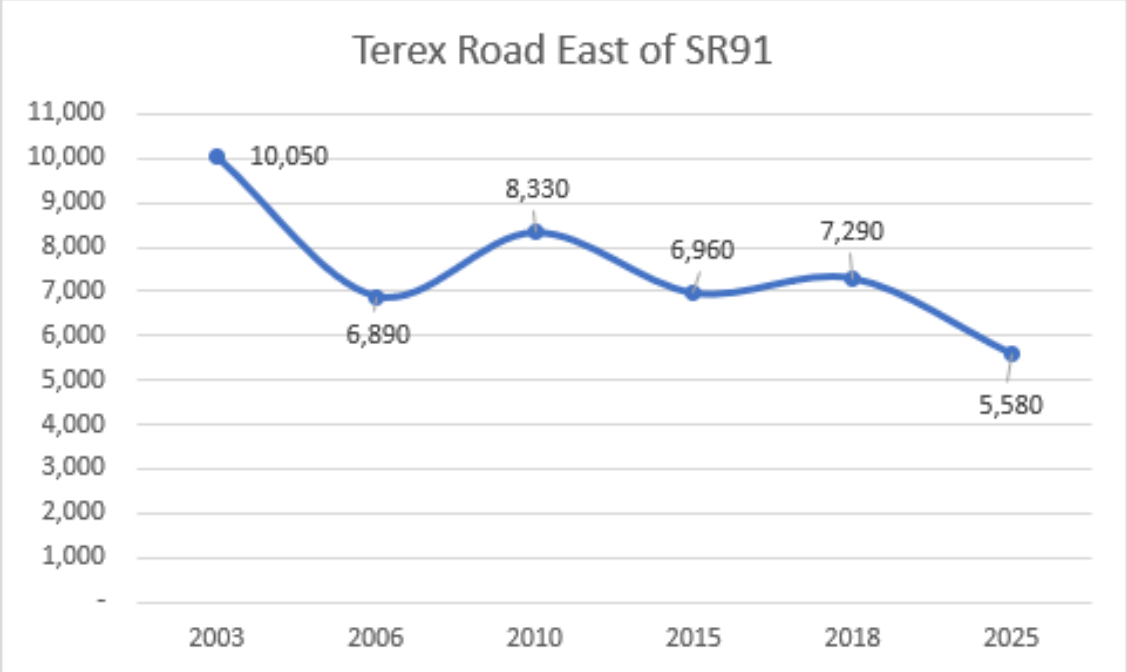
1. Summary of Scenario Data from TMS Report
2. AMATS Average Daily Traffic Data
3. ODOT Traffic Forecasting Management System (TFMS) Projects
4. TMS Engineers, Inc. Trip Generation Full Report

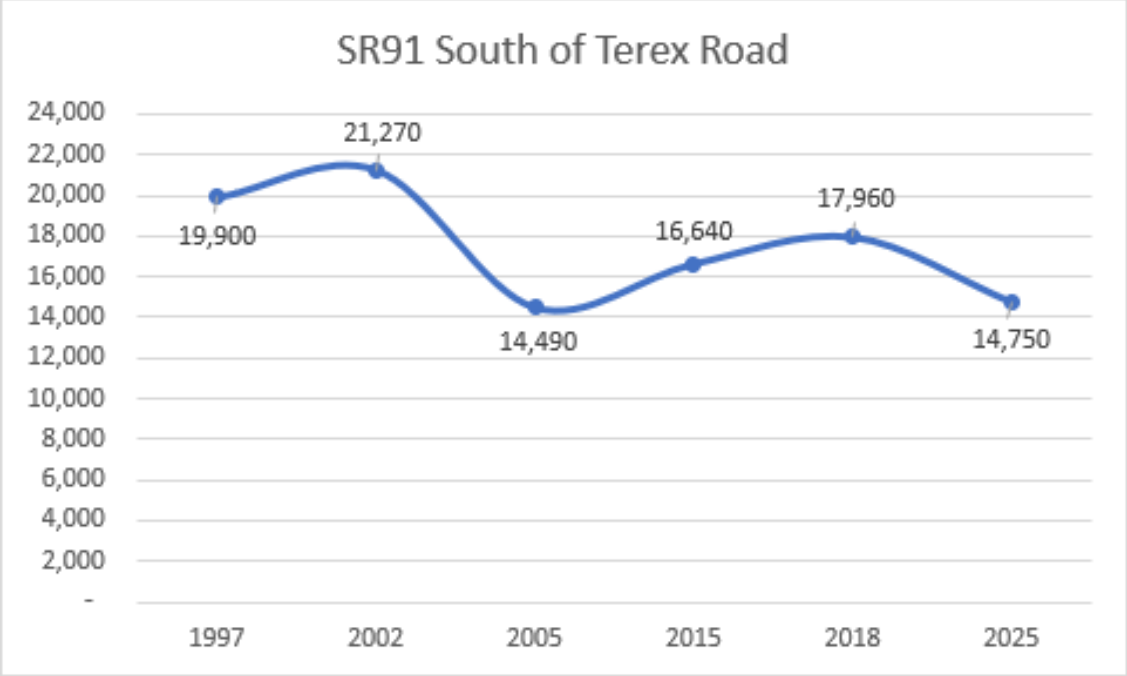
Summary of Scenario Data from TMS Report



#	Scenario Description	Development Scenario Buildable Under			Peak Counts	
		Existing District 8	Comp. Plan	Proposed District 11	AM	PM
1	Base Scenario: Building refilled with similar use mix, existing day care, no other development.	✓	✓	✓	695	682
2	Base scenario plus two 40,000SF retail plazas added.	✓	✓	✓	911	1,034
3	Base scenario plus five 70,000SF office buildings added.	✓	✓	✓	1,185	1,182
4	Base scenario plus three 50,000SF office buildings and two 40,000SF retail plazas added.	✓	✓	✓	1,107	1,277
5	Base scenario plus eleven 10,000SF retail locations added.		✓	✓	1,026	1,436
6	Base scenario plus seven 10,000SF retail locations added and 200 townhomes.			✓	965	1,166

Akron Metropolitan Area Transportation Study (AMATS) Average Daily Traffic Data





Source: https://www.amatsplanning.org/traffic-counts

TMS Engineers, Inc.
Transportation Management Services
2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087
www.TMSEngineers.com

Date: May 7, 2026

To: Mr. Bradley Kosco. P.E., P.S.
Hudson City Engineer

From: Michael Schweickart, P.E., PTOE
TMS Engineers, Inc.

Subject: SR 91 & Terex Road Traffic Growth

The ODOT Traffic Forecasting Management System (TFMS) was used to determine the growrh of traffic in the vicinity of the SR 91 and Terex Road intersection. The use of the TFMS in traffic forecasting is addressed in *Chapter 7* of the **Ohio Traffic Forecasting Manual, Volume 1**and Chapter 4 of the **Ohio Traffic Forecasting Manual, Volume 2.**

TFMS is a front-end software application for reporting simplified traffic forecasts. TFMS generates design designations using a Microsoft Access database file which was created by adding functionality to the ODOT Modeling & Forecasting (M&F) congestion management forecasting tool and thus is consistent with Ohio's Congestion Management and Ohio's statewide Travel Demand Forecasting (TDF) model. The database is updated annually.

The TFMS segment runs provide twenty year Average Daily Traffic (ADT) forecast data.

TFMS segment runs were performed for SR 91 from Veterans Way to Norton Road. Copies of the TFMS segment runs can be found attached. The following table presents the projected annual percent growth for the volumes in each segment between the years 2026 and 2026.

SR 91 SEGMENTS	2026 ADT VOLUME	2046 ADT VOLUME	% GROWTH (%/Year)
Veterans Way - Barlow Road	17,000	17,000	0.0000%
Barlow Road - Hudson Drive	17,000	17,000	0.0000%
Hudson Drive - Terex Road	17,000	17,000	0.0000%
Terex Road - Georgetown Road	17,000	17,000	0.0000%
Georgetown Road - Norton Road	17,000	17,000	0.0000%

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TFMS segment runs were performed for Terex Road west of SR 91. Copies of the TFMS segment runs can be found attached. The following table presents the projected annual percent growth for the volumes in each segment between the years 2026 and 2026.

TEREX ROAD (WEST) SEGMENTS	2026 ADT VOLUME	2046 ADT VOLUME	% GROWTH (%/Year)
Barlow Road - West of Hudson Drive	8,200	8,200	0.0000%
West of Hudson Drive - Hudson Drive	8,200	8,200	0.0000%
Hudson Drive - SR 91	11,000	11,000	0.0000%

TFMS segment runs were performed for Terex Road east of SR 91. Copies of the TFMS segment runs can be found attached. The following table presents the projected annual percent growth for the volumes in each segment between the years 2026 and 2026.

TEREX ROAD (EAST) SEGMENTS	2026 ADT VOLUME	2046 ADT VOLUME	% GROWTH (%/Year)
SR 91 - Hudson Industrial Parkway	7,800	8,200	0.2564%
Hudson Industrial Parkway - Barlow Road	8,500	8,800	0.1765%
Barlow Road - Stow Road	8,500	8,900	0.2353%

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Date: May 7, 2026

To: Mr. Bradley Kosco. P.E., P.S.
Hudson City Engineer

From: Michael Schweickart, P.E., PTOE
TMS Engineers, Inc.

Subject: District 11
Trip Generation Scenarios

EXECUTIVE SUMMARY

TMS Engineers, Inc. performed a trip generation analysis for the District 11 study area in the City of Hudson, Ohio to evaluate potential traffic associated with six development scenarios for the former JOANN site and surrounding area.

Trip generation estimates were developed utilizing methodologies contained in the Institute of Transportation Engineers (ITE) **Trip Generation Manual, 12th Edition**, including consideration of internal trip capture and pass-by trip reductions where applicable.

The scenarios included varying combinations of office, retail, and residential development. Estimated total weekday peak hour driveway volumes ranged from 695 to 1,185 trips during the AM peak hour and from 682 to 1,436 trips during the PM peak hour. Scenario 1 generated the lowest overall traffic volumes, while Scenario 3 generated the highest AM peak hour traffic volumes due to the office land uses. Scenario 5 generated the highest PM peak hour traffic volumes due to the retail land uses. The following table summarizes the estimated site generated traffic for each development scenario.

TABLE 1 - TRIP GENERATION SUMMARY

SCENARIO DESCRIPTION		DEVELOPMENT SCENARIO BUILDABLE UNDER			PEAK COUNT	
		Existing Disitrct 8	Comprehensive Plan	Proposed District 11	AM	PM
1	Base Scenario: JOANN building refilled with similar use mix, existing day care maintained, no other development.	✓	✓	✓	695	682
2	Base scenario plus two 40,000SF retail plazas added.	✓	✓	✓	911	1,034
3	Base scenario plus five 70,000SF office buildings added.	✓	✓	✓	1,185	1,182
4	Base scenario plus three 50,000SF office buildings & two 40,000SF retail plazas added.	✓	✓	✓	1,107	1,277
5	Base scenario plus eleven 10,000SF retail locations added.		✓	✓	1,026	1,436
6	Base scenario plus seven 10,000SF retail locations & 200 townhomes added.			✓	965	1,166

Overall, the analyses indicate that retail oriented scenarios generally produce greater PM peak hour traffic demand, while office oriented scenarios generate higher AM traffic volumes. The mixed-use scenarios distribute traffic demand more evenly between peak periods while still generating substantially higher overall traffic volumes than the existing base scenario.

PURPOSE

TMS Engineers, Inc. has performed the following trip generation analysis for the District 11 study area in the City of Hudson, Summit County, Ohio. The District 11 study area can be seen in the attached **Location Map, Figure 1**.

The purpose of the trip generation analyses is to estimate the traffic that may be generated from several development scenarios considering the possible re-zoning of the study area and the redevelopment of the JOANN site. The City of Hudson provided six scenarios to analyze. The six development scenarios can be seen in *Table 2, Page 3*.

Each scenario will be documented in a separate appendix that includes the supporting calculation worksheets, trip generation worksheets, internal capture worksheets, and pass-by rate tables. Where supporting information is common to multiple scenarios, it is presented only in the first appendix in which it is applicable and is not repeated in subsequent appendices. The following appendices can be found with this report:

- Appendix A - Scenario 1
- Appendix B - Scenario 2
- Appendix C - Scenario 3
- Appendix D - Scenario 4
- Appendix E - Scenario 5
- Appendix F - Scenario 6

TRIP GENERATION

Calculating future total driveway trips requires an estimate of the traffic generated by the proposed development. The most widely accepted method of determining the amount of traffic that a development may generate is to compare the proposed land use with existing facilities of the same use. The Institute of Transportation Engineers (ITE) has prepared a document titled "**Trip Generation Manual**", which is a compilation of similar traffic generation studies to aide in making such a comparison. The most recent update of this manual is the 12TH edition and was utilized for this analysis.

Table 2, Page 3 details the development land use for each scenario and the corresponding **Trip Generation Manual** land uses that will be used to forecast the site generated traffic volumes.

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TABLE 2 - TRIP GENERATION SCENARIOS & LAND USES

SCENARIO #1: Base Scenario

SITE COMPONENTS	SIZE	LAND USE	ITE CODE	ITE DESCRIPTION
Existing JOANN Facility	1,137,000 SF	Industrial	130	Industrial Park
	263,000 SF	Office	710	General Office Building
Existing Day Care	8,750 SF	Institutional	565	Day Care Center

SCENARIO #2: Base scenario plus two retail plazas added.

SITE COMPONENTS	SIZE	LAND USE	ITE CODE	ITE DESCRIPTION
Existing JOANN Facility	1,137,000 SF	Industrial	130	Industrial Park
	263,000 SF	Office	710	General Office Building
Existing Day Care	8,750 SF	Institutional	565	Day Care Center
Retail Development	40,000 SF x 2	Retail	822	Strip Retail Plaza (<40k)

SCENARIO #3: Base scenario plus five office buildings added.

SITE COMPONENTS	SIZE	LAND USE	ITE CODE	ITE DESCRIPTION
Existing JOANN Facility	1,137,000 SF	Industrial	130	Industrial Park
	263,000 SqFtSF	Office	710	General Office Building
Existing Day Care	8,750 SF	Institutional	565	Day Care Center
Office Buildings	70,000 SF x 5	Office	710	General Office Building

SCENARIO #4: Base scenario plus three office buildings & two retail plazas added.

SITE COMPONENTS	SIZE	LAND USE	ITE CODE	ITE DESCRIPTION
Existing JOANN Facility	1,137,000SF	Industrial	130	Industrial Park
	263,000 SF	Office	710	General Office Building
Existing Day Care	8,750 SF	Institutional	565	Day Care Center
Retail Development	40,000 SF x 2	Retail	822	Strip Retail Plaza (<40k)
Office Buildings	50,000 SF x 3	Office	710	General Office Building

SCENARIO #5: Base scenario plus eleven retail locations added.

SITE COMPONENTS	SIZE	LAND USE	ITE CODE	ITE DESCRIPTION
Existing JOANN Facility	1,137,000 SF	Industrial	130	Industrial Park
	263,000 SF	Office	710	General Office Building
Existing Day Care	8,750 SF	Institutional	565	Day Care Center
Retail Development	10,000 SF x 11	Retail	822	Strip Retail Plaza (<40k)

SCENARIO #6: Base scenario plus seven retail locations and 200 townhomes added.

SITE COMPONENTS	SIZE	LAND USE	ITE CODE	ITE DESCRIPTION
Existing JOANN Facility	1,137,000 SF	Industrial	130	Industrial Park
	263,000 SF	Office	710	General Office Building
Existing Day Care	8,750 SF	Institutional	565	Day Care Center
Retail Development	10,000 SF x 7	Retail	822	Strip Retail Plaza (<40k)
Townhomes	200 Units	Residential	215	Single-Family Attached Housing

INTERNAL CAPTURE

The development scenarios can be classified as a multi-use where trips can be made between two on-site land uses, without using the off-site road system. The trip making characteristics are interrelated, and some trips are made among on-site uses because of the nature of these developments. This capture of trips internal to the site has the net effect of reducing vehicle trip generation between the overall development site and the external street system (compared to the total number of trips generated by comparable land uses developed individually on stand-alone sites).

The methodology to calculate the internally captured trips was developed as part of a research project sponsored by the National Cooperative Highway Research Program (NCHRP) entitled **Enhancing Internal Trip Capture Estimation of Mixed-Use Developments**, published as **NCHRP Report 684**. **NCHRP Report 684** provides a computer spreadsheet tool to assist in preparing the calculations of the internally captured trips. The methodology developed in the NCHRP project is the same recommended procedure presented in the ITE **Trip Generation Handbook, Third Edition**.

VEHICLE TRIP TYPES

The site generated driveway trips can be separated into two major categories: non pass-by trips and pass-by trips. Non-pass-by trips can be further subdivided into primary trips and diverted trips. Pass-by and diverted trips may be part of a multiple-stop chain of trips. Retail and service land use categories sometimes generate a different mixture of traffic than land uses such as residential homes and office facilities, which add all of the “new” traffic to the adjacent roadway system.

A ***pass-by trip*** is made as an intermediate stop on the way from an origin to a primary trip destination. Pass-by trips are attracted from traffic passing the site on an adjacent street or roadway that offers direct access to the generator (i.e. motorists who are already on Darrow Road and stop pick up dinner on their way home from work).

A ***non-pass-by trip*** is simply any trip generated by a site that is not a pass-by trip. Non-pass-by trips are sometimes used when diverted trips are not calculated separately from primary trips in the analysis process.

- A ***diverted trip*** is attracted from the traffic volume on roadways within the vicinity of the generator but without direct access to the site. A diverted trip requires a diversion from a roadway not adjacent to the site to another roadway to gain direct access to the site.

- A ***primary trip*** is made for the specific purpose of visiting the destination, the trip generator. The stop at the destination is the primary reason for the trip.

The site generated traffic for the development scenarios detailed in *Table 1* will be categorized as **non-pass-by trips** and **pass-by trips** for the purpose of this report and all analysis contained within.

The technical appendices in the ITE **Trip Generation Manual** provides access to pass-by trip rates (previously **Trip Generation Handbook**) for various land uses. The appendices can be accessed by subscription either through the **ITETripGen** web-based app or through the trip generation resource page on the ITE website at the following address:

https://www.ite.org/technical-resources/topics/trip-and-parking-generation

Pass-by rates will be used for land uses with available data from ITE (i.e. retail and day care land uses). The site generated pass-by trips will be based on applying the average pass-by rate to the lower of the entering and exiting site generated volumes in order to have an equal volume of pass-by traffic entering and exiting the site. A copy of the ITE **Trip Generation Manual** pass-by rate tables used in this report are provided in the Appendices**.**

TRIP GENERATION SUMMARY

Trip generation calculations for the development were performed utilizing data contained in the **Trip Generation Manual** and the methods outlined in the **Trip Generation Handbook**. Copies of the trip generation worksheets and the internal trip capture calculations using the **NCHRP Report 684** spreadsheet can be found in the Appendices.

Table 3, Page 6 details the expected generated weekday peak hour traffic volumes for each trip type under each development scenario.

CONCLUSIONS

Based on the results of the analyses, we offer the following conclusions:

- All scenarios exhibit higher total trip generation in the PM peak hour compared to the AM peak hour except Scenario 1.
- Scenario 1 was found to generate the lowest total site driveway volumes in both the AM (695 trips) and PM (682 trips) peak hours.
- Scenario 3, which includes five office buildings, generates the highest AM peak hour traffic volumes (1,185 trips). The traffic pattern is strongly commuter-oriented, with heavy inbound AM traffic and outbound PM traffic.
- Scenario 5, which includes eleven retail locations, generates the highest PM peak hour traffic volumes (1,436 trips). The retail-focused land uses produce substantially greater PM peak hour activity compared to the office scenarios.

Should you have any questions or comments that require additional information please call me at (330) 686-6402 or email me at Michael@tmsengineers.com.

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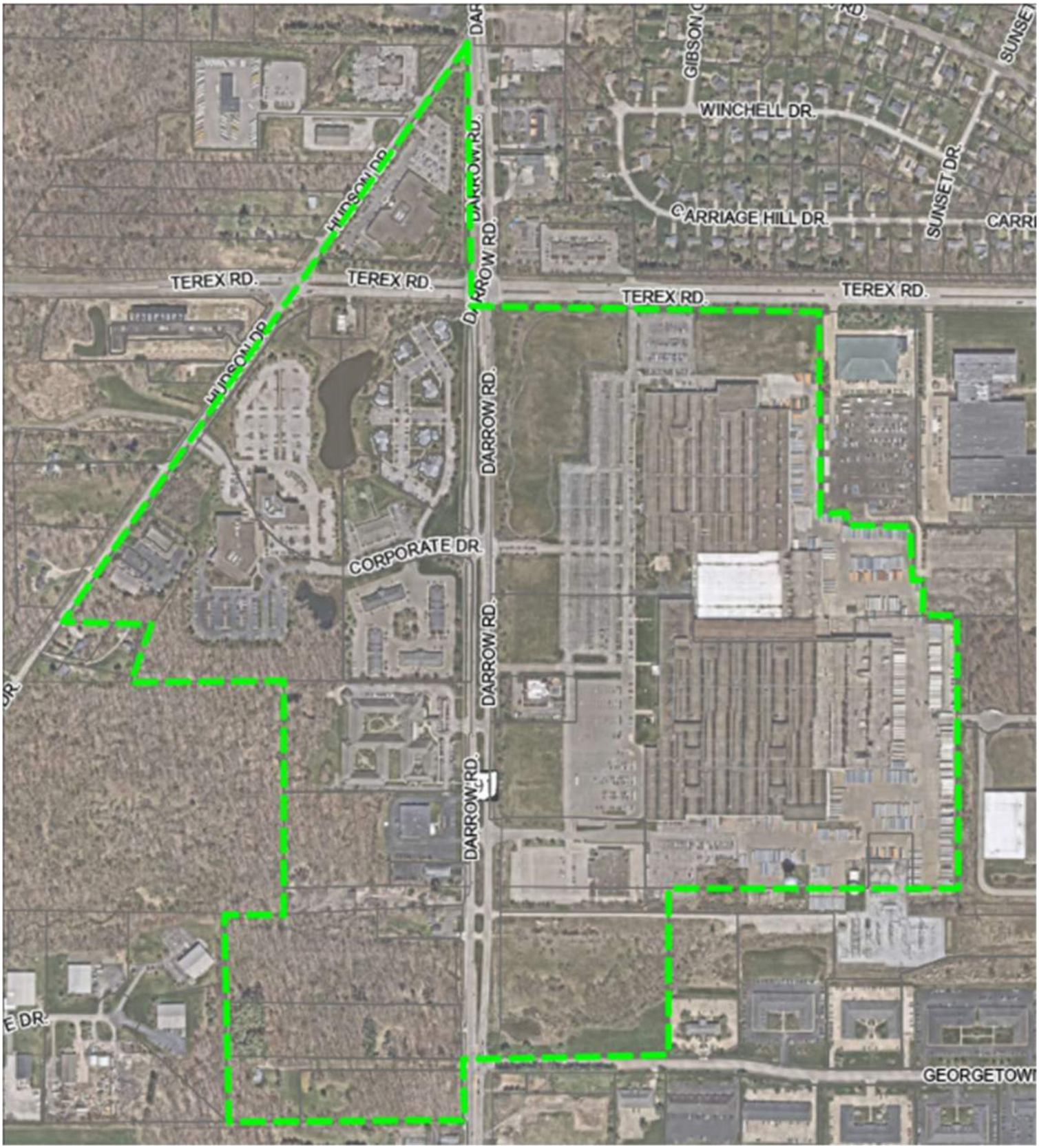
TABLE 3 - TRIP GENERATION SUMMARY & COMPARISON

WEEKDAY TRIP ENDS Trip Generation & Trip Type Summary	AM PEAK HOUR		PM PEAK HOUR	
	Enter	Exit	Enter	Exit
SCENARIO #1: Base Scenario				
TOTAL PASS-BY TRIPS	0	0	19	19
TOTAL NON-PASS-BY TRIPS	*546*	*149*	155	489
TOTAL SITE DRIVEWAY VOLUMES	***546***	***149***	**174**	**508**
	695		**682**	
SCENARIO #2: Base scenario plus two retail plazas added.				
TOTAL PASS-BY TRIPS	0	0	19	19
TOTAL NON-PASS-BY TRIPS	669	242	331	665
TOTAL SITE DRIVEWAY VOLUMES	***669***	***242***	**350**	**684**
	911		**1034**	
SCENARIO #3: Base scenario plus five office buildings added.				
TOTAL PASS-BY TRIPS	0	0	19	19
TOTAL NON-PASS-BY TRIPS	981	204	235	909
TOTAL SITE DRIVEWAY VOLUMES	***981***	***204***	**254**	**928**
	1185		**1182**	
SCENARIO #4: Base scenario plus three office buildings & two retail plazas added.				
TOTAL PASS-BY TRIPS	0	0	19	19
TOTAL NON-PASS-BY TRIPS	854	253	370	869
TOTAL SITE DRIVEWAY VOLUMES	***854***	***253***	**389**	**888**
	1107		**1277**	
SCENARIO #5: Base scenario plus eleven retail locations added.				
TOTAL PASS-BY TRIPS	0	0	19	19
TOTAL NON-PASS-BY TRIPS	739	287	532	866
TOTAL SITE DRIVEWAY VOLUMES	***739***	***287***	**551**	**885**
	1026		**1436**	
SCENARIO #6: Base scenario plus seven retail locations and 200 townhomes added.				
TOTAL PASS-BY TRIPS	0	0	19	19
TOTAL NON-PASS-BY TRIPS	673	292	405	723
TOTAL SITE DRIVEWAY VOLUMES	***673***	***292***	**424**	**742**
	965		**1166**	



TMS Engineers, Inc. 2112 Case Parkway S., Unit 7, Twinsburg, Ohio 44087 www.TMSEngineers.com	**District 11** **Trip Generation Analysis** **Hudson, Ohio**	**Location Map**	**NORTH** NOT TO SCALE	**Figure: 1** **Attachment**

APPENDIX A
SCENARIO 1

TRIP GENERATION SUMMARY - SCENARIO 1

LAND USE		ITE TRIP GENERATION DESCRIPTION	WEEKDAY TRIP ENDS			
			AM Peak Hour		PM Peak Hour	
ITE Code	SIZE (SqFt)		Enter	Exit	Enter	Exit
Office		General Office Building	277	38	47	245
710	263,000	*Internal Trip Reduction*	*0*	*0*	*0*	*0*
		Driveway Volumes Less Internal Trip Reduction	***277***	***38***	***47***	***245***
Industrial		Industrial Park	219	66	83	213
130	1,137,000	*Internal Trip Reduction*	*0*	*0*	*0*	*0*
		Driveway Volumes Less Internal Trip Reduction	***219***	***66***	***83***	***213***
Day Care		Day Care Center	50	45	44	50
565	8,750	*Internal Trip Reduction*	*0*	*0*	*0*	*0*
		Driveway Volumes Less Internal Trip Reduction	***50***	***45***	***44***	***50***
Total Land Use Generated Trips			546	149	174	508
Internal Trip Reduction			*0*	*0*	*0*	*0*
TOTAL SITE DRIVEWAY VOLUMES (Less Internal Trip Reduction)			***546***	***149***	***174***	***508***
			695		***682***	

TRIP TYPE SUMMARY - SCENARIO 1

LAND USE		TRIP TYPES	WEEKDAY TRIP ENDS			
			AM Peak Hour		PM Peak Hour	
ITE Code	SIZE (SqFt)		Enter	Exit	Enter	Exit
Office		***Driveway Volumes Less Internal Trip Reduction***	***277***	***38***	***47***	***245***
710	263,000	Pass-by Trips (AM - 0% / PM - 0%)	0	0	0	0
		Non-Pass-by Trips	277	38	47	245
Industrial		***Driveway Volumes Less Internal Trip Reduction***	***219***	***66***	***83***	***213***
130	1,137,000	Pass-by Trips (AM - 0% / PM - 0%)	0	0	0	0
		Non-Pass-by Trips	219	66	83	213
Day Care		***Driveway Volumes Less Internal Trip Reduction***	***50***	***45***	***44***	***50***
565	8,750	Pass-by Trips (AM - 0% / PM - 44%)	*0*	*0*	*19*	*19*
		Non-Pass-by Trips	50	45	25	31
TOTAL PASS-BY TRIPS			**0**	**0**	**19**	**19**
TOTAL NON-PASS-BY TRIPS			***546***	***149***	***155***	***489***
TOTAL SITE DRIVEWAY VOLUMES			***546***	***149***	***174***	***508***
			695		***682***	

General Office Building – ITE CODE #710

Size: 263,000 SqFt

WEEKDAY

Weekday

DATA STATISTICS

Land Use:
General Office Building (710) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
22

Avg. 1000 Sq. Ft. GFA:
126

Average Rate:
7.83

Range of Rates:
3.27 - 27.56

Standard Deviation:
3.71

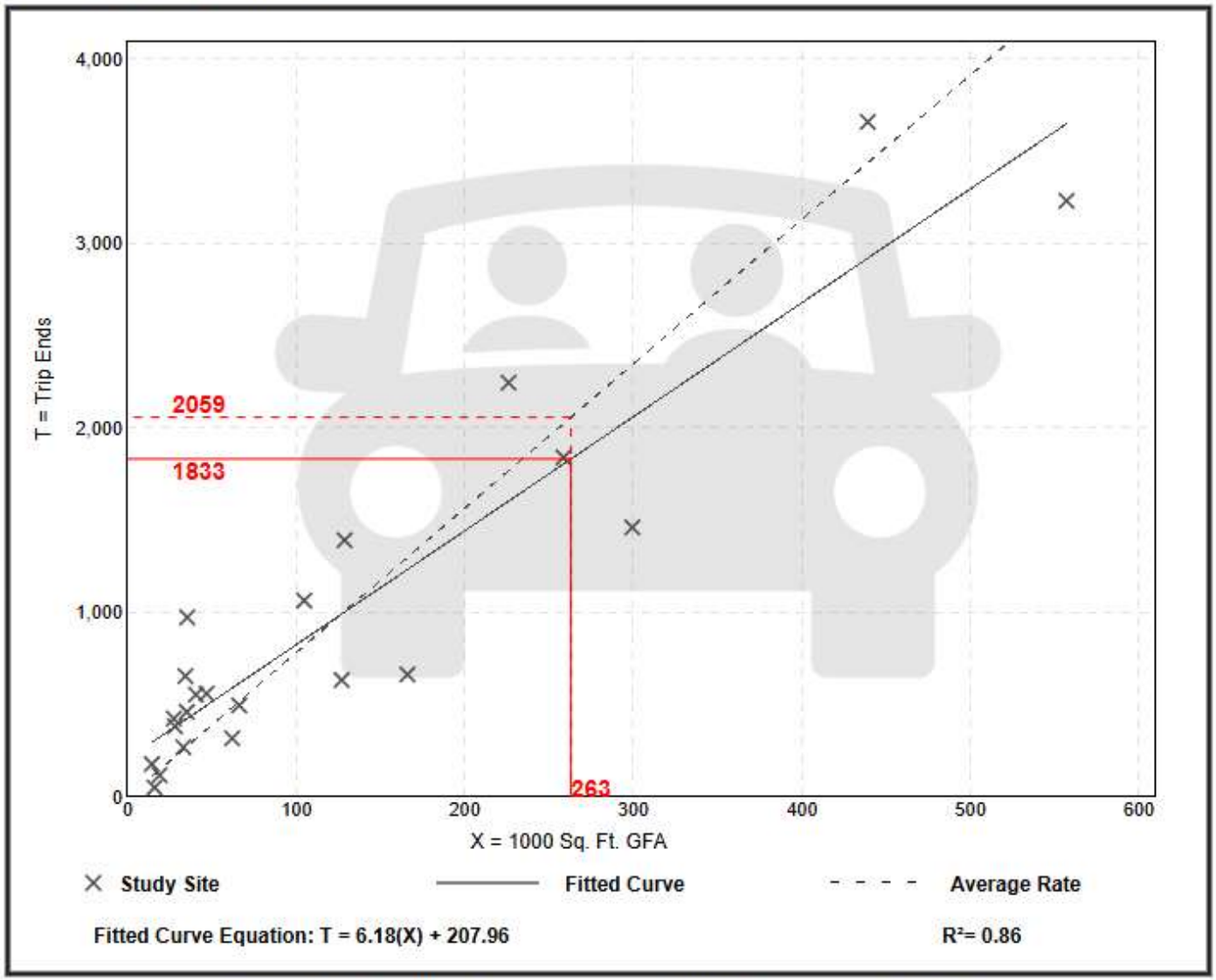
Fitted Curve Equation:
T = 6.18(X) + 207.96

R^2:
0.86

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 2059 (Total), 1030 (Entry), 1029 (Exit)
Fitted Curve: 1833 (Total), 917 (Entry), 916 (Exit)

Data Plot and Equation



Trip Gen Manual, 12th Edition • Institute of Transportation Engineers

Date: 4/17/2026

General Office Building – ITE CODE #710

Size: 263,000 SqFt

WEEKDAY

Peak Hour of Adjacent Street Traffic: 7-9 AM

DATA STATISTICS

Land Use:
General Office Building (710) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

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:
54

Avg. 1000 Sq. Ft. GFA:
170

Average Rate:
1.24

Range of Rates:
0.32 - 2.83

Standard Deviation:
0.40

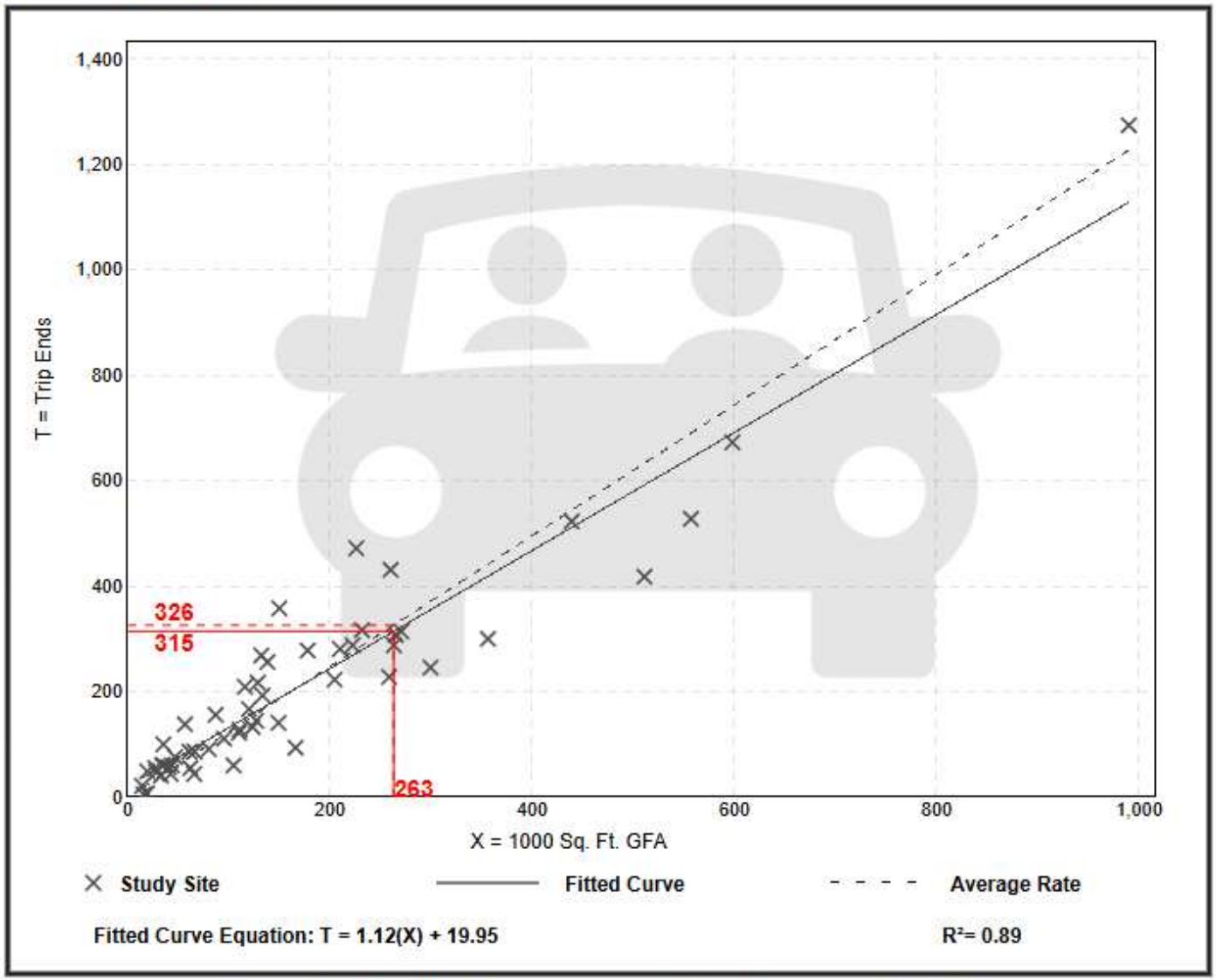
Fitted Curve Equation:
T = 1.12(X) + 19.95

R^2:
0.89

Directional Distribution:
88% entering, 12% exiting

Calculated Trip Ends:
Average Rate: 326 (Total), 287 (Entry), 39 (Exit)
Fitted Curve: 315 (Total), 277 (Entry), 38 (Exit)

Data Plot and Equation



Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

Date: 4/17/2026

General Office Building – ITE CODE #710

Size: 263,000 SqFt

WEEKDAY

Peak Hour of Adjacent Street Traffic: 4-6 PM

DATA STATISTICS

Land Use:
General Office Building (710) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
53

Avg. 1000 Sq. Ft. GFA:
166

Average Rate:
1.18

Range of Rates:
0.26 - 2.59

Standard Deviation:
0.41

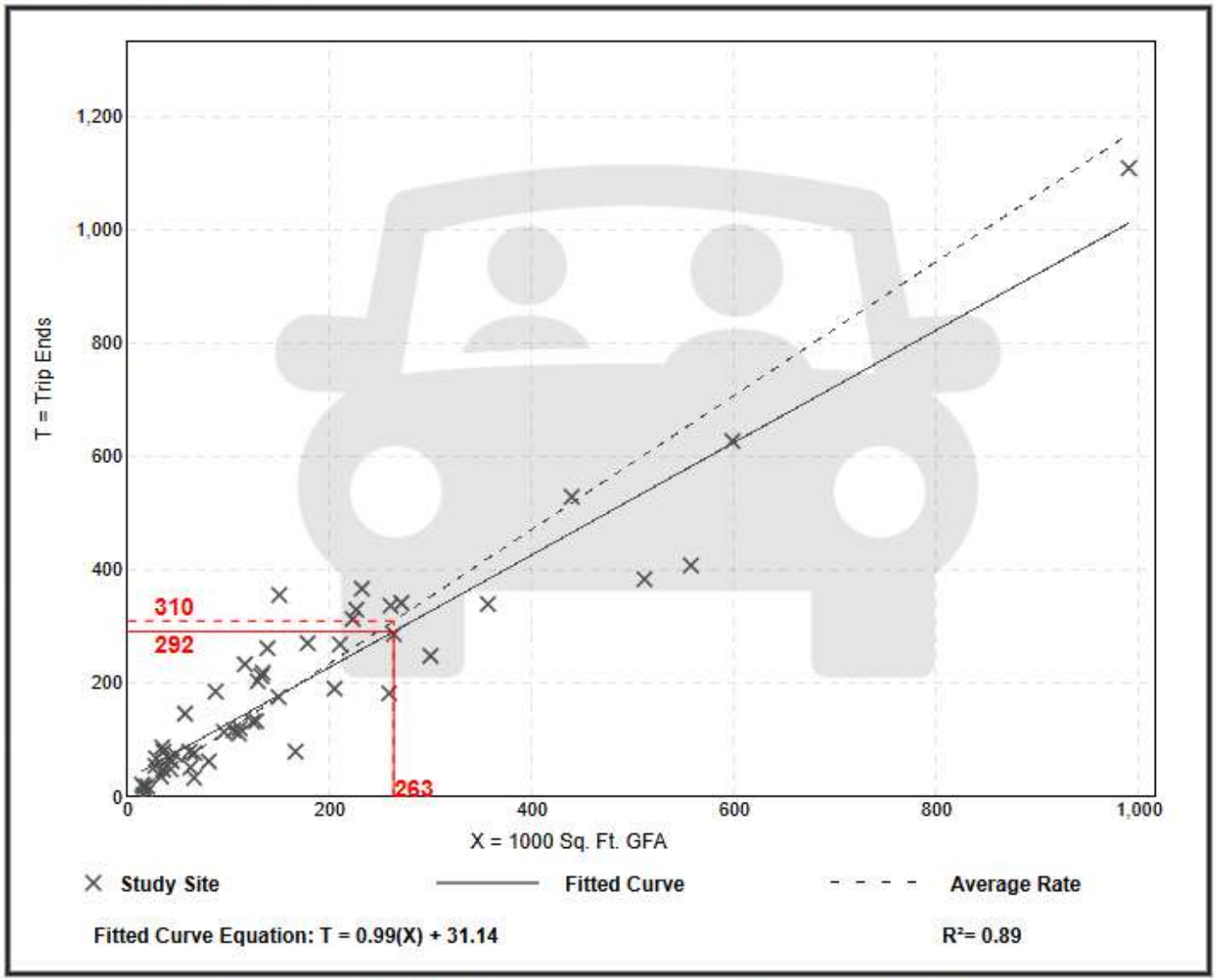
Fitted Curve Equation:
T = 0.99(X) + 31.14

R^2:
0.89

Directional Distribution:
16% entering, 84% exiting

Calculated Trip Ends:
Average Rate: 310 (Total), 50 (Entry), 260 (Exit)
Fitted Curve: 292 (Total), 47 (Entry), 245 (Exit)

Data Plot and Equation



Trip Gen Manual, 12th Edition • Institute of Transportation Engineers

Date: 4/17/2026

Industrial Park – ITE CODE #130

Size: 1,137,000 SqFt

WEEKDAY

Weekday

Data Plot and Equation

DATA STATISTICS

Land Use:
Industrial Park (130) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
27

Avg. 1000 Sq. Ft. GFA:
1252

Average Rate:
2.68

Range of Rates:
1.05 - 14.98

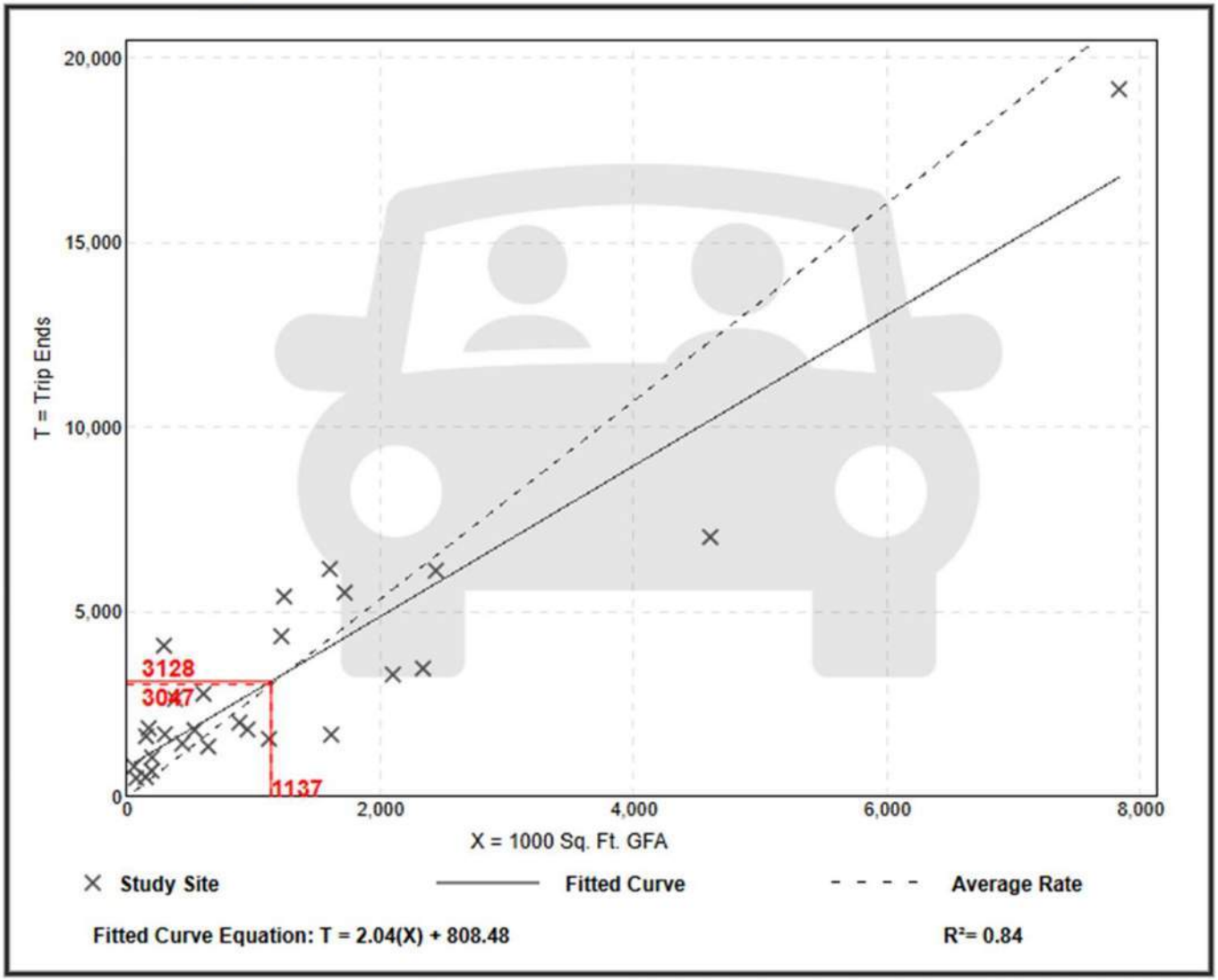
Standard Deviation:
1.84

Fitted Curve Equation:
T = 2.04(X) + 808.48

R^2:
0.84

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 3047 (Total), 1524 (Entry), 1523 (Exit)
Fitted Curve: 3128 (Total), 1564 (Entry), 1564 (Exit)



Trip Gen Manual, 12th Edition • Institute of Transportation Engineers

Date: 4/14/2026

Industrial Park – ITE CODE #130

Size: 1,137,000 SqFt

WEEKDAY

Peak Hour of Adjacent Street Traffic: 7-9 AM

Data Plot and Equation

DATA STATISTICS

Land Use:
Industrial Park (130) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

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:
28

Avg. 1000 Sq. Ft. GFA:
1529

Average Rate:
0.22

Range of Rates:
0.06 - 2.13

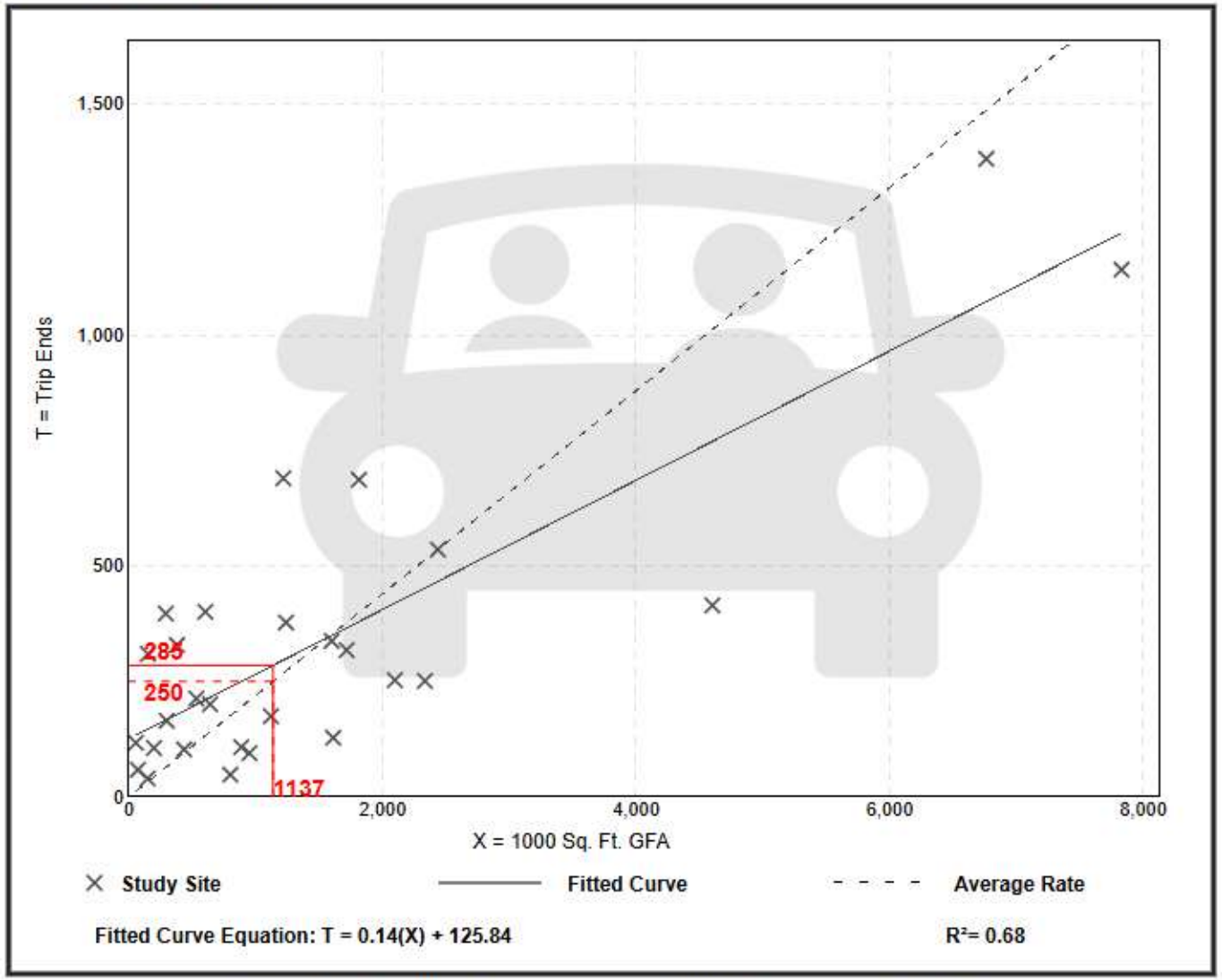
Standard Deviation:
0.22

Fitted Curve Equation:
T = 0.14(X) + 125.84

R^2:
0.68

Directional Distribution:
77% entering, 23% exiting

Calculated Trip Ends:
Average Rate: 250 (Total), 193 (Entry), 57 (Exit)
Fitted Curve: 285 (Total), 219 (Entry), 66 (Exit)



Trip Gen Manual, 12th Edition • Institute of Transportation Engineers

Date: 4/14/2026

Industrial Park – ITE CODE #130

Size: 1,137,000 SqFt

WEEKDAY

Peak Hour of Adjacent Street Traffic: 4-6 PM

Data Plot and Equation

DATA STATISTICS

Land Use:
Industrial Park (130) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
27

Avg. 1000 Sq. Ft. GFA:
1541

Average Rate:
0.23

Range of Rates:
0.09 - 2.85

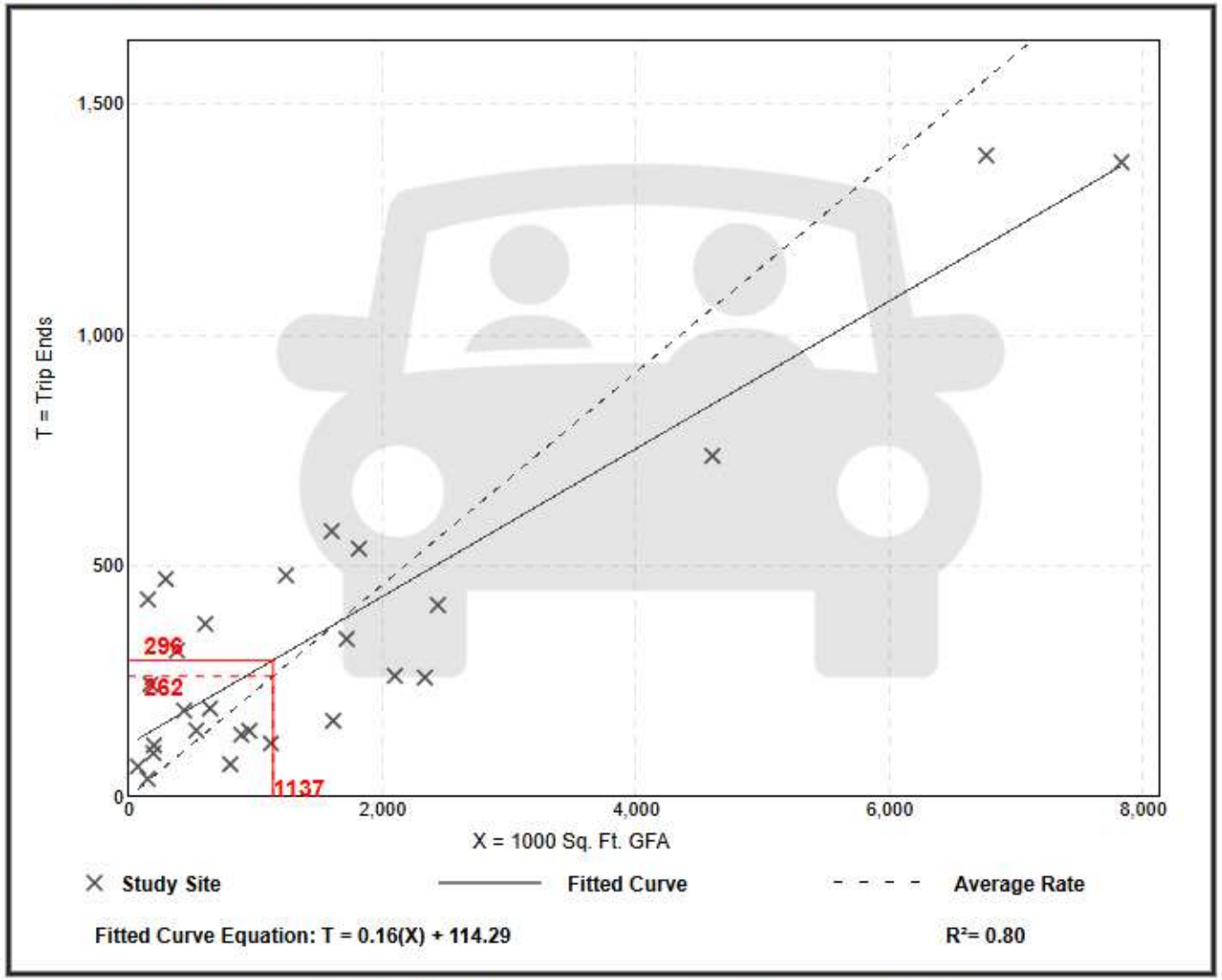
Standard Deviation:
0.25

Fitted Curve Equation:
T = 0.16(X) + 114.29

R^2:
0.80

Directional Distribution:
28% entering, 72% exiting

Calculated Trip Ends:
Average Rate: 262 (Total), 73 (Entry), 189 (Exit)
Fitted Curve: 296 (Total), 83 (Entry), 213 (Exit)



Trip Gen Manual, 12th Edition • Institute of Transportation Engineers

Date: 4/14/2026

Day Care Center – ITE CODE #565

Size: 8,750 SqFt

WEEKDAY

Weekday

Data Plot and Equation

DATA STATISTICS

Land Use:
Day Care Center (565) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
21

Avg. 1000 Sq. Ft. GFA:
5

Average Rate:
39.30

Range of Rates:
12.12 - 211.06

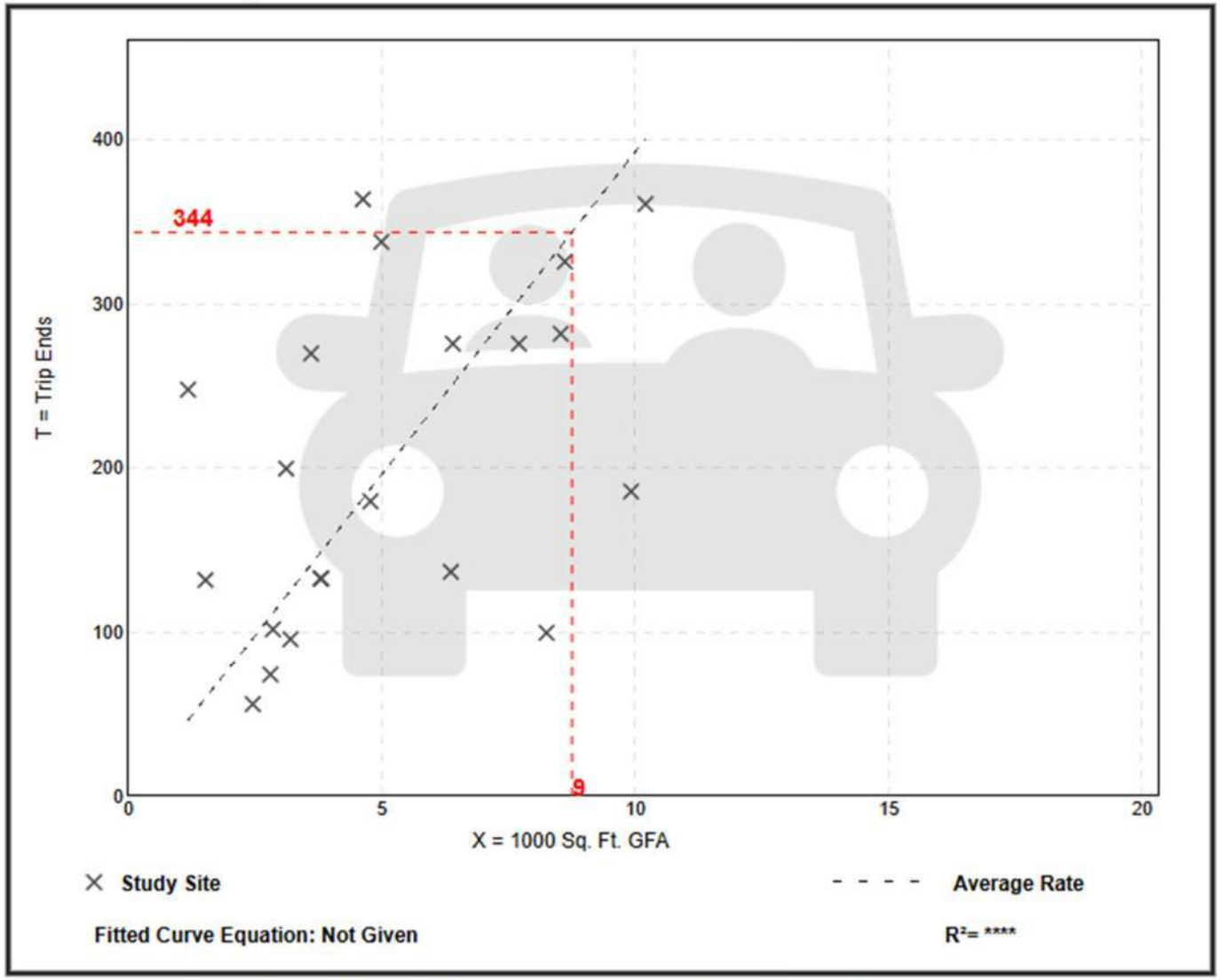
Standard Deviation:
26.09

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 344 (Total), 172 (Entry), 172 (Exit)



Trip Gen Manual, 12th Edition • Institute of Transportation Engineers

Date: 4/14/2026

Day Care Center – ITE CODE #565

Size: 8,750 SqFt

WEEKDAY

Peak Hour of Adjacent Street Traffic: 7-9 AM

Data Plot and Equation

DATA STATISTICS

Land Use:
Day Care Center (565) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

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:
78

Avg. 1000 Sq. Ft. GFA:
5

Average Rate:
10.88

Range of Rates:
1.79 - 57.02

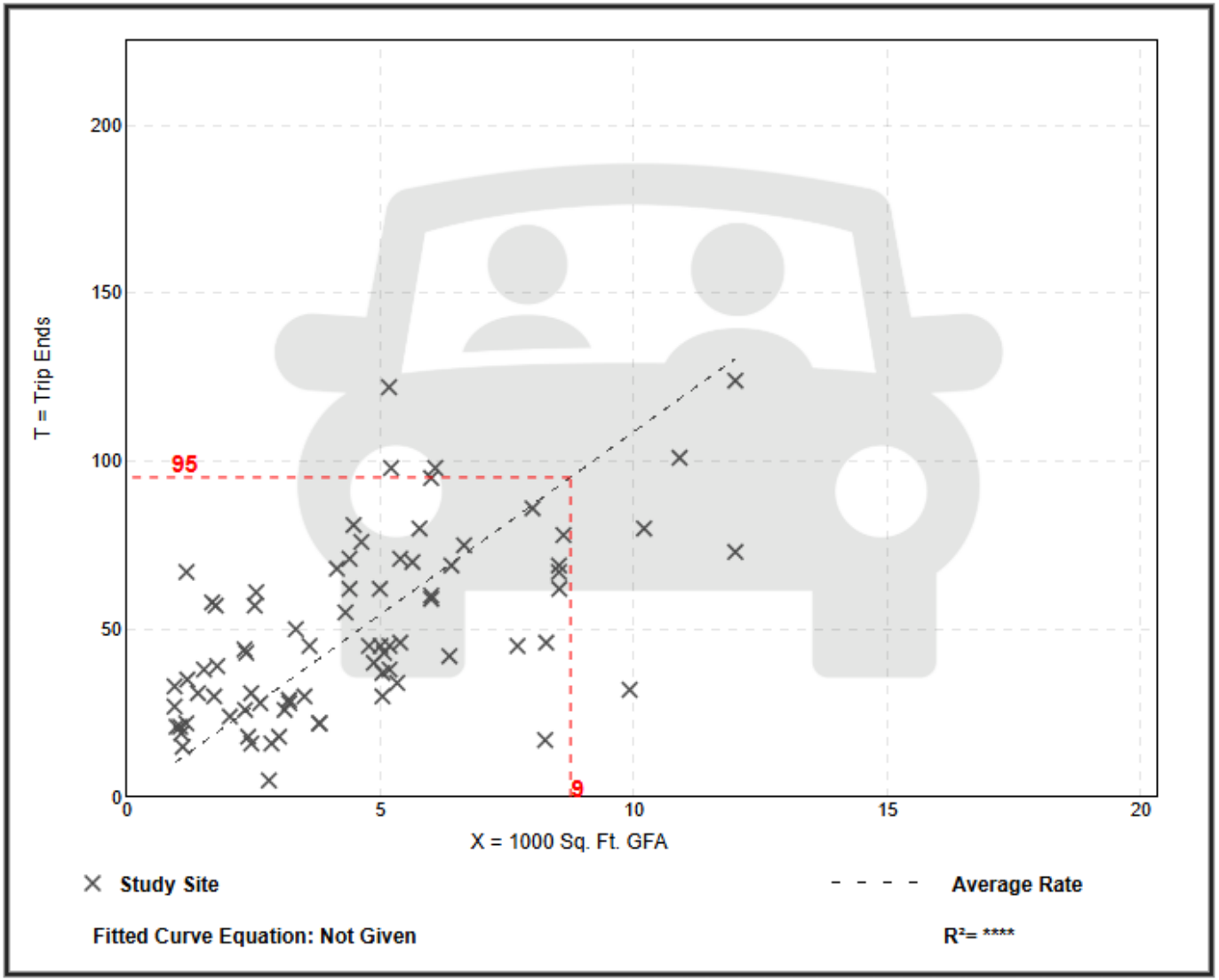
Standard Deviation:
6.27

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
53% entering, 47% exiting

Calculated Trip Ends:
Average Rate: 95 (Total), 50 (Entry), 45 (Exit)



Trip Gen Manual, 12th Edition • Institute of Transportation Engineers

Date: 4/14/2026

Day Care Center – ITE CODE #565

Size: 8,750 SqFt

WEEKDAY

Peak Hour of Adjacent Street Traffic: 4-6 PM

Data Plot and Equation

DATA STATISTICS

Land Use:
Day Care Center (565) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
79

Avg. 1000 Sq. Ft. GFA:
4

Average Rate:
10.75

Range of Rates:
1.56 - 40.85

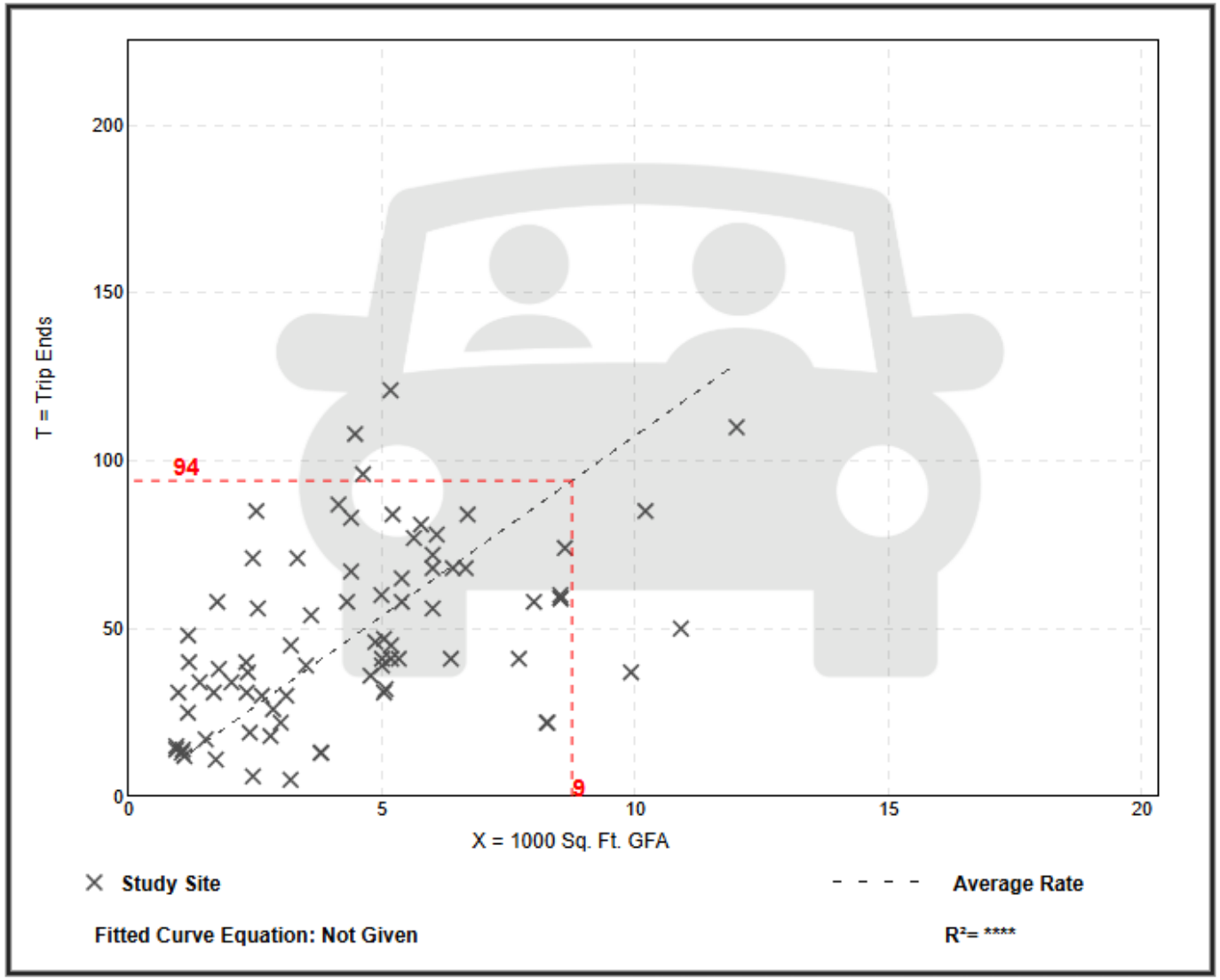
Standard Deviation:
6.46

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
47% entering, 53% exiting

Calculated Trip Ends:
Average Rate: 94 (Total), 44 (Entry), 50 (Exit)



Trip Gen Manual, 12th Edition • Institute of Transportation Engineers

Date: 4/14/2026

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	District 11	**Organization:**	TMS Engineers, Inc.
Project Location:	Hudson, Ohio	**Performed By:**	ABC
Scenario Description:	Scenario 1	**Date:**	4/17/2026
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	130/710	1,400,000	SF	600	496	104
Retail				0		
Restaurant				0		
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]	565	8,750	SF	95	50	45
Total				695	546	149

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	695	546	149
Internal Capture Percentage	0%	0%	0%
External Vehicle-Trips[3]	695	546	149
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	0%	0%
Retail	N/A	N/A
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	District 11
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	496	496	1.00	104	104
Retail	1.00	0	0	1.00	0	0
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		29	66	0	1	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	20		0	0	0	0
Restaurant	69	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	15	0	0	0		0
Hotel	15	0	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	496	496	496	0	0
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	50	50	50	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	104	104	104	0	0
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	45	45	45	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	District 11	**Organization:**	TMS Engineers, Inc.
Project Location:	Hudson, Ohio	**Performed By:**	ABC
Scenario Description:	Scenario 1	**Date:**	4/17/2026
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	130/710	1,400,000	SF	588	130	458
Retail				0		
Restaurant				0		
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]	565	8,750	SF	94	44	50
Total				682	174	508

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	682	174	508
Internal Capture Percentage	0%	0%	0%
External Vehicle-Trips[3]	682	174	508
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	0%	0%
Retail	N/A	N/A
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	District 11
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	130	130	1.00	458	458
Retail	1.00	0	0	1.00	0	0
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		92	18	0	9	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	40		0	0	0	0
Restaurant	39	0		0	0	0
Cinema/Entertainment	8	0	0		0	0
Residential	74	0	0	0		0
Hotel	0	0	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	130	130	130	0	0
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	44	44	44	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	458	458	458	0	0
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	50	50	50	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual* , 12th Edition

Land Use Code	565								
Land Use	Day Care Center								
Setting	General Urban/Suburban								
Time Period	Weekday PM Peak Period								
# Data Sites	1								
Average Pass-By Rate	44%								
	Pass-By Characteristics for Individual Sites								
		Survey		Pass-By	Non-Pass-By Trips			Adj Street Peak	
GFA (000)	State or Province	Year	# Interviews	Trip (%)	Primary (%)	Diverted (%)	Total (%)	Hour Volume	Source
7.2	Pennsylvania	1990	—	44	24	32	56	—	23

APPENDIX B
SCENARIO 2

TRIP GENERATION SUMMARY - SCENARIO 2

LAND USE		ITE TRIP GENERATION DESCRIPTION	WEEKDAY TRIP ENDS			
			AM Peak Hour		PM Peak Hour	
ITE Code	SIZE (SqFt)		Enter	Exit	Enter	Exit
Office		General Office Building	277	38	47	245
710	263,000	*Internal Trip Reduction*	*-11*	*-11*	*-1*	*-9*
		Driveway Volumes Less Internal Trip Reduction	***266***	***27***	***46***	***236***
Industrial		Industrial Park	219	66	83	213
130	1,137,000	*Internal Trip Reduction*	*-9*	*-18*	*-3*	*-7*
		Driveway Volumes Less Internal Trip Reduction	***210***	***48***	***80***	***206***
Day Care		Day Care Center	50	45	44	50
565	8,750	*Internal Trip Reduction*	*0*	*0*	*0*	*0*
		Driveway Volumes Less Internal Trip Reduction	***50***	***45***	***44***	***50***
Retail		Strip Retail Plaza (<40k)	172	142	196	196
822	40,000 2 Parcels	*Internal Trip Reduction*	*-29*	*-20*	*-16*	*-4*
		Driveway Volumes Less Internal Trip Reduction	***143***	***122***	***180***	***192***
Total Land Use Generated Trips			718	291	370	704
Internal Trip Reduction			*-49*	*-49*	*-20*	*-20*
TOTAL SITE DRIVEWAY VOLUMES (Less Internal Trip Reduction)			***669***	***242***	***350***	***684***
			911		***1034***	

TRIP TYPE SUMMARY - SCENARIO 2

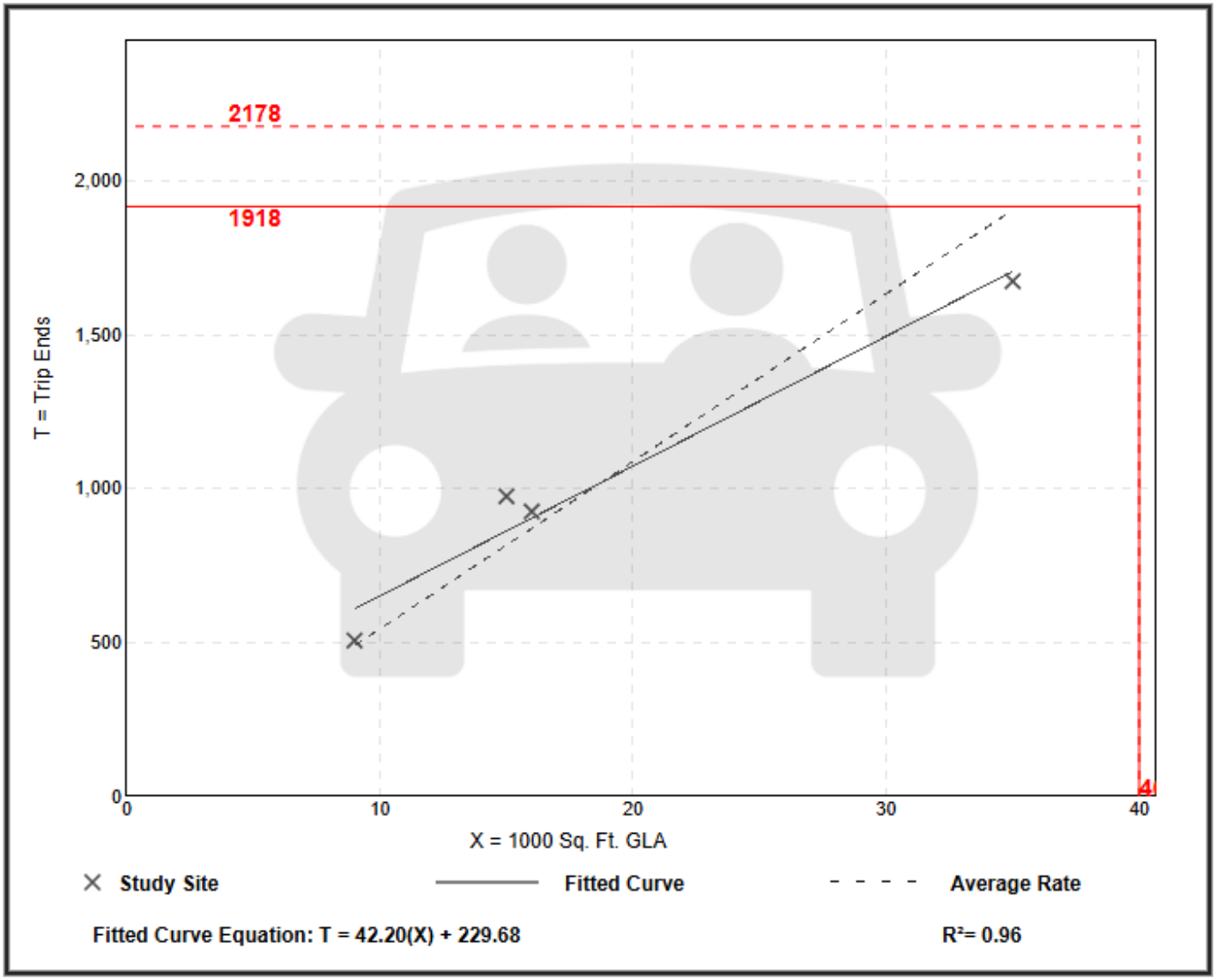
LAND USE		TRIP TYPES	WEEKDAY TRIP ENDS			
			AM Peak Hour		PM Peak Hour	
ITE Code	SIZE (SqFt)		Enter	Exit	Enter	Exit
Office		***Driveway Volumes Less Internal Trip Reduction***	***266***	***27***	***46***	***236***
710	263,000	Pass-by Trips Not Applicable	0	0	0	0
		Non-Pass-by Trips	266	27	46	236
Industrial		***Driveway Volumes Less Internal Trip Reduction***	***210***	***48***	***80***	***206***
130	1,137,000	Pass-by Trips Not Applicable	0	0	0	0
		Non-Pass-by Trips	210	48	80	206
Day Care		***Driveway Volumes Less Internal Trip Reduction***	***50***	***45***	***44***	***50***
565	8,750	Pass-by Trips (AM - Data Not Available / PM - 44%)	*0*	*0*	*19*	*19*
		Non-Pass-by Trips	50	45	25	31
Retail		***Driveway Volumes Less Internal Trip Reduction***	***143***	***122***	***180***	***192***
822	40,000 2 Parcels	Pass-by Trips Data Not Available	0	0	0	0
		Non-Pass-by Trips	143	122	180	192
TOTAL PASS-BY TRIPS			**0**	**0**	**19**	**19**
TOTAL NON-PASS-BY TRIPS			***669***	***242***	***331***	***665***
TOTAL SITE DRIVEWAY VOLUMES			***669***	***242***	***350***	***684***
			911		***1034***	

STRIP RETAIL PLAZA (<40k)
ITE CODE #822
Size: 40,000 Sq. Ft.

WEEKDAY

Data Plot and Equation

Caution – Small Sample Size



DATA STATISTICS

Land Use:
Strip Retail Plaza (<40k) (822) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GLA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
4

Avg. 1000 Sq. Ft. GLA:
19

Average Rate:
54.45

Range of Rates:
47.86 - 65.07

Standard Deviation:
7.81

Fitted Curve Equation:
T = 42.20(X) + 229.68

R^2:
0.96

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 2178 (Total), 1089 (Entry), 1089 (Exit)
Fitted Curve: 1918 (Total), 959 (Entry), 959 (Exit)

Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

Date: 5/7/2026

STRIP RETAIL PLAZA (<40k)
ITE CODE #822
Size: 40,000 Sq. Ft.

WEEKDAY
Peak Hour of Adjacent Street Traffic: 7-9 AM

Data Plot and Equation

DATA STATISTICS

Land Use:
Strip Retail Plaza (<40k) (822) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GLA

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:
6

Avg. 1000 Sq. Ft. GLA:
17

Average Rate:
3.93

Range of Rates:
1.60 - 17.44

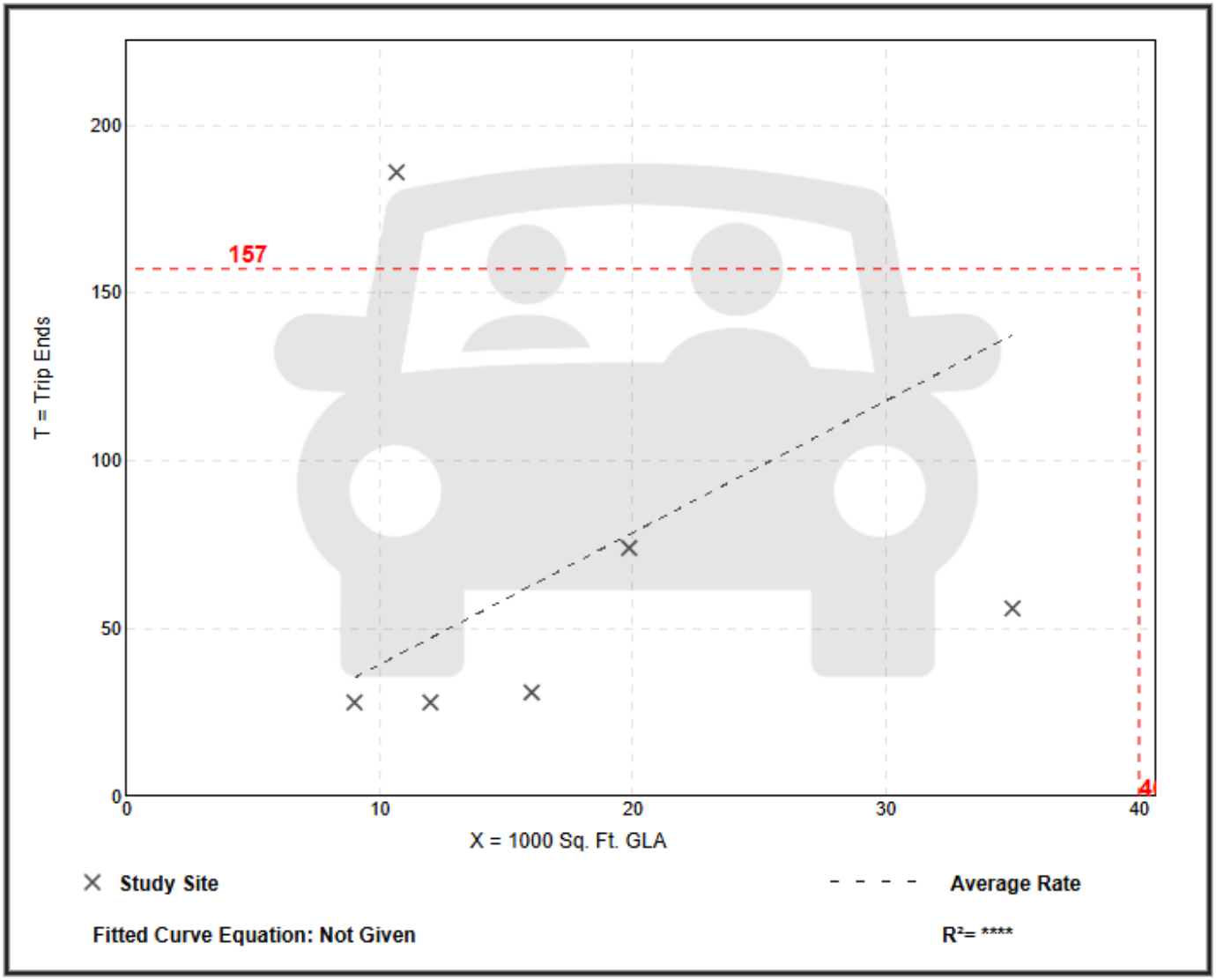
Standard Deviation:
5.12

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
55% entering, 45% exiting

Calculated Trip Ends:
Average Rate: 157 (Total), 86 (Entry), 71 (Exit)



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Date: 5/7/2026

STRIP RETAIL PLAZA (<40k)
ITE CODE #822
Size: 40,000 Sq. Ft.

WEEKDAY
Peak Hour of Adjacent Street Traffic: 4-6 PM

DATA STATISTICS

Land Use:
Strip Retail Plaza (<40k) (822) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GLA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
24

Avg. 1000 Sq. Ft. GLA:
22

Average Rate:
6.29

Range of Rates:
2.81 - 17.72

Standard Deviation:
3.02

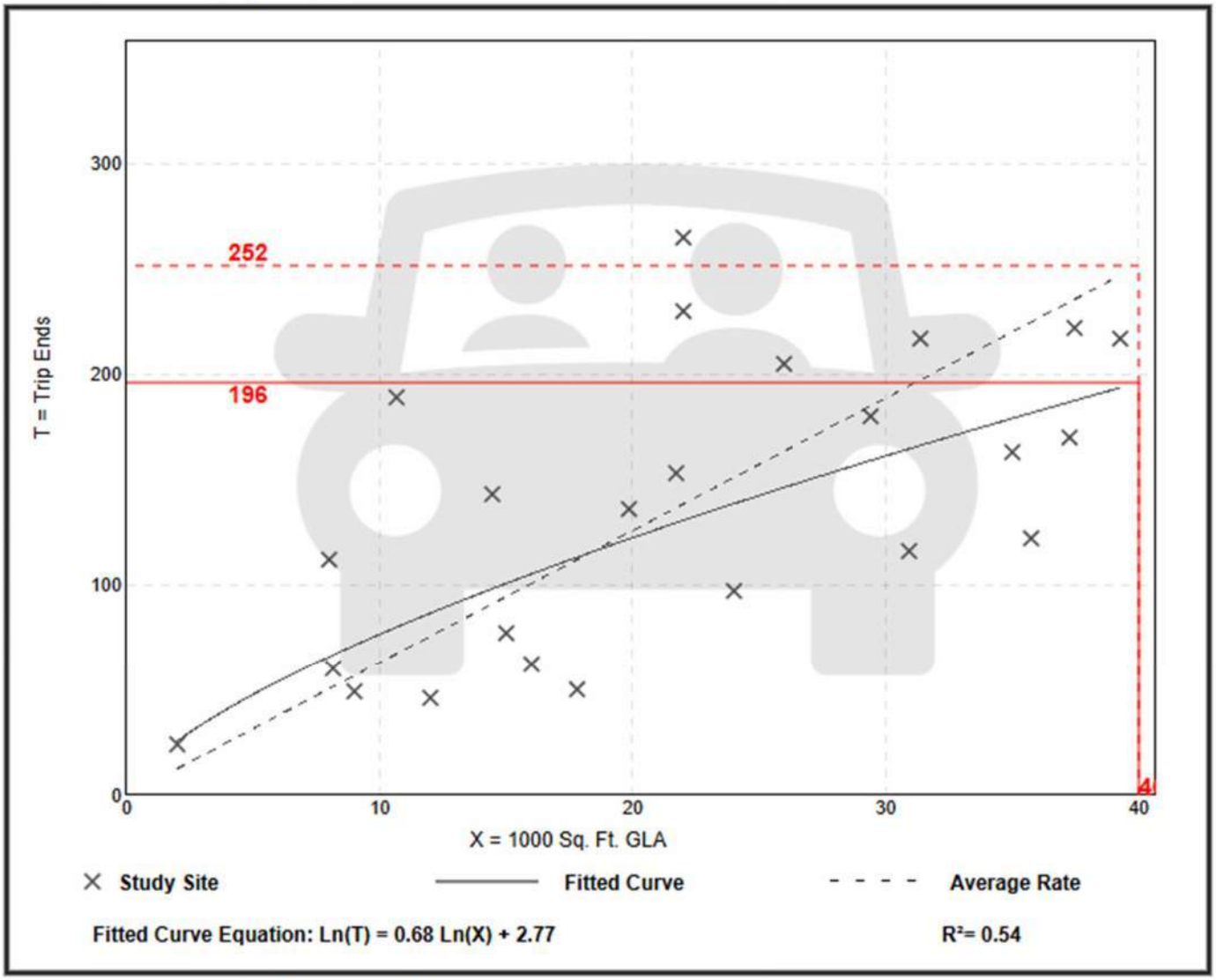
Fitted Curve Equation:
Ln(T) = 0.68 Ln(X) + 2.77

R^2:
0.54

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 252 (Total), 126 (Entry), 126 (Exit)
Fitted Curve: 196 (Total), 98 (Entry), 98 (Exit)

Data Plot and Equation



Trip Gen Manual, 12th Edition • Institute of Transportation Engineers

Date: 5/7/2026

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	District 11	**Organization:**	TMS Engineers, Inc.
Project Location:	Hudson, Ohio	**Performed By:**	ABC
Scenario Description:	Scenario 2	**Date:**	5/7/2026
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	130/710	1,400,000	SF	600	496	104
Retail	822	80,000	SF	314	172	142
Restaurant				0		
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]	565	8,750	SF	95	50	45
Total				1009	718	291

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		29	0	0	0	0
Retail	20		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,009	718	291
Internal Capture Percentage	10%	7%	17%
External Vehicle-Trips[3]	911	669	242
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	4%	28%
Retail	17%	14%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	District 11
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	496	496	1.00	104	104
Retail	1.00	172	172	1.00	142	142
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		29	66	0	1	0
Retail	41		18	0	20	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		55	0	0	0	0
Retail	20		0	0	0	0
Restaurant	69	14		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	15	29	0	0		0
Hotel	15	7	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	20	476	496	476	0	0
Retail	29	143	172	143	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	50	50	50	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	29	75	104	75	0	0
Retail	20	122	142	122	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	45	45	45	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	District 11	**Organization:**	TMS Engineers, Inc.
Project Location:	Hudson, Ohio	**Performed By:**	ABC
Scenario Description:	Scenario 2	**Date:**	5/7/2026
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	130/710	1,400,000	SF	588	130	458
Retail	822	80,000	SF	392	196	196
Restaurant				0		
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]	565	8,750	SF	94	44	50
Total				1074	370	704

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		16	0	0	0	0
Retail	4		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,074	370	704
Internal Capture Percentage	4%	5%	3%
External Vehicle-Trips[3]	1,034	350	684
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	3%	3%
Retail	8%	2%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	District 11
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	130	130	1.00	458	458
Retail	1.00	196	196	1.00	196	196
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		92	18	0	9	0
Retail	4		57	8	51	10
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		16	0	0	0	0
Retail	40		0	0	0	0
Restaurant	39	98		0	0	0
Cinema/Entertainment	8	8	0		0	0
Residential	74	20	0	0		0
Hotel	0	4	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	4	126	130	126	0	0
Retail	16	180	196	180	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	44	44	44	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	16	442	458	442	0	0
Retail	4	192	196	192	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	50	50	50	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

APPENDIX C
SCENARIO 3

TRIP GENERATION SUMMARY - SCENARIO 3

LAND USE		ITE TRIP GENERATION - SCENARIO 3 DESCRIPTION	WEEKDAY TRIP ENDS			
			AM Peak Hour		PM Peak Hour	
ITE Code	SIZE (SqFt)		Enter	Exit	Enter	Exit
Office		General Office Building	277	38	47	245
710	263,000	*Internal Trip Reduction*	*0*	*0*	*0*	*0*
		Driveway Volumes Less Internal Trip Reduction	***277***	***38***	***47***	***245***
Industrial		Industrial Park	219	66	83	213
130	1,137,000	*Internal Trip Reduction*	*0*	*0*	*0*	*0*
		Driveway Volumes Less Internal Trip Reduction	***219***	***66***	***83***	***213***
Day Care		Day Care Center	50	45	44	50
565	8,750	*Internal Trip Reduction*	*0*	*0*	*0*	*0*
		Driveway Volumes Less Internal Trip Reduction	***50***	***45***	***44***	***50***
Office		General Office Building	435	55	80	420
710	70,000 5 Parcels	*Internal Trip Reduction*	*0*	*0*	*0*	*0*
		Driveway Volumes Less Internal Trip Reduction	***435***	***55***	***80***	***420***
Total Land Use Generated Trips			981	204	254	928
Internal Trip Reduction			*0*	*0*	*0*	*0*
TOTAL SITE DRIVEWAY VOLUMES (Less Internal Trip Reduction)			***981***	***204***	***254***	***928***
			1185		***1182***	

TRIP TYPE SUMMARY - SCENARIO 3

LAND USE		TRIP TYPES	WEEKDAY TRIP ENDS			
			AM Peak Hour		PM Peak Hour	
ITE Code	SIZE (SqFt)		Enter	Exit	Enter	Exit
Office		***Driveway Volumes Less Internal Trip Reduction***	***277***	***38***	***47***	***245***
710	263,000	Pass-by Trips Not Applicable	0	0	0	0
		Non-Pass-by Trips	277	38	47	245
Industrial		***Driveway Volumes Less Internal Trip Reduction***	*219*	*66*	*83*	***213***
130	1,137,000	Pass-by Trips Not Applicable	0	0	0	0
		Non-Pass-by Trips	219	66	83	213
Day Care		***Driveway Volumes Less Internal Trip Reduction***	***50***	***45***	***44***	***50***
565	8,750	Pass-by Trips (AM - Data Not Available / PM - 44%)	*0*	*0*	*19*	*19*
		Non-Pass-by Trips	50	45	25	31
Office		***Driveway Volumes Less Internal Trip Reduction***	***435***	***55***	***80***	***420***
710	70,000 5 Parcels	Pass-by Trips Not Applicable	0	0	0	0
		Non-Pass-by Trips	435	55	80	420
TOTAL PASS-BY TRIPS			**0**	**0**	**19**	**19**
TOTAL NON-PASS-BY TRIPS			***981***	***204***	***235***	***909***
TOTAL SITE DRIVEWAY VOLUMES			***981***	***204***	***254***	***928***
			1185		***1182***	

General Office Building – ITE CODE #710

Size: 70,000 SF

WEEKDAY

Weekday

DATA STATISTICS

Land Use:
General Office Building (710) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
22

Avg. 1000 Sq. Ft. GFA:
126

Average Rate:
7.83

Range of Rates:
3.27 - 27.56

Standard Deviation:
3.71

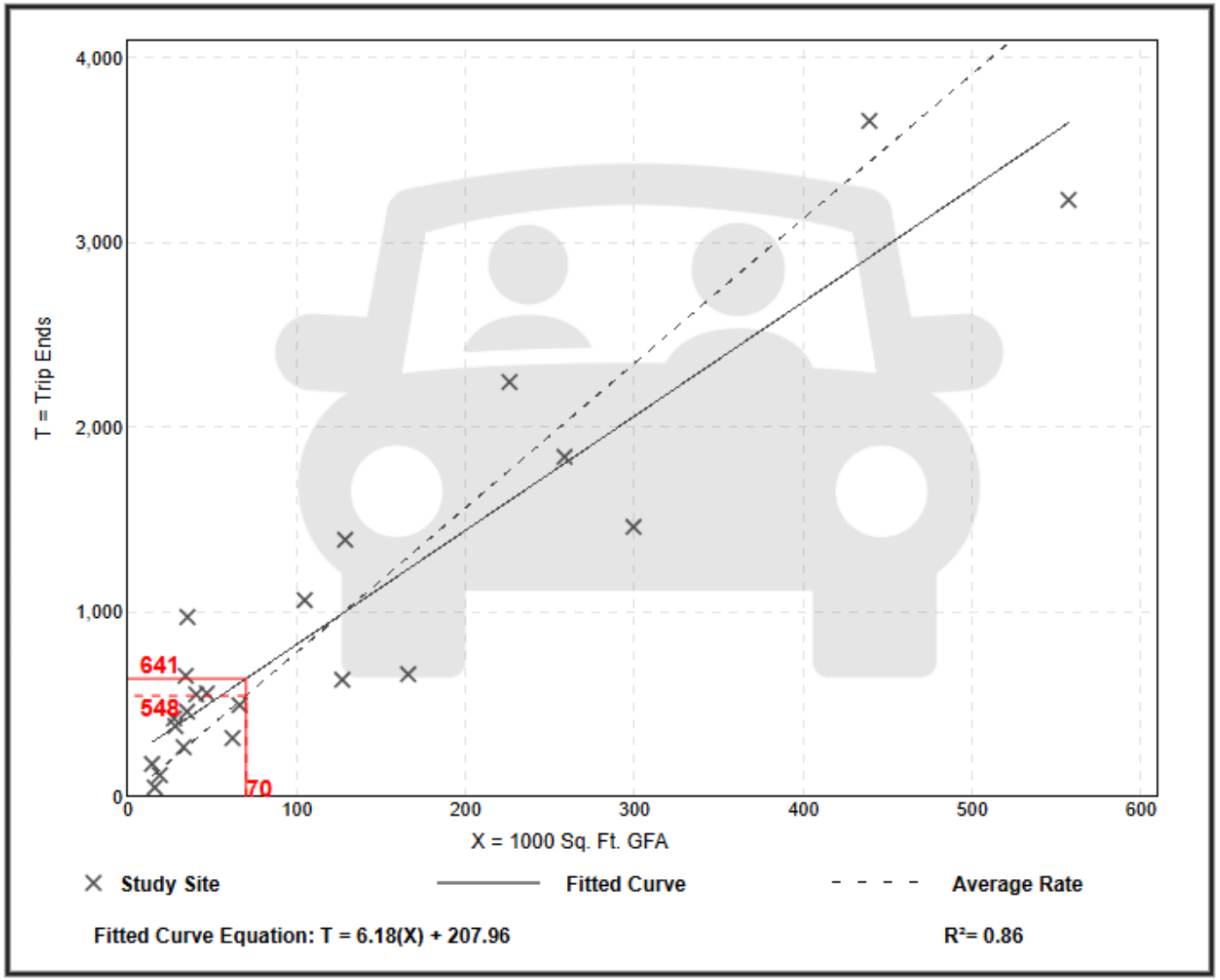
Fitted Curve Equation:
T = 6.18(X) + 207.96

R^2:
0.86

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 548 (Total), 274 (Entry), 274 (Exit)
Fitted Curve: 641 (Total), 320 (Entry), 321 (Exit)

Data Plot and Equation



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Date: 5/7/20261

General Office Building – ITE CODE #710

Size: 70,000 SF

WEEKDAY

Peak Hour of Adjacent Street Traffic: 7-9 AM

DATA STATISTICS

Land Use:
General Office Building (710) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

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:
54

Avg. 1000 Sq. Ft. GFA:
170

Average Rate:
1.24

Range of Rates:
0.32 - 2.83

Standard Deviation:
0.40

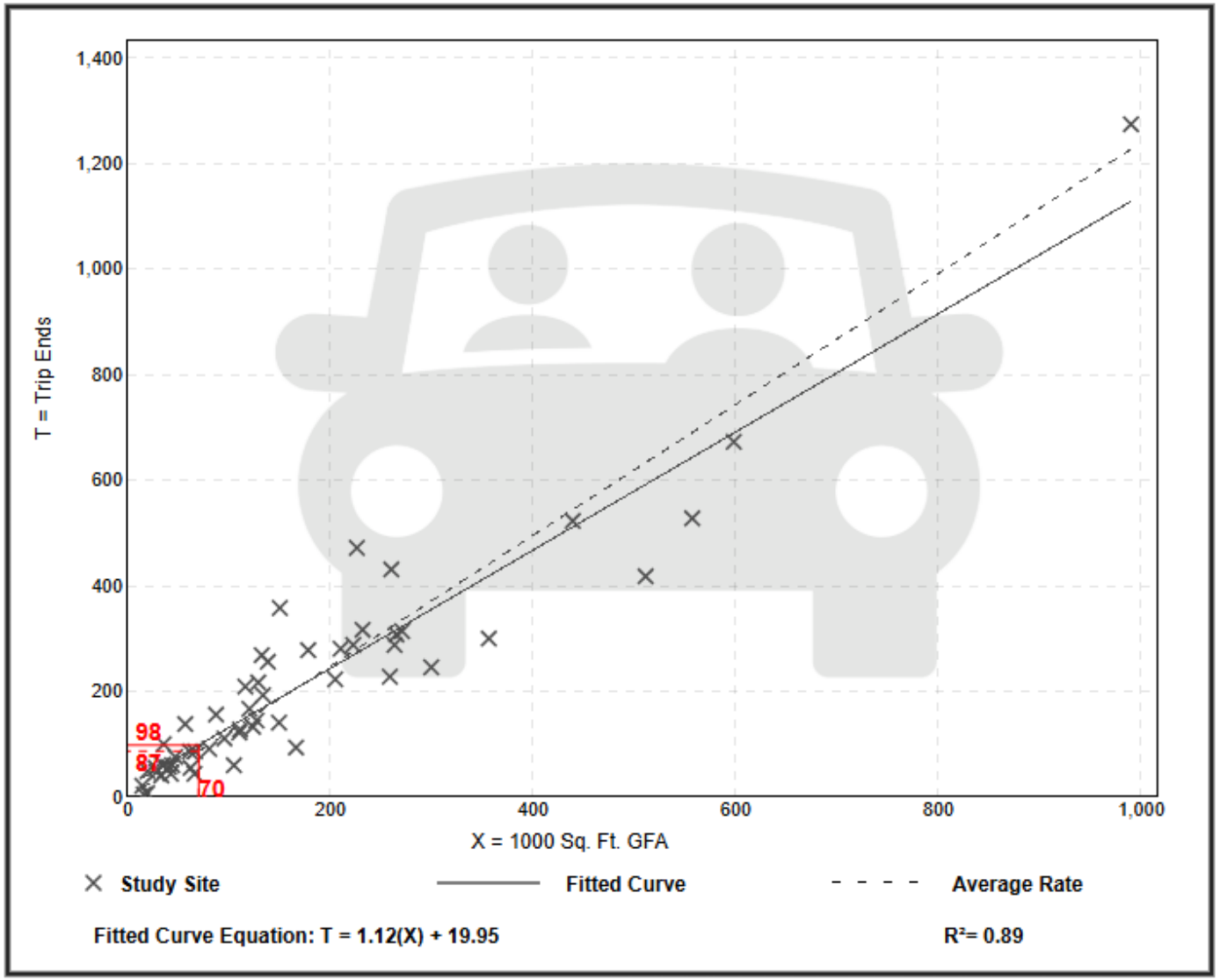
Fitted Curve Equation:
T = 1.12(X) + 19.95

R^2:
0.89

Directional Distribution:
88% entering, 12% exiting

Calculated Trip Ends:
Average Rate: 87 (Total), 76 (Entry), 11 (Exit)
Fitted Curve: 98 (Total), 87 (Entry), 11 (Exit)

Data Plot and Equation



Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

Date: 5/7/20261

General Office Building – ITE CODE #710

Size: 70,000 SF

WEEKDAY

Peak Hour of Adjacent Street Traffic: 4-6 PM

DATA STATISTICS

Land Use:
General Office Building (710) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
53

Avg. 1000 Sq. Ft. GFA:
166

Average Rate:
1.18

Range of Rates:
0.26 - 2.59

Standard Deviation:
0.41

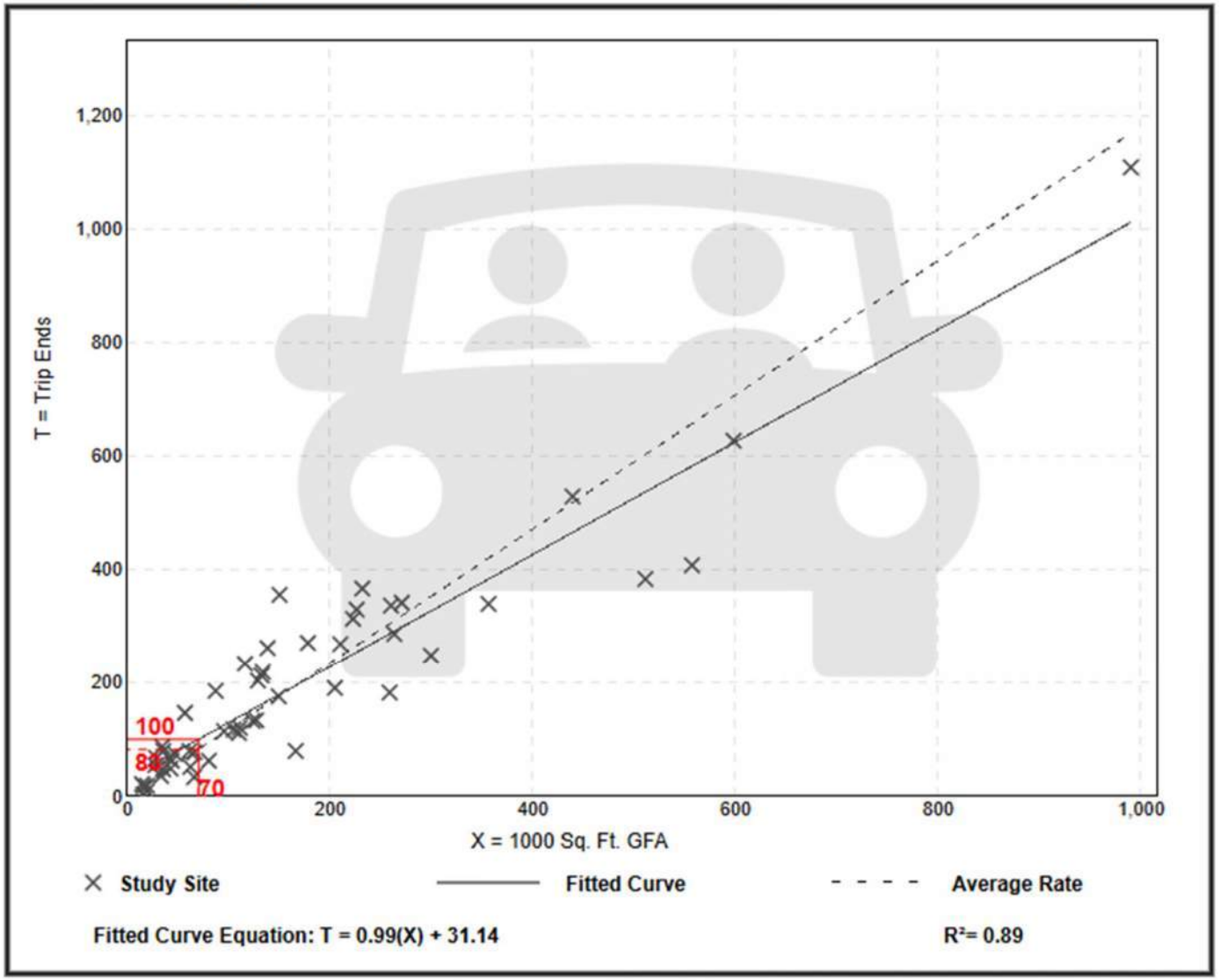
Fitted Curve Equation:
T = 0.99(X) + 31.14

R^2:
0.89

Directional Distribution:
16% entering, 84% exiting

Calculated Trip Ends:
Average Rate: 83 (Total), 13 (Entry), 70 (Exit)
Fitted Curve: 100 (Total), 16 (Entry), 84 (Exit)

Data Plot and Equation



Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

Date: 5/7/20261

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	District 11	**Organization:**	TMS Engineers, Inc.
Project Location:	Hudson, Ohio	**Performed By:**	ABC
Scenario Description:	Scenario 3	**Date:**	5/7/2026
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	130/710	1,750,000	SF	1090	931	159
Retail				0		
Restaurant				0		
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]	565	8,750	SF	95	50	45
Total				1185	981	204

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,185	981	204
Internal Capture Percentage	0%	0%	0%
External Vehicle-Trips[3]	1,185	981	204
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	0%	0%
Retail	N/A	N/A
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	District 11
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	931	931	1.00	159	159
Retail	1.00	0	0	1.00	0	0
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		45	100	0	2	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	37		0	0	0	0
Restaurant	130	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	28	0	0	0		0
Hotel	28	0	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	931	931	931	0	0
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	50	50	50	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	159	159	159	0	0
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	45	45	45	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	District 11	**Organization:**	TMS Engineers, Inc.
Project Location:	Hudson, Ohio	**Performed By:**	ABC
Scenario Description:	Scenario 3	**Date:**	5/7/2026
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	130/710	1,750,000	SF	1088	210	878
Retail				0		
Restaurant				0		
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]	565	8,750	SF	94	44	50
Total				1182	254	928

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,182	254	928
Internal Capture Percentage	0%	0%	0%
External Vehicle-Trips[3]	1,182	254	928
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	0%	0%
Retail	N/A	N/A
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	District 11
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	210	210	1.00	878	878
Retail	1.00	0	0	1.00	0	0
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		176	35	0	18	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	65		0	0	0	0
Restaurant	63	0		0	0	0
Cinema/Entertainment	13	0	0		0	0
Residential	120	0	0	0		0
Hotel	0	0	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	210	210	210	0	0
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	44	44	44	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	878	878	878	0	0
Retail	0	0	0	0	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	50	50	50	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

APPENDIX D
SCENARIO 4

TRIP GENERATION SUMMARY - SCENARIO 4

LAND USE		ITE TRIP GENERATION DESCRIPTION	WEEKDAY TRIP ENDS			
			AM Peak Hour		PM Peak Hour	
ITE Code	SIZE (SqFt)		Enter	Exit	Enter	Exit
Office		General Office Building	277	38	47	245
710	263,000	*Internal Trip Reduction*	*-11*	*-11*	*-1*	*-6*
		Driveway Volumes Less Internal Trip Reduction	***266***	***27***	***46***	***239***
Industrial		Industrial Park	219	66	83	213
130	1,137,000	*Internal Trip Reduction*	*-9*	*-19*	*-2*	*-5*
		Driveway Volumes Less Internal Trip Reduction	***210***	***47***	***81***	***208***
Day Care		Day Care Center	50	45	44	50
565	8,750	*Internal Trip Reduction*	*0*	*0*	*0*	*0*
		Driveway Volumes Less Internal Trip Reduction	***50***	***45***	***44***	***50***
Office		General Office Building	201	27	39	204
710	50,000 3 Parcels	*Internal Trip Reduction*	*-8*	*-7*	*-1*	*-5*
		Driveway Volumes Less Internal Trip Reduction	***193***	***20***	***38***	***199***
Retail		Strip Retail Plaza (<40k)	172	142	196	196
822	40,000 2 Parcels	*Internal Trip Reduction*	*-37*	*-28*	*-16*	*-4*
		Driveway Volumes Less Internal Trip Reduction	***135***	***114***	***180***	***192***
Total Land Use Generated Trips			919	318	409	908
Internal Trip Reduction			*-65*	*-65*	*-20*	*-20*
TOTAL SITE DRIVEWAY VOLUMES (Less Internal Trip Reduction)			***854***	***253***	***389***	***888***
			1107		***1277***	

TRIP TYPE SUMMARY - SCENARIO 4

LAND USE		TRIP TYPES	WEEKDAY TRIP ENDS			
			AM Peak Hour		PM Peak Hour	
ITE Code	SIZE (SqFt)		Enter	Exit	Enter	Exit
Office		***Driveway Volumes Less Internal Trip Reduction***	***266***	***27***	***46***	***239***
710	263,000	Pass-by Trips Not Applicable	0	0	0	0
		Non-Pass-by Trips	266	27	46	239
Industrial		***Driveway Volumes Less Internal Trip Reduction***	***210***	***47***	***81***	***208***
130	1,137,000	Pass-by Trips Not Applicable	0	0	0	0
		Non-Pass-by Trips	210	47	81	208
Day Care		***Driveway Volumes Less Internal Trip Reduction***	***50***	***45***	***44***	***50***
565	8,750	Pass-by Trips (AM - Data Not Available / PM - 44%)	0	0	19	19
		Non-Pass-by Trips	50	45	25	31
Office		***Driveway Volumes Less Internal Trip Reduction***	***193***	***20***	***38***	***199***
710	50,000 3 Parcels	Pass-by Trips Not Applicable	0	0	0	0
		Non-Pass-by Trips	193	20	38	199
Retail		***Driveway Volumes Less Internal Trip Reduction***	***135***	***114***	***180***	***192***
822	40,000 2 Parcels	Pass-by Trips Data Not Available	0	0	0	0
		Non-Pass-by Trips	135	114	180	192
TOTAL PASS-BY TRIPS			**0**	**0**	**19**	**19**
TOTAL NON-PASS-BY TRIPS			***854***	***253***	***370***	***869***
TOTAL SITE DRIVEWAY VOLUMES			***854***	***253***	***389***	***888***
			1107		***1277***	

General Office Building – ITE CODE #710

Size: 50,000 SF

WEEKDAY

Weekday

DATA STATISTICS

Land Use:
General Office Building (710) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
22

Avg. 1000 Sq. Ft. GFA:
126

Average Rate:
7.83

Range of Rates:
3.27 - 27.56

Standard Deviation:
3.71

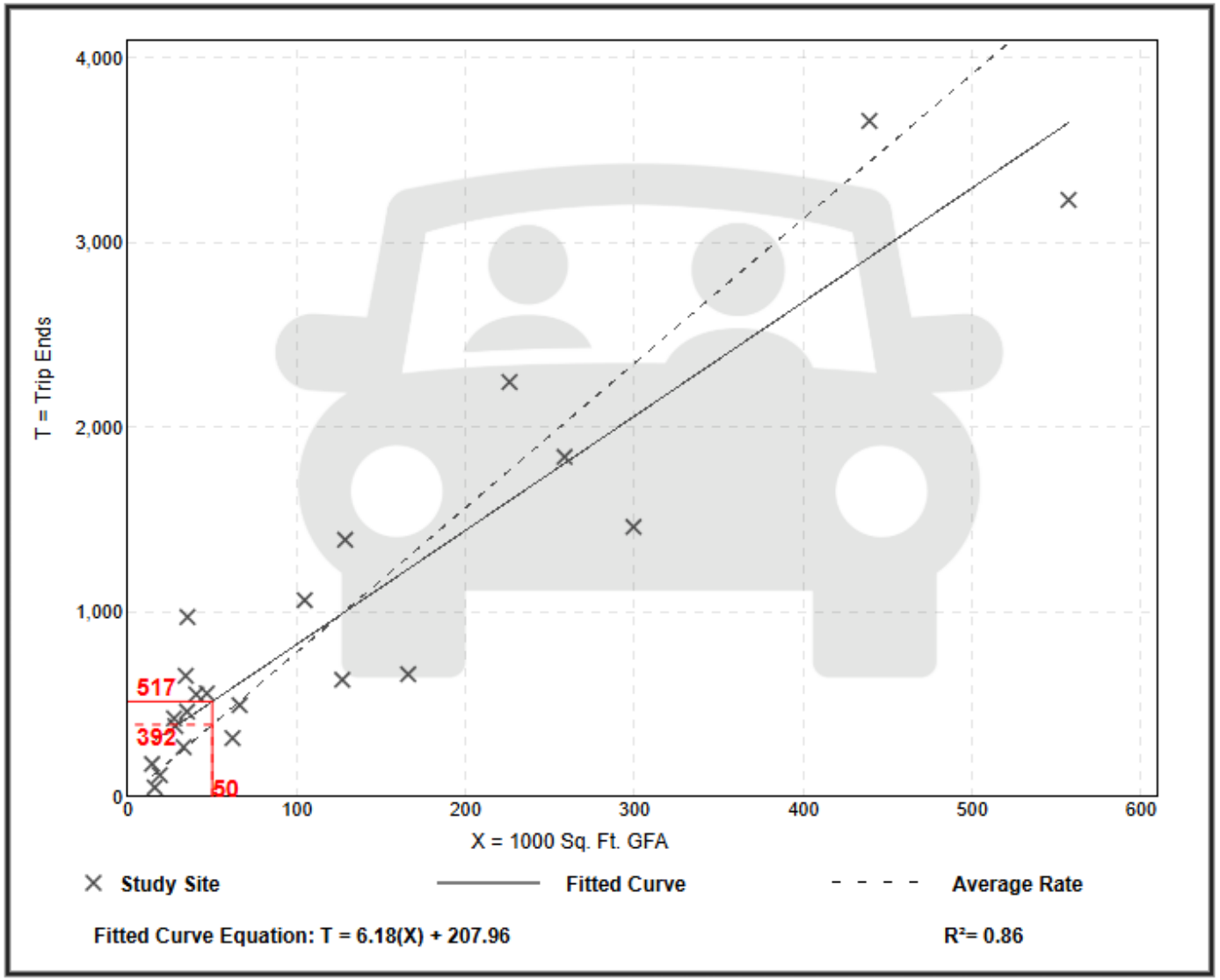
Fitted Curve Equation:
T = 6.18(X) + 207.96

R^2:
0.86

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 392 (Total), 196 (Entry), 196 (Exit)
Fitted Curve: 517 (Total), 258 (Entry), 259 (Exit)

Data Plot and Equation



Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

Date: 5/7/20261

General Office Building – ITE CODE #710

Size: 50,000 SF

WEEKDAY

Peak Hour of Adjacent Street Traffic: 7-9 AM

DATA STATISTICS

Land Use:
General Office Building (710) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

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:
54

Avg. 1000 Sq. Ft. GFA:
170

Average Rate:
1.24

Range of Rates:
0.32 - 2.83

Standard Deviation:
0.40

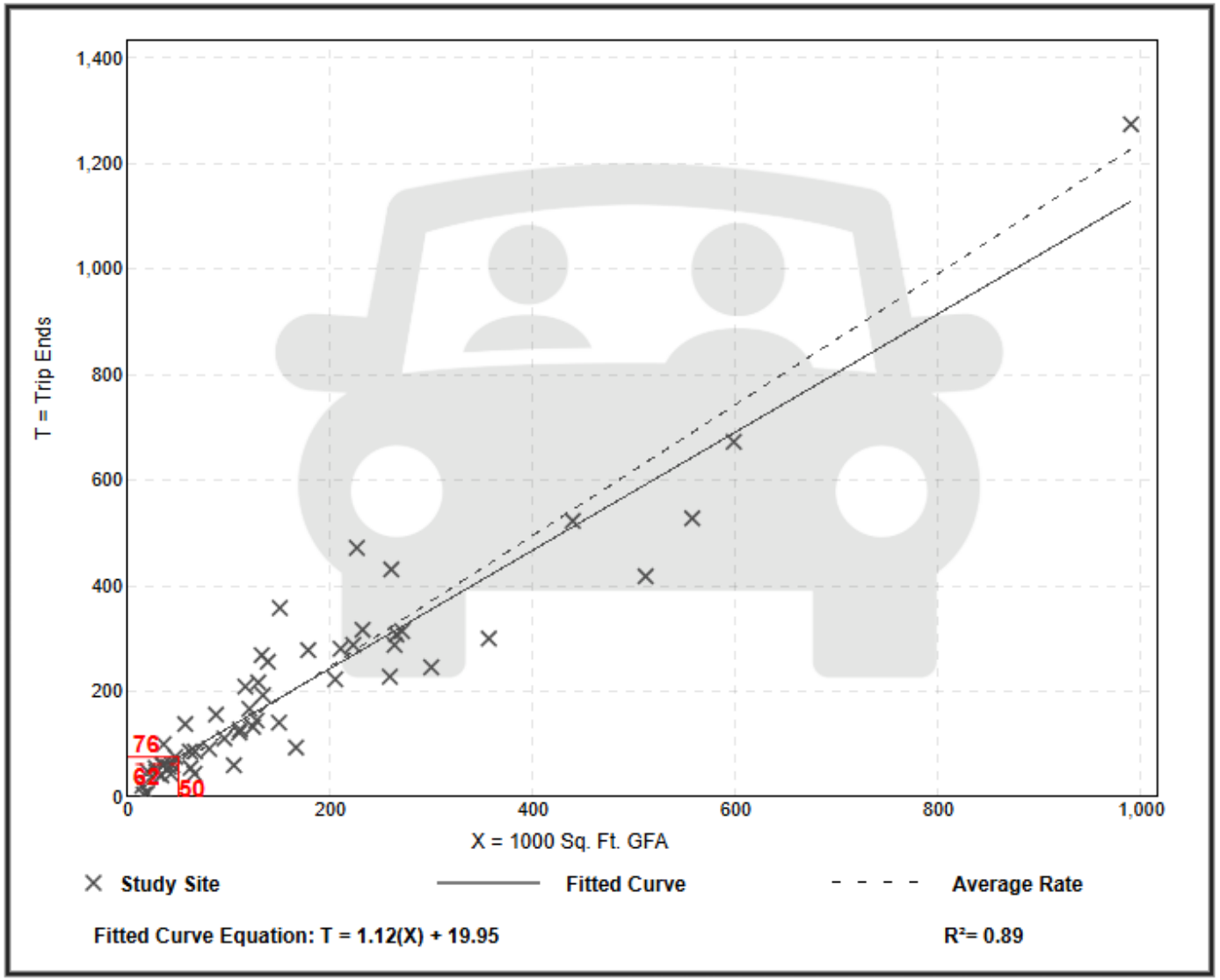
Fitted Curve Equation:
T = 1.12(X) + 19.95

R^2:
0.89

Directional Distribution:
88% entering, 12% exiting

Calculated Trip Ends:
Average Rate: 62 (Total), 55 (Entry), 7 (Exit)
Fitted Curve: 76 (Total), 67 (Entry), 9 (Exit)

Data Plot and Equation



Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

Date: 5/7/20261

General Office Building – ITE CODE #710

Size: 50,000 SF

WEEKDAY

Peak Hour of Adjacent Street Traffic: 4-6 PM

DATA STATISTICS

Land Use:
General Office Building (710) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
53

Avg. 1000 Sq. Ft. GFA:
166

Average Rate:
1.18

Range of Rates:
0.26 - 2.59

Standard Deviation:
0.41

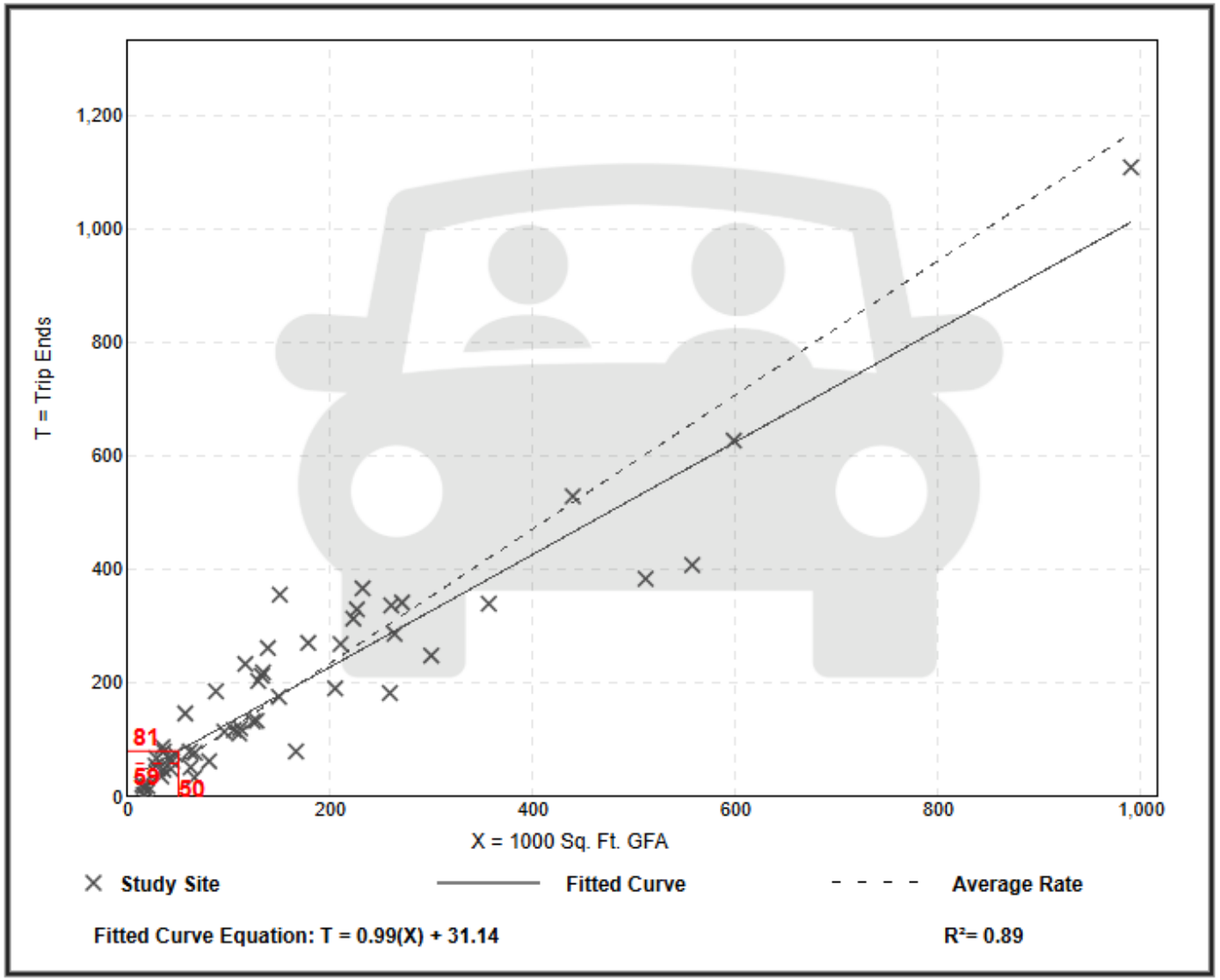
Fitted Curve Equation:
T = 0.99(X) + 31.14

R^2:
0.89

Directional Distribution:
16% entering, 84% exiting

Calculated Trip Ends:
Average Rate: 59 (Total), 9 (Entry), 50 (Exit)
Fitted Curve: 81 (Total), 13 (Entry), 68 (Exit)

Data Plot and Equation



Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

Date: 5/7/20261

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	District 11	**Organization:**	TMS Engineers, Inc.
Project Location:	Hudson, Ohio	**Performed By:**	ABC
Scenario Description:	Scenario 4	**Date:**	5/7/2026
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	130/710	1,550,000	SF	828	697	131
Retail	822	80,000	SF	314	172	142
Restaurant				0		
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]	565	8,750	SF	95	50	45
Total				1237	919	318

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		37	0	0	0	0
Retail	28		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,237	919	318
Internal Capture Percentage	11%	7%	20%
External Vehicle-Trips[3]	1,107	854	253
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	4%	28%
Retail	22%	20%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	District 11
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	697	697	1.00	131	131
Retail	1.00	172	172	1.00	142	142
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		37	83	0	1	0
Retail	41		18	0	20	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		55	0	0	0	0
Retail	28		0	0	0	0
Restaurant	98	14		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	21	29	0	0		0
Hotel	21	7	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	28	669	697	669	0	0
Retail	37	135	172	135	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	50	50	50	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	37	94	131	94	0	0
Retail	28	114	142	114	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	45	45	45	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	District 11	**Organization:**	TMS Engineers, Inc.
Project Location:	Hudson, Ohio	**Performed By:**	ABC
Scenario Description:	Scenario 4	**Date:**	5/7/2026
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	130/710	1,550,000	SF	831	169	662
Retail	822	80,000	SF	392	196	196
Restaurant				0		
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]	565	8,750	SF	94	44	50
Total				1317	409	908

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		16	0	0	0	0
Retail	4		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,317	409	908
Internal Capture Percentage	3%	5%	2%
External Vehicle-Trips[3]	1,277	389	888
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	2%	2%
Retail	8%	2%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	District 11
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	169	169	1.00	662	662
Retail	1.00	196	196	1.00	196	196
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		132	26	0	13	0
Retail	4		57	8	51	10
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		16	0	0	0	0
Retail	52		0	0	0	0
Restaurant	51	98		0	0	0
Cinema/Entertainment	10	8	0		0	0
Residential	96	20	0	0		0
Hotel	0	4	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	4	165	169	165	0	0
Retail	16	180	196	180	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	44	44	44	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	16	646	662	646	0	0
Retail	4	192	196	192	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	50	50	50	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

APPENDIX E
SCENARIO 5

TRIP GENERATION SUMMARY - SCENARIO 3

LAND USE		ITE TRIP GENERATION - SCENARIO 3 DESCRIPTION	WEEKDAY TRIP ENDS			
			AM Peak Hour		PM Peak Hour	
ITE Code	SIZE (SqFt)		Enter	Exit	Enter	Exit
Office		General Office Building	277	38	47	245
710	263,000	*Internal Trip Reduction*	*-11*	*-11*	*-5*	*-18*
		Driveway Volumes Less Internal Trip Reduction	***266***	***27***	***42***	***227***
Industrial		Industrial Park	219	66	83	213
130	1,137,000	*Internal Trip Reduction*	*-9*	*-18*	*-3*	*-15*
		Driveway Volumes Less Internal Trip Reduction	***210***	***48***	***80***	***198***
Day Care		Day Care Center	50	45	44	50
565	8,750	*Internal Trip Reduction*	*0*	*0*	*0*	*0*
		Driveway Volumes Less Internal Trip Reduction	***50***	***45***	***44***	***50***
Retail		Strip Retail Plaza (<40k)	242	187	418	418
822	10,000 11 Parcels	*Internal Trip Reduction*	*-29*	*-20*	*-33*	*-8*
		Driveway Volumes Less Internal Trip Reduction	***213***	***167***	***385***	***410***
Total Land Use Generated Trips			788	336	592	926
Internal Trip Reduction			*-49*	*-49*	*-41*	*-41*
TOTAL SITE DRIVEWAY VOLUMES (Less Internal Trip Reduction)			***739***	***287***	***551***	***885***
			1026		***1436***	

TRIP TYPE SUMMARY - SCENARIO 3

LAND USE		TRIP TYPES	WEEKDAY TRIP ENDS			
			AM Peak Hour		PM Peak Hour	
ITE Code	SIZE (SqFt)		Enter	Exit	Enter	Exit
Office		***Driveway Volumes Less Internal Trip Reduction***	***266***	***27***	***42***	***227***
710	263,000	Pass-by Trips (AM - 0% / PM - 0%)	0	0	0	0
		Non-Pass-by Trips	266	27	42	227
Industrial		***Driveway Volumes Less Internal Trip Reduction***	*210*	*48*	*80*	***198***
130	1,137,000	Pass-by Trips (AM - 0% / PM - 0%)	0	0	0	0
		Non-Pass-by Trips	210	48	80	198
Day Care		***Driveway Volumes Less Internal Trip Reduction***	***50***	***45***	***44***	***50***
565	8,750	Pass-by Trips (AM - 0% / PM - 44%)	*0*	*0*	*19*	*19*
		Non-Pass-by Trips	50	45	25	31
Retail		***Driveway Volumes Less Internal Trip Reduction***	***213***	***167***	***385***	***410***
822	10,000 11 Parcels	Pass-by Trips (AM - 0% / PM - 40%)	0	0	154	154
		Non-Pass-by Trips	213	167	231	256
TOTAL PASS-BY TRIPS			**0**	**0**	**173**	**173**
TOTAL NON-PASS-BY TRIPS			***739***	***287***	***378***	***712***
TOTAL SITE DRIVEWAY VOLUMES			***739***	***287***	***551***	***885***
			1026		***1436***	

STRIP RETAIL PLAZA (<40k)
ITE CODE #822
Size: 10,000 Sq. Ft.

WEEKDAY

Data Plot and Equation

Caution – Small Sample Size

DATA STATISTICS

Land Use:
Strip Retail Plaza (<40k) (822) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GLA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
4

Avg. 1000 Sq. Ft. GLA:
19

Average Rate:
54.45

Range of Rates:
47.86 - 65.07

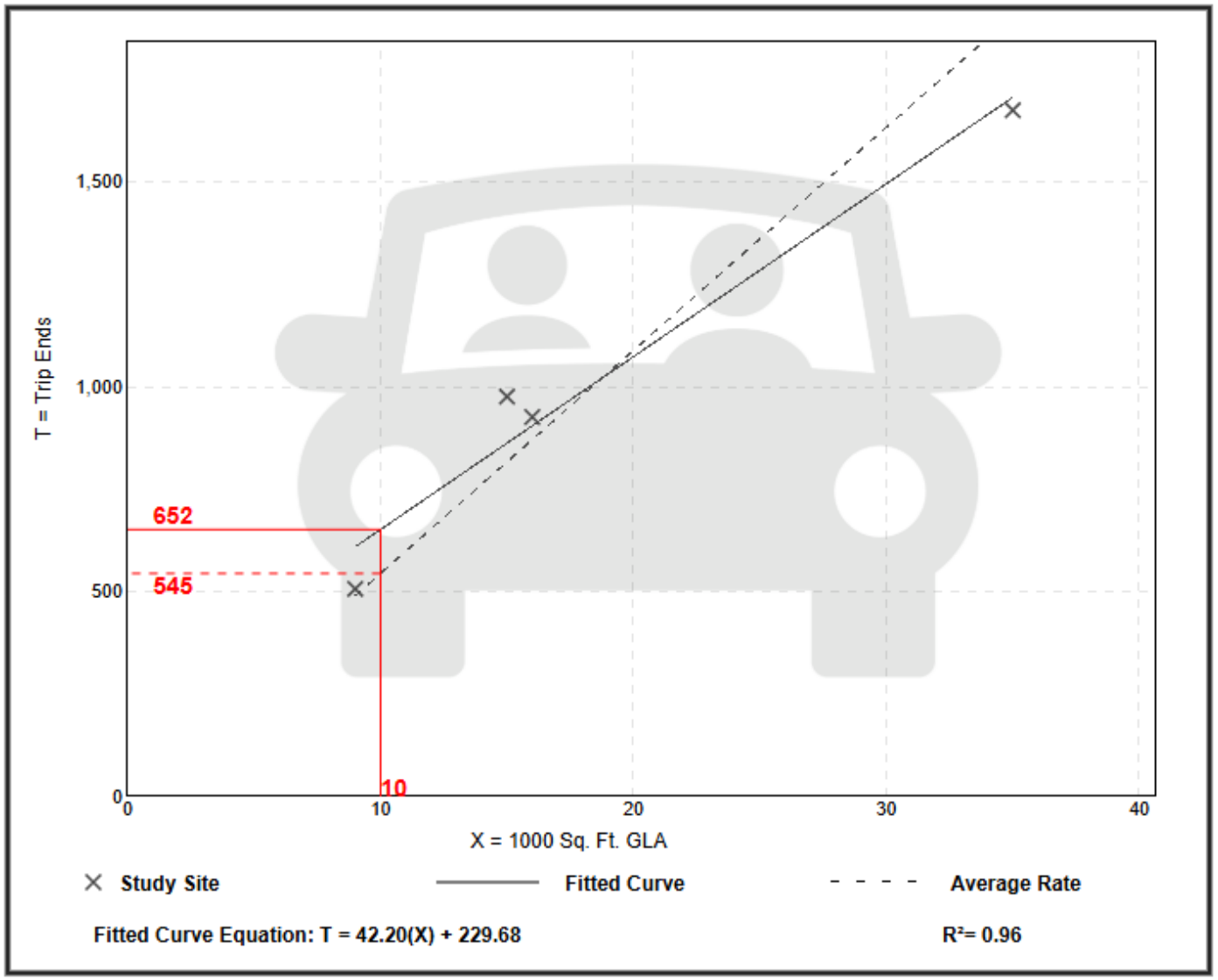
Standard Deviation:
7.81

Fitted Curve Equation:
T = 42.20(X) + 229.68

R^2:
0.96

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 545 (Total), 272 (Entry), 273 (Exit)
Fitted Curve: 652 (Total), 326 (Entry), 326 (Exit)



Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

Date: 4/17/2026

STRIP RETAIL PLAZA (<40k)
ITE CODE #822
Size: 10,000 Sq. Ft.

WEEKDAY
Peak Hour of Adjacent Street Traffic: 7-9 AM

Data Plot and Equation

DATA STATISTICS

Land Use:
Strip Retail Plaza (<40k) (822) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GLA

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:
6

Avg. 1000 Sq. Ft. GLA:
17

Average Rate:
3.93

Range of Rates:
1.60 - 17.44

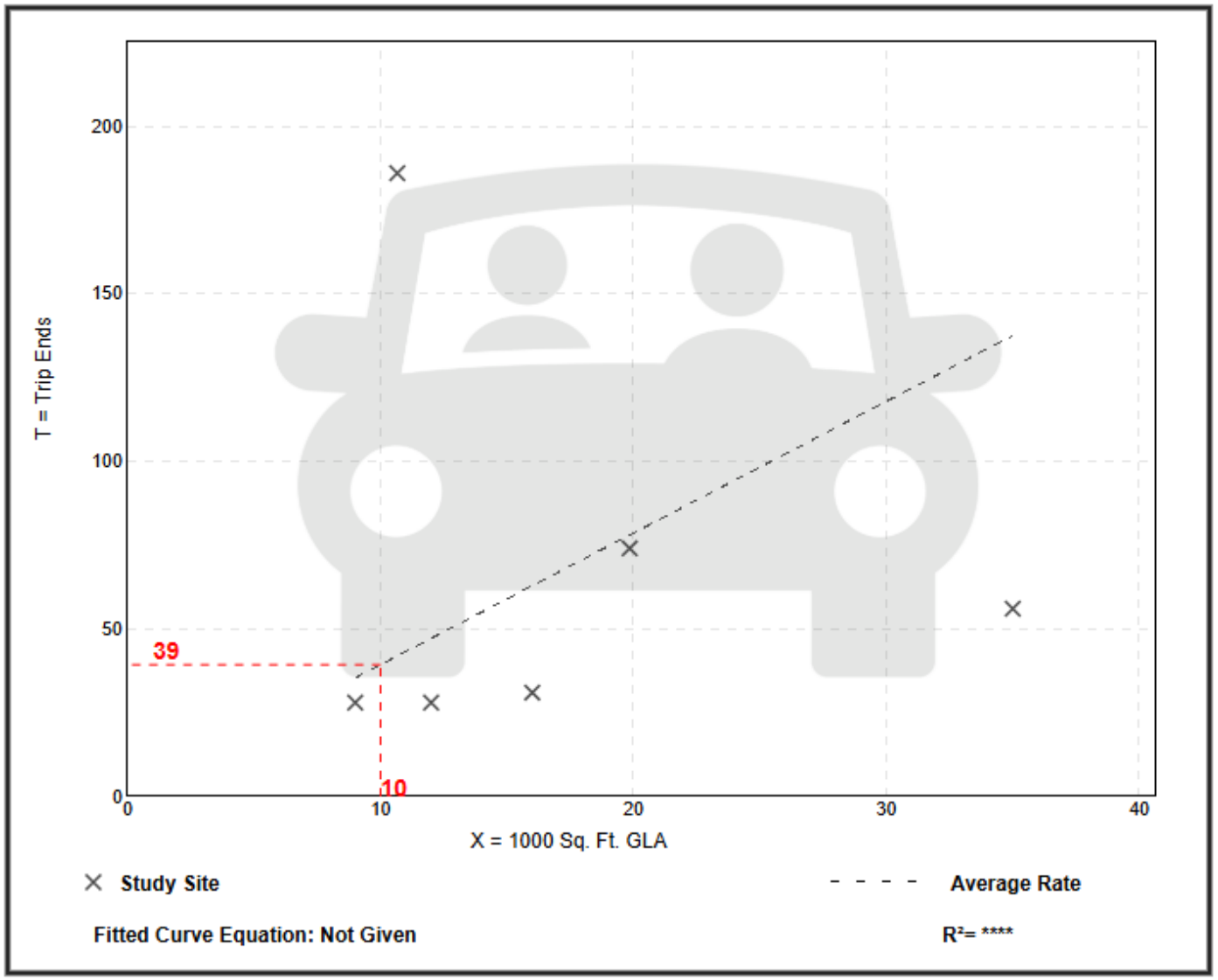
Standard Deviation:
5.12

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
55% entering, 45% exiting

Calculated Trip Ends:
Average Rate: 39 (Total), 22 (Entry), 17 (Exit)



Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

Date: 4/17/2026

STRIP RETAIL PLAZA (<40k)
ITE CODE #822
Size: 10,000 Sq. Ft.

WEEKDAY
Peak Hour of Adjacent Street Traffic: 4-6 PM

Data Plot and Equation

DATA STATISTICS

Land Use:
Strip Retail Plaza (<40k) (822) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GLA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
24

Avg. 1000 Sq. Ft. GLA:
22

Average Rate:
6.29

Range of Rates:
2.81 - 17.72

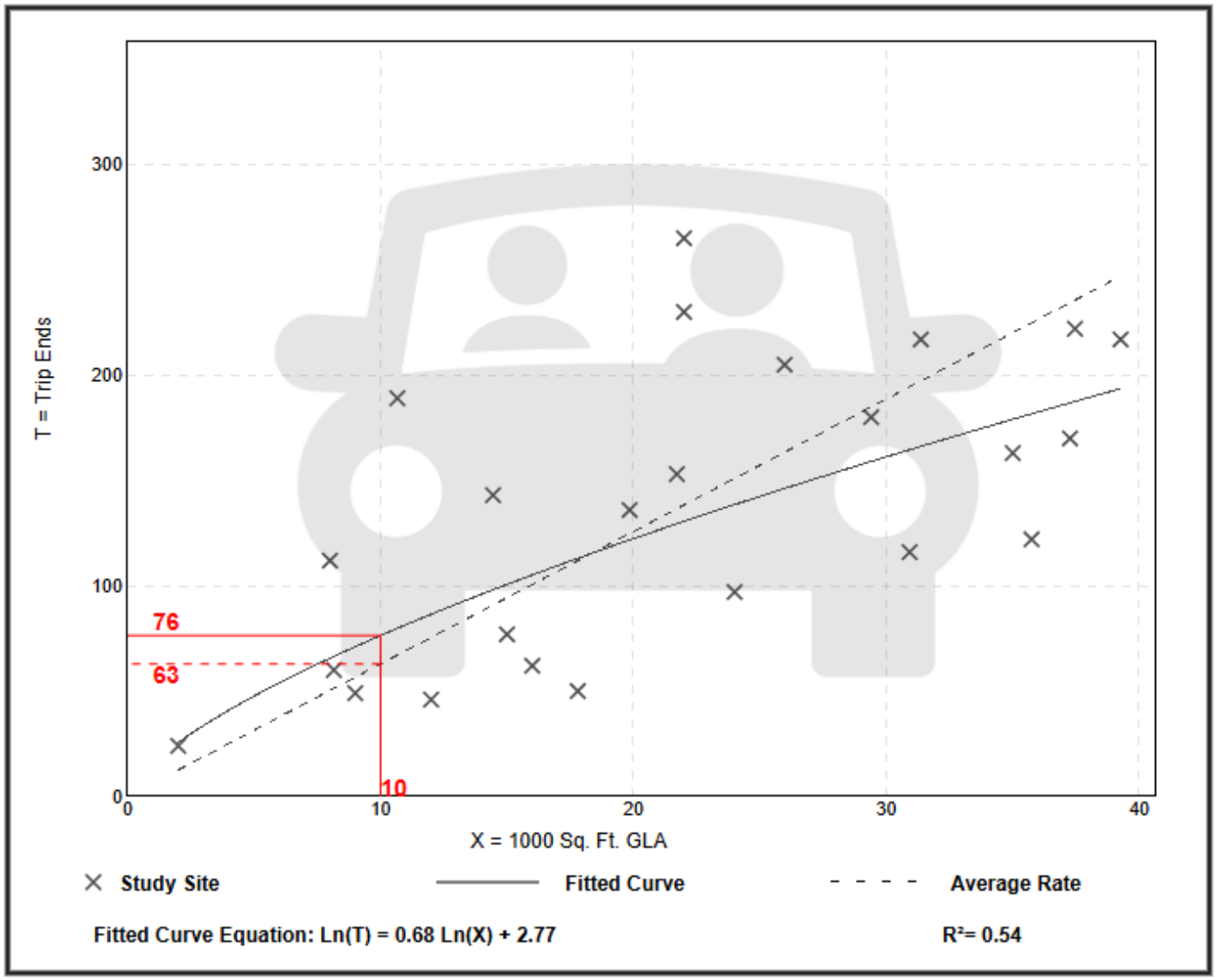
Standard Deviation:
3.02

Fitted Curve Equation:
Ln(T) = 0.68 Ln(X) + 2.77

R^2:
0.54

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 63 (Total), 31 (Entry), 32 (Exit)
Fitted Curve: 76 (Total), 38 (Entry), 38 (Exit)



Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

Date: 4/17/2026

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	District 11	**Organization:**	TMS Engineers, Inc.
Project Location:	Hudson, Ohio	**Performed By:**	ABC
Scenario Description:	Scenario 5	**Date:**	5/7/2026
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	130/710	1,400,000	SF	600	496	104
Retail	822	110,000	SF	429	242	187
Restaurant				0		
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]	565	8,750	SF	95	50	45
Total				1124	788	336

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		29	0	0	0	0
Retail	20		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,124	788	336
Internal Capture Percentage	9%	6%	15%
External Vehicle-Trips[3]	1,026	739	287
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	4%	28%
Retail	12%	11%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	District 11
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	496	496	1.00	104	104
Retail	1.00	242	242	1.00	187	187
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		29	66	0	1	0
Retail	54		24	0	26	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		77	0	0	0	0
Retail	20		0	0	0	0
Restaurant	69	19		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	15	41	0	0		0
Hotel	15	10	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	20	476	496	476	0	0
Retail	29	213	242	213	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	50	50	50	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	29	75	104	75	0	0
Retail	20	167	187	167	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	45	45	45	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	District 11	**Organization:**	TMS Engineers, Inc.
Project Location:	Hudson, Ohio	**Performed By:**	ABC
Scenario Description:	Scenario 5	**Date:**	5/7/2026
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	130/710	1,400,000	SF	588	130	458
Retail	822	110,000	SF	836	418	418
Restaurant				0		
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]	565	8,750	SF	94	44	50
Total				1518	592	926

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		33	0	0	0	0
Retail	8		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,518	592	926
Internal Capture Percentage	5%	7%	4%
External Vehicle-Trips[3]	1,436	551	885
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	6%	7%
Retail	8%	2%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	District 11
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	130	130	1.00	458	458
Retail	1.00	418	418	1.00	418	418
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	0	0	1.00	0	0
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		92	18	0	9	0
Retail	8		121	17	109	21
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		33	0	0	0	0
Retail	40		0	0	0	0
Restaurant	39	209		0	0	0
Cinema/Entertainment	8	17	0		0	0
Residential	74	42	0	0		0
Hotel	0	8	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	8	122	130	122	0	0
Retail	33	385	418	385	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	44	44	44	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	33	425	458	425	0	0
Retail	8	410	418	410	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	50	50	50	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

APPENDIX F
SCENARIO 6

TRIP GENERATION SUMMARY - SCENARIO 5

LAND USE		ITE TRIP GENERATION DESCRIPTION	WEEKDAY TRIP ENDS			
			AM Peak Hour		PM Peak Hour	
ITE Code	SIZE (SqFt)		Enter	Exit	Enter	Exit
Office		General Office Building	277	38	47	245
710	263,000	*Internal Trip Reduction*	*-12*	*-11*	*-3*	*-12*
		Driveway Volumes Less Internal Trip Reduction	***265***	***27***	***44***	***233***
Industrial		Industrial Park	219	66	83	213
130	1,137,000	*Internal Trip Reduction*	*-10*	*-18*	*-4*	*-11*
		Driveway Volumes Less Internal Trip Reduction	***209***	***48***	***79***	***202***
Day Care		Day Care Center	50	45	44	50
565	8,750	*Internal Trip Reduction*	*0*	*0*	*0*	*0*
		Driveway Volumes Less Internal Trip Reduction	***50***	***45***	***44***	***50***
Retail		Strip Retail Plaza (<40k)	154	119	266	266
822	10,000 7 Parcels	*Internal Trip Reduction*	*-30*	*-21*	*-40*	*-33*
		Driveway Volumes Less Internal Trip Reduction	***124***	***98***	***226***	***233***
Residential		Single-Family Attached Housing	26	77	61	45
215	200 Units	*Internal Trip Reduction*	*-1*	*-3*	*-30*	*-21*
		Driveway Volumes Less Internal Trip Reduction	***25***	***74***	***31***	***24***
Total Land Use Generated Trips			726	345	501	819
Internal Trip Reduction			*-53*	*-53*	*-77*	*-77*
TOTAL SITE DRIVEWAY VOLUMES (Less Internal Trip Reduction)			***673***	***292***	***424***	***742***
			965		***1166***	

TRIP TYPE SUMMARY - SCENARIO 5

LAND USE		TRIP TYPES	WEEKDAY TRIP ENDS			
			AM Peak Hour		PM Peak Hour	
ITE Code	SIZE (SqFt)		Enter	Exit	Enter	Exit
Office		***Driveway Volumes Less Internal Trip Reduction***	***265***	***27***	***44***	***233***
710	263,000	Pass-by Trips (AM - 0% / PM - 0%)	0	0	0	0
		Non-Pass-by Trips	265	27	44	233
Industrial		***Driveway Volumes Less Internal Trip Reduction***	***209***	***48***	***79***	***202***
130	1,137,000	Pass-by Trips (AM - 0% / PM - 0%)	0	0	0	0
		Non-Pass-by Trips	209	48	79	202
Day Care		***Driveway Volumes Less Internal Trip Reduction***	***50***	***45***	***44***	***50***
565	8,750	Pass-by Trips (AM - 0% / PM - 44%)	*0*	*0*	*19*	*19*
		Non-Pass-by Trips	50	45	25	31
Retail		***Driveway Volumes Less Internal Trip Reduction***	***124***	***98***	***226***	***233***
822	10,000 7 Parcels	Pass-by Trips (AM - 0% / PM - 40%)	0	0	90	90
		Non-Pass-by Trips	124	98	136	143
Residential		***Driveway Volumes Less Internal Trip Reduction***	**25**	**74**	**31**	**24**
215	200 Units	Pass-by Trips (AM - 0% / PM - 0%)	*0*	*0*	*0*	*0*
		Non-Pass-by Trips	***25***	***74***	***31***	***24***
TOTAL PASS-BY TRIPS			**0**	**0**	**109**	**109**
TOTAL NON-PASS-BY TRIPS			***673***	***292***	***315***	***633***
TOTAL SITE DRIVEWAY VOLUMES			***673***	***292***	***424***	***742***
			965		***1166***	

Single-Family Attached Housing – ITE CODE #215

Size: 200 Units

WEEKDAY

Weekday

DATA STATISTICS

Land Use:
Single-Family Attached Housing (215) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
11

Avg. Num. of Dwelling Units:
84

Average Rate:
6.57

Range of Rates:
4.80 - 8.45

Standard Deviation:
1.28

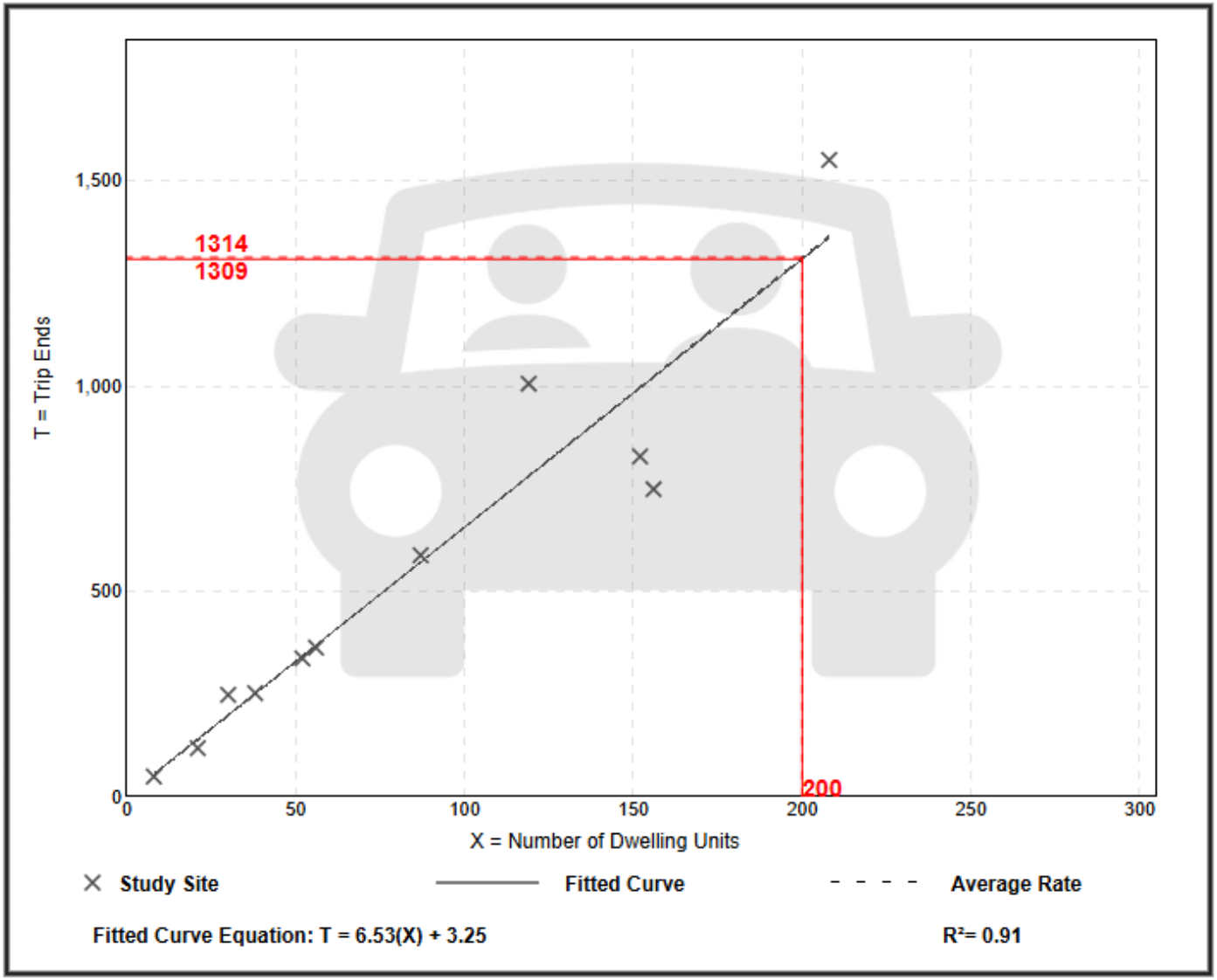
Fitted Curve Equation:
T = 6.53(X) + 3.25

R^2:
0.91

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 1314 (Total), 657 (Entry), 657 (Exit)
Fitted Curve: 1309 (Total), 655 (Entry), 654 (Exit)

Data Plot and Equation



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Date: 4/17/2026

Single-Family Attached Housing – ITE CODE #215

Size: 200 Units

WEEKDAY

Peak Hour of Adjacent Street Traffic: 7-9 AM

DATA STATISTICS

Land Use:
Single-Family Attached Housing (215) 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:
26

Avg. Num. of Dwelling Units:
129

Average Rate:
0.47

Range of Rates:
0.12 - 0.74

Standard Deviation:
0.16

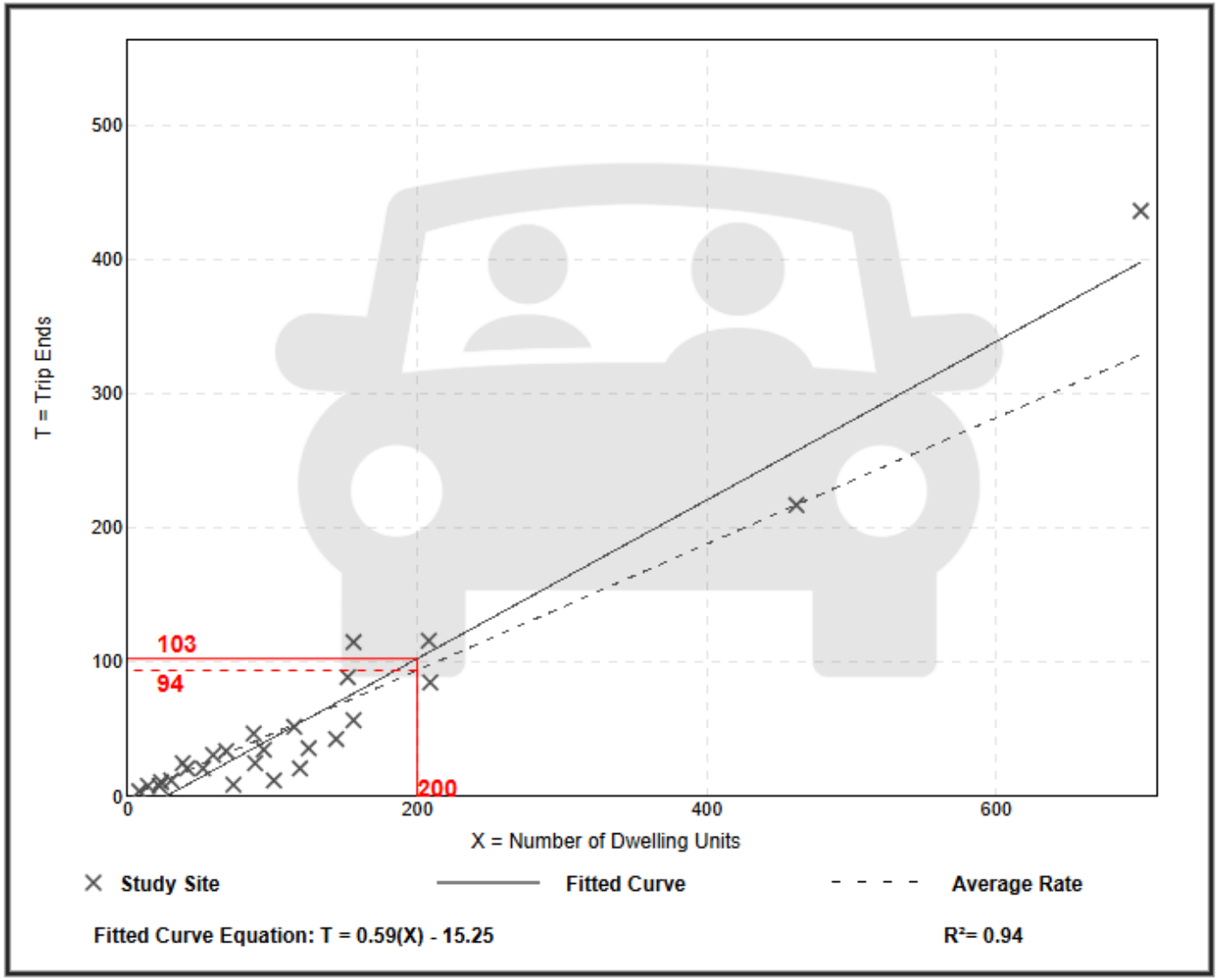
Fitted Curve Equation:
T = 0.59(X) - 15.25

R^2:
0.94

Directional Distribution:
25% entering, 75% exiting

Calculated Trip Ends:
Average Rate: 94 (Total), 24 (Entry), 70 (Exit)
Fitted Curve: 103 (Total), 26 (Entry), 77 (Exit)

Data Plot and Equation



Trip Gen Manual, 12th Edition • Institute of Transportation Engineers

Date: 4/17/2026

Single-Family Attached Housing – ITE CODE #215

Size: 200 Units

WEEKDAY

Peak Hour of Adjacent Street Traffic: 4-6 PM

DATA STATISTICS

Land Use:
Single-Family Attached Housing (215) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
31

Avg. Num. of Dwelling Units:
131

Average Rate:
0.51

Range of Rates:
0.17 - 1.25

Standard Deviation:
0.16

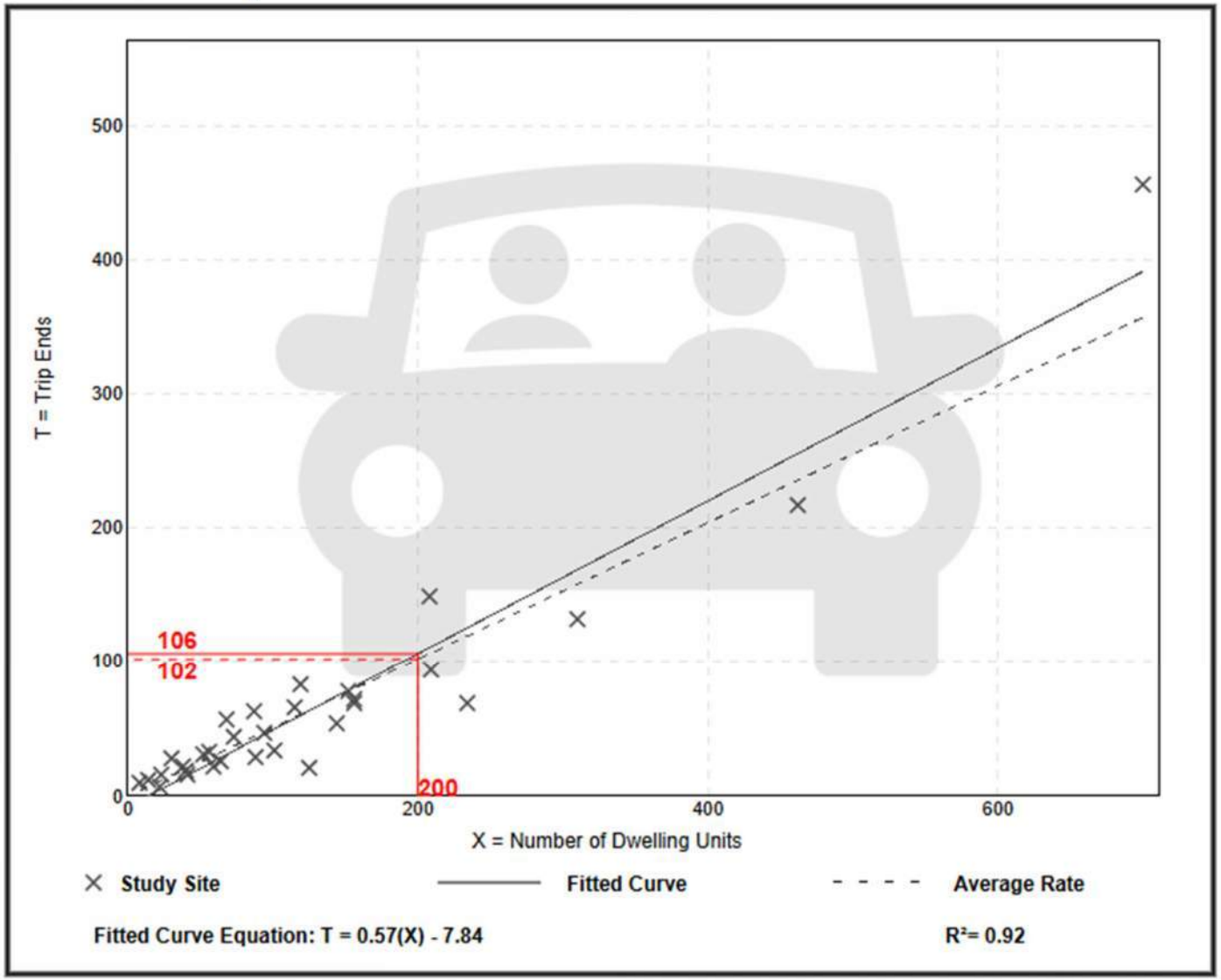
Fitted Curve Equation:
T = 0.57(X) - 7.84

R^2:
0.92

Directional Distribution:
57% entering, 43% exiting

Calculated Trip Ends:
Average Rate: 102 (Total), 58 (Entry), 44 (Exit)
Fitted Curve: 106 (Total), 61 (Entry), 45 (Exit)

Data Plot and Equation



Trip Gen Manual, 12th Edition • Institute of Transportation Engineers

Date: 4/17/2026

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	District 11	**Organization:**	TMS Engineers, Inc.
Project Location:	Hudson, Ohio	**Performed By:**	ABC
Scenario Description:	Scenario 6	**Date:**	5/7/2026
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	130/710	1,400,000	SF	600	496	104
Retail	822	70,000	SF	273	154	119
Restaurant				0		
Cinema/Entertainment				0		
Residential	215	200	Units	103	26	77
Hotel				0		
All Other Land Uses[2]	565	8,750	SF	95	50	45
Total				1071	726	345

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		29	0	0	0	0
Retail	20		0	0	1	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	1	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,071	726	345
Internal Capture Percentage	10%	7%	15%
External Vehicle-Trips[3]	965	673	292
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	4%	28%
Retail	19%	18%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	4%	4%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	District 11
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	496	496	1.00	104	104
Retail	1.00	154	154	1.00	119	119
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	26	26	1.00	77	77
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		29	66	0	1	0
Retail	35		15	0	17	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	1	15	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		49	0	0	0	0
Retail	20		0	0	1	0
Restaurant	69	12		0	1	0
Cinema/Entertainment	0	0	0		0	0
Residential	15	26	0	0		0
Hotel	15	6	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	22	474	496	474	0	0
Retail	30	124	154	124	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	25	26	25	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	50	50	50	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	29	75	104	75	0	0
Retail	21	98	119	98	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	3	74	77	74	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	45	45	45	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	District 11	**Organization:**	TMS Engineers, Inc.
Project Location:	Hudson, Ohio	**Performed By:**	ABC
Scenario Description:	Scenario 6	**Date:**	5/7/2026
Analysis Year:	2026	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	130/710	1,400,000	SF	588	130	458
Retail	822	70,000	SF	532	266	266
Restaurant				0		
Cinema/Entertainment				0		
Residential	215	200	Units	106	61	45
Hotel				0		
All Other Land Uses[2]	565	8,750	SF	94	44	50
Total				1320	501	819

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		21	0	0	2	0
Retail	5		0	0	28	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	19	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,320	501	819
Internal Capture Percentage	12%	15%	9%
External Vehicle-Trips[3]	1,166	424	742
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	5%	5%
Retail	15%	12%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	49%	47%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	District 11
Analysis Period:	PM Street Peak Hour

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	130	130	1.00	458	458
Retail	1.00	266	266	1.00	266	266
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	61	61	1.00	45	45
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		92	18	0	9	0
Retail	5		77	11	69	13
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	19	9	0		1
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		21	0	0	2	0
Retail	40		0	0	28	0
Restaurant	39	133		0	10	0
Cinema/Entertainment	8	11	0		2	0
Residential	74	27	0	0		0
Hotel	0	5	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	7	123	130	123	0	0
Retail	40	226	266	226	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	30	31	61	31	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	44	44	44	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	23	435	458	435	0	0
Retail	33	233	266	233	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	21	24	45	24	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	50	50	50	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.