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WHERE EXPERIENCE AND PASSION MEET

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Prepared by:	Simon Lin, EIT, Abby Pal Meghan Macias, TE
To:	City of Tustin
Site:	Tustin Legacy Specific Plan Amendment EPD Project Number 23-068
Subject:	Vehicle Miles Traveled (VMT) Analysis



This technical study evaluates the potential vehicle miles traveled (VMT) for the proposed Tustin Legacy Specific Plan amendment (Project) to include an additional 4,970 residential units. The City of Tustin (City) proposes an amendment to the Tustin Legacy Specific Plan (TLSP) to meet the objectives of the General Plan 2021-2029 Housing Element. The Housing Element identified three sites (i.e. Planning Area (PA) 8, PA 13 &14, and PA 15) in the TLSP for rezoning to provide increased opportunity for housing in the City as part of Program 1.1a of the Housing Element.

Project Description

The three sites spread across two geographically defined areas, referred to as Neighborhoods in the TLSP: Neighborhood D and Neighborhood G. Neighborhood D North (PA 8) is generally bound by Valencia Avenue to the north, Tustin Ranch Road to the east, Warner Avenue to the south, and Armstrong Avenue to the west. Neighborhood D South (PA 13 &14) is generally bound by Warner Avenue to the north, Tustin Ranch Road to the east, Barranca Parkway to the south, and Armstrong Avenue to the west. Neighborhood G West (PA 15) is generally bound by Edinger Avenue to the north, Jamboree Road to the east, Warner Avenue to the south and Tustin Ranch Road to the west.

The difference in land use between the Approved Project and the Modified (Proposed) Project are shown in Table 1.

Residential Addition of TLSP

The updated Housing Element would accommodate the addition of 1,911 units within PA 8 of TLSP Neighborhood D North, the addition of 100 units to PA 13 & 14 of TLSP Neighborhood D South, and the addition of 200 units to PA 15 of TLSP Neighborhood G West. These changes result in a combined total of 2,211 additional Housing Element residential units (inclusive of buffer units). Additionally, the proposed modifications to the Housing Element include density bonus units that allow addition of 956 units within PA 8 of TLSP Neighborhood D North, the addition of 655 units to PA 13 and 14 of TLSP Neighborhood D South, and the addition of 1,148 units to PA 15 of TLSP Neighborhood G West. The density bonus units will also be analyzed for increased density due to the provision of density bonuses available under the Surplus Land Act and other state housing incentives. These changes result in a combined total of another 2,759 additional residential units. In total, the VMT analysis presented in this document evaluates a total of 4,970 additional dwelling units within the TLSP.

Nonresidential Uses of TLSP

In addition to the proposed changes above, the TLSP would be amended to reflect updates to nonresidential development by land use type. The Project would replace 93,600 square feet (SF) of hotel use, 95,200 SF

of neighborhood commercial use, 482,900 SF of community commercial use and 529,000 SF of senior housing use with 1,200,700 SF of office use. Overall, the changes amongst the various nonresidential land uses would result in no change in total square footage and a reduction in trip generation, as reflected in Table 1.

The Project location is shown in Figure 1. Please note that this VMT analysis is based on the requirements of the *City of Tustin Vehicle Miles Traveled Analysis Guidelines*.

Project Trip Generation

The Project trip generation was calculated using trip rates from the Institute of Transportation Engineers, *Trip Generation 11th Edition*, 2021. Existing conditions (Baseline) were assessed using ITE trip rates for Land Use Code 310 (Hotel), 822 (Neighborhood Commercial), 820 (Community Commercial), 710 (Office), 251 (Continuing Care - Senior Housing) and 525 (High School). The rates for Project Parks (Legacy Park and Sports Park) were taken from the previously approved TLSP. Based on the density of the proposed housing, trip rates for Land Use Code 210 (Single-family Housing) and 221 Multifamily Housing (Mid-Rise) were used. The ITE rates used for the trip generation can be found in *Appendix A*. As shown in Table 1, the Project would generate approximately 15,679 daily trips including 3,251 trips during the AM peak hour and 1,777 trips during the PM peak hour.

Table 1: Project Trip Generation

Land Use	ITE Trip Rate/Unit[1]			Unit[2]	Neighborhood D South (PA 13 & 14)				Neighborhood D North (PA 8)				Neighborhood G (PA 15)				Total			
No-Project	**Daily**	**AM**	**PM**		**Approved Project**	**Daily Trips**	**AM Trips**	**PM Trips**	**Approved Project**	**Daily Trips**	**AM Trips**	**PM Trips**	**Approved Project**	**Daily Trips**	**AM Trips**	**PM Trips**	**Approved Project**	**Daily Trips**	**AM Trips**	**PM Trips**
Single Family Housing	9.43	0.7	0.94	DU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Multi-Family Housing	4.54	0.37	0.39	DU	1,672	7,591	619	652	-	-	-	-	2,814	12,776	1,041	1,097	4,486	20,366	1,660	1,750
Hotel	7.99	0.46	0.59	RM	550	4,395	253	325	-	-	-	-	-	-	-	-	550	4,395	253	325
Neighborhood Commercial	54.45	2.36	6.59	TSF	-	-	-	-	-	-	-	-	95.2	5,184	225	627	95	5,184	225	627
Community Commercial	37.01	0.84	3.4	TSF	20.4	755	17	69	1,547.69	57,280	1,300	5,262	-	-	-	-	1,568	58,035	1,317	5,332
Office	10.84	1.52	1.44	TSF	420	4,553	638	605	-	-	-	-	-	-	-	-	420	4,553	638	605
Continuing Care - Senior Housing	4.31	0.24	0.3	DU	-	-	-	-	-	-	-	-	404	1,741	97	121	404	1,741	97	121
High School	1.94	0.52	0.14	STU	-	-	-	-	1,784	3,461	928	250	-	-	-	-	1,784	3,461	928	250
Park - Legacy Park (Passive)	5	0	0	AC	6	30	-	-	54	270	-	-	31	155	-	-	91	455	-	-
Park - Sports Park (Active)	53.8	0.01	7.5	AC	-	-	-	-	45	2,421	0	338	-	-	-	-	45	2,421	0	338
No-Project Total						**17,323**	**1,527**	**1,651**		**63,432**	**2,228**	**5,849**		**19,855**	**1,363**	**1,846**		**100,611**	**5,118**	**9,346**
Project Land Use Changes	**Daily**	**AM**	**PM**	**Unit**	**Project Addition**	**Daily Trips**	**AM Trips**	**PM Trips**	**Project Addition**	**Daily Trips**	**AM Trips**	**PM Trips**	**Project Addition**	**Daily Trips**	**AM Trips**	**PM Trips**	**Project Addition**	**Daily Trips**	**AM Trips**	**PM Trips**
Single Family Housing	9.43	0.7	0.94	DU	117	1,103	82	110	-	-	-	-	692	6,526	484	650	809	7,629	566	760
Multi-Family Housing	4.54	0.37	0.39	DU	638	2,897	236	249	2,867	13,016	1,061	1,118	656	2,978	243	256	4,161	18,891	1,540	1,623
Hotel	7.99	0.46	0.59	RM	(430)	(3,436)	(198)	(254)	121	967	56	71	-	-	-	-	(309)	(2,469)	(142)	(182)
Neighborhood Commercial	54.45	2.36	6.59	TSF	-	-	-	-	-	-	-	-	(95)	(5,184)	(225)	(627)	(95)	(5,184)	(225)	(627)
Community Commercial	37.01	0.84	3.4	TSF	(10)	(385)	(9)	(35)	(509)	(18,838)	(428)	(1,731)	37	1,351	31	124	(483)	(17,872)	(406)	(1,642)
Office	10.84	1.52	1.44	TSF	23	249	35	33	473	5,127	719	681	705	7,639	1,071	1,015	1,201	13,016	1,825	1,729
Continuing Care - Senior Housing	4.31	0.24	0.3	DU	521	2,246	125	156	-	-	-	-	(134)	(578)	(32)	(40)	387	1,668	93	116
High School	1.94	0.52	0.14	STU	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Park - Legacy Park (Passive)	5	0	0	AC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Park - Sports Park (Active)	53.8	0.01	7.5	AC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Project Changes Total						**2,674**	**271**	**259**		**272**	**1,408**	**140**		**12,732**	**1,572**	**1,378**		**15,679**	**3,251**	**1,777**
Total Land Use	**Daily**	**AM**	**PM**	**Unit**	**Modified Project**	**Daily Trips**	**AM Trips**	**PM Trips**	**Modified Project**	**Daily Trips**	**AM Trips**	**PM Trips**	**Modified Project**	**Daily Trips**	**AM Trips**	**PM Trips**	**Modified Project**	**Daily Trips**	**AM Trips**	**PM Trips**
Single Family Housing	9.43	0.7	0.94	DU	117	1,103	82	110	-	-	-	-	692	6,526	484	650	809	7,629	566	760
Multi-Family Housing	4.54	0.37	0.39	DU	2,310	10,487	855	901	2,867	13,016	1,061	1,118	3,470	15,754	1,284	1,353	8,647	39,257	3,199	3,372
Hotel	7.99	0.46	0.59	RM	120	959	55	71	121	967	56	71	-	-	-	-	241	1,926	111	142
Neighborhood Commercial	54.45	2.36	6.59	TSF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Community Commercial	37.01	0.84	3.4	TSF	10	370	8	34	1,039	38,442	872	3,532	36.5	1,351	31	124	1,085	40,163	912	3,690
Office	10.84	1.52	1.44	TSF	443	4,802	673	638	473	5,127	719	681	704.7	7,639	1,071	1,015	1,621	17,568	2,463	2,334
Continuing Care - Senior Housing	4.31	0.24	0.3	DU	521	2,246	125	156	-	-	-	-	270	1,164	65	81	791	3,409	190	237
High School	1.94	0.52	0.14	STU	-	-	-	-	1,784	3,461	928	250	-	-	-	-	1,784	3,461	928	250
Park - Legacy Park (Passive)	5	0	0	AC	6	30	-	-	54	270	-	-	31	155	-	-	91	455	-	-
Park - Sports Park (Active)	53.8	0.01	7.5	AC	-	-	-	-	45	2,421	0	338	-	-	-	-	45	2,421	0	338
Total						**19,997**	**1,799**	**1,910**		**63,704**	**3,636**	**5,989**		**32,588**	**2,935**	**3,224**		**116,289**	**8,370**	**11,123**

[1] Trip rates from the Institute of Transportation Engineers, *Trip Generation Manual,11th Edition, 2021*.

[2] Units:

DU = Dwelling Units

RM = Rooms

TSF = Thousand Square Feet

STU = Students

AC = Acres

Background

Senate Bill (SB) 743 was signed by Governor Brown in 2013 and required the Governor's Office of Planning and Research (OPR) to amend the CEQA Guidelines to replace Level of Service (LOS) as the appropriate method for evaluating transportation impacts under CEQA. SB 743 specified that the new criteria should promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses. The bill also specified that delay-based LOS could no longer be considered an indicator of a significant impact on the environment under CEQA. In response, the Natural Resources Agency amended the CEQA Guidelines to include new Section 15064.3 - Determining the Significance of Transportation Impacts. The section states that Vehicle Miles Traveled (VMT) is the most appropriate measure of a project's transportation impacts and provides lead agencies with the discretion to choose the most appropriate methodology and thresholds for evaluating VMT. Section 15064.3(c) states that the provisions of the section shall apply statewide beginning on July 1, 2020.

City of Tustin VMT Screening Criteria

The Project is located in the City of Tustin (City). The City's Guidelines provide the following screening thresholds to assess whether further VMT analysis is required. If a project meets one of the following criteria, then the VMT impact of the project would be considered less-than-significant and no further analysis of VMT would be required:

1. The project consists of 100% affordable housing.
2. The project is located within one half (½) mile of qualifying transit.
3. The project type has been identified as local serving land use.
4. The project is in a low VMT area.
5. The project generates less than 500 daily vehicle trips.

The applicability of each criterion to the project is discussed below:

Screening Criteria 1 – Affordable Housing Screening: As per the City's guidelines, projects which consist of 100% affordable housing will have a less than significant impact on VMT.

The Project does not consist of 100% affordable housing and therefore would not satisfy the requirements of Screening criteria 1 - Affordable Housing Screening.

Screening Criteria 2 – High Quality Transit Screening: As per the City's guidelines, projects located within one half (½) mile of qualifying transit may be presumed to have a less than significant impact. Qualifying transit is defined as follows:

- **Major transit stop** means a site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods. (Pub. Resources Code, § 21064.3)
- **High-quality transit corridor** means a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours. (Pub. Resources Code, § 21155).

The High-Quality Transit Area from the City's Guideline is shown in Figure 2. As shown in Figure 2, Neighborhood G West is within one half (½) mile of qualifying transit. However, Neighborhood D North is located approximately 1 mile away from qualifying transit; Neighborhood D South is located approximately

1.5 miles away from qualifying transit. Therefore the project would not satisfy the requirements of Screening Criteria 2 – High Quality Transit screening.

Screening Criteria 3 - Project Type Screening: As per the City's guidelines, projects which propose local serving retail (retail projects less than 50,000 square feet) or other local serving uses would have a less than significant impact on VMT. The types of projects considered local serving include K-12 schools, local parks, day care centers, gas stations, libraries, fire stations, and other local serving civic uses.

This screening criteria would be discussed separately for the residential and non-residential portion of the Project in sections below.

Screening Criteria 4 - Low VMT Area Screening: The City's guidelines include a screening threshold for projects located in a low VMT generating area. Low VMT generating area is defined as traffic analysis zones (TAZs) with a total daily VMT/Service Population (employment plus population) that is less than the base level for the city.

This screening criteria would be discussed separately for the residential and non-residential portion of the Project in sections below.

Screening Criteria 5 - Generating less than 500 daily vehicle trips: As per the City's guidelines, projects which generate less than 500 daily vehicle trips would have a less than significant impact on VMT.

This screening criteria would be discussed separately for the residential and non-residential portion of the Project in sections below.

The City of Tustin VMT screening form for the Project can be found in *Appendix B*.

Residential VMT Screening

Screening Criteria 3 - Project Type Screening:

Screening Criteria 3 would not apply to the residential portion of the Project.

Screening Criteria 4 - Low VMT Area Screening:

The Map of Low VMT Generating Area for VMT per capita from the City's Guideline is shown in Figure 3. As shown in Figure 3, the Project is not located in a low VMT area. Therefore, the residential portion of the Project would not satisfy the requirements of Screening Criteria 4 – Low-VMT Area Screening.

Screening Criteria 5 - Generating less than 500 daily vehicle trips:

As shown in Table 1, the residential portion of the Project is forecasted to generate 26,520 daily trips, which is more than 500 daily vehicle trips. Therefore, the residential portion of the Project would not meet Screening Criteria 5.

Because the residential portion of the Project would not meet any of the City's screening criteria, the residential portion of the Project's impact on VMT would not be considered less-than-significant and an analysis of VMT would be required.

Non-residential VMT Screening

Screening Criteria 3 - Project Type Screening:

The non-residential portion of the project proposes locally serving office use with a net square footage of 0 SF, which is less than 50,000 SF. Therefore, it would satisfy the requirements of Screening Criteria 3 - Project Type Screening.

Screening Criteria 4 - Low VMT Area Screening:

The Map of Low VMT Generating Area for VMT per employee from the City's Guideline is shown in Figure 4. As shown in Figure 4, the non-residential portion of the Project is not located in a low VMT area. Therefore, the non-residential portion of the Project would not satisfy the requirements of Screening Criteria 4 – Low-VMT Area Screening.

Screening Criteria 5 - Generating less than 500 daily vehicle trips:

As shown in Table 1, the non-residential portion of the Project is forecasted to generate 10,841 fewer (negative 10,841) daily trips, which is less than 500 daily vehicle trips. Therefore, the non-residential portion of the Project would meet Screening Criteria 5.

The non-residential portion of the Project would meet Screening Criteria 3 – Project Type Screening; and Screening Criteria 5 – Generating less than 500 daily vehicle trips, and therefore the non-residential portion of the Project's impact on VMT would be considered less-than-significant and an analysis of VMT would not be required.

VMT Analysis Methodology

The City's guidelines require use of the Orange County Transportation Analysis Model 5.0 v.6.22.23 (OCTAM) for preparation of VMT analysis.

The Project is located within three Model Traffic Analysis Zones (TAZs), TAZ 1133 (Neighborhood D North), TAZ 1134 (Neighborhood G West), and TAZ 1136 (Neighborhood D South). The total population and employed population of the Project was calculated using the current household average in each TAZ. The Project total households and population was entered into TAZ 1133, 1134 and 1136.

The Model includes validated scenarios for 2016 and 2045. These scenarios have been validated using existing traffic counts. Data for years between 2016 and 2045 can be extrapolated using linear interpolation between the 2016 and 2045 Model output. The Model was run for the base year (2016) and future year (2045) without and with-project conditions (i.e. four full Model runs).

As noted below under the discussion of significance thresholds, the City's significance threshold for residential projects is based on the project's home-based VMT (HB VMT) per capita.

Residential VMT Significance Threshold

The significance criteria from the City's guidelines are as follows:

The City of Tustin VMT Guidelines have relied upon the recommendations provided by OPR and modeling data provided by OCTA to establish the following VMT thresholds of significance for residential land use projects:

> Residential Projects: A significant transportation impact occurs if:

1. The project's base year home-based VMT per capita exceeds the OCTAM base model year citywide average VMT per capita for the City of Tustin.

2. The project's future year home-based VMT per capita exceeds the OCTAM base model year citywide average VMT per capita for the City of Tustin.

The metric utilized as the residential VMT threshold of significance for City of Tustin is the average city-wide VMT under 2016 Base Model Year, which has been calculated to be 15.0 HB VMT per capita. The OPR Technical Advisory recommends that a fifteen percent reduction in VMT below that of existing development may be a reasonable threshold. However, given that the City of Tustin is primarily located within a suburban setting, the amount of VMT reduction from an individual land use project is limited, and it is likely infeasible to achieve a 15% reduction below the citywide average for many areas in the City. However, by ensuring that land use development projects result in no net increase in VMT over the current base year citywide VMT averages, a sustained reduction in citywide VMT and GHG emissions will occur, the Project's impact on VMT would be considered less-than-significant.

Project Residential VMT Evaluation

The total HB VMT of TAZs 1133, 1134 and 1136 were evaluated using the OCTAM VMT post-processor. To determine the Project's HB VMT per capita, the total HB VMT of TAZs 1133, 1134 and 1136 is divided by the total residents of TAZs 1133, 1134 and 1136 respectively. Tustin Citywide HB VMT per capita was obtained from the OCTAM base year model following a similar process. The VMT analysis results per the City's significance criteria are shown in Table 2.

As shown in the tables, all three Project TAZs' HB VMT per capita would be lower than the OCTAM base model year citywide average HB VMT per capita for the City of Tustin under both base and future year conditions. The Project TAZ's HB VMT per capita would be 44.4% for TAZ 1133, 6.3% for TAZ 1134 & 45.2% for TAZ 1136 below the City's threshold under base conditions and 27.5% TAZ 1133, 3.7% TAZ 1134 & 40.1% for TAZ 1136 below the City's threshold under future conditions, respectively. Overall, the Project's HB VMT per capita would be 32.1% below the City's threshold under base conditions and 20.3% below the City's threshold under future conditions.

Overall, the entire Project would therefore result in a less than significant VMT impact.

If you have any questions, please feel free to contact me at techservices@epdsolutions.com or at (949) 794-1180.

Table 2: VMT Analysis of Project Impact per City Guidelines

	Base Year 2016	**Future Year 2045**
Project TAZ 1133 Zone Total Home-based VMT	72,732	94,803
TAZ 1133 Total Residents	8,744	8,744
Project TAZ 1133 HB VMT per capita	**8.3**	**10.8**
City of Tustin Baseline Home-based VMT	1,356,977	1,356,977
City of Tustin Baseline Total Residents	90,762	90,762
City of Tustin Baseline HB VMT per capita	**15.0**	**15.0**
% Above/Below Threshold	-44.4%	-27.5%
Impact?	**No**	**No**

	Base Year 2016	**Future Year 2045**
Project TAZ 1134 Zone Total Home-based VMT	73,824	182,731
TAZ 1134 Total Residents	5,267	12,694
Project TAZ 1134 HB VMT per capita	**14.0**	**14.4**
City of Tustin Baseline Home-based VMT	1,356,977	1,356,977
City of Tustin Baseline Total Residents	90,762	90,762
City of Tustin Baseline HB VMT per capita	**15.0**	**15.0**
% Above/Below Threshold	-6.3%	-3.7%
Impact?	**No**	**No**

	Base Year 2016	**Future Year 2045**
Project TAZ 1136 Zone Total Home-based VMT	17,387	66,278
TAZ 1136 Total Residents	2,134	7,402
Project TAZ 1136 HB VMT per capita	**8.2**	**9.0**
City of Tustin Baseline Home-based VMT	1,356,977	1,356,977
City of Tustin Baseline Total Residents	90,762	90,762
City of Tustin Baseline HB VMT per capita	**15.0**	**15.0**
% Above/Below Threshold	-45.2%	-40.1%
Impact?	**No**	**No**

	Base Year 2016	**Future Year 2045**
TLSP Total Home-based VMT	163,943	343,812
TLSP Total Residents	16,145	28,840
TLSP HB VMT per capita	**10.2**	**11.9**
City of Tustin Baseline Home-based VMT	1,356,977	1,356,977
City of Tustin Baseline Total Residents	90,762	90,762
City of Tustin Baseline HB VMT per capita	**15.0**	**15.0**
% Above/Below Threshold	-32.1%	-20.3%
Impact?	**No**	**No**

Figure 1: Project Site Location

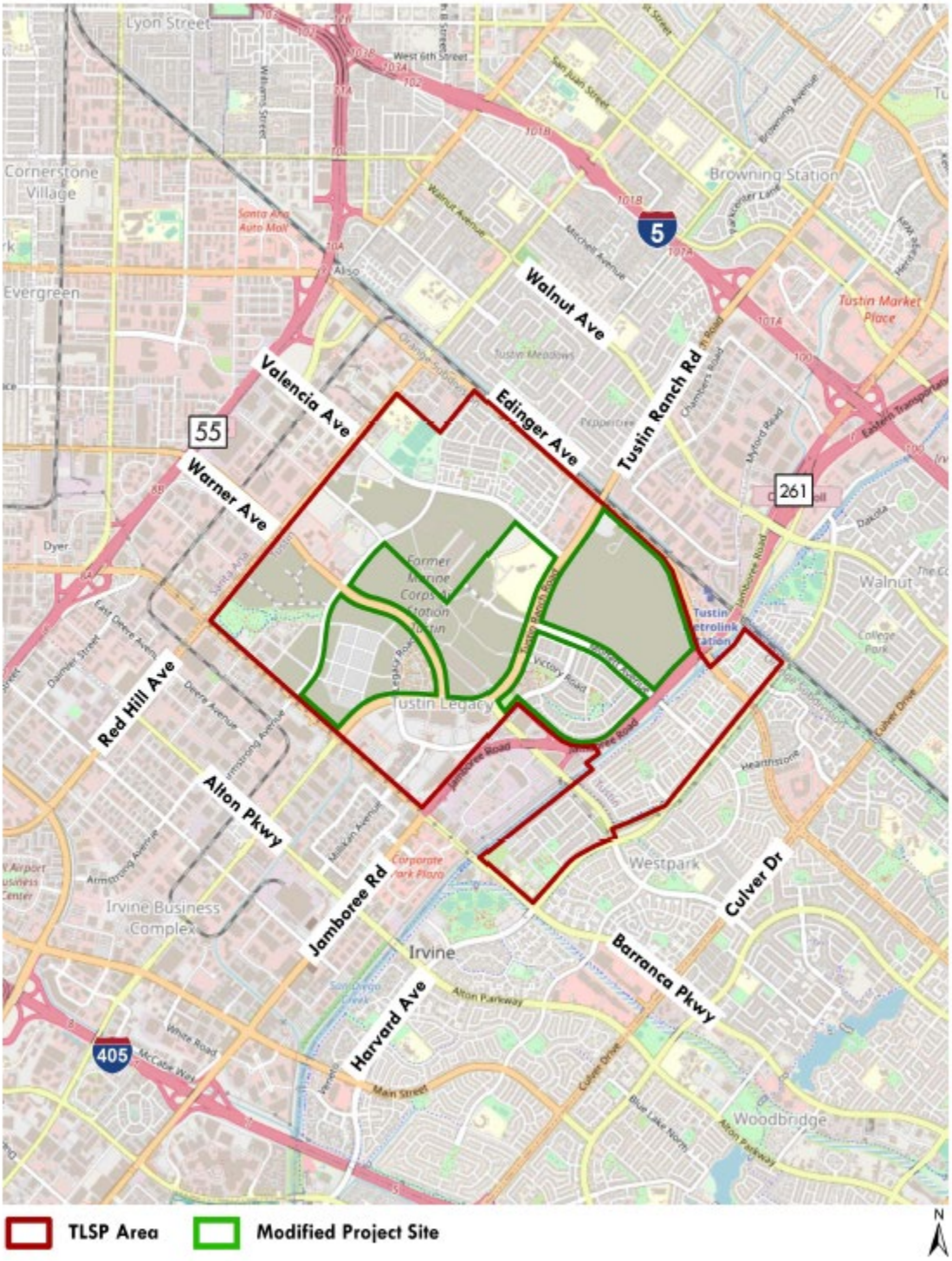


Figure 2: High-Quality Transit Area

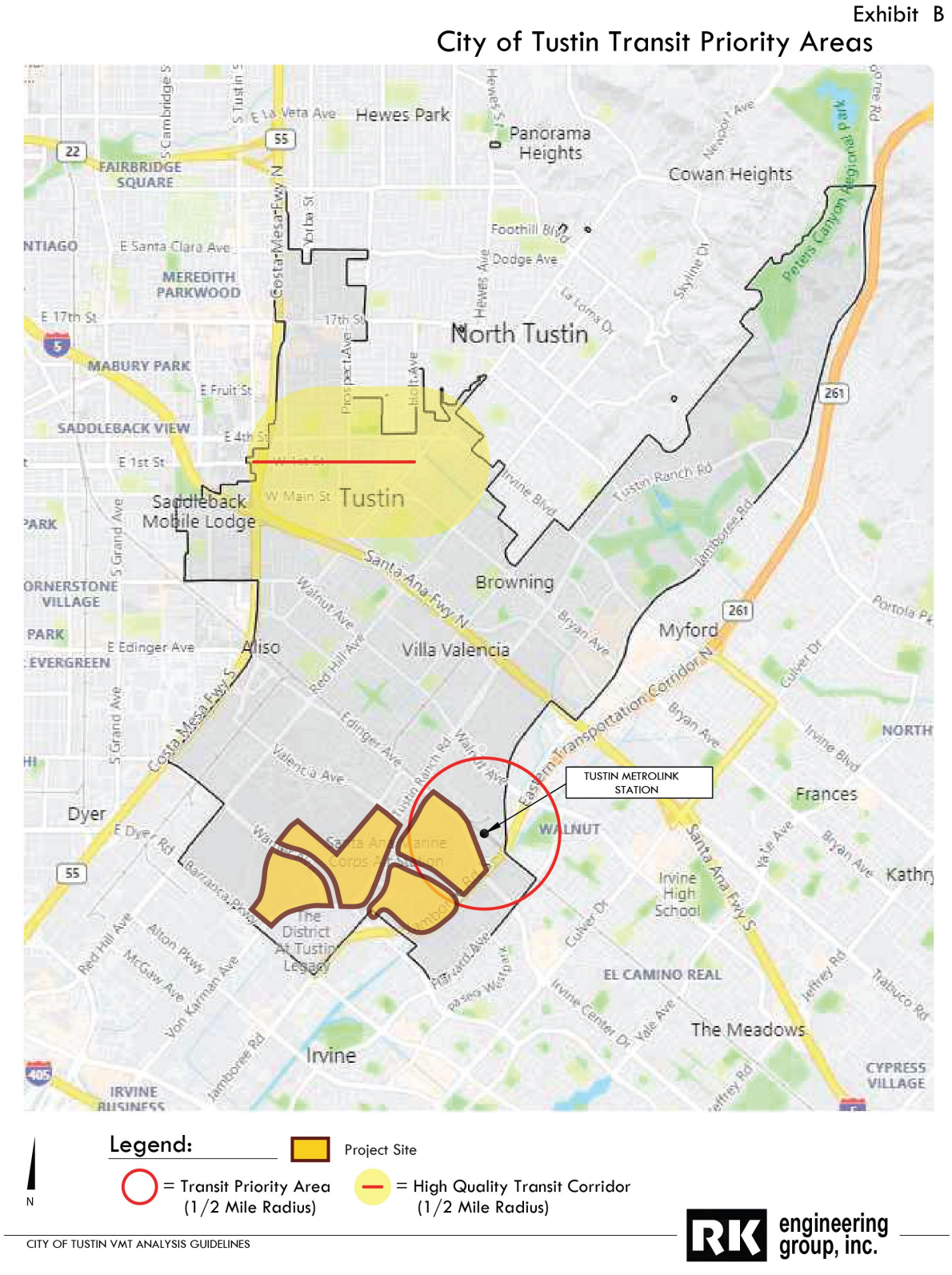


Figure 3: Low VMT Generating Area - VMT per capita

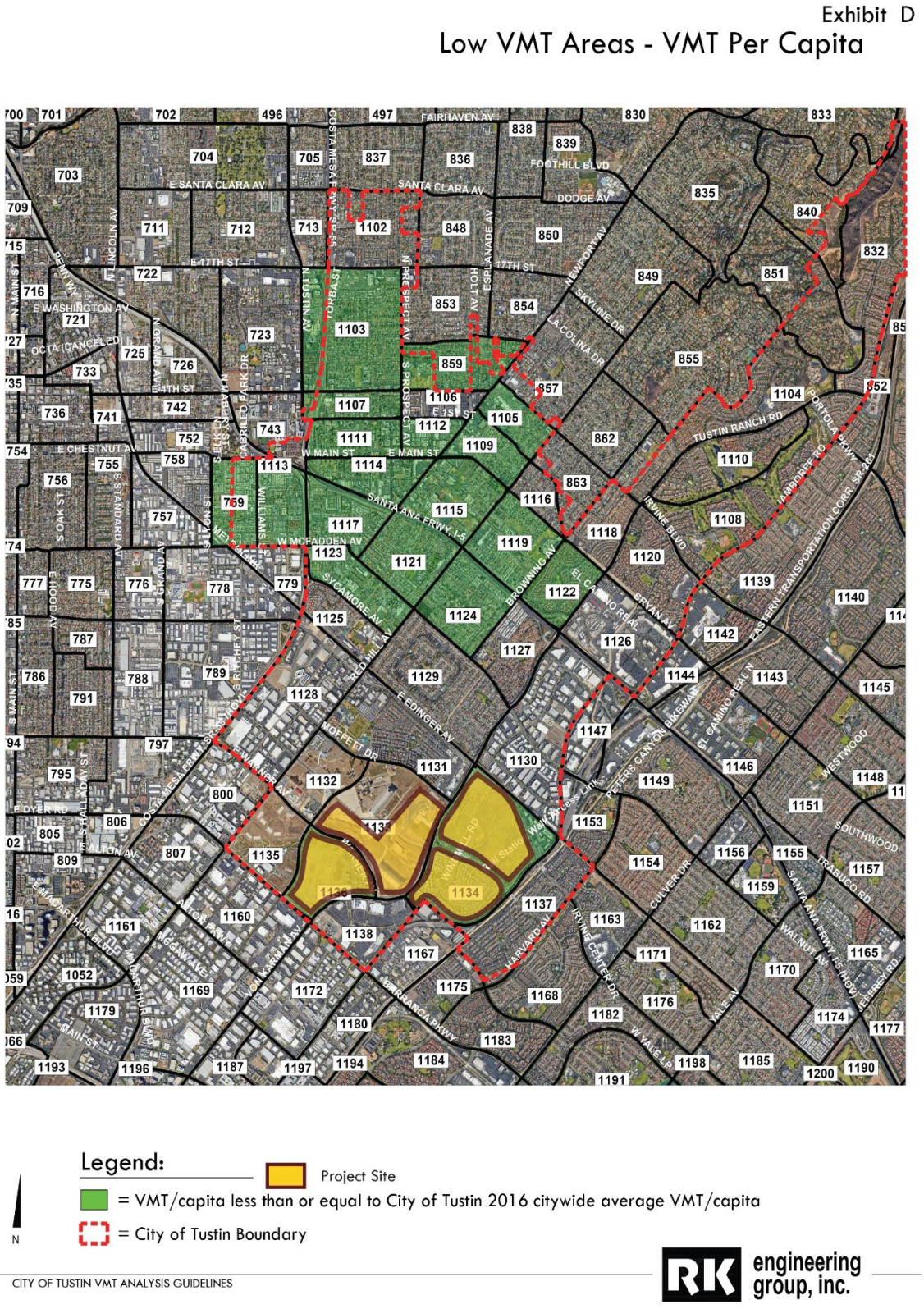
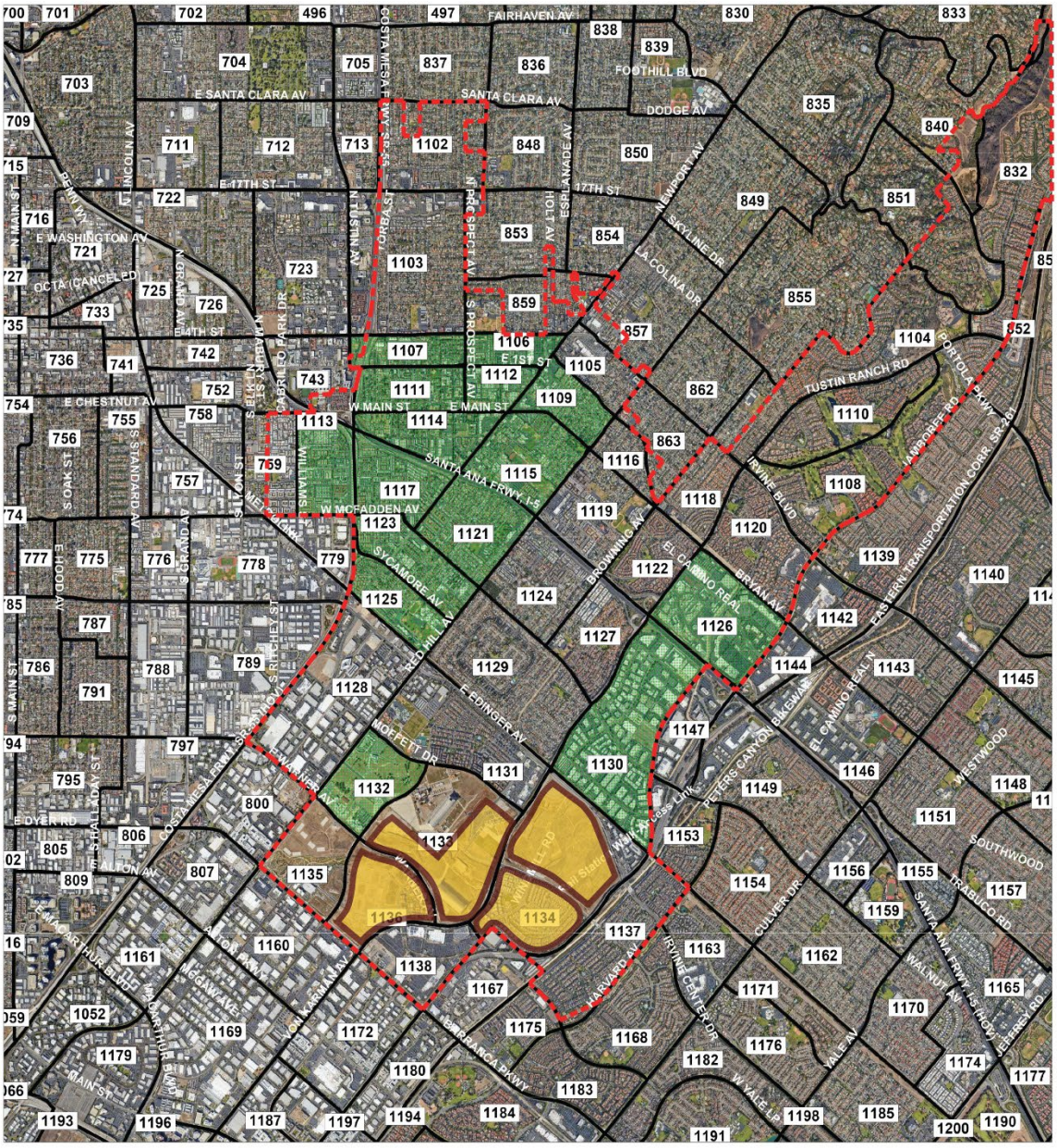


Figure 4: Low VMT Generating Area - VMT per employee

Exhibit E

Low VMT Areas - VMT Per Employee



Legend:

Project Site

= VMT/employee less than or equal to City of Tustin 2016 citywide average VMT/employee

= City of Tustin Boundary

N

APPENDIX A – ITE Trip Generation Rates

Land Use: 210
Single-Family Detached Housing

Description

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

Specialized Land Use

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

Additional Data

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

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

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

Source Numbers

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

Single-Family Detached Housing
(210)

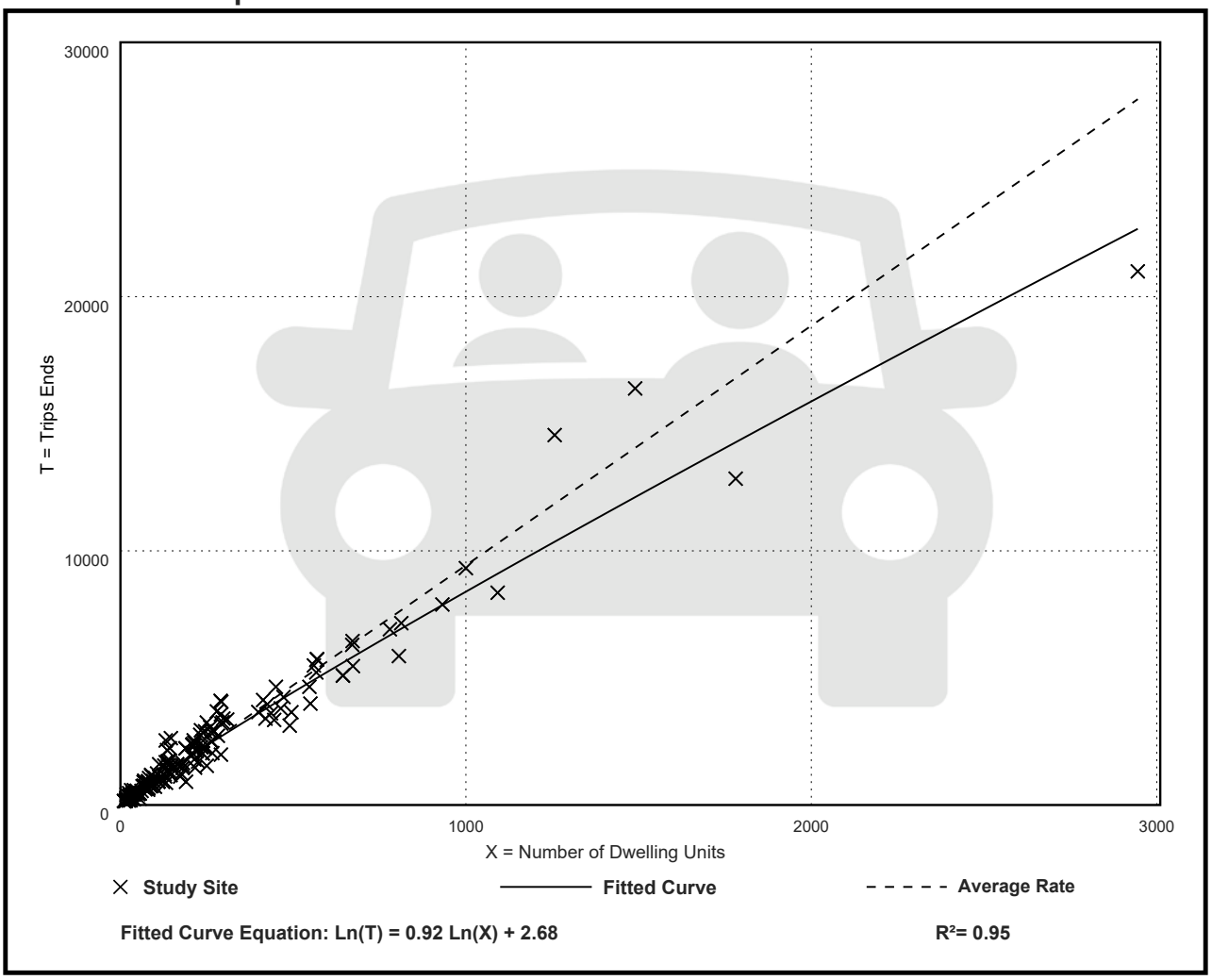
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 174
Avg. Num. of Dwelling Units: 246
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.68

R^2= 0.95

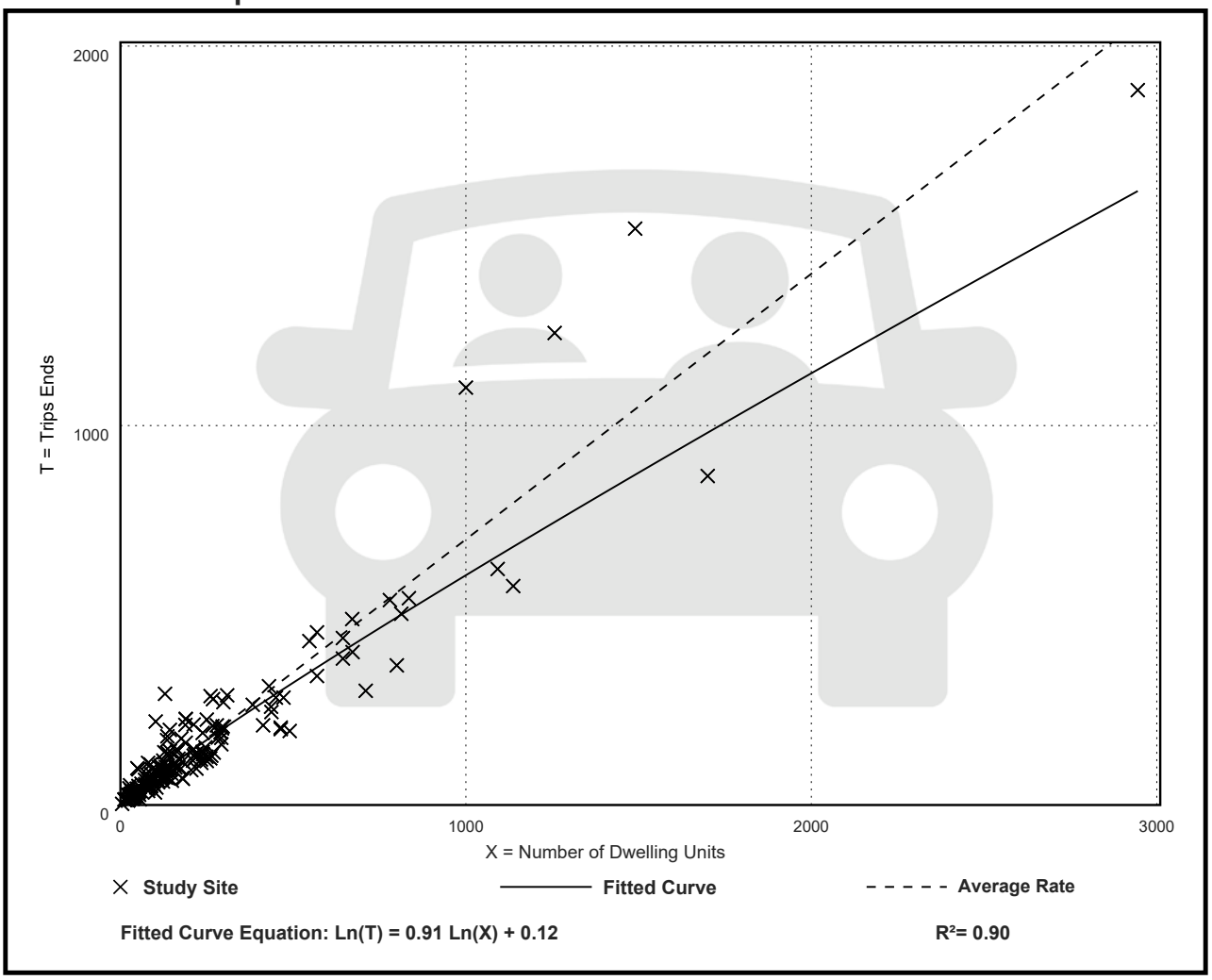
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 192
Avg. Num. of Dwelling Units: 226
Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



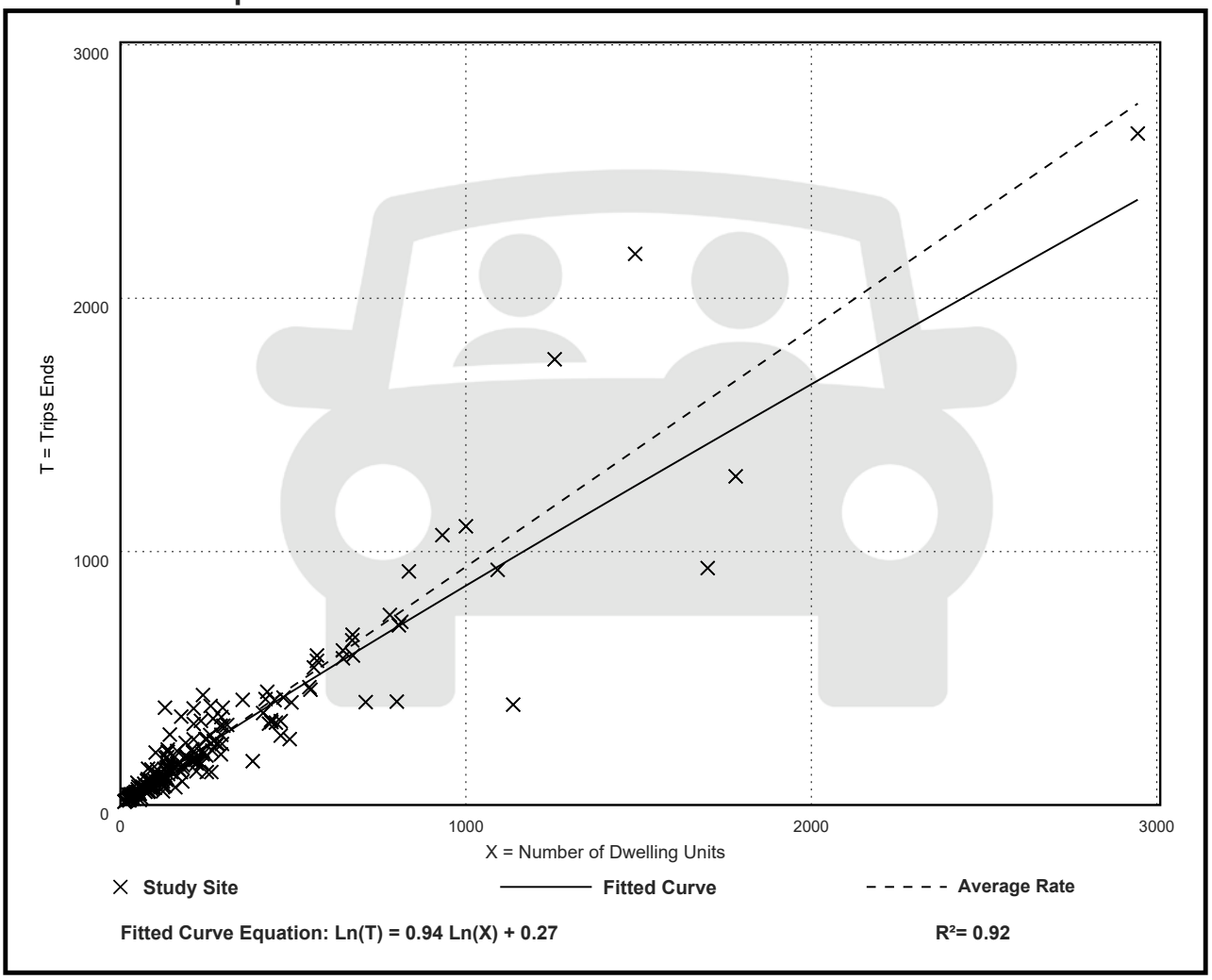
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 208
Avg. Num. of Dwelling Units: 248
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

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

Data Plot and Equation



Land Use: 221
Multifamily Housing (Mid-Rise)

Description

Mid-rise multifamily housing includes apartments and condominiums located in a building that has between four and 10 floors of living space. Access to individual dwelling units is through an outside building entrance, a lobby, elevator, and a set of hallways.

Multifamily housing (low-rise) (Land Use 220), multifamily housing (high-rise) (Land Use 222), off-campus student apartment (mid-rise) (Land Use 226), and mid-rise residential with ground-floor commercial (Land Use 231) are related land uses.

Land Use Subcategory

Data are presented for two subcategories for this land use: (1) not close to rail transit and (2) close to rail transit. A site is considered close to rail transit if the walking distance between the residential site entrance and the closest rail transit station entrance is ½ mile or less.

Additional Data

For the six sites for which both the number of residents and the number of occupied dwelling units were available, there were an average of 2.5 residents per occupied dwelling unit.

For the five sites for which the numbers of both total dwelling units and occupied dwelling units were available, an average of 96 percent of the total dwelling units were occupied.

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

It is expected that the number of bedrooms and number of residents are likely correlated to the trips generated by a residential site. To assist in future analysis, trip generation studies of all multifamily housing should attempt to obtain information on occupancy rate and on the mix of residential unit sizes (i.e., number of units by number of bedrooms at the site complex).

The sites were surveyed in the 1990s, the 2000s, the 2010s, and the 2020s in Alberta (CAN), California, District of Columbia, Florida, Georgia, Illinois, Maryland, Massachusetts, Minnesota, Montana, New Jersey, New York, Ontario (CAN), Oregon, Utah, and Virginia.

Source Numbers

168, 188, 204, 305, 306, 321, 818, 857, 862, 866, 901, 904, 910, 949, 951, 959, 963, 964, 966, 967, 969, 970, 1004, 1014, 1022, 1023, 1025, 1031, 1032, 1035, 1047, 1056, 1057, 1058, 1071, 1076

Multifamily Housing (Mid-Rise)
Not Close to Rail Transit (221)

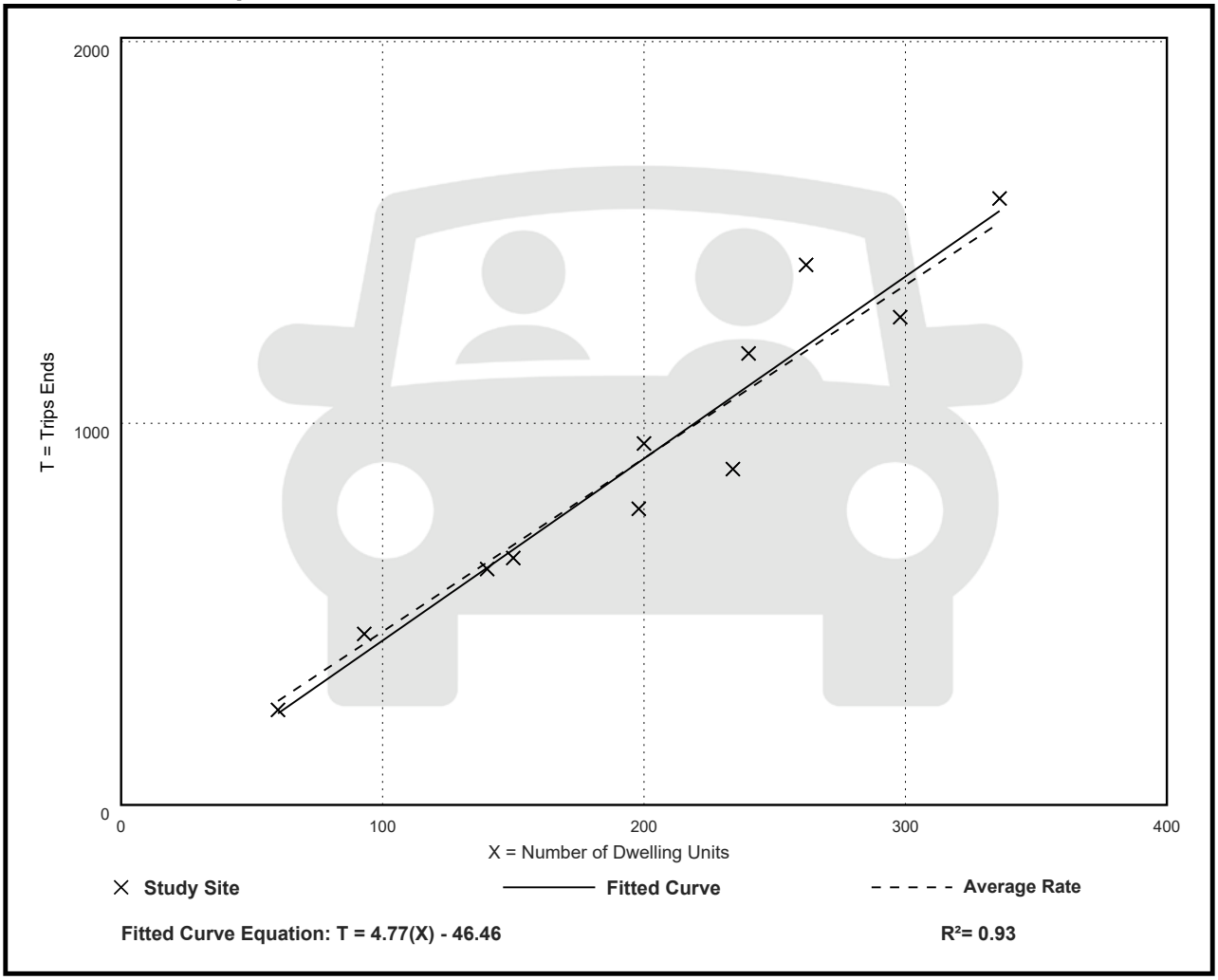
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 11
Avg. Num. of Dwelling Units: 201
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
4.54	3.76 - 5.40	0.51

Data Plot and Equation



Fitted Curve Equation: T = 4.77(X) - 46.46

R^2= 0.93

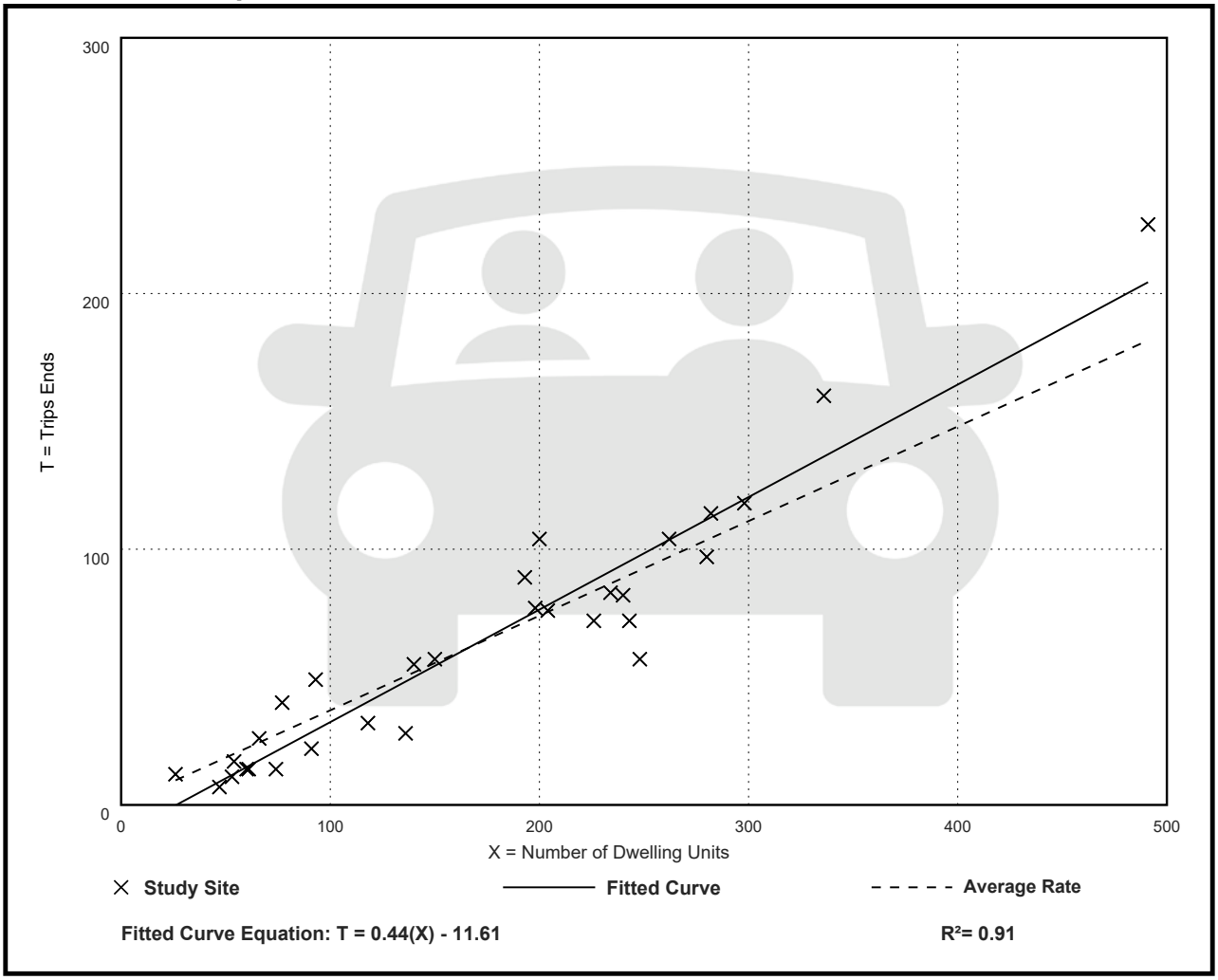
Multifamily Housing (Mid-Rise)
Not Close to Rail Transit (221)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 30
Avg. Num. of Dwelling Units: 173
Directional Distribution: 23% entering, 77% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.37	0.15 - 0.53	0.09

Data Plot and Equation



Fitted Curve Equation: T = 0.44(X) - 11.61

R^2= 0.91

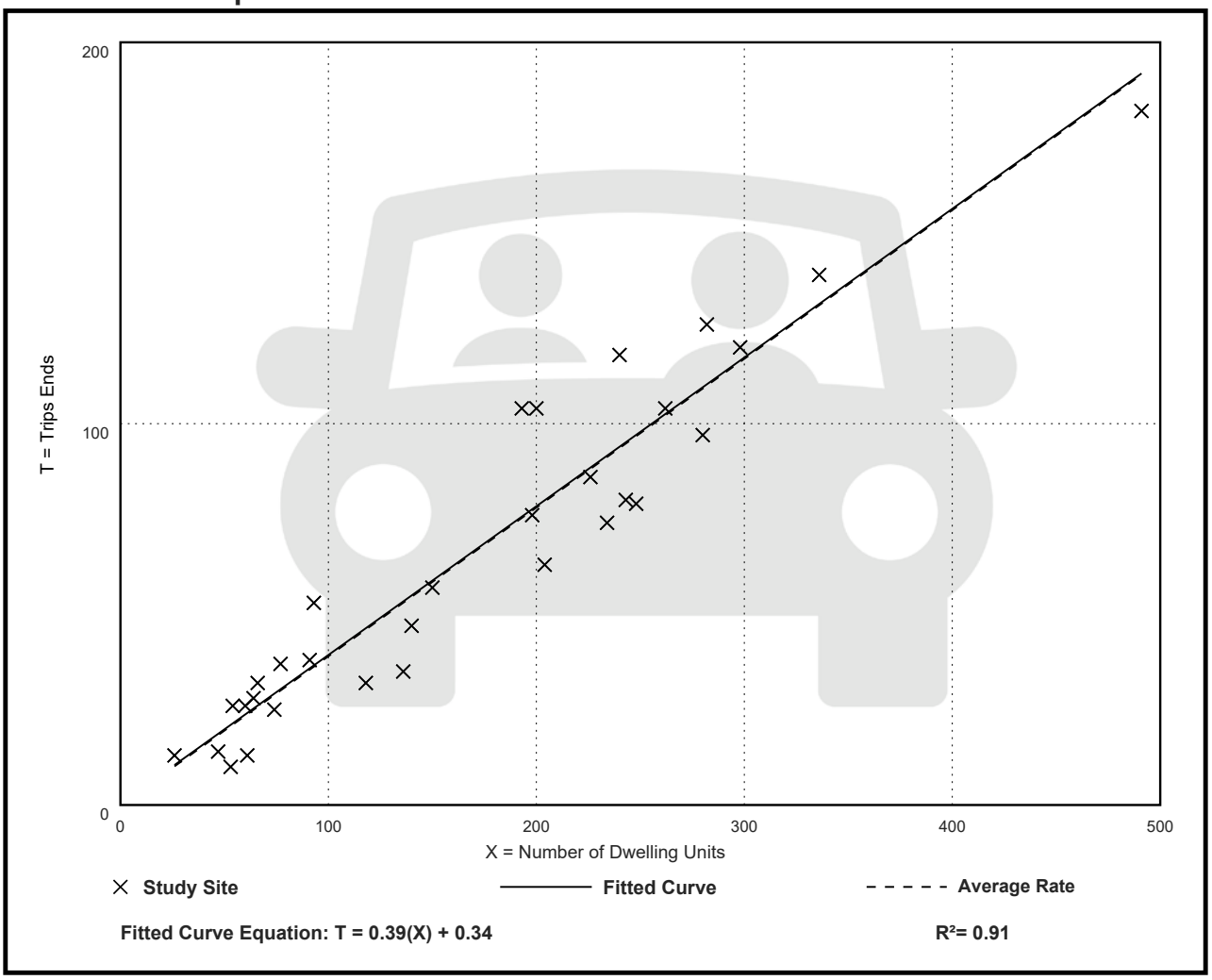
Multifamily Housing (Mid-Rise)
Not Close to Rail Transit (221)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 31
Avg. Num. of Dwelling Units: 169
Directional Distribution: 61% entering, 39% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.39	0.19 - 0.57	0.08

Data Plot and Equation



Land Use: 251
Senior Adult Housing—Single-Family

Description

Senior adult housing—single-family sites are independent living developments that are called various names including retirement communities, age-restricted housing, and active adult communities. The development has a specific age restriction for its residents, typically a minimum of 55 years of age for at least one resident of the household.

Residents in these communities are typically considered active and requiring little to no medical supervision. The percentage of retired residents varies by development. The development may include amenities such as a golf course, swimming pool, 24-hour security, transportation, and common recreational facilities. They generally lack centralized dining and on-site health facilities.

The dwelling units can be either detached or attached. The types of housing types represented by sites in the database include traditional single-family detached homes, patio homes, duplexes, and townhouses. Single-family attached housing includes any single-family housing unit that shares a wall with an adjoining dwelling unit, whether the walls are for living space, a vehicle garage, or storage space.

Senior adult housing—multifamily (Land Use 252), congregate care facility (Land Use 253), assisted living (Land Use 254), and continuing care retirement community (Land Use 255) are related land uses.

Additional Data

Caution should be used when applying trip rates for this land use as it may contain a wide variety of studies ranging from communities with very active, working residents to communities with older, retired residents. As more data become available, consideration will be given to future stratification of this land use.

Many factors affected the trip rates for detached senior adult housing. Factors such as the average age of residents, development location and size, affluence of residents, employment status, and vehicular access should be taken into consideration when conducting an analysis. Some developments were located within close proximity to medical facilities, restaurants, shopping centers, banks, and recreational activities.

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

For the six sites for which data were provided for both occupied dwelling units and total dwelling units, an average of 98 percent of the units were occupied.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), California, Delaware, Florida, Maryland, New Jersey, New York, Pennsylvania, Virginia, and Washington.

Source Numbers

221, 289, 398, 421, 500, 550, 598, 601, 602, 629, 930, 1015, 1060, 1074

Senior Adult Housing - Single-Family (251)

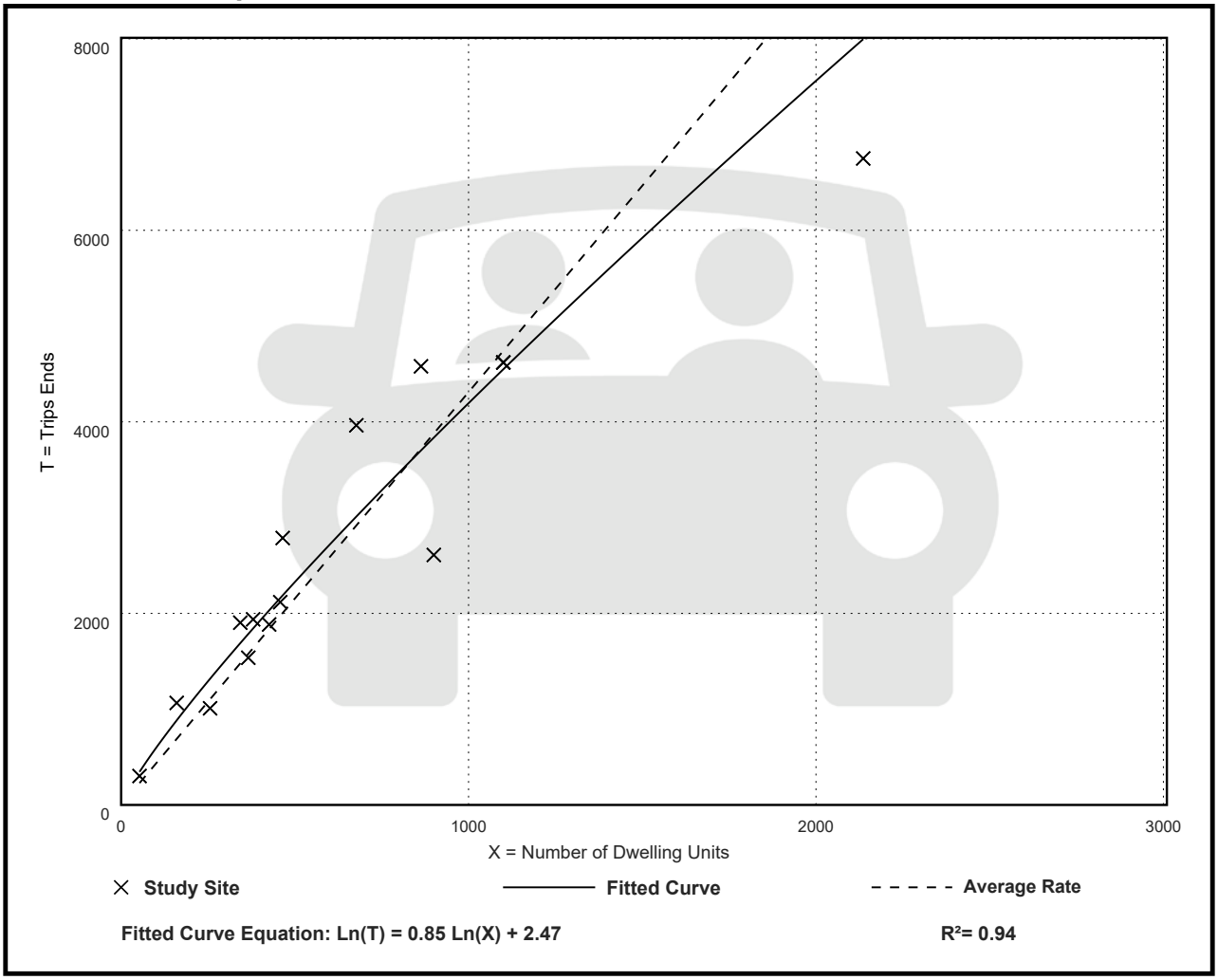
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 15
Avg. Num. of Dwelling Units: 646
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
4.31	2.90 - 6.66	1.07

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.85 Ln(X) + 2.47

R^2= 0.94

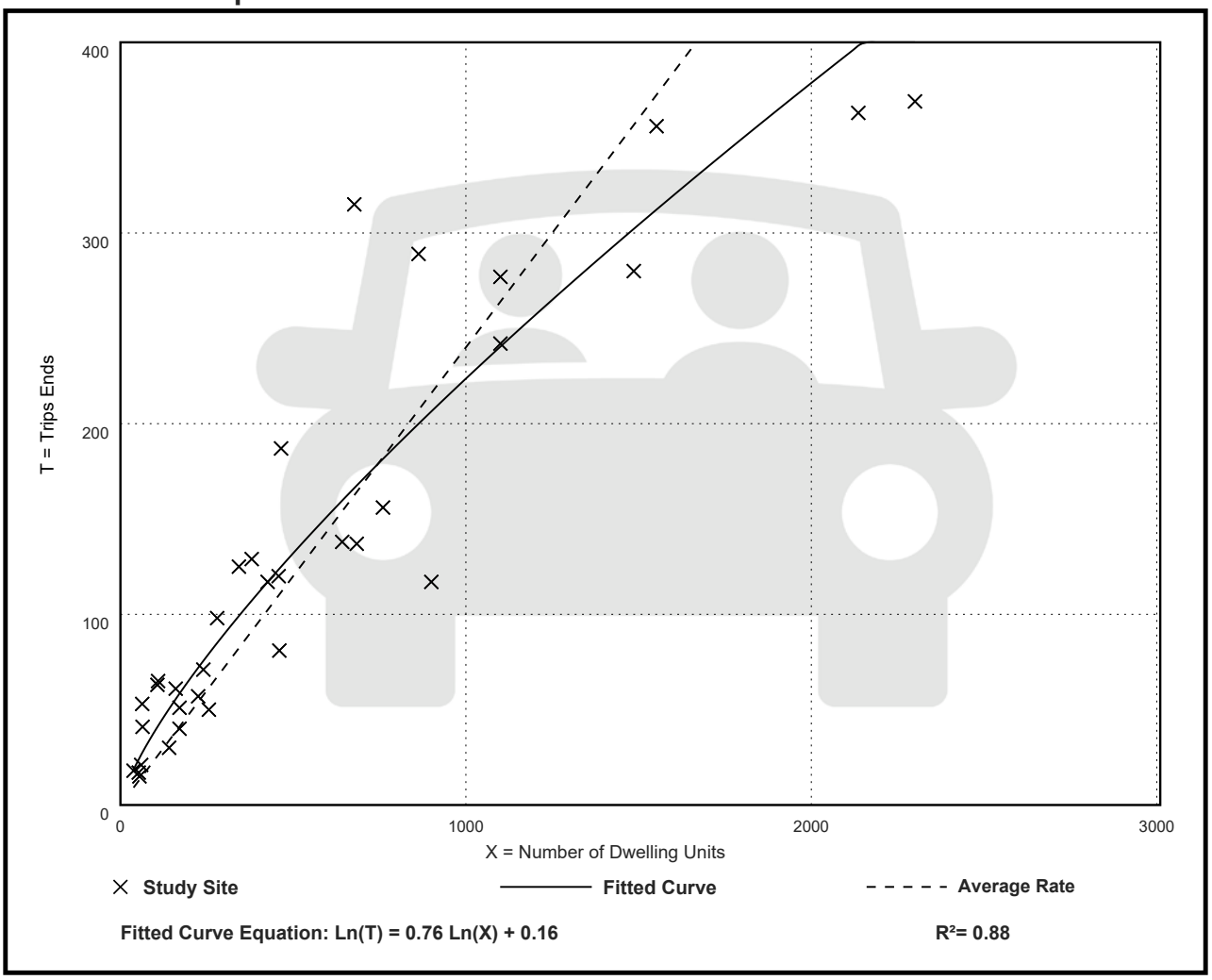
Senior Adult Housing - Single-Family
(251)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 34
Avg. Num. of Dwelling Units: 557
Directional Distribution: 33% entering, 67% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.24	0.13 - 0.84	0.10

Data Plot and Equation



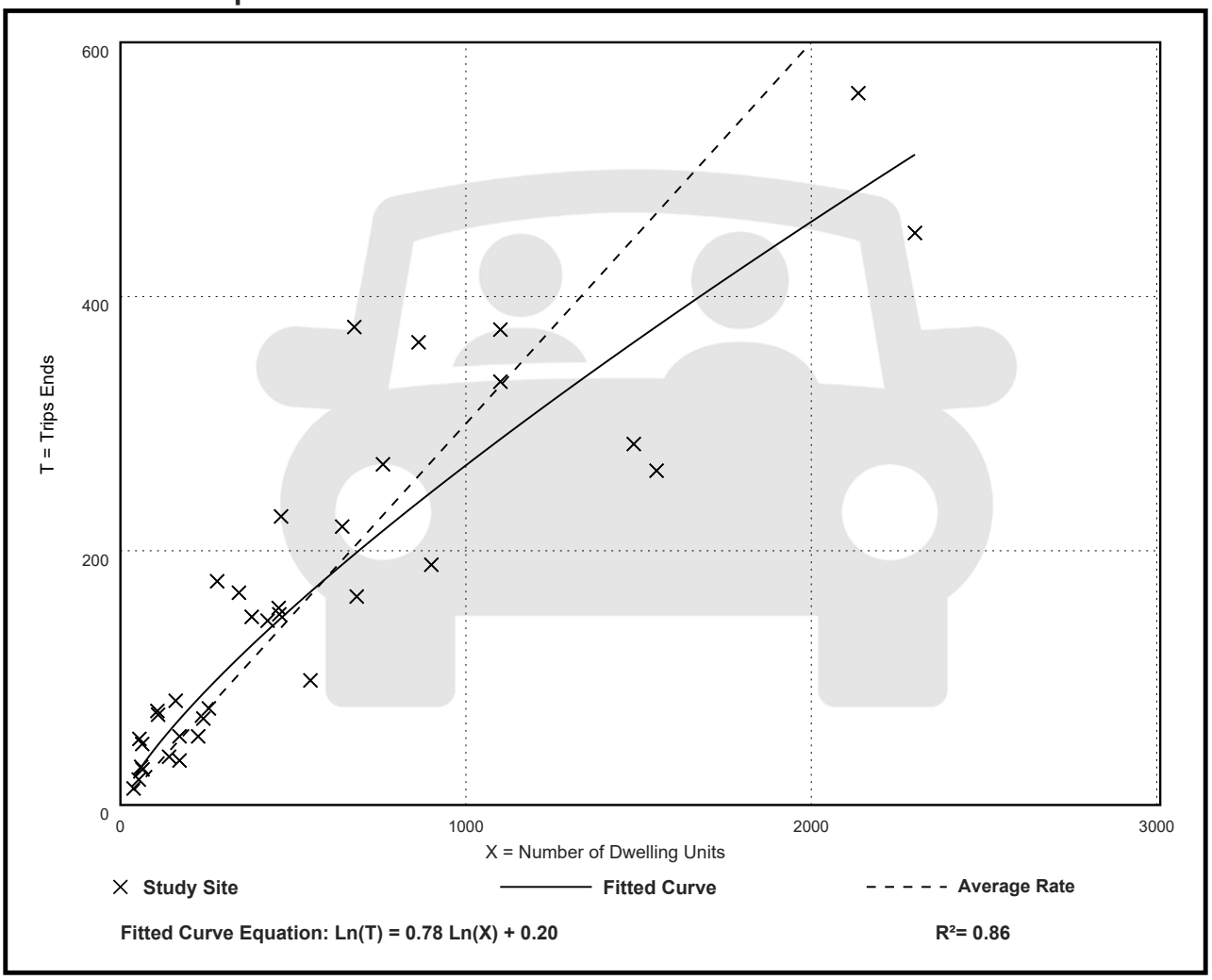
Senior Adult Housing - Single-Family
(251)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 35
Avg. Num. of Dwelling Units: 556
Directional Distribution: 61% entering, 39% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.30	0.17 - 0.95	0.12

Data Plot and Equation



Land Use: 310
Hotel

Description

A hotel is a place of lodging that provides sleeping accommodations and supporting facilities such as a full-service restaurant, cocktail lounge, meeting rooms, banquet room, and convention facilities. A hotel typically provides a swimming pool or another recreational facility such as a fitness room. All suites hotel (Land Use 311), business hotel (Land Use 312), motel (Land Use 320), and resort hotel (Land Use 330) are related uses.

Additional Data

Twenty-five studies provided information on occupancy rates at the time the studies were conducted. The average occupancy rate for these studies was approximately 82 percent.

Some properties in this land use provide guest transportation services (e.g., airport shuttle, limousine service, golf course shuttle service) which may have an impact on the overall trip generation rates.

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

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, District of Columbia, Florida, Georgia, Indiana, Minnesota, New York, Ontario (CAN), Pennsylvania, South Dakota, Texas, Vermont, Virginia, and Washington.

For all lodging uses, it is important to collect data on occupied rooms as well as total rooms in order to accurately predict trip generation characteristics for the site.

Trip generation at a hotel may be related to the presence of supporting facilities such as convention facilities, restaurants, meeting/banquet space, and retail facilities. Future data submissions should specify the presence of these amenities. Reporting the level of activity at the supporting facilities such as full, empty, partially active, number of people attending a meeting/banquet during observation may also be useful in further analysis of this land use.

Source Numbers

170, 260, 262, 277, 280, 301, 306, 357, 422, 507, 577, 728, 867, 872, 925, 951, 1009, 1021, 1026, 1046

Hotel
(310)

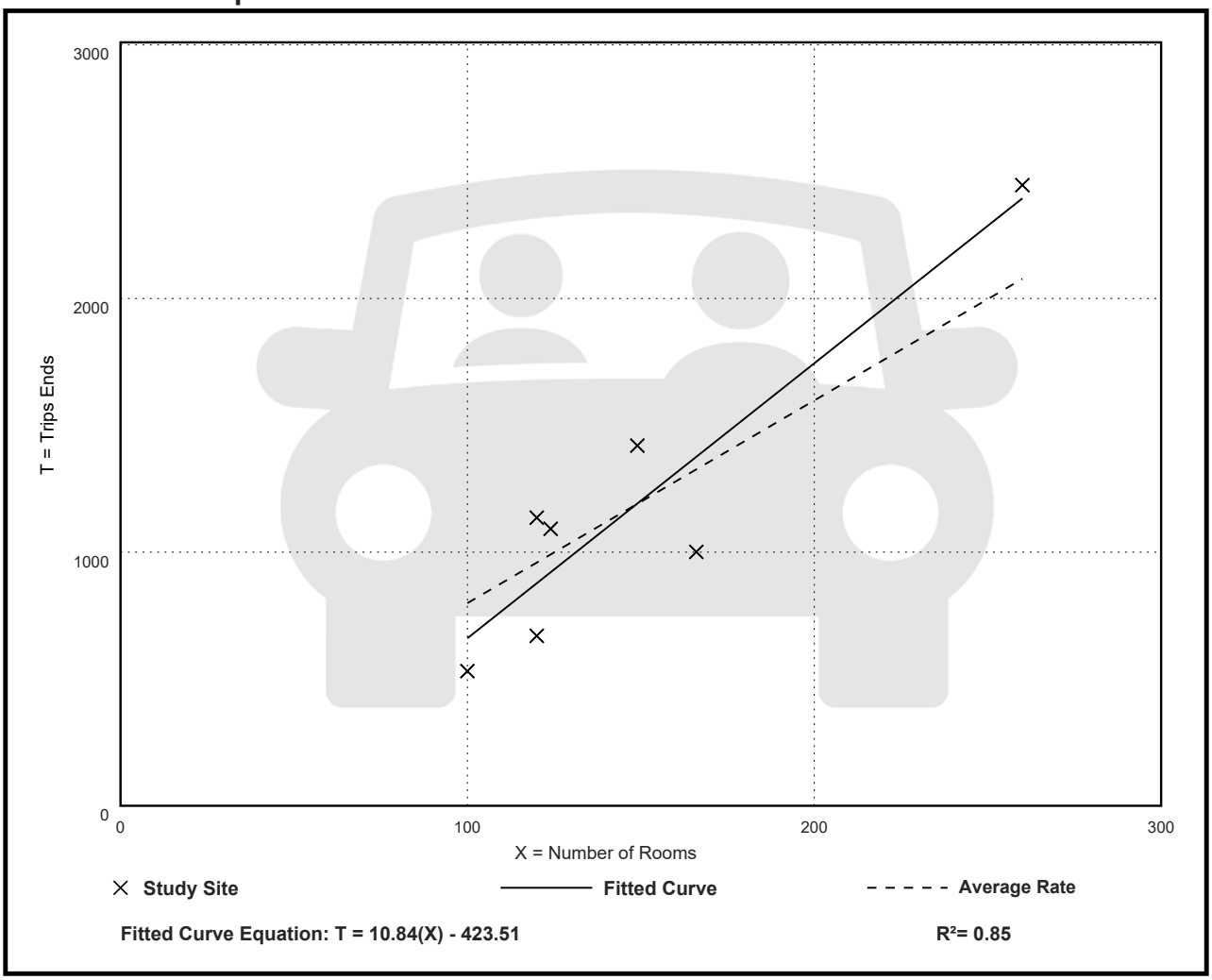
Vehicle Trip Ends vs: Rooms
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 7
Avg. Num. of Rooms: 148
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
7.99	5.31 - 9.53	1.92

Data Plot and Equation



Fitted Curve Equation: T = 10.84(X) - 423.51

R^2= 0.85

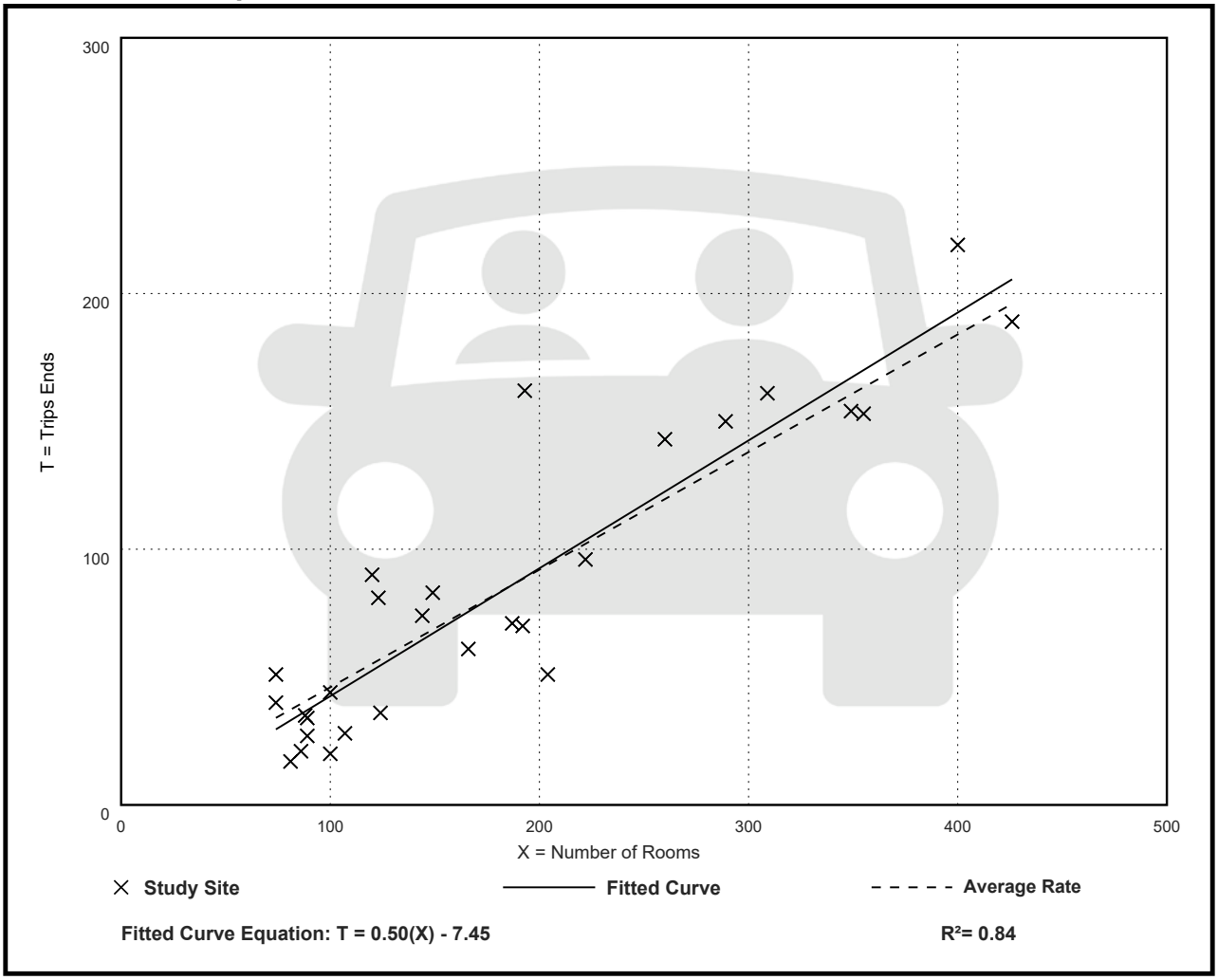
Hotel
(310)

Vehicle Trip Ends vs: Rooms
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 28
Avg. Num. of Rooms: 182
Directional Distribution: 56% entering, 44% exiting

Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.46	0.20 - 0.84	0.14

Data Plot and Equation



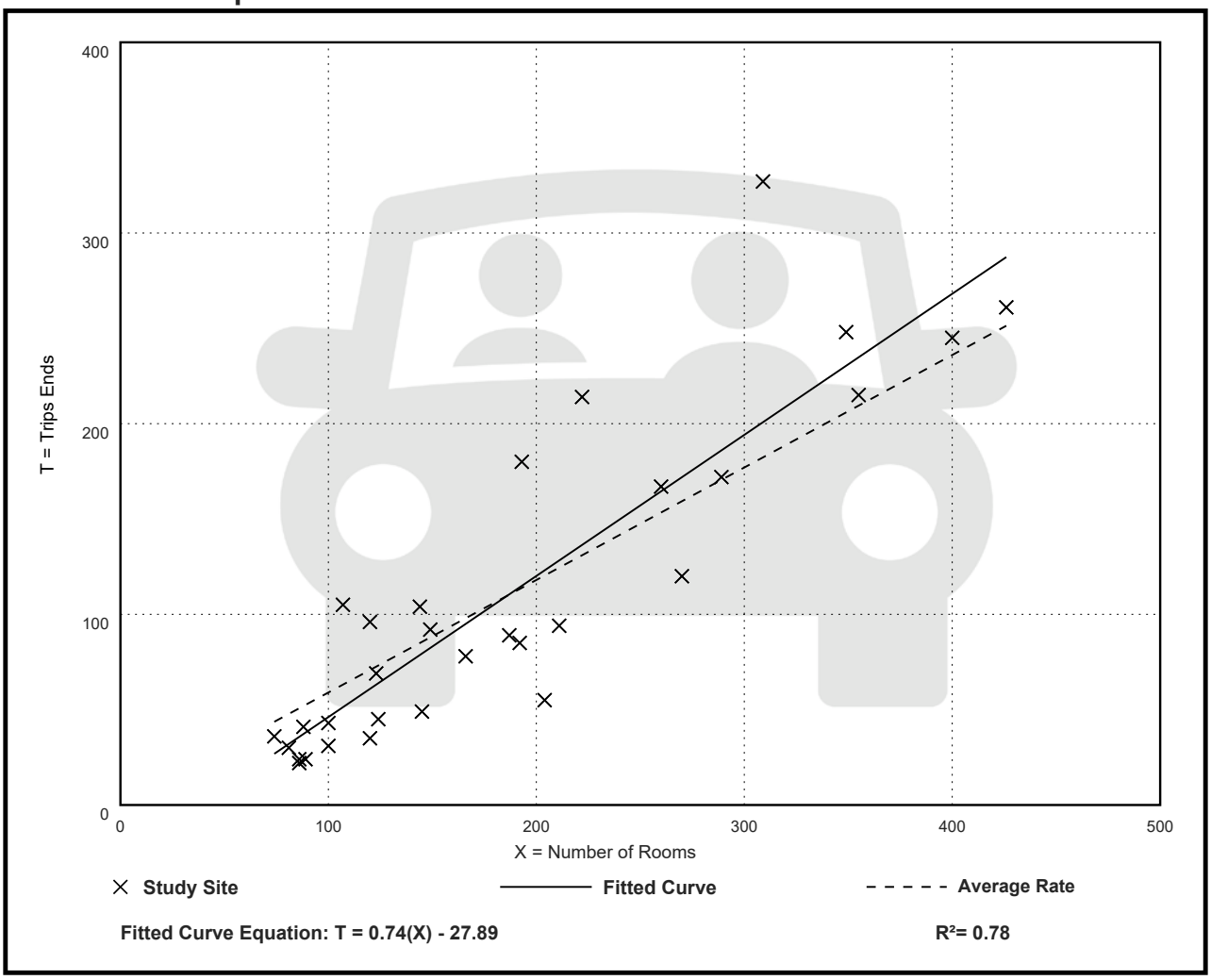
Hotel
(310)

Vehicle Trip Ends vs: Rooms
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 31
Avg. Num. of Rooms: 186
Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.59	0.26 - 1.06	0.22

Data Plot and Equation



Land Use 525
High School

Description

A high school is a public school that serves students who have completed middle or junior high school. Middle school/junior high school (Land Use 522), private school (K-12) (Land Use 532), private high school (Land Use (534), and charter school (K-12) (Land Use 538) are related uses.

Additional Data

The trip generation for weekend time periods varied considerably; therefore, caution should be used when applying weekend statistics. Information describing the weekend activities conducted at the high schools was not available.

The percentage of students at the sites who were transported to school via bus varied considerably. Due to the varied transit and school bus usage at these sites, it is desirable that future studies include additional detail on the percentage of students who were bused to school and the percentage who were dropped off and picked up.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), Arizona, California, Connecticut, Delaware, Florida, Minnesota, New Jersey, North Carolina, Oregon, Texas, Vermont, Washington, and West Virginia.

Source Numbers

293, 383, 409, 422, 444, 533, 536, 550, 564, 579, 598, 611, 620, 751, 854, 905, 915, 926, 936, 954, 971, 1026, 1048, 1067, 1083

High School
(525)

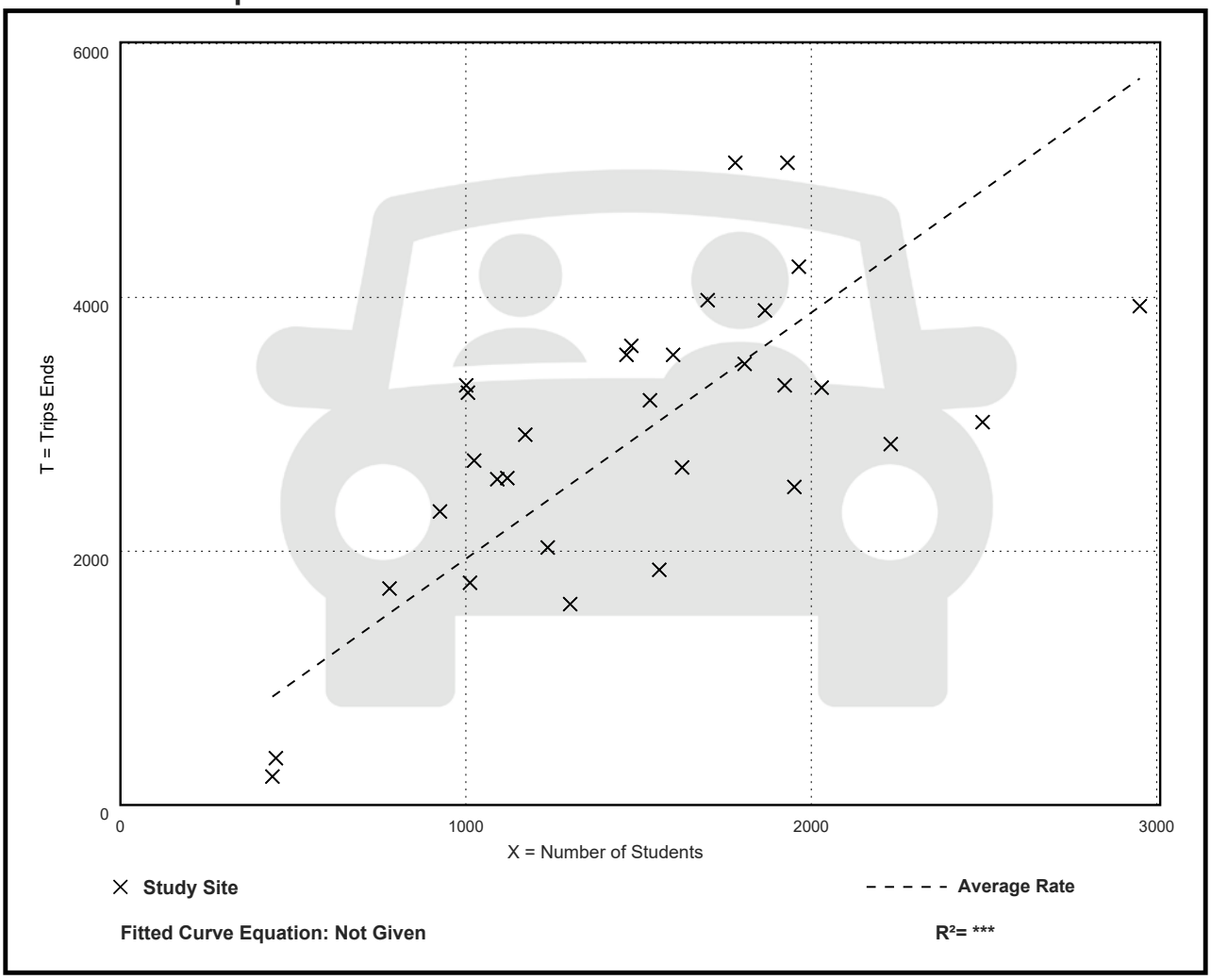
Vehicle Trip Ends vs: Students
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 31
Avg. Num. of Students: 1498
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
1.94	0.51 - 3.30	0.61

Data Plot and Equation



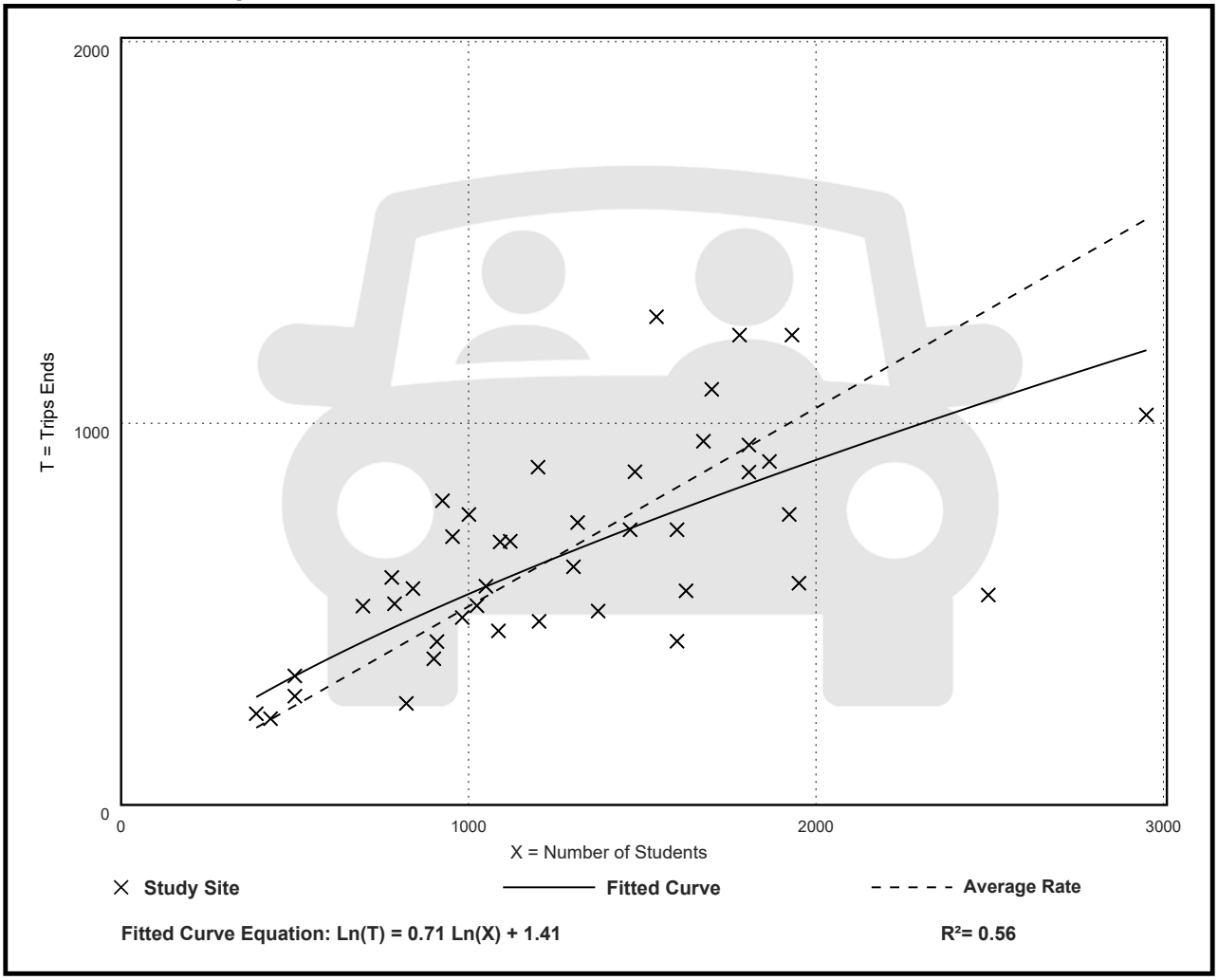
High School
(525)

Vehicle Trip Ends vs: Students
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 42
Avg. Num. of Students: 1295
Directional Distribution: 68% entering, 32% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.52	0.22 - 0.86	0.16

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.71 Ln(X) + 1.41

R^2= 0.56

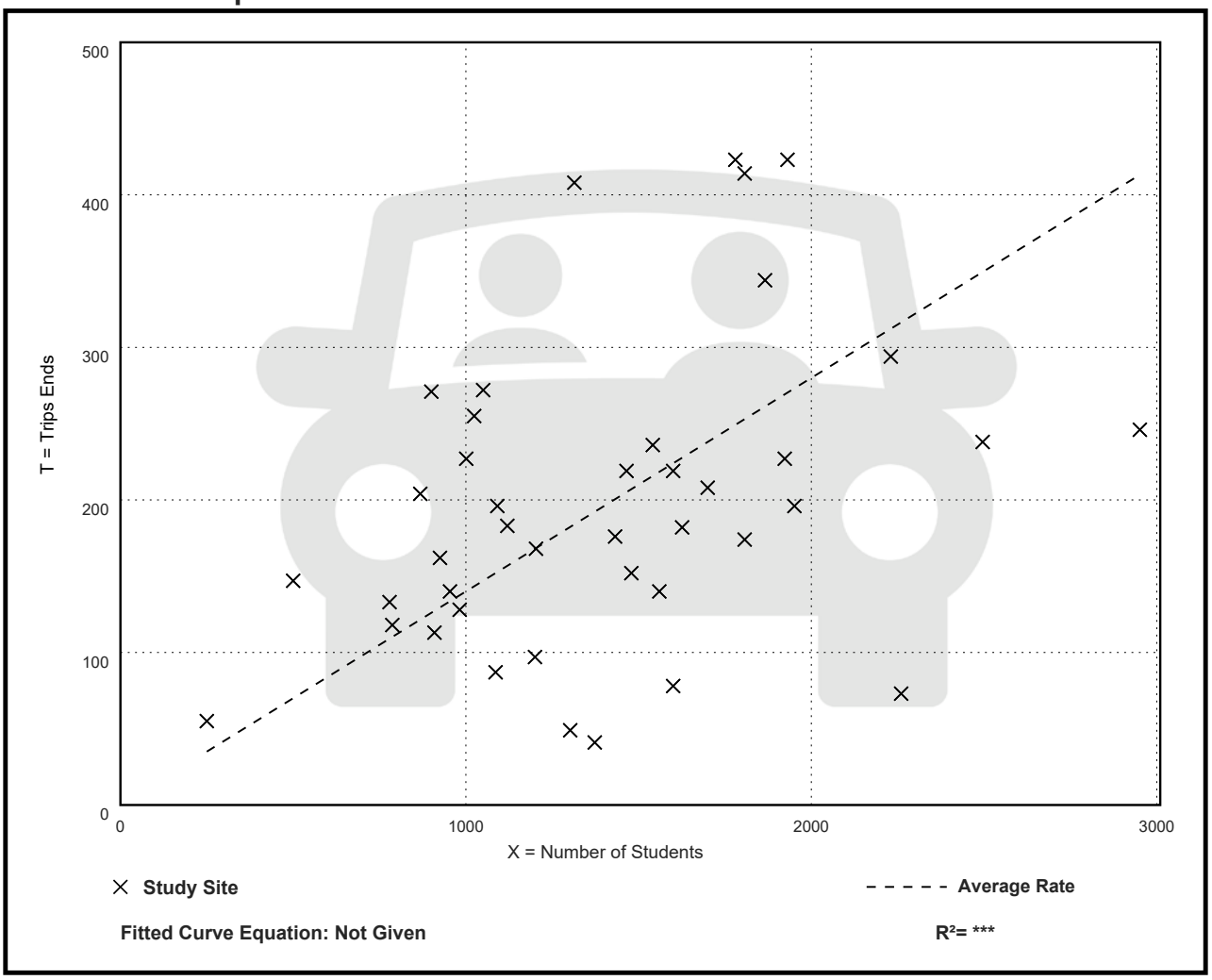
High School
(525)

Vehicle Trip Ends vs: Students
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 41
Avg. Num. of Students: 1405
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.14	0.03 - 0.31	0.07

Data Plot and Equation



Land Use: 710
General Office Building

Description

A general office building is a location where affairs of businesses, commercial or industrial organizations, or professional persons or firms are conducted. An office building houses multiple tenants that can include, as examples, professional services, insurance companies, investment brokers, a banking institution, a restaurant, or other service retailers. A general office building with a gross floor area of 10,000 square feet or less is classified as a small office building (Land Use 712). Corporate headquarters building (Land Use 714), single tenant office building (Land Use 715), medical-dental office building (Land Use 720), office park (Land Use 750), research and development center (Land Use 760), and business park (Land Use 770) are additional related uses.

Additional Data

If two or more general office buildings are in close physical proximity (within a close walk) and function as a unit (perhaps with a shared parking facility and common or complementary tenants), the total gross floor area or employment of the paired office buildings can be used for calculating the site trip generation. If the individual buildings are isolated or not functionally related to one another, trip generation should be calculated for each building separately.

For study sites with reported gross floor area and employees, an average employee density of 3.3 employees per 1,000 square feet GFA (or roughly 300 square feet per employee) has been consistent through the 1980s, 1990s, and 2000s. No sites counted in the 2010s reported both GFA and employees.

The average building occupancy varies considerably within the studies for which occupancy data were provided. The reported occupied gross floor area was 88 percent for general urban/suburban sites and 96 percent for the center city core and dense multi-use urban sites.

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

The average numbers of person trips per vehicle trip at the eight center city core sites at which both person trip and vehicle trip data were collected are as follows:

- 2.8 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 7 and 9 a.m.
- 2.9 during Weekday, AM Peak Hour of Generator
- 2.9 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 4 and 6 p.m.
- 3.0 during Weekday, PM Peak Hour of Generator

The average numbers of person trips per vehicle trip at the 18 dense multi-use urban sites at which both person trip and vehicle trip data were collected are as follows:

- 1.5 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 7 and 9 a.m.
- 1.5 during Weekday, AM Peak Hour of Generator
- 1.5 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 4 and 6 p.m.
- 1.5 during Weekday, PM Peak Hour of Generator

The average numbers of person trips per vehicle trip at the 23 general urban/suburban sites at which both person trip and vehicle trip data were collected are as follows:

- 1.3 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 7 and 9 a.m.
- 1.3 during Weekday, AM Peak Hour of Generator
- 1.3 during Weekday, Peak Hour of Adjacent Street Traffic, one hour between 4 and 6 p.m.
- 1.4 during Weekday, PM Peak Hour of Generator

The sites were surveyed in the 1980s, the 1990s, the 2000s, the 2010s, and the 2020s in Alberta (CAN), California, Colorado, Connecticut, Georgia, Illinois, Indiana, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, Missouri, Montana, New Hampshire, New Jersey, New York, Ontario (CAN)Pennsylvania, Texas, Utah, Virginia, and Washington.

Source Numbers

161, 175, 183, 184, 185, 207, 212, 217, 247, 253, 257, 260, 262, 273, 279, 297, 298, 300, 301, 302, 303, 304, 321, 322, 323, 324, 327, 404, 407, 408, 419, 423, 562, 734, 850, 859, 862, 867, 869, 883, 884, 890, 891, 904, 940, 944, 946, 964, 965, 972, 1009, 1030, 1058, 1061

General Office Building
(710)

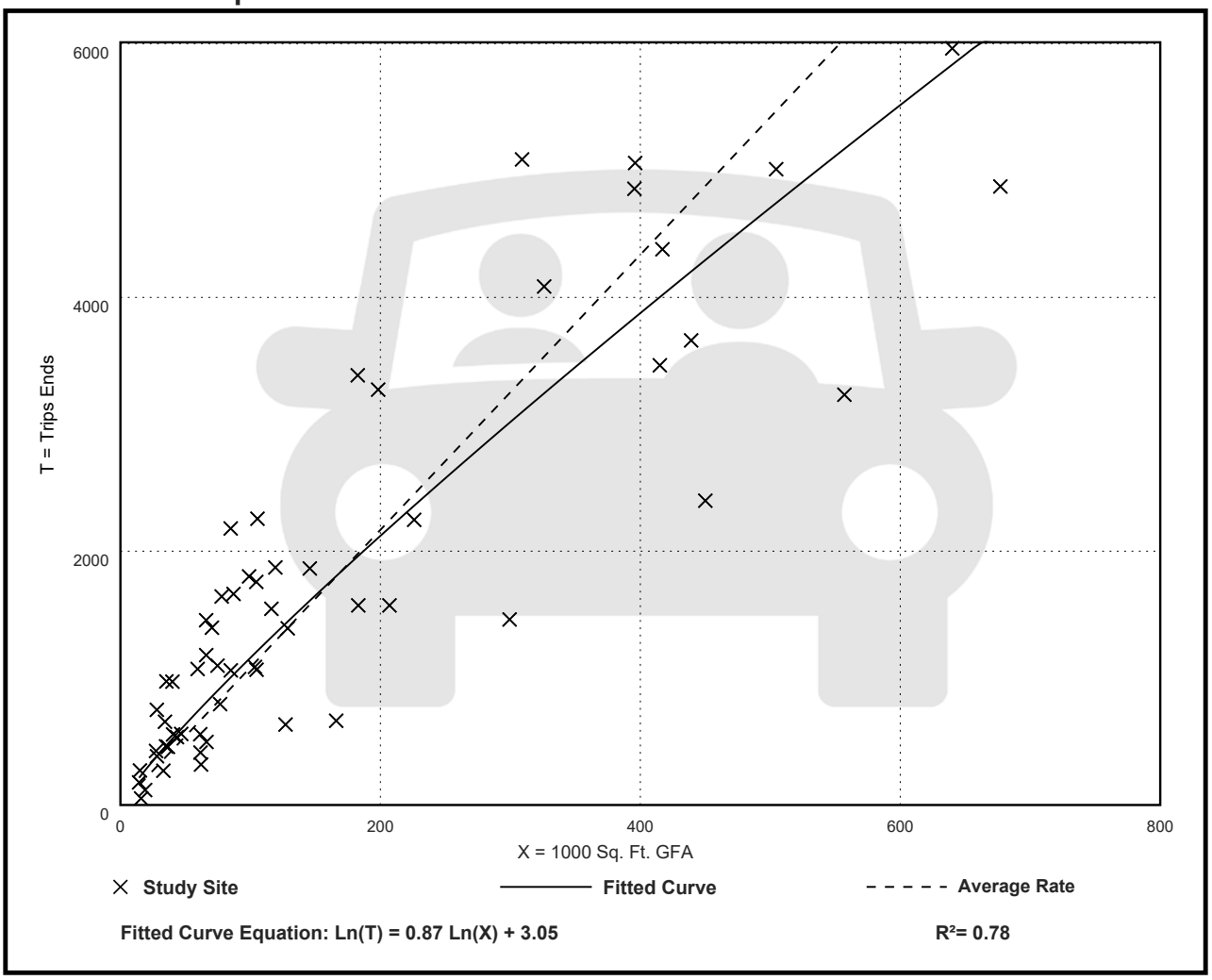
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 59
Avg. 1000 Sq. Ft. GFA: 163
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
10.84	3.27 - 27.56	4.76

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.87 Ln(X) + 3.05

R^2= 0.78

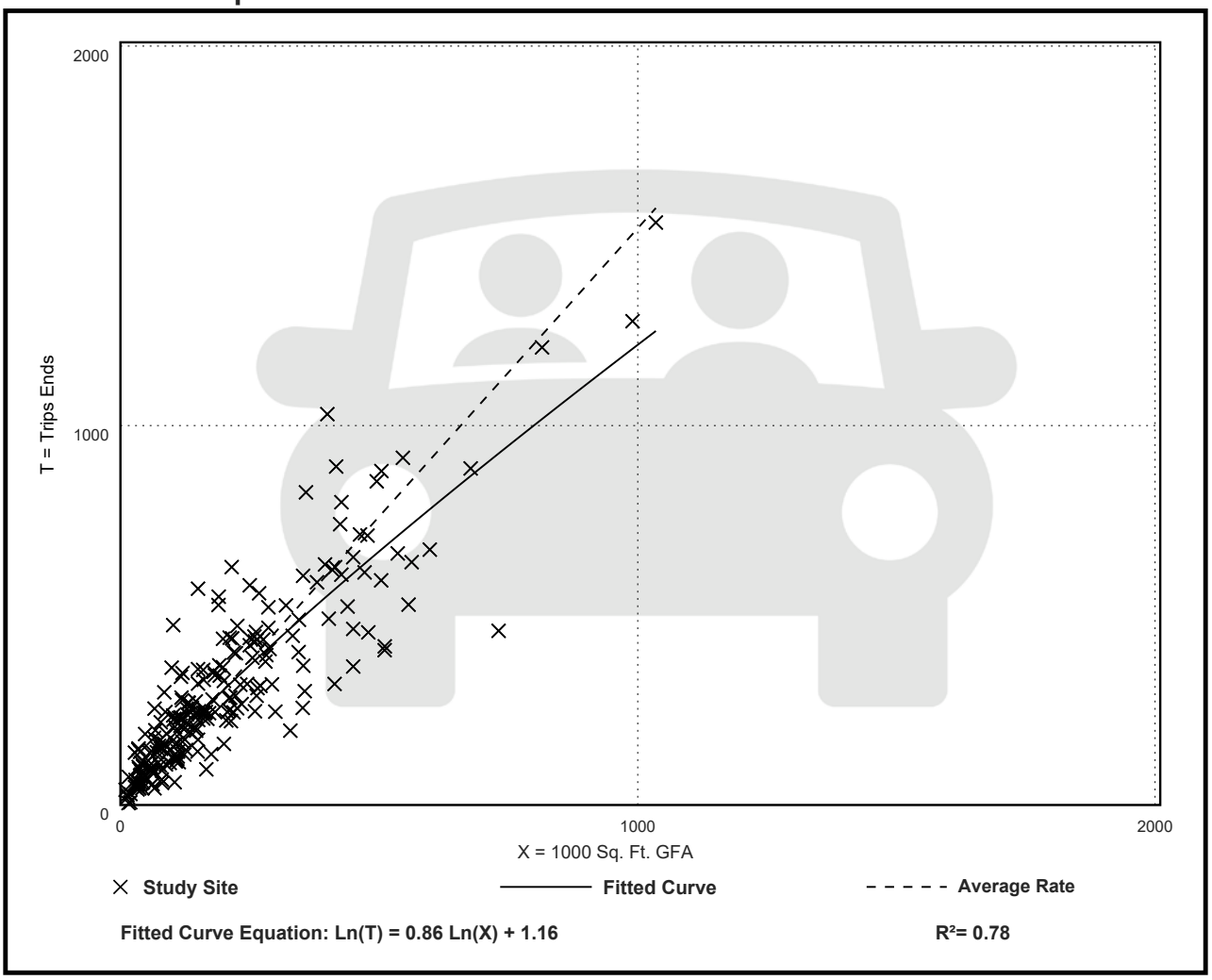
General Office Building
(710)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 221
Avg. 1000 Sq. Ft. GFA: 201
Directional Distribution: 88% entering, 12% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.52	0.32 - 4.93	0.58

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.86 Ln(X) + 1.16

R^2= 0.78

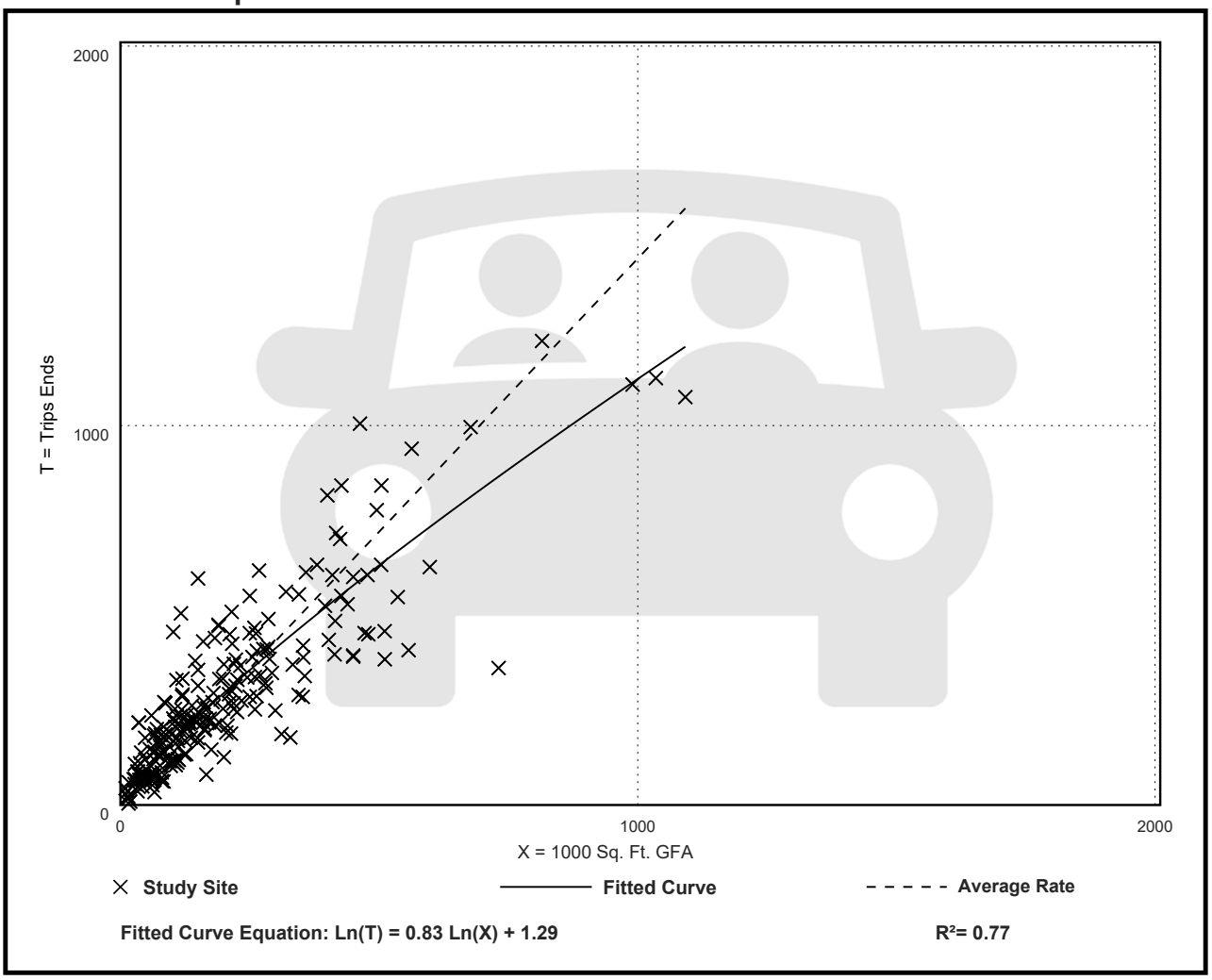
General Office Building
(710)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 232
Avg. 1000 Sq. Ft. GFA: 199
Directional Distribution: 17% entering, 83% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.44	0.26 - 6.20	0.60

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.83 Ln(X) + 1.29

R^2= 0.77

Land Use: 820
Shopping Center (>150k)

Description

A shopping center is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. Each study site in this land use has at least 150,000 square feet of gross leasable area (GLA). It often has more than one anchor store. Various names can be assigned to a shopping center within this size range, depending on its specific size and tenants, such as community center, regional center, superregional center, fashion center, and power center.

A shopping center of this size typically contains more than retail merchandising facilities. Office space, a movie theater, restaurants, a post office, banks, a health club, and recreational facilities are common tenants.

A shopping center of this size can be enclosed or open-air. The vehicle trips generated at a shopping center are based upon the total GLA of the center. In the case of a smaller center without an enclosed mall or peripheral buildings, the GLA is the same as the gross floor area of the building.

The 150,000 square feet GLA threshold value between community/regional shopping center and shopping plaza (Land Use 821) is based on an examination of trip generation data. For a shopping plaza that is smaller than the threshold value, the presence or absence of a supermarket within the plaza has a measurable effect on site trip generation. For a shopping center that is larger than the threshold value, the trips generated by its other major tenants mask any effects of the presence or absence of an on-site supermarket.

Shopping plaza (40-150k) (Land Use 821), strip retail plaza (<40k) (Land Use 822), and factory outlet center (Land Use 823) are related uses.

Additional Data

Many shopping centers—in addition to the integrated unit of shops in one building or enclosed around a mall—include outparcels (peripheral buildings or pads located on the perimeter of the center adjacent to the streets and major access points). These buildings are typically drive-in banks, retail stores, restaurants, or small offices. Although the data herein do not indicate which of the centers studied include peripheral buildings, it can be assumed that some of the data show their effect.

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

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), California, Colorado, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky,

Maryland, Massachusetts, Michigan, Minnesota, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Texas, Vermont, Virginia, Washington, West Virginia, and Wisconsin.

Source Numbers

77, 110, 154, 156, 159, 190, 199, 202, 204, 213, 251, 269, 294, 295, 299, 304, 305, 307, 308, 309, 311, 314, 315, 316, 317, 319, 365, 385, 404, 414, 423, 442, 446, 562, 629, 702, 715, 728, 868, 871, 880, 899, 912, 926, 946, 962, 973, 974, 978, 1034, 1040, 1067

Shopping Center (>150k)
(820)

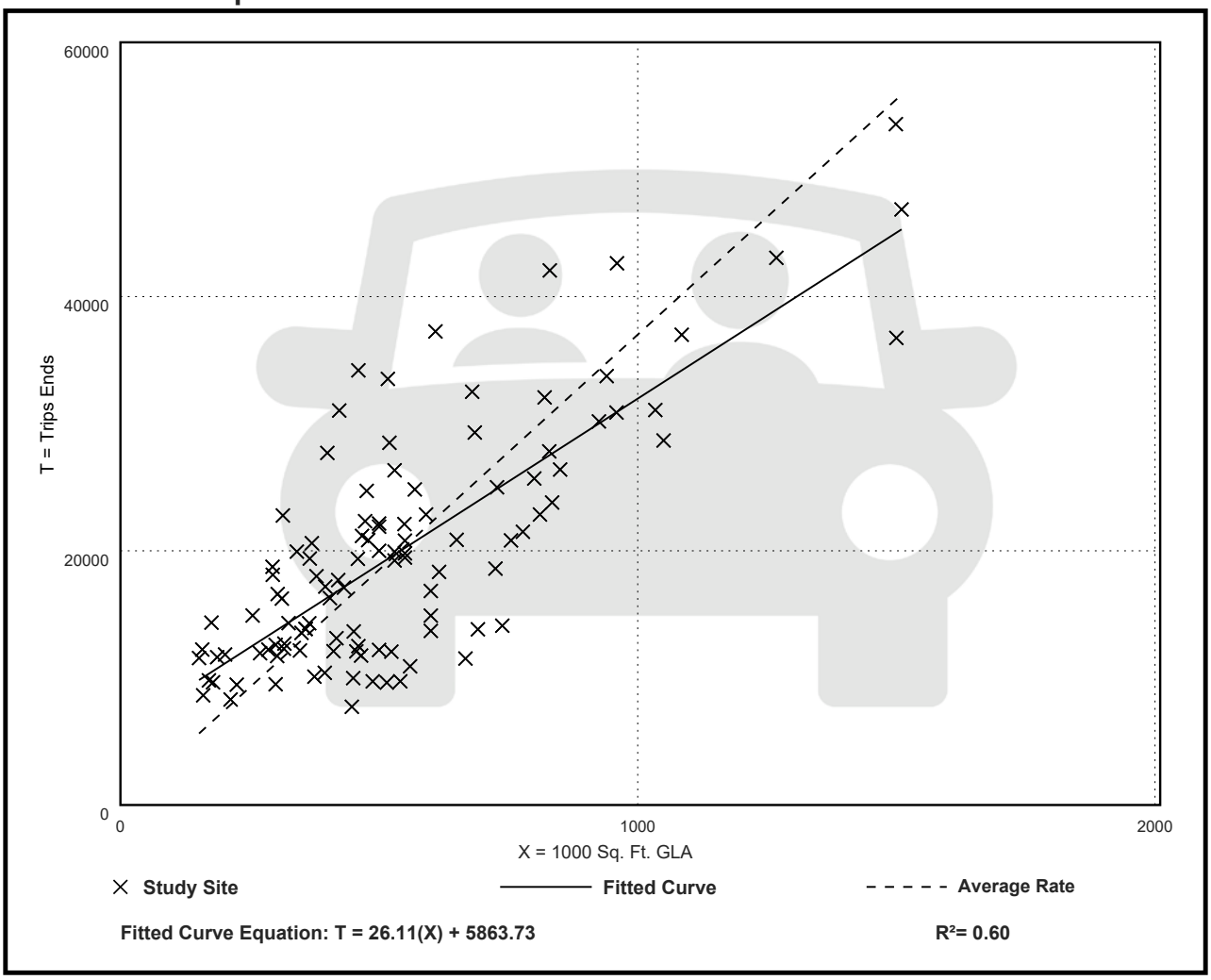
Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 108
Avg. 1000 Sq. Ft. GLA: 538
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
37.01	17.27 - 81.53	12.79

Data Plot and Equation



Fitted Curve Equation: T = 26.11(X) + 5863.73

R^2= 0.60

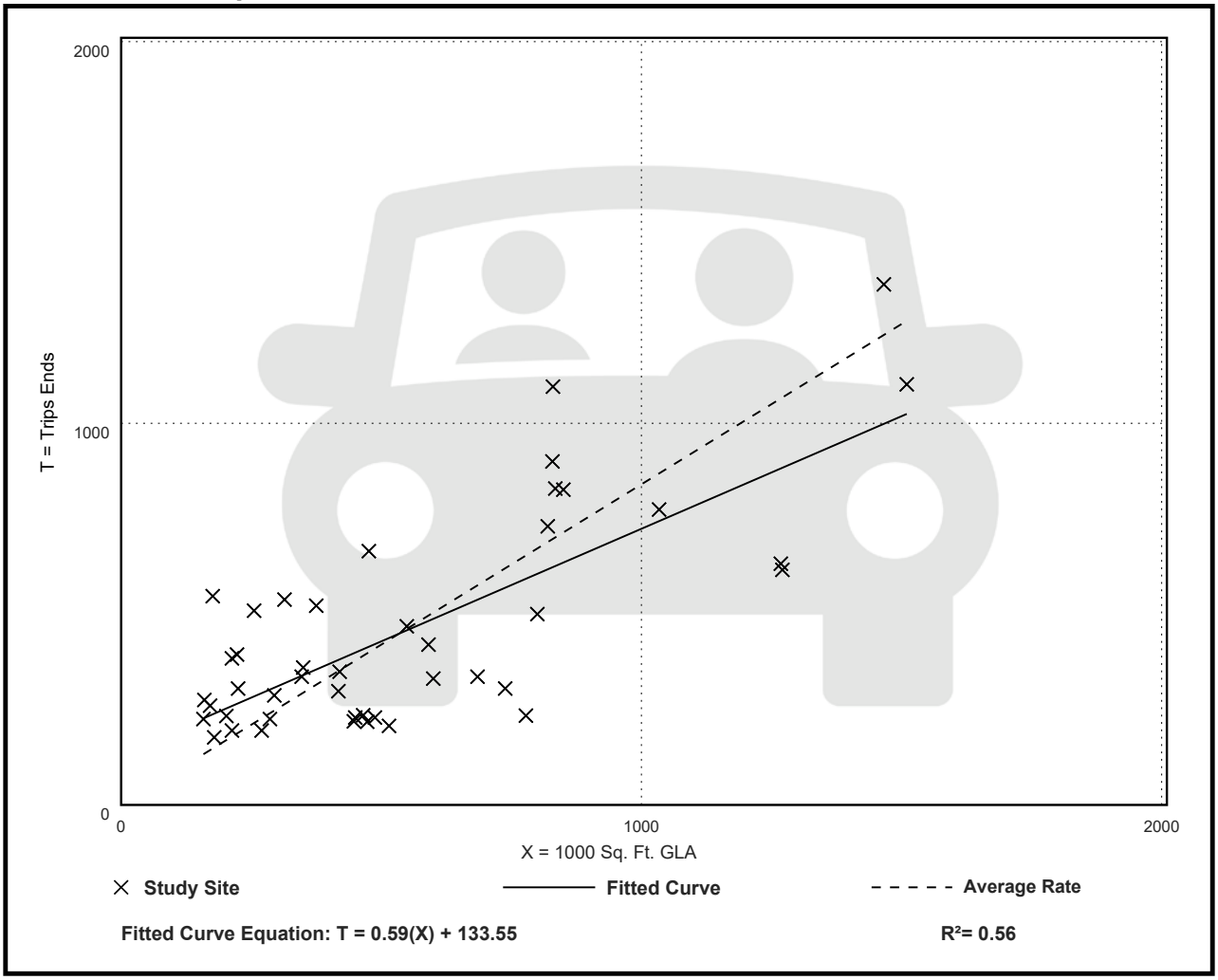
Shopping Center (>150k)
(820)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 44
Avg. 1000 Sq. Ft. GLA: 546
Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
0.84	0.30 - 3.11	0.42

Data Plot and Equation



Fitted Curve Equation: T = 0.59(X) + 133.55

R^2= 0.56

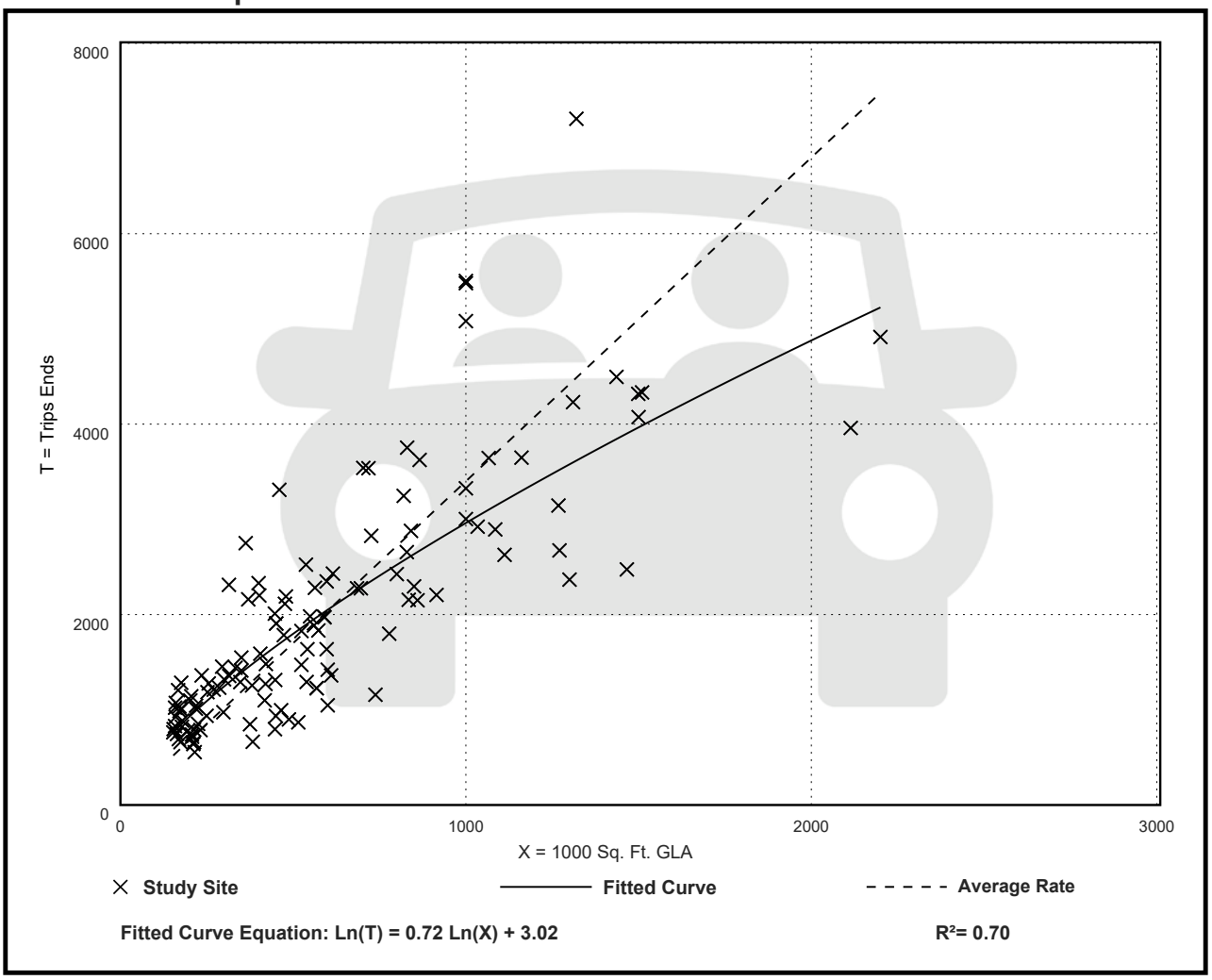
Shopping Center (>150k)
(820)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 126
Avg. 1000 Sq. Ft. GLA: 581
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.40	1.57 - 7.58	1.26

Data Plot and Equation



Land Use: 822
Strip Retail Plaza (<40k)

Description

A strip retail plaza is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. Each study site in this land use has less than 40,000 square feet of gross leasable area (GLA). Because a strip retail plaza is open-air, the GLA is the same as the gross floor area of the building.

The 40,000 square feet GFA threshold between strip retail plaza and shopping plaza (Land Use 821) was selected based on an examination of the overall shopping center/plaza database. No shopping plaza with a supermarket as its anchor is smaller than 40,000 square feet GLA.

Shopping center (>150k) (Land use 820), shopping plaza (40-150k) (Land Use 821), and factory outlet center (Land Use 823) are related uses.

Additional Data

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

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), California, Delaware, Florida, New Jersey, Ontario (CAN), South Dakota, Vermont, Washington, and Wisconsin.

Source Numbers

304, 358, 423, 428, 437, 507, 715, 728, 936, 960, 961, 974, 1009

Strip Retail Plaza (<40k)
(822)

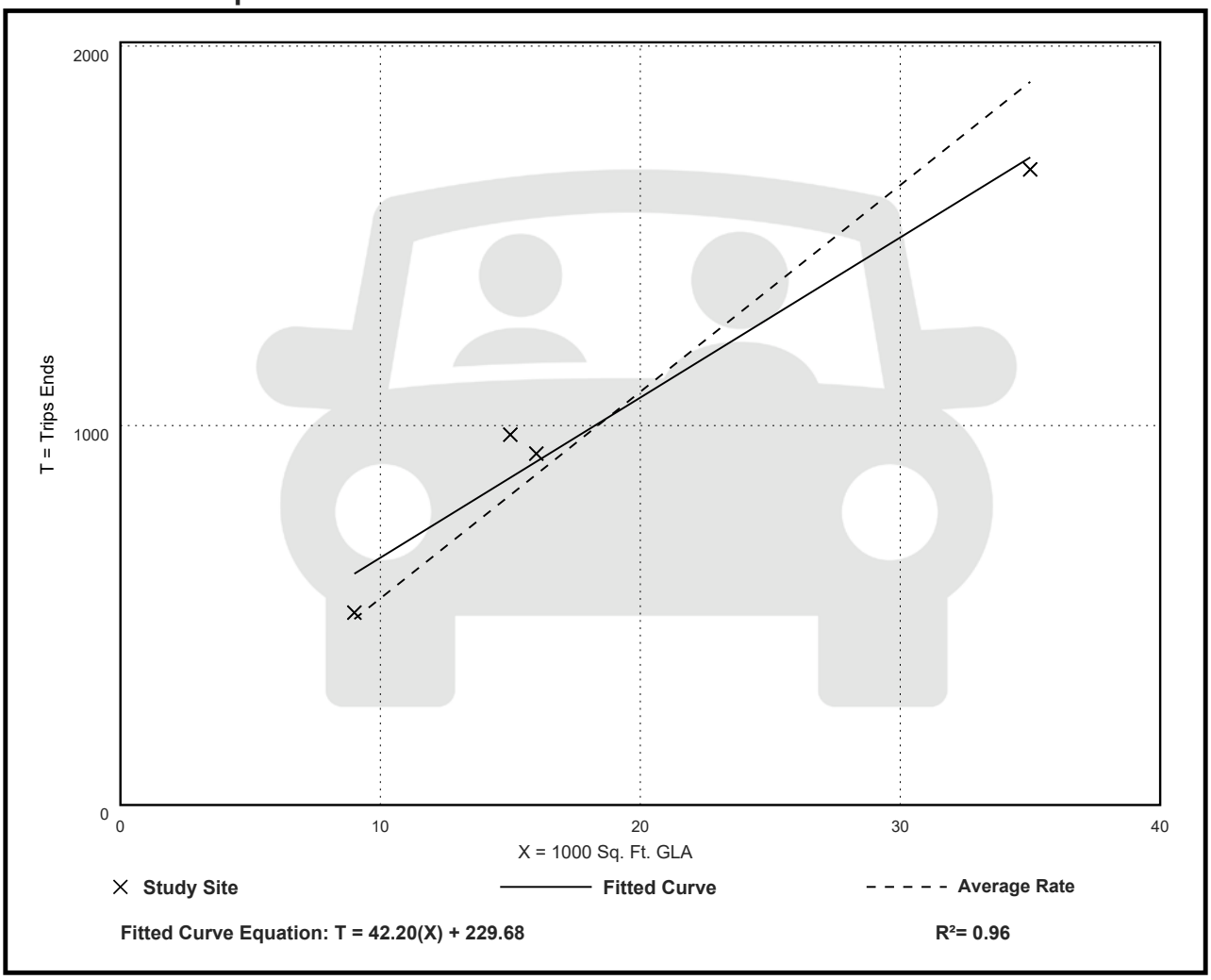
Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 4
Avg. 1000 Sq. Ft. GLA: 19
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
54.45	47.86 - 65.07	7.81

Data Plot and Equation



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

R^2= 0.96

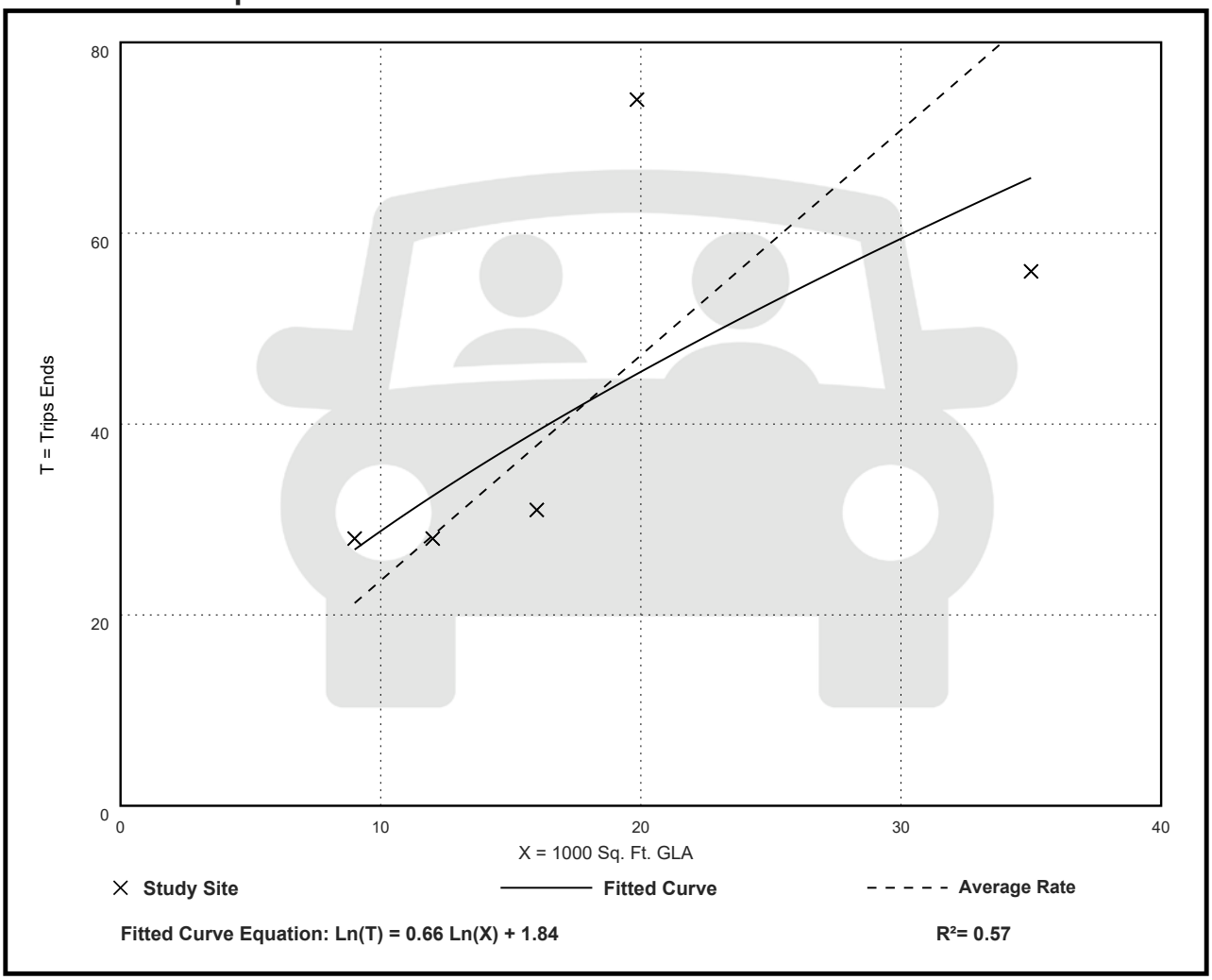
Strip Retail Plaza (<40k)
(822)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. 1000 Sq. Ft. GLA: 18
Directional Distribution: 60% entering, 40% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
2.36	1.60 - 3.73	0.94

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.66 Ln(X) + 1.84

R^2= 0.57

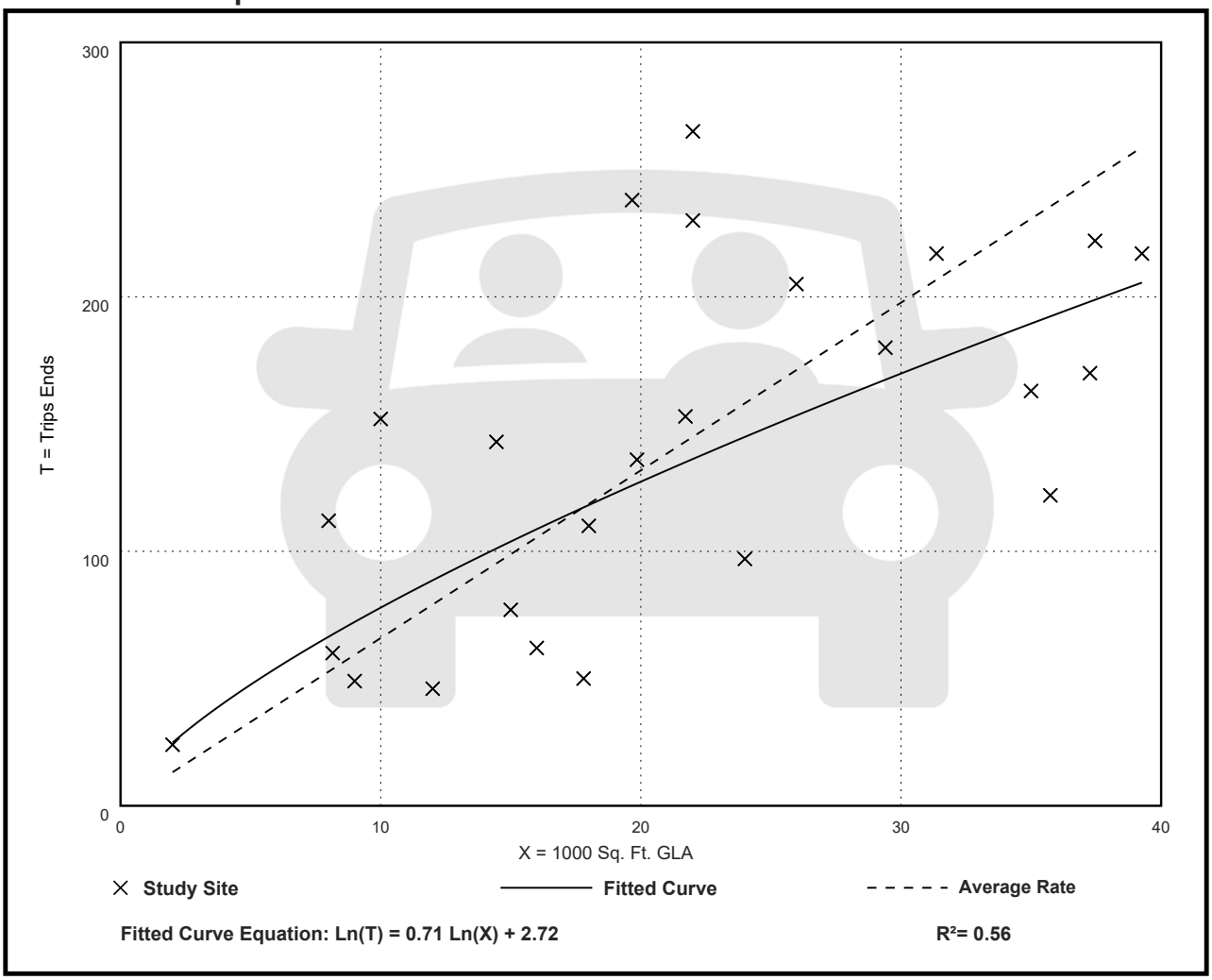
Strip Retail Plaza (<40k)
(822)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 25
Avg. 1000 Sq. Ft. GLA: 21
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
6.59	2.81 - 15.20	2.94

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.71 Ln(X) + 2.72

R^2= 0.56

APPENDIX B – City of Tustin VMT Screening Form

CITY OF TUSTIN
VMT SCREENING FORM FOR LAND USE PROJECTS

This form acknowledges the City of Tustin requirements for the evaluation of vehicle miles traveled (VMT) under CEQA. The analysis provided in this form should follow the City of Tustin approved VMT Guidelines, dated February 13, 2024.

I. Project Description

Case Number:	
Project Name:	Tustin Legacy Specific Plan Amendment
Project Location:	Planning Area (PA) 8, PA 13 &14, and PA 15 in the TLSP.
Project Description:	4,970 dwelling units within the TLSP. Replace 93,600 square feet (SF) of hotel use, 95,200 SF of neighborhood commercial use, 482,900 SF of community commercial use and 529,000 SF of senior housing use with 1,200,700 SF of office use.

Current GP Land Use:	TLSP	**Proposed GP Land Use:**	TLSP
Current Zoning:	SP 1 - Tustin Legacy	**Proposed Zoning:**	SP 1 - Tustin Legacy

Does the Project require a General Plan Amendment and/or Zone Change?	**YES**		**NO**	x	

II. VMT Screening Criteria

A. Is the Project 100% affordable housing?	**YES**		**NO**	X	Attachments:	
B. Is the Project within 1/2 mile of qualifying transit?	**YES**		**NO**	X	Attachments:	
		Commercial		Residential		
C. Is the Project a local serving land use?	**YES**	X	**NO**	X	Attachments:	
D. Is the Project in a low VMT area?	**YES**		**NO**	X	Attachments:	
		Commercial		Residential		
E. Are the Project's Net Daily Trips less than 500 ADT?	**YES**	X	**NO**	X	Attachments:	

Low VMT Area Evaluation:

City of Tustin VMT Thresholds		
Citywide Average Home-Based VMT[1] =	15.0	VMT/Capita
Citywide Average Employment VMT[1] =	25.1	VMT/Employee

[1] OCTAM 5.0 v.6.22.23 base year (2016) statistics.

Project Traffic Analysis Zone (TAZ)	VMT Rate for Project TAZ[1]		Type of Project	
1133,1134,1136	N/A,13.4,8.3	VMT/Capita	Residential:	X
	N/A,26.0,36.8	VMT/Employee	Non-Residential:	X

Trip Generation Evaluation:

Source of Trip Generation: Institute of Transportation Engineers (ITE), Trip Generation Manual,11th Edition, 2021

* Use trip rates from the latest edition of the ITE Trip Generation Manual or as approved by City Staff.

Project Trip Generation: 15,679 **Average Daily Trips (ADT)**

Internal Trip Credit:	YES		NO	X	% Trip Credit:	
Pass-By Trip Credit:	YES		NO	X	% Trip Credit:	
Affordable Housing Credit:	YES		NO	X	% Trip Credit:	
Existing Land Use Trip Credit:	YES		NO	X	Trip Credit:	

Net Project Trip Generation: 15,679 **Average Daily Trips (ADT)** Attachments:

Does project trip generation warrant an LOS evaluation outside of CEQA? **YES** X **NO**

III. VMT Analysis Summary

A. Is additional VMT modeling required to evaluate impacts?

YES	x	NO	

Projects that do not satisfy at least one (1) of the VMT screening criteria AND generate 2,400 or more net daily trips AND require a zone change/general plan amendment may require additional VMT modeling using OCTAM. Project that generates less than 2,400 daily trips may use the base TAZ rate for VMT analysis and mitigation purposes.

B. City of Tustin VMT Threshold of Significance:

Residential-VMT per Capita: City's Threshold: 15.0

C. Unmitigated Project VMT Rate:

TAZ: 1133,1134,1136 Residential
Based Year 2016 : 8.3, 14.0, 8.2- VMT/Capita
Future Year 2045: 10.8, 14.4, 9.0- VMT/Capita

D. Does Unmitigated Project VMT Rate Exceed VMT Threshold?

YES		NO	x

E. Is mitigation required?

YES		NO	x

F. Percentage Reduction Required to Achieve the Citywide Average VMT:

G. Mitigation Measures:

Source:		
	VMT Reduction Mitigation Measure:	**Estimated VMT Reduction (%)**
1.	N/A	0.00%
2.	N/A	0.00%
3.	N/A	0.00%
4.	N/A	0.00%
5.	N/A	0.00%
6.	N/A	0.00%
7.	N/A	0.00%
8.	N/A	0.00%
9.	N/A	0.00%
10.	N/A	0.00%
	Total VMT Reduction (%)	

All mitigation measures are subject to become Conditions of Approval of the project. Provide attachments showing all VMT reduction calculations.

H. Mitigated Project TAZ VMT Rate:

I. Significance Finding:
(Less than significant, less than significant with mitigation, potential significant, etc.)

Less than significant

Prepared By		Developer/Applicant	
Company:	EPD Solutions	**Company:**	City of Tustin
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Phone:	949-794-1180	**Phone:**	714-573-3172
Email:	techservices@epdsolutions.com	**Email:**	ksaldivar@tustinca.org
Date:	Revised 3/22/2024	**Date:**	Revised 3/22/2024

Approved by:

Tustin Public Works Engineering	Date	Tustin Community Development Planning	Date

Development review and processing fees should be submitted with, or prior to the submittal of this Form.
The Public Works and/or Planning Division staff will not process the Form prior to fees being paid to the City.

OCTAM 5.0 v.6.22.23 Base Model Year 2016 VMT Statistics

Zone	Home-based VMT per Capita	Employment (commute) VMT per employee
759	8.8	25.2
832	23.6	33.8
851	23.5	34.3
857	16.0	26.0
859	13.0	25.2
863	16.9	25.3
1102	15.4	25.9
1103	12.1	25.3
1104	21.1	30.1
1105	12.2	25.1
1106	15.8	24.6
1107	14.5	24.3
1108	21.8	33.2
1109	11.6	24.4
1110	21.2	29.4
1111	13.8	24.6
1112	11.4	22.8
1113	10.7	23.6
1114	11.6	23.6
1115	14.1	24.4
1116	15.5	28.6
1117	12.1	24.3
1118	17.2	26.8
1119	15.0	26.0
1120	16.0	27.6
1121	12.9	23.3
1122	13.5	32.1
1123	11.6	22.5
1124	14.7	27.4
1125	16.8	24.5
1126	0.0	23.6
1127	17.5	27.4
1128	0.0	25.2
1129	17.2	28.0
1130	0.0	24.8
1131	18.0	25.7
1132	0.0	25.0
1133	0.0	0.0
1134	13.4	26.0
1135	0.0	0.0
1136	8.3	36.8
1137	17.2	29.6
1138	0.0	25.3

* Geography nests into OCTAM zone structure. VMT includes all VMT to/from specified geography, except for VMT that leaves OCTAM model area.

** Note that as OCTAM is updated, these statistics are subject to change.