VILLAGE OF SUGAR GROVE
BOARD REPORT

TO: VILLAGE PRESIDENT & BOARD OF TRUSTEES

FROM: BRENT M. EICHELBERGER, VILLAGE ADMINISTRATOR

SUBJECT: DISCUSSION: INDUSTRIAL TRAFFIC TYPOLOGY

AGENDA: AUGUST 16, 2022 VILLAGE BOARD MEETING

DATE: AUGUST 8, 2022

ISSUE

Should the Board accept the Industrial Traffic Typology Memorandum from Kimley-Horn.

DISCUSSION

At the April 5, 2022 Village Board meeting, a PSA with Kimley-Horn (K-H), was approved to provide a trip generation analysis for the proposed Sugar Grove Commerce Center and estimates for up to ten (10) typical industrial developments or typologies.

At the May 3, 2022 Board meeting Emma Albers from K-H presented the memorandum for the first task, which was accepted by the Board.

Emma will be present to discuss the attached memorandum covering the second task. The second memorandum is 204 pages. The main portion is seven pages. Attachment A which provides Chicagoland examples of the typologies is on pages 8 - 13. Attachment B, pages 14 – 204, includes the supporting data from the ITE Trip Generation Manual. Board members can focus their attention on pages 1 – 13.

Staff has identified several key findings from the memorandum.

- Heavy Vehicle trips are generally less than a layperson would likely expect.
- Passenger Car trips typically greatly exceed heavy vehicle trips.
- Hourly Traffic Distributions are as important as total trips.
- Within current Village limits, IL 47, US 30, IL 56, Galena Boulevard, and Bliss Road all have significant capacity available over current average daily traffic volumes.

COST

The estimated costs of services is $8,800.00 to be paid out of TIF 2.

RECOMMENDATION

That the Board discuss the Industrial Building Typology memorandum and request additional information prior to this phase of the engagement being finalized.

Kimley»Horn

MEMORANDUM

To:	Brent Eichelberger, Village Administrator Village of Sugar Grove
From:	Emma Albers, P.E., PTOE Rory Fancler-Splitt, AICP, PTP Kimley-Horn and Associates, Inc.
Date:	June 27, 2022
Subject:	Industrial Building Typology Evaluation Sugar Grove, IL

Kimley-Horn was retained by the Village of Sugar Grove to provide trip generation data and influencing factors for various industrial facility types. This memorandum documents key findings based on information provided in the Institute of Transportation Engineer's (ITE) Trip Generation Manual, 11th Edition and our knowledge of current trends in the industrial market.

INDUSTRIAL TYPOLOGY TRIP GENERATION

Data provided in the ITE Trip Generation Manual has been collected over the past several decades and is widely considered the primary transportation industry resource for trip generation rates. The ITE manual provides trip generation data for a number of land use groups, including industrial. Within the industrial land use group, there are 13 different industrial typologies or Land Use Codes (LUC). For each LUC, the manual provides average trip generation rates for multiple time periods, including daily, AM peak hour of the adjacent street (7-9AM), and PM peak hour of the adjacent street (4-6PM), which were assumed for this review. It should be noted that trips generated by industrial land uses are generally comprised of both passenger cars and trucks (heavy vehicles). As an appendix to the ITE manual, truck trip generation data is provided for most industrial LUC.

The ITE manual also provides the average building size (gross floor area) for each industrial LUC. The average building sizes are based sites included in the empirical trip generation data. Current trends in the industrial market show some variation in building size from those provided in the ITE manual. For purposes of this review, Kimley-Horn identified the typical industrial building sizes based on experience in the Chicagoland market. The typical building sizes reflect industrial development that would be expected in the Village of Sugar Grove, which in some cases may be different than other Chicagoland communities.

Table 1 provides a summary of ten industrial facility types and the corresponding trip generation rates for each type. To provide a high-level understanding of potential site-generated trips for each facility type, trip generation estimates were developed using the maximum building size currently being developed within the market. Chicagoland examples of the uses are provided as **Attachment A**. A summary of the ITE data is provided as **Attachment B**.

Table 1. ITE Trip Generation Data

ITE Land Use	Average Size per ITE (sq. ft.)[1]	Typical Size per Market Conditions (sq. ft.)	Trip Type	ITE Trip Generation Data: Weekday			Trip Generation Estimates: Weekday[3]						
				Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour			PM Peak Hour		
								In	Out	Total	In	Out	Total
General Light Industrial *A light industrial facility is generally a free-standing building with a single use. Activity at the facility could include printing, materials testing, and assembly of data processing equipment. General light industrial does NOT include manufacturing activities.*													
LUC 110	45,000	10,000 - 150,000	Passenger Cars[2]	4.62X 50% in/50% out	0.73X 88% in/12% out	0.64X 14% in/86% out	690	95	15	110	15	80	95
			Heavy Vehicles	0.25X 50% in/50% out	0.01X 60% in/40% out	0.01X 50% in/50% out	40	--	--	--	--	--	--
Industrial Park *An industrial park is comprised of several industrial or related facilities. Facilities could be manufacturing, distribution, warehouse, etc. and the proportion of each type of use varies widely from park to park. Building sizes can also range widely.*													
LUC 130	762,000	600,000 – 1,500,000	Passenger Cars[2]	2.80X 50% in/50% out	0.30X 81% in/19% out	0.30X 22% in/86% out	4,200	365	85	450	100	350	450
			Heavy Vehicles	0.57X 50% in/50% out	0.04X 45% in/55% out	0.04X 38% in/62% out	850	5	5	10	5	5	10
Manufacturing *The primary activity of manufacturing is the conversion of raw materials or parts into finished products. Manufacturing sites typically have accessory office space and may also provide space for material storage, research, or other associated functions. The size of manufacturing sites can vary widely from tenant to tenant.*													
LUC 140	208,000	100,000 – 400,000	Passenger Cars[2]	4.30X 50% in/50% out	0.65X 76% in/24% out	0.71X 31% in/69% out	1,720	200	60	260	90	195	285
			Heavy Vehicles	0.45X 50% in/50% out	0.03X 56% in/44% out	0.03X 41% in/59% out	180	5	5	10	5	5	10
Warehousing *Warehousing is typically devoted to the storage of materials. It may also include accessory space for office and maintenance.*													
LUC 150	292,000	75,000 – 400,000	Passenger Cars[2]	1.11X 50% in/50% out	0.15X 77% in/23% out	0.15X 28% in/72% out	440	45	15	60	15	45	60
			Heavy Vehicles	0.60X 50% in/50% out	0.02X 52% in/48% out	0.03X 52% in/48% out	240	5	5	10	5	5	10

X = 1,000 square feet of gross floor area

[1]Average size based on the Weekday Daily data provided for each land use code.

[2]Data provided in the ITE manual for industrial land use codes was assumed to be total trips (heavy vehicle and passenger cars). The ITE Trip Generation Manual, 11th Edition includes an appendix with trip generation data plots for trucks (heavy vehicles). These rates are included in the table above. The rate for passenger cars was calculated by subtracting the truck rate from the total rate for each land use.

[3]Trip generation estimates were developed using the maximum value from the "Typical Size per Market Conditions."

Table 1. ITE Trip Generation Data (continued)

ITE Land Use	Average Size per ITE (sq. ft.)	Typical Size per Market Conditions (sq. ft.)	Trip Type	ITE Trip Generation Data: Weekday			Trip Generation Estimates: Weekday[2]						
				Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour			PM Peak Hour		
								In	Out	Total	In	Out	Total
High-Cube Transload and Short-Term Storage Warehouse *High-cube warehouse generally provides a large number of racks and shelves for short-term storage and/or consolidation of manufactured goods. Goods are generally sorted at these facilities prior to distribution to retail locations or smaller warehouses. Typically, a high-cube warehouse has a clear height of at least 24 feet and may provide a mezzanine. An office may be provided onsite but is generally an insignificant portion of the building size.*													
LUC 154	798,000	200,000 – 1,000,000	Passenger Cars[2]	1.18X 50% in/50% out	0.06X 77% in/23% out	0.09X 28% in/72% out	940	40	10	50	20	50	70
			Heavy Vehicles	0.22X 50% in/50% out	0.02X 49% in/51% out	0.01X 47% in/53% out	180	10	10	20	5	5	10
High-Cube Fulfillment Center Warehouse – Non-Sort *A non-sort fulfillment center is similar in nature to a high-cube warehouse, with a high level of automation and logistics resulting in lower employee headcount than a sort facility. Typically, goods are stored for a short period of time and then consolidated prior to distribution to retail locations or other warehouses.*													
LUC 155	886,000	200,000 – 1,000,000	Passenger Cars[2]	1.58X 50% in/50% out	0.13X 81% in/19% out	0.15X 39% in/61% out	1,580	105	25	130	60	90	150
			Heavy Vehicles	0.23X 50% in/50% out	0.02X 50% in/50% out	0.01X 46% in/54% out	230	10	10	20	5	5	10
High-Cube Fulfillment Center Warehouse – Sort *A sort fulfillment center ships out smaller items, which typically requires extensive manual sorting resulting in a higher employee headcount. In contrast, large box items are shipped from a non-sort facility, which provides a high level of automation and lower employee headcount. Current market trends indicate these buildings are generally less than 500,000 square feet.*													
LUC 155	1,360,000	100,000 – 500,000	Passenger Cars[2]	6.25X 50% in/50% out	0.85X 81% in/19% out	1.18X 39% in/61% out	3,130	345	80	425	230	360	590
			Heavy Vehicles	0.19X 50% in/50% out	0.02X 50% in/50% out	0.02X 46% in/54% out	100	5	5	10	5	5	10

X = 1,000 square feet of gross floor area

[1]Average size based on the Weekday Daily data provided for each land use code.

[2]Data provided in the ITE manual for industrial land use codes was assumed to be total trips (heavy vehicle and passenger cars). The ITE Trip Generation Manual, 11th Edition includes an appendix with trip generation data plots for trucks (heavy vehicles). These rates are included in the table above. The rate for passenger cars was calculated by subtracting the truck rate from the total rate for each land use.

[3]Trip generation estimates were developed using the maximum value from the "Typical Size per Market Conditions."

Table 1. ITE Trip Generation Data (continued)

ITE Land Use	Average Size per ITE (sq. ft.)	Typical Size per Market Conditions (sq. ft.)	Trip Type	ITE Trip Generation Data: Weekday			Trip Generation Estimates: Weekday[2]						
				Daily	AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour			PM Peak Hour		
								In	Out	Total	In	Out	Total
High-Cube Parcel Hub Warehouse *A parcel hub typically serves as a regional and local freight-forwarder facility for shipments via airfreight and ground carriers.*													
LUC 156	543,000	200,000 – 750,000	Passenger Cars[2]	4.05X 50% in/50% out	0.61X 50% in/50% out	0.58X 68% in/32% out	3,040	230	230	460	295	140	435
			Heavy Vehicles	0.58X 50% in/50% out	0.09X 50% in/50% out[3]	0.06X 50% in/50% out[3]	430	35	35	70	25	20	45
High-Cube Cold Storage Warehouse *High-cube cold storage is very similar in nature to high-cube transload warehouse. Due to the substantial need for temperature-controlled environments for frozen food and other perishable items, current market trends indicate these facilities are generally less than 400,000 square feet.*													
LUC 157	569,000	50,000 – 400,000	Passenger Cars[2]	1.37X 50% in/50% out	0.08X 50% in/50% out	0.09X 50% in/50% out	550	15	15	30	20	20	40
			Heavy Vehicles	0.75X 50% in/50% out	0.03X 33% in/67% out	0.03X 50% in/50% out[3]	300	5	10	15	5	5	10
Data Center *A data center serves as a temperature-regulated storage facility for data servers and computer systems.*													
LUC 160	169,000	75,000 – 400,000	Passenger Cars[2]	0.99X 50% in/50% out	0.11X 55% in/45% out	0.09X 30% in/70% out	400	25	20	45	10	25	35

X = 1,000 square feet of gross floor area

[1]Average size based on the Weekday Daily data provided for each land use code.

[2]Data provided in the ITE manual for industrial land use codes was assumed to be total trips (heavy vehicle and passenger cars). The ITE Trip Generation Manual, 11th Edition includes an appendix with trip generation data plots for trucks (heavy vehicles). These rates are included in the table above. The rate for passenger cars was calculated by subtracting the truck rate from the total rate for each land use.

[3]Trip generation estimates were developed using the maximum value from the "Typical Size per Market Conditions."

TRIP GENERATION INFLUENCES

Data provided by ITE has been collected from a variety of sites with different end users and tenants in markets across the country. While ITE data should be considered a robust industry resource, logistics operations and procedures are constantly evolving and can vary based on numerous factors. The following provides a list of potential factors that may influence trip generation estimates at individual industrial sites:

- Shift schedules
  - Shift schedules may vary at an individual site from the those used in the ITE manual. It is not uncommon for shifts to turnover during non-peak periods resulting in higher trip generation rates during off-peak hours.
- Employee headcount
  - Employees generally make up the majority of site-generated trips at industrial sites. Depending on facility operations or size of building components (i.e., office or maintenance space), employee headcount may vary.
- Level of automation
  - The amount of logistics processes that are automated continues to evolve, resulting in a lower employee headcount at some industrial sites. The level of automation for any individual end user may have a direct influence on employee headcount and trip generation characteristics.
- Point in distribution process
  - The movement of goods (distribution process) is often comprised of three stages: first mile, middle mile, and last (final) mile. Each stage requires different levels of automation and sorting, which may influence trip generation at a warehouse type facility.

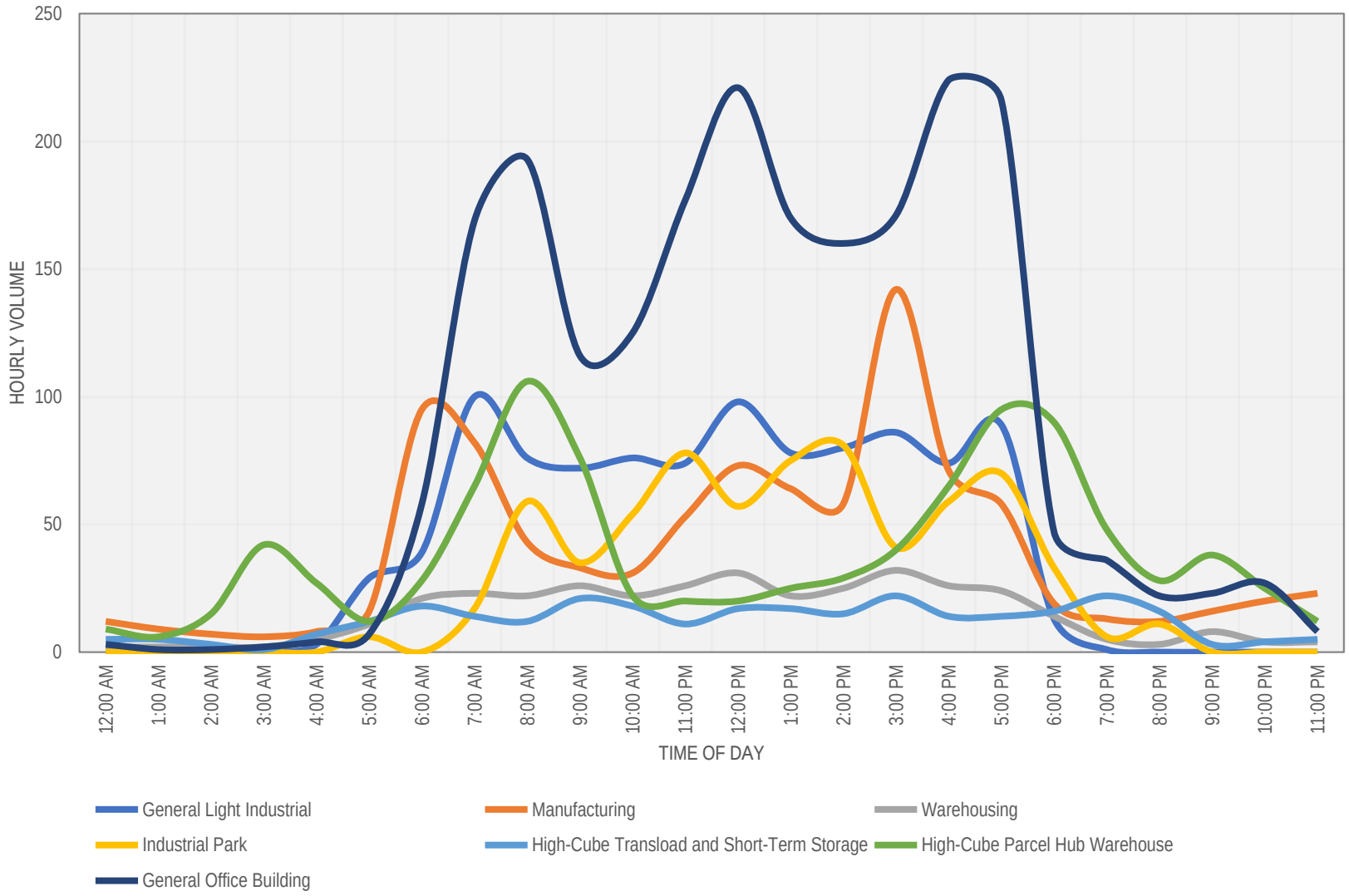
In general, the number of loading docks is not used as an independent variable to determine the number of truck trips generated at an industrial site. It can be a common misconception that the number of loading docks on site is equal to the number of daily truck trips in and out of the site. Loading docks are often used for trailer storage or are commonly empty throughout much of the day. It is also very uncommon for loading docks to be turned over once, if at all, in a 24-hour period. The number of trucks generated by an individual site is influenced by the operational characteristics of the tenant, such as the factors described above. It is important to understand individual site operations to evaluate their impact on site-generated truck trips.

HOURLY TRAFFIC DISTRIBUTIONS

Site-generated traffic for different land uses can vary throughout the day, sometimes resulting in the highest levels of site traffic occurring during non-peak times, and thereby minimizing traffic impacts to the area roadway network. **Figure 1** provides a comparison of site-generated trips for a 200,000 square-foot building for multiple industrial uses. This chart also provides a picture of general hours of operation at certain industrial type uses. For example, manufacturing sites tend to be more heavily used during day hours (traditional day shift), versus a high-cube parcel warehouse sees some activity during the overnight hours (9:00PM and 3:00AM).

For purposes of comparison, the hourly trip generation was compared to that of a 200,000 square-foot professional office building. As shown in Figure 1, industrial sites typically generate significantly less traffic than office uses, which can be a common alternative use at a particular site.

Figure 1 – Hourly Trip Generation Comparison



AVERAGE DAILY TRAFFIC (ADT) REVIEW

A high-level review was completed of the existing major roadways within the Village to understand existing roadway capacity to determine potential future impacts from development in certain areas to roadway throughput. Roadway capacities are based on a level of service (LOS) approximation tool from the Florida Department of Transportation. The LOS approximation tool considers traffic volume (ADT), classification, and roadway geometry to estimate a volume-to-capacity (v/c) ratio. When a v/c ratio reaches 1.0, the LOS is considered to be LOS E and the roadway is at capacity. Existing ADTs and functional classification were obtained from IDOT maps. A summary of this review is shown in **Table 2**.

Table 1. ITE Trip Generation Data

Roadway	From	To	Existing ADT	Classification	Geometry	Capacity
IL 47	Main Street	I-88	12,700	Principal Arterial	2-lane, undivided	12,300
	I-88	Harter Road	9,700	Principal Arterial	4-lane, divided	33,000
	Harter Road	Bliss Road	12,600	Principal Arterial	4-lane, divided	33,000
	Bliss Road	US 30	15,800	Principal Arterial	4-lane, divided	33,000
	US 30	Cross Street	17,700	Principal Arterial	4-lane, divided	33,000
US 30	Dugan Road	IL 47	10,650	Minor Arterial	4-lane, divided	33,000
IL 56	IL 47	Galena Boulevard	16,900	Freeway	4-lane, divided	80,000
Galena Boulevard	IL 47	IL 56	8,900	Minor Arterial	2-lane, undivided	12,300
Bliss Road	IL 47	I-88	6,500	Minor Arterial	2-lane, undivided	12,300

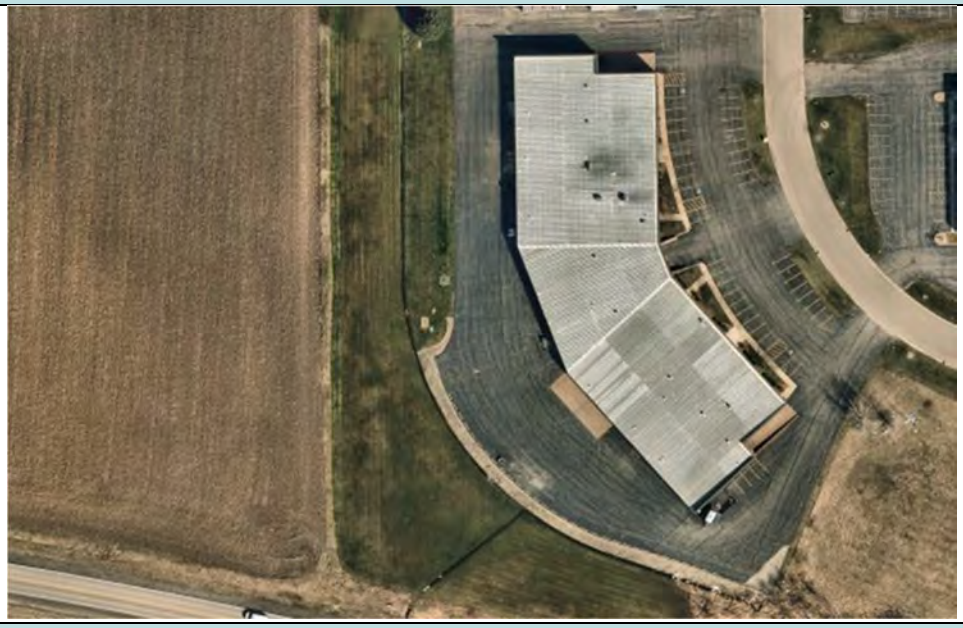
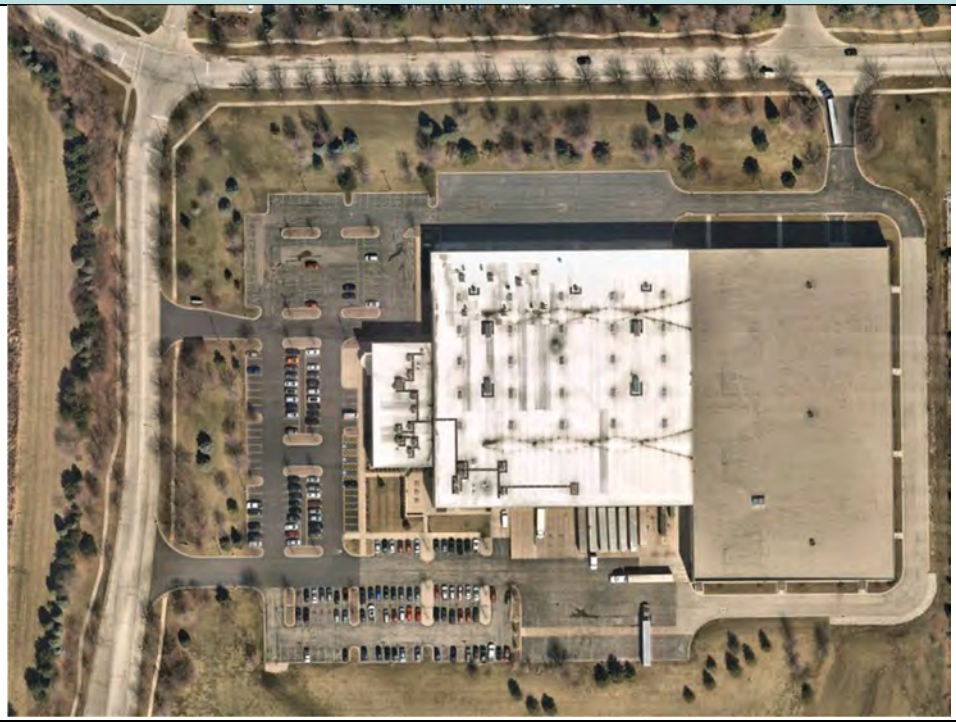
SUMMARY

Logistics operations and procedures are frequently evolving and can vary by end user, which can have an influence on trip generation projections. Data from the ITE Trip Generation Manual is the leading industry resource for determining site-generated trips for industrial sites. However, as operations can vary widely by end user, any future developments within the Village should be evaluated on an individual basis. In those evaluations, it is important to understand operational characteristics from the future end-user/tenant (e.g., employee headcount, automation levels, hours of operation, etc.) to determine potential variations to the ITE-based trip generation projections.

Please do not hesitate to contact us with any questions related to the information in this memorandum.

ATTACHMENT A

Chicagoland Industrial Examples

General Light Industrial	
Jigsaw Medical 1012 Airpak Drive Sugar Grove, IL 60554 45,000 sq. ft.	
Manufacturing	
Nutrivo, LLC 1785 Edgelawn Drive Aurora, IL 60506 195,000 sq. ft.	

Warehousing	
Aurora Distribution Center 2570 Orchard Gateway Boulevard Aurora, IL 60506 302,000 sq. ft.	
High-Cube Transload and Short-Term Storage Warehouse	
DHL Mondelez 2380 Sullivan Road Aurora, IL 60506 520,000 sq. ft.	

High-Cube Fulfillment Center Warehouse – Non-Sort	
Amazon Fulfillment Center 2865 Duke Parkway Naperville, IL 60563 960,000 sq. ft.	
High-Cube Fulfillment Center Warehouse – Sort	
Amazon Fulfillment Center 4200 Ferry Road Aurora, IL 60502 392,000 sq. ft.	

High-Cube Parcel Hub Warehouse	
FedEx Ground 145 S Pinnacle Drive Romeoville, IL 60446 475,000 sq. ft.	
High-Cube Cold Storage Warehouse	
KRAFT Foods 2302 W Indian Trail Aurora, IL 60506 305,000 sq. ft.	

Data Center	
CME Group Data Center 2905 Diehl Road Aurora, IL 60502 280,000 sq. ft.	

ATTACHMENT B

Data from ITE Trip Generation, Eleventh Edition

Land Use: 110
General Light Industrial

Description

A light industrial facility is a free-standing facility devoted to a single use. The facility has an emphasis on activities other than manufacturing and typically has minimal office space. Typical light industrial activities include printing, material testing, and assembly of data processing equipment. Industrial park (Land Use 130) and manufacturing (Land Use 140) 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 2000s, and the 2010s in Colorado, Connecticut, Indiana, New Jersey, New York, Oregon, Pennsylvania, and Texas.

Source Numbers

106, 157, 174, 177, 179, 184, 191, 251, 253, 286, 300, 611, 874, 875, 912

General Light Industrial
(110)

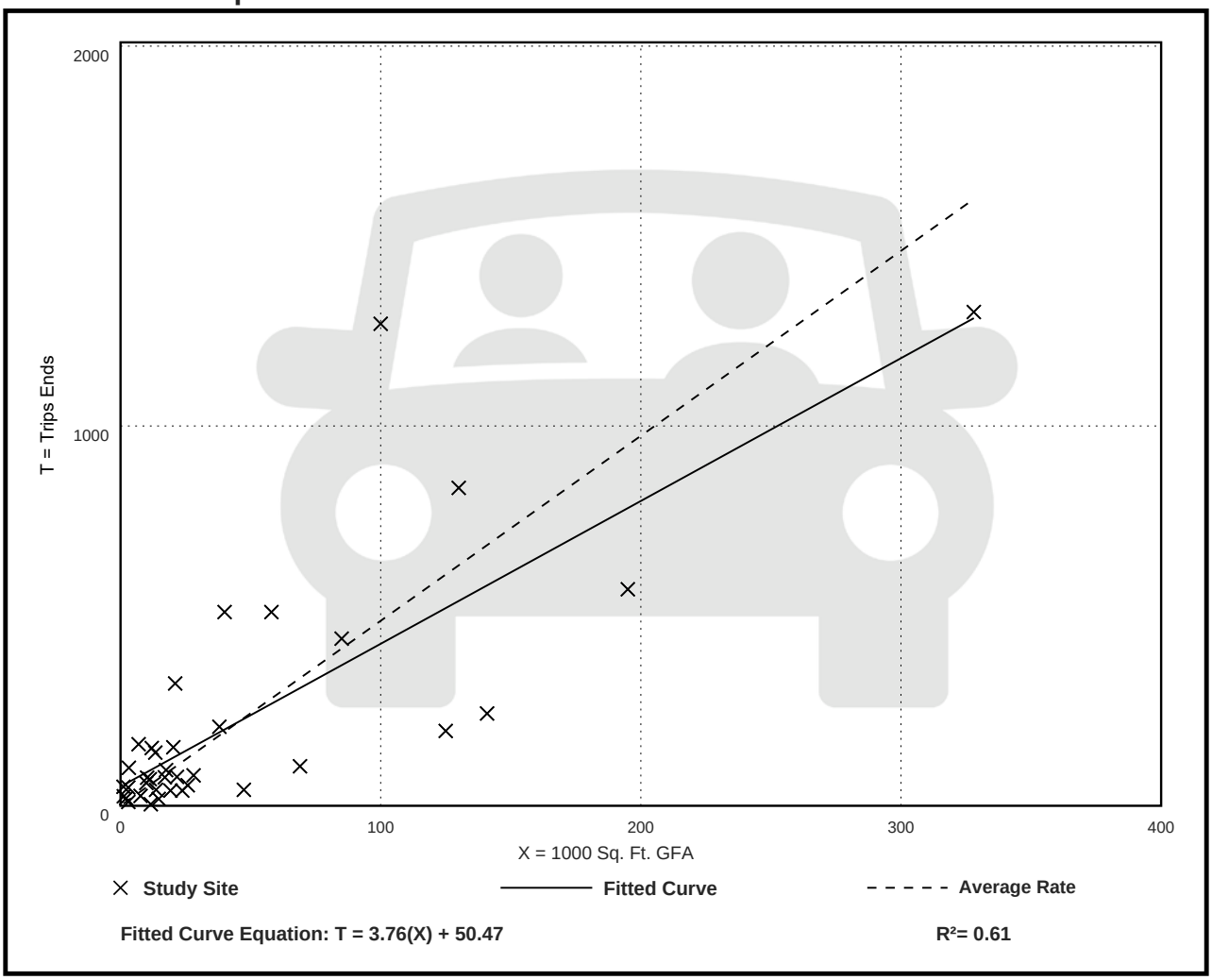
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 37
Avg. 1000 Sq. Ft. GFA: 45
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
4.87	0.34 - 43.86	4.08

Data Plot and Equation



Fitted Curve Equation: T = 3.76(X) + 50.47

R^2= 0.61

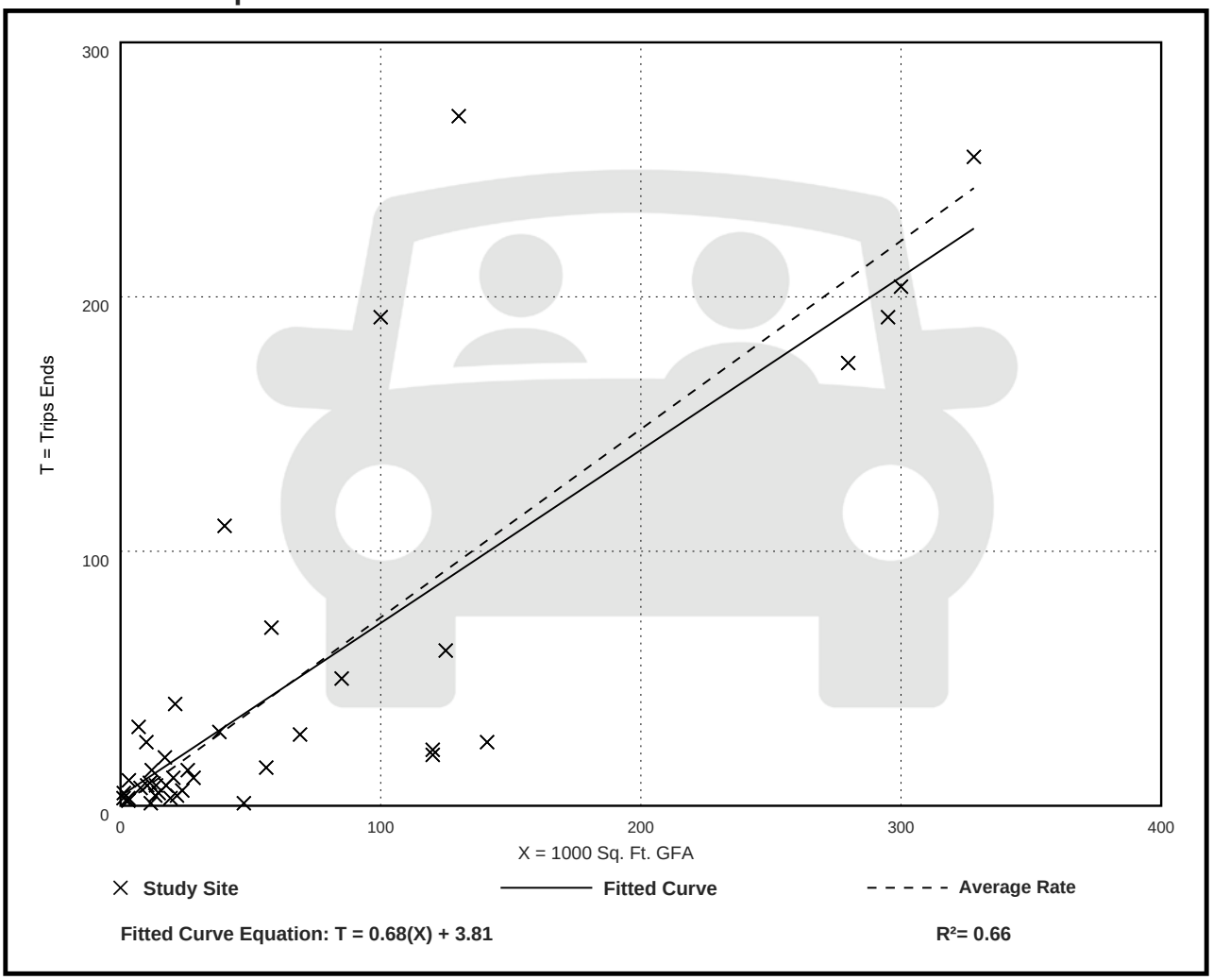
General Light Industrial
(110)

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: 41
Avg. 1000 Sq. Ft. GFA: 65
Directional Distribution: 88% entering, 12% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.74	0.02 - 4.46	0.61

Data Plot and Equation



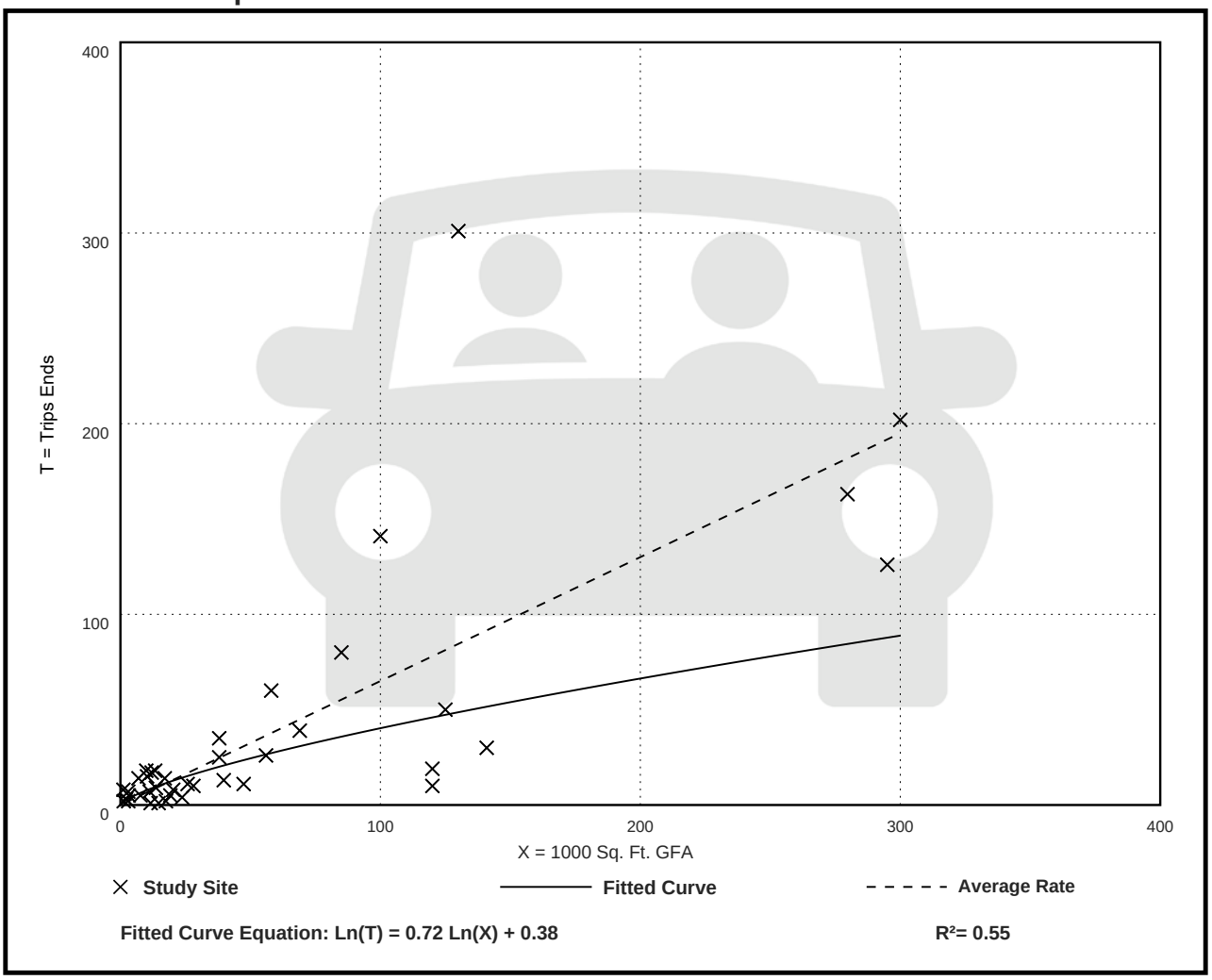
General Light Industrial
(110)

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: 40
Avg. 1000 Sq. Ft. GFA: 58
Directional Distribution: 14% entering, 86% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.65	0.07 - 7.02	0.56

Data Plot and Equation



General Light Industrial
(110)

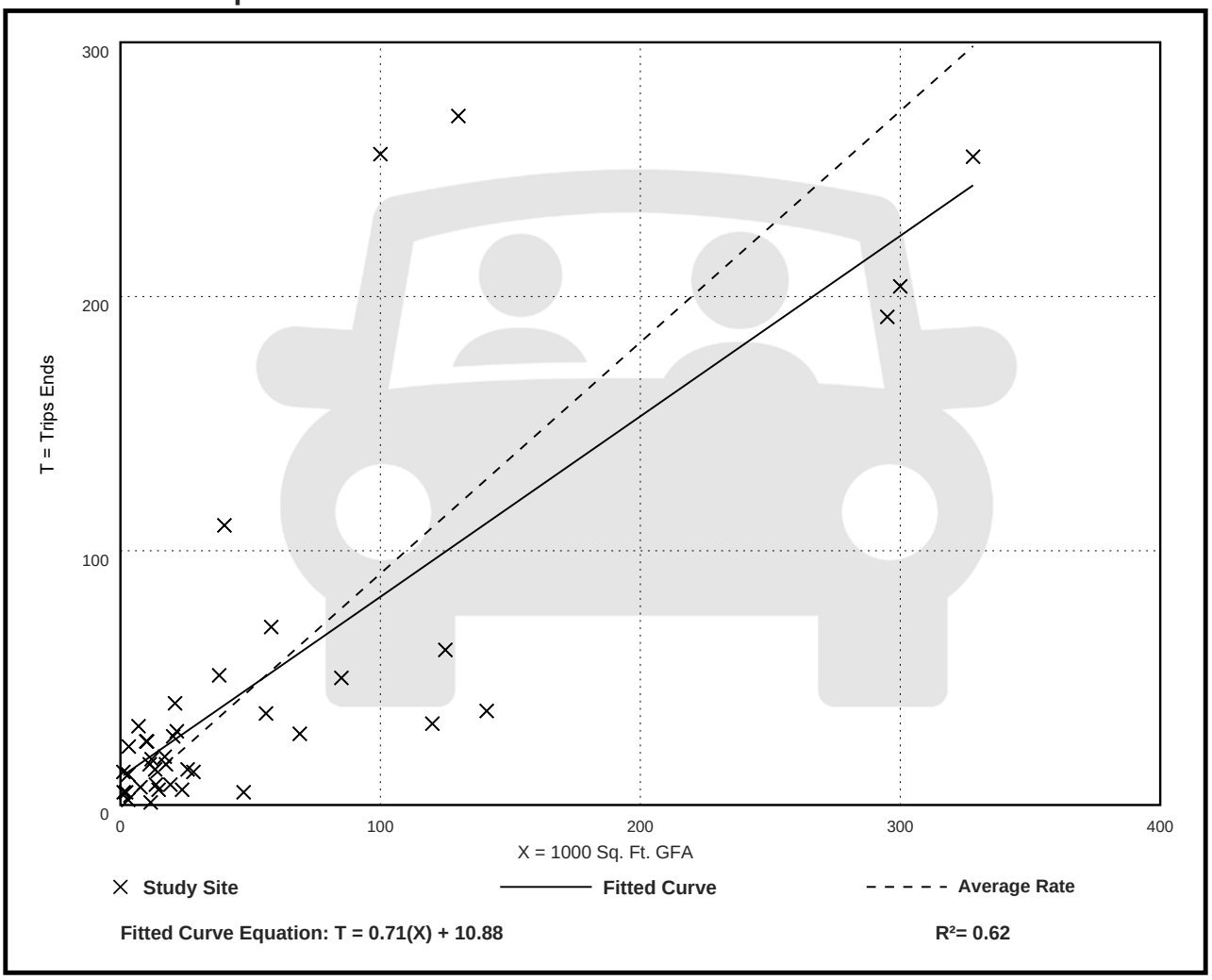
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 40
Avg. 1000 Sq. Ft. GFA: 56
Directional Distribution: 87% entering, 13% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.91	0.09 - 11.40	0.78

Data Plot and Equation



Fitted Curve Equation: T = 0.71(X) + 10.88

R^2= 0.62

General Light Industrial
(110)

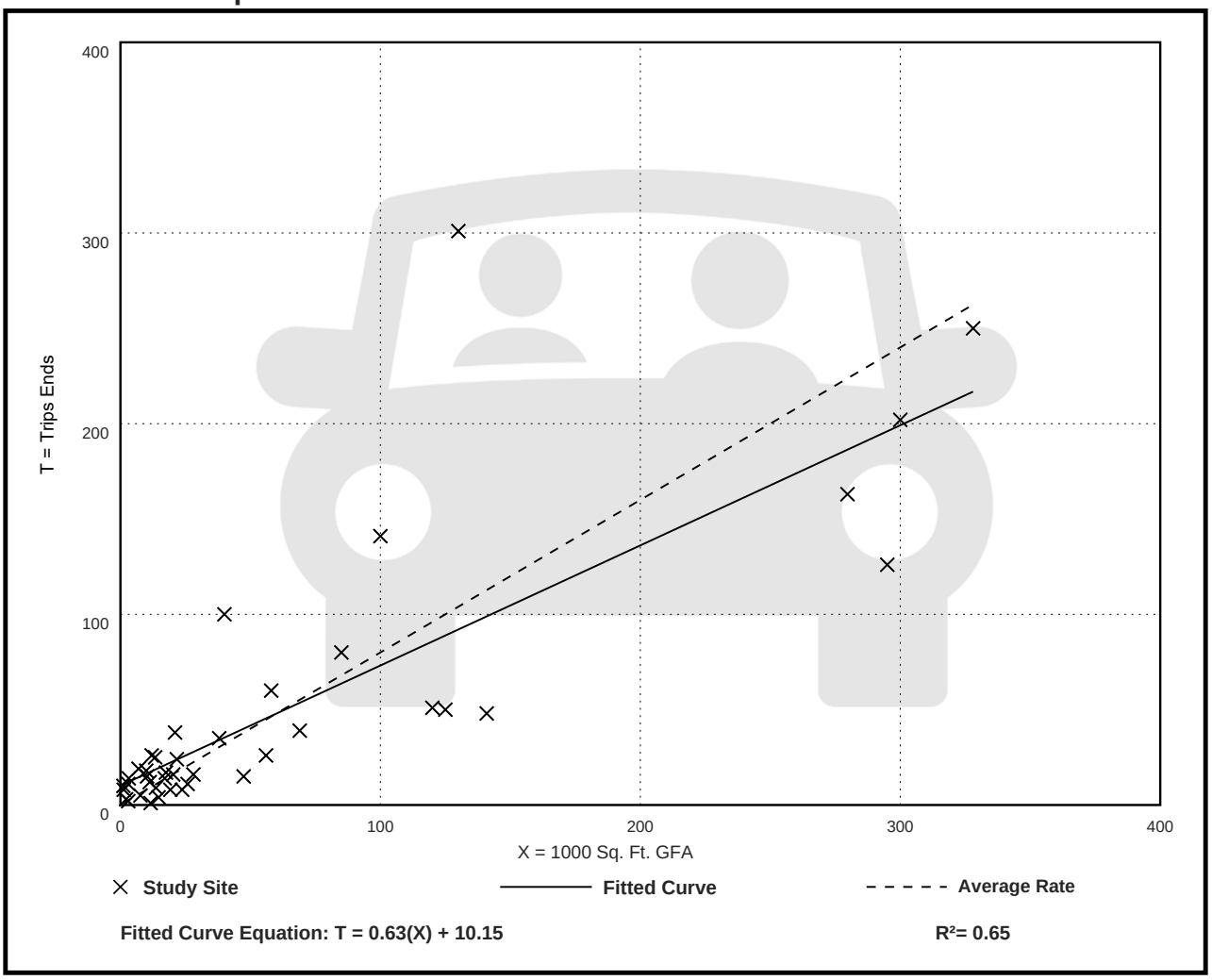
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 41
Avg. 1000 Sq. Ft. GFA: 62
Directional Distribution: 18% entering, 82% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.80	0.09 - 8.77	0.61

Data Plot and Equation



General Light Industrial
(110)

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

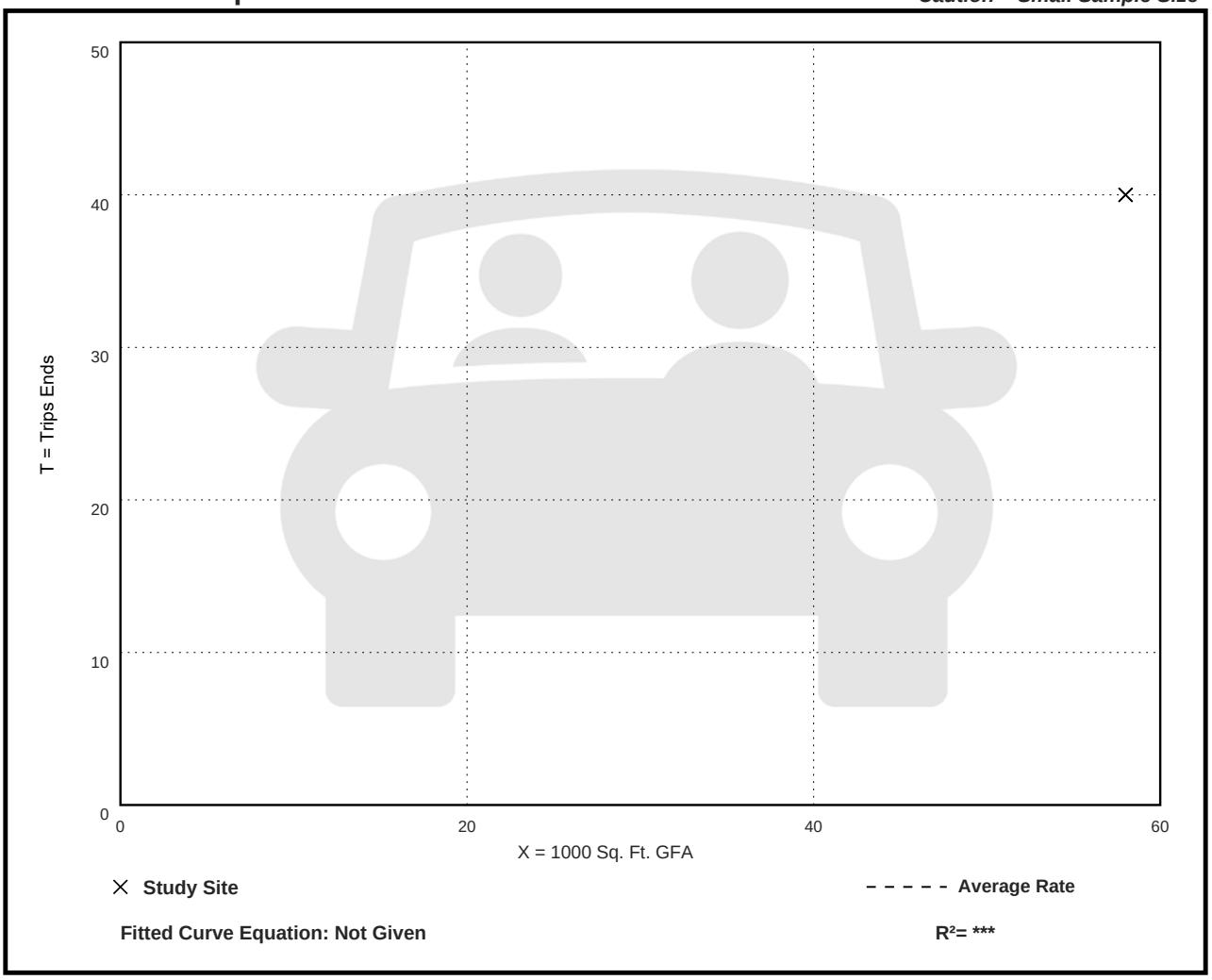
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. 1000 Sq. Ft. GFA: 58
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.69	0.69 - 0.69	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

General Light Industrial
(110)

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

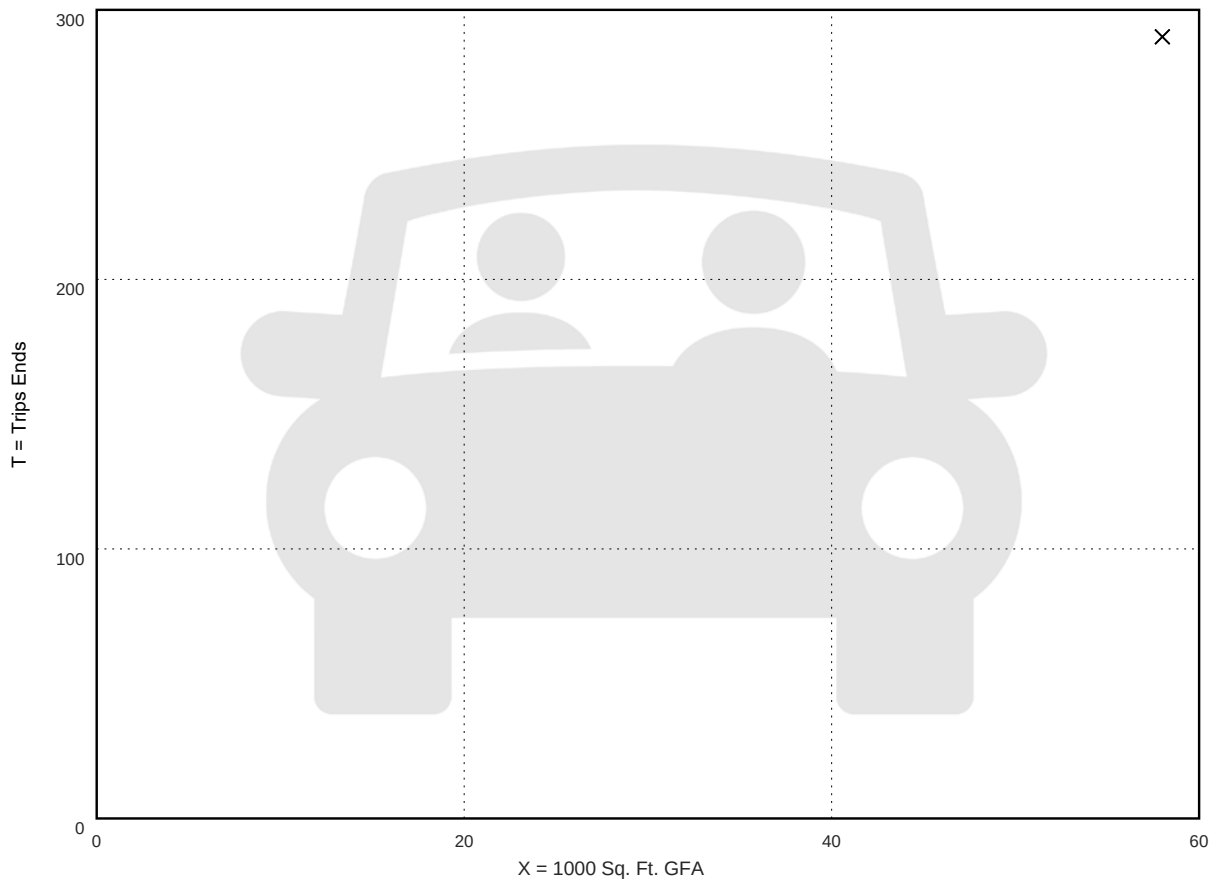
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. 1000 Sq. Ft. GFA: 58
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
5.00	5.00 - 5.00	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

General Light Industrial
(110)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Sunday, Peak Hour of Generator

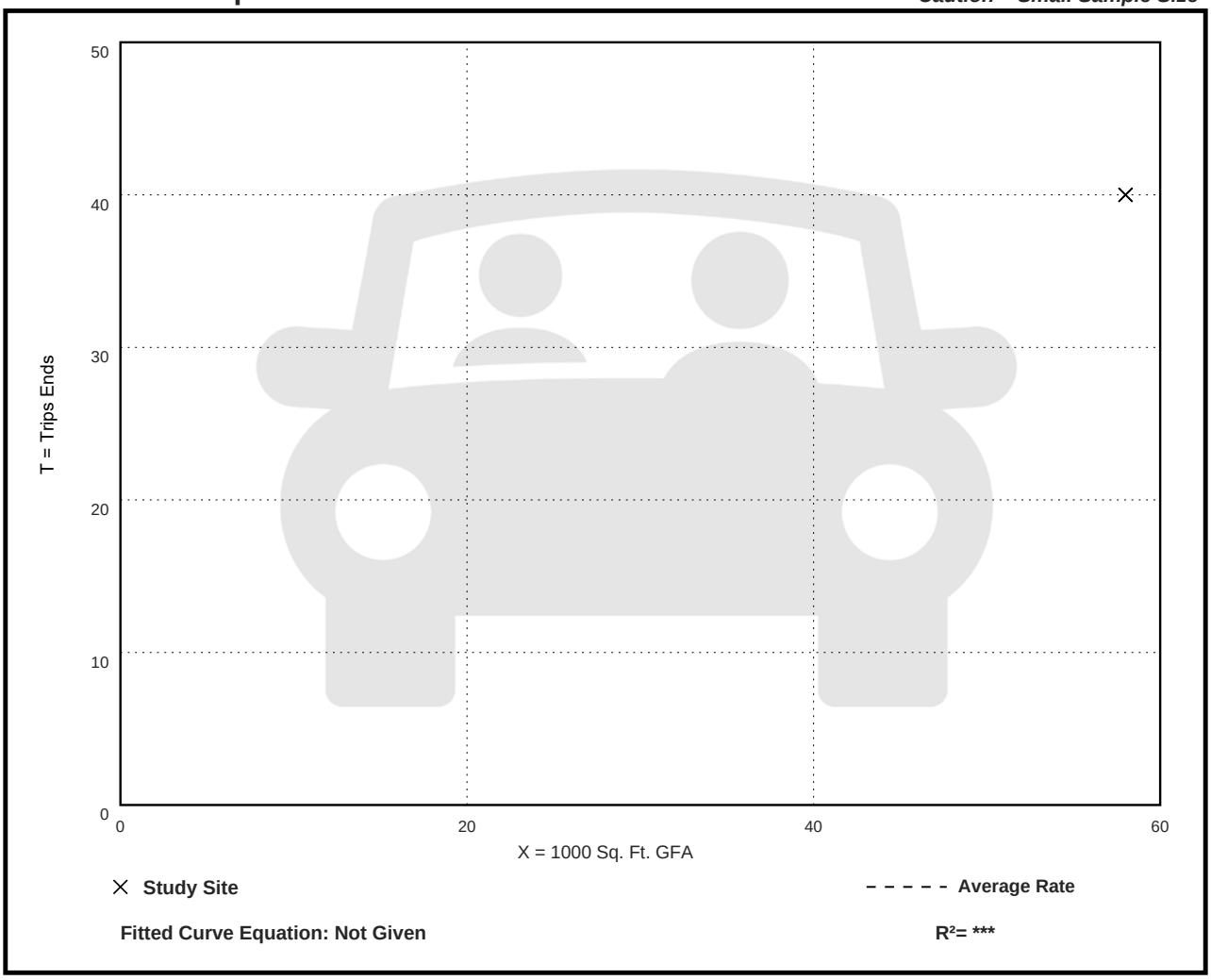
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. 1000 Sq. Ft. GFA: 58
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.69	0.69 - 0.69	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

General Light Industrial
(110)

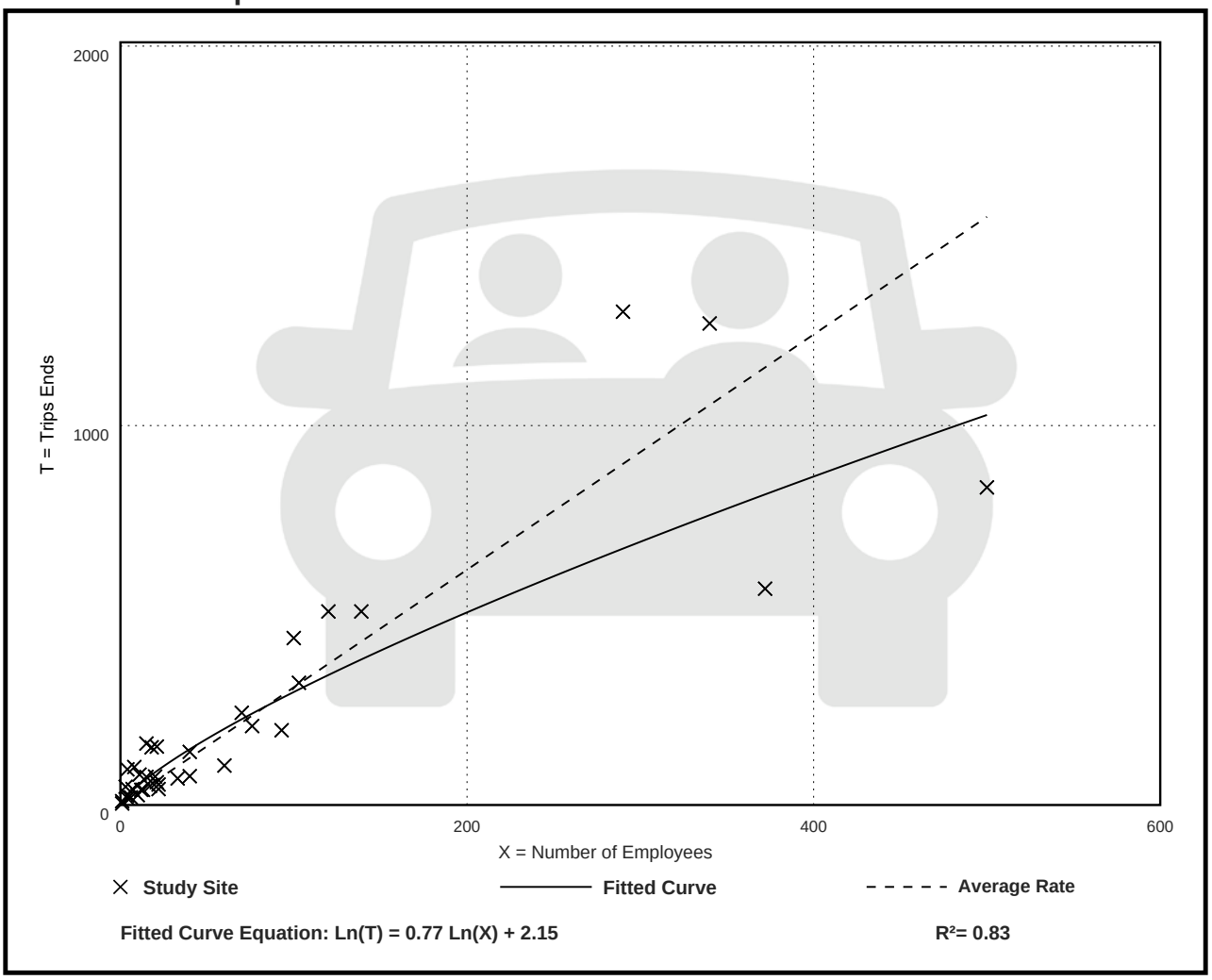
Vehicle Trip Ends vs: Employees
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 37
Avg. Num. of Employees: 71
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
3.10	1.53 - 23.50	1.81

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.77 Ln(X) + 2.15

R^2= 0.83

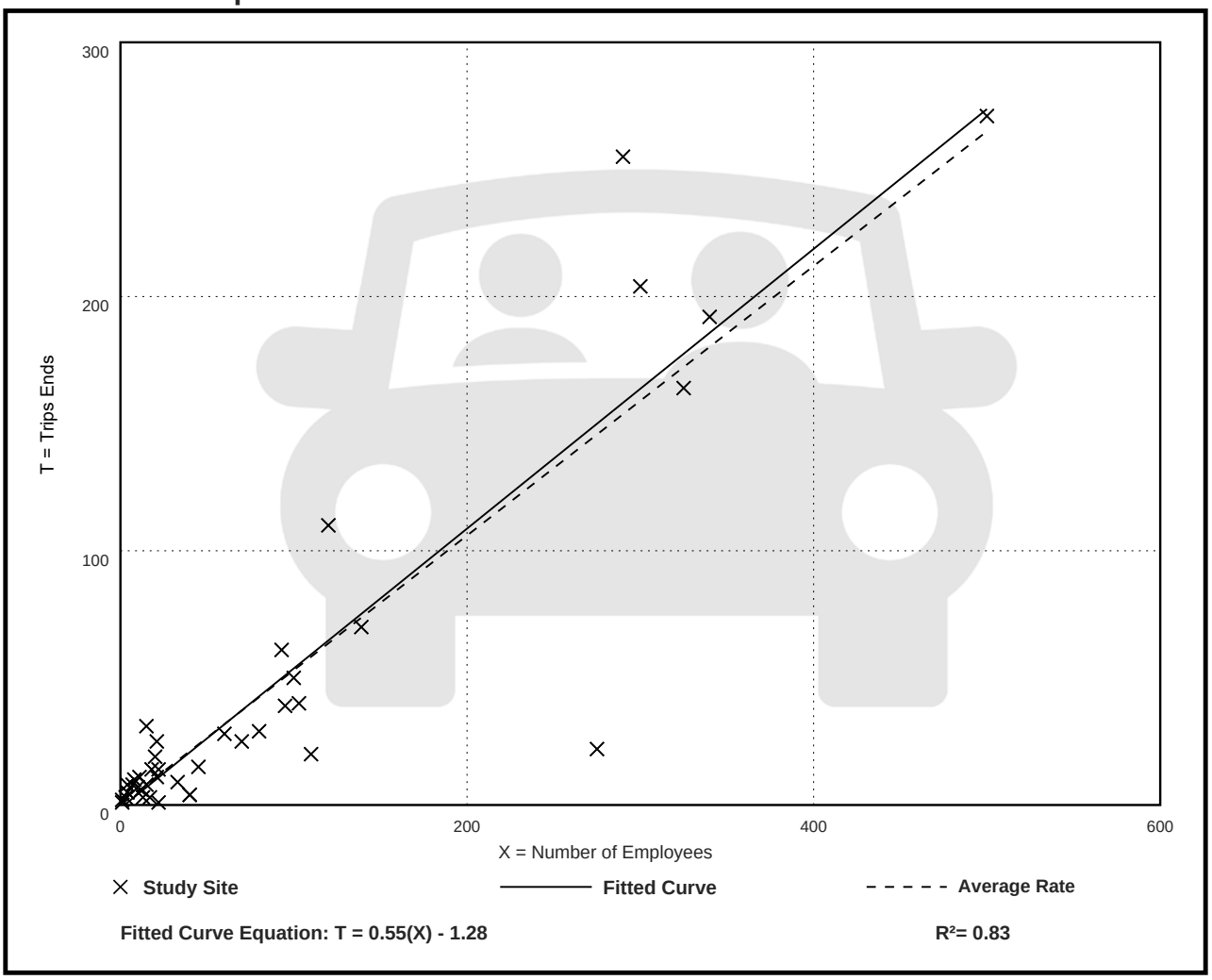
General Light Industrial
(110)

Vehicle Trip Ends vs: Employees
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: 41
Avg. Num. of Employees: 83
Directional Distribution: 83% entering, 17% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.53	0.05 - 2.07	0.27

Data Plot and Equation



Fitted Curve Equation: T = 0.55(X) - 1.28

R^2= 0.83

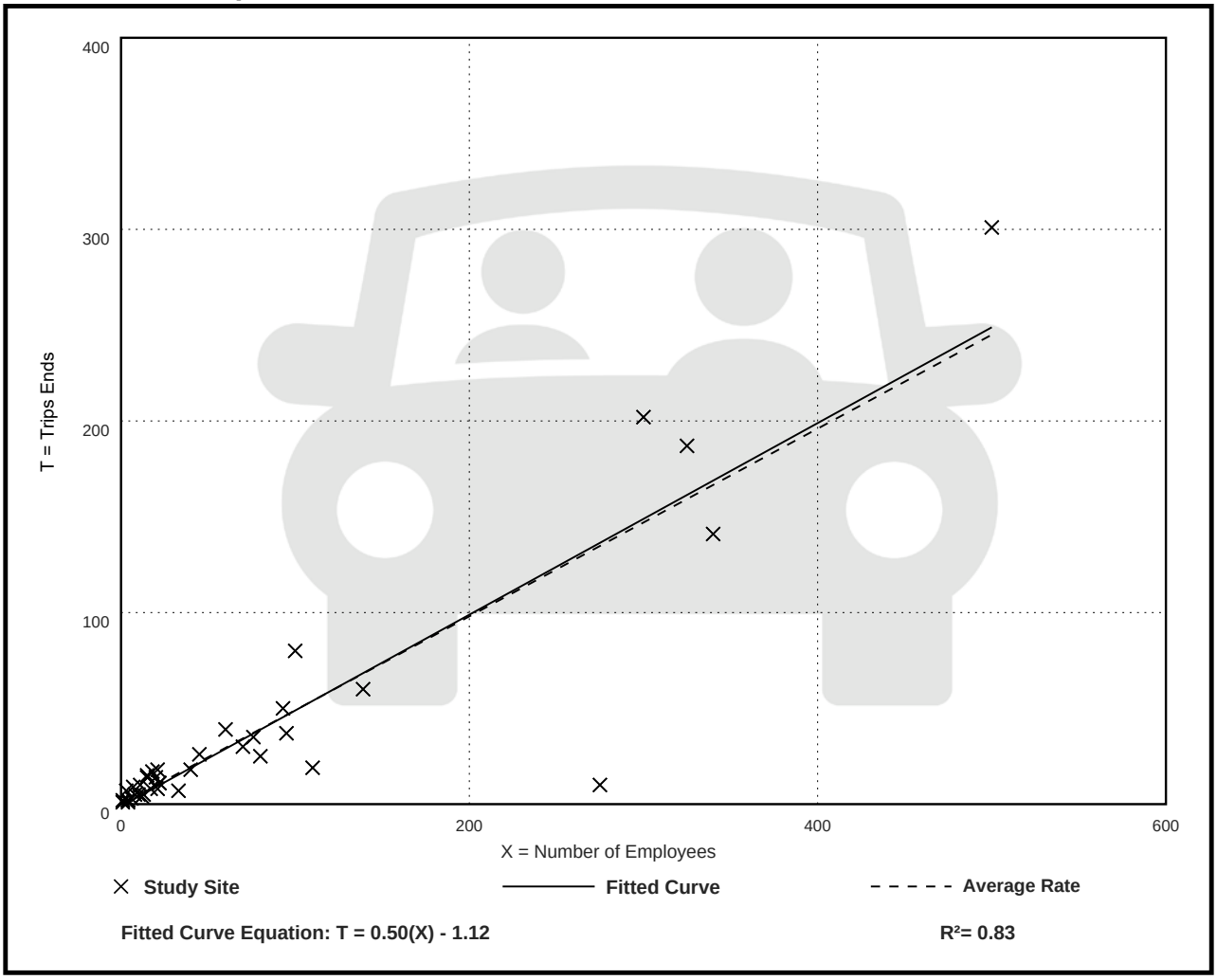
General Light Industrial
(110)

Vehicle Trip Ends vs: Employees
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: 39
Avg. Num. of Employees: 75
Directional Distribution: 22% entering, 78% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.49	0.04 - 2.33	0.22

Data Plot and Equation



General Light Industrial
(110)

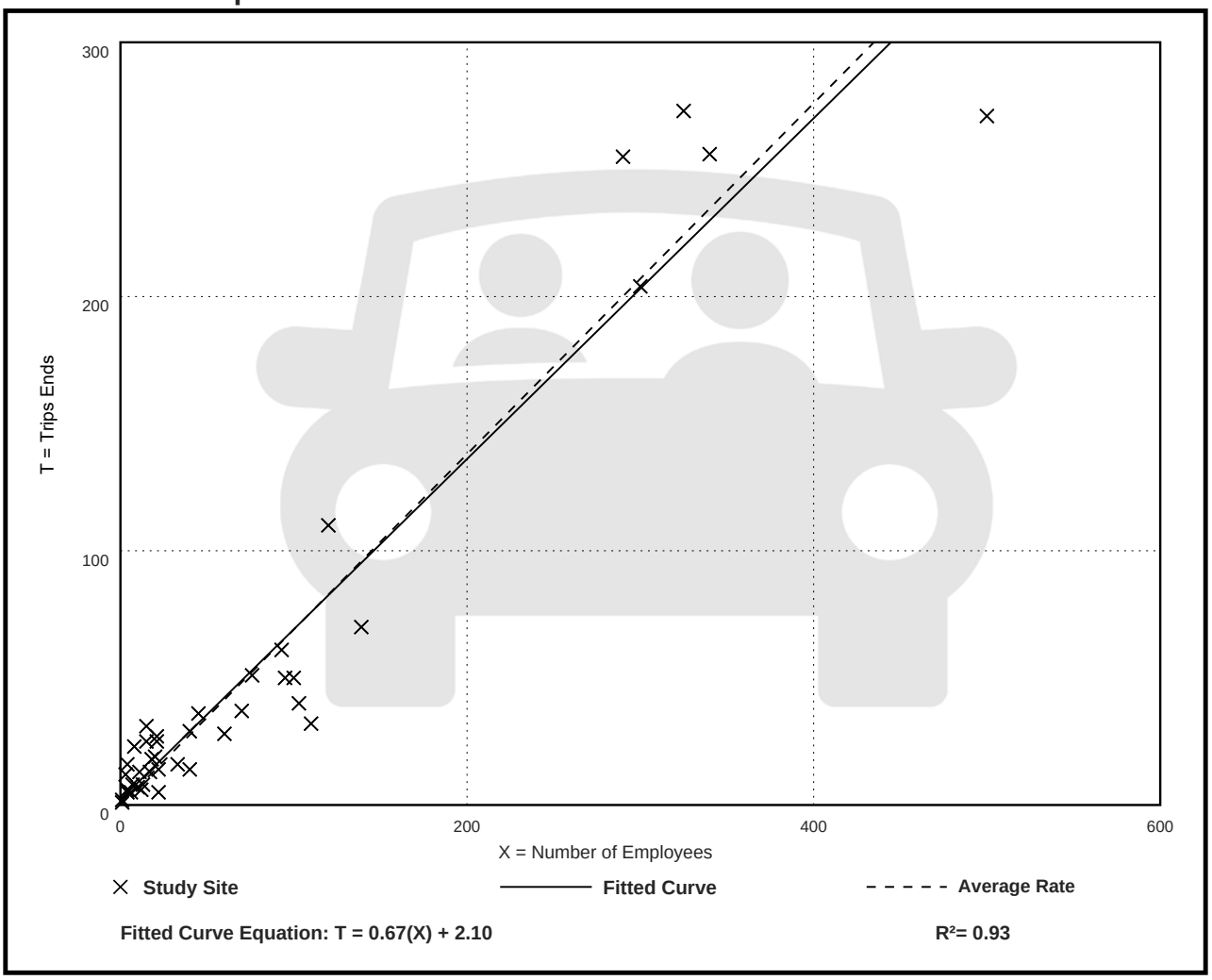
Vehicle Trip Ends vs: Employees
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 41
Avg. Num. of Employees: 76
Directional Distribution: 85% entering, 15% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.69	0.23 - 4.00	0.30

Data Plot and Equation



General Light Industrial
(110)

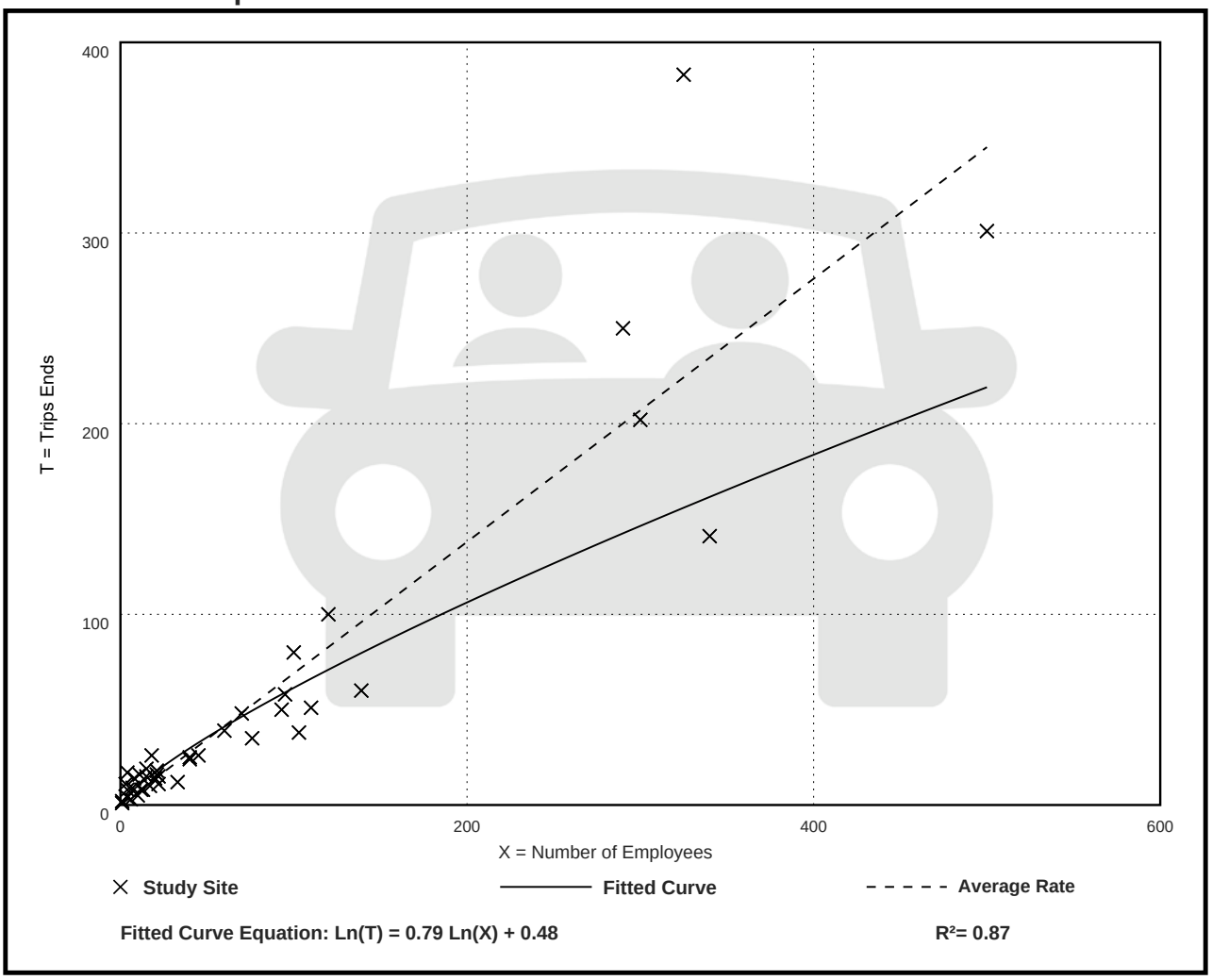
Vehicle Trip Ends vs: Employees
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 41
Avg. Num. of Employees: 76
Directional Distribution: 31% entering, 69% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.69	0.36 - 4.25	0.30

Data Plot and Equation



General Light Industrial
(110)

Vehicle Trip Ends vs: Employees
On a: Saturday

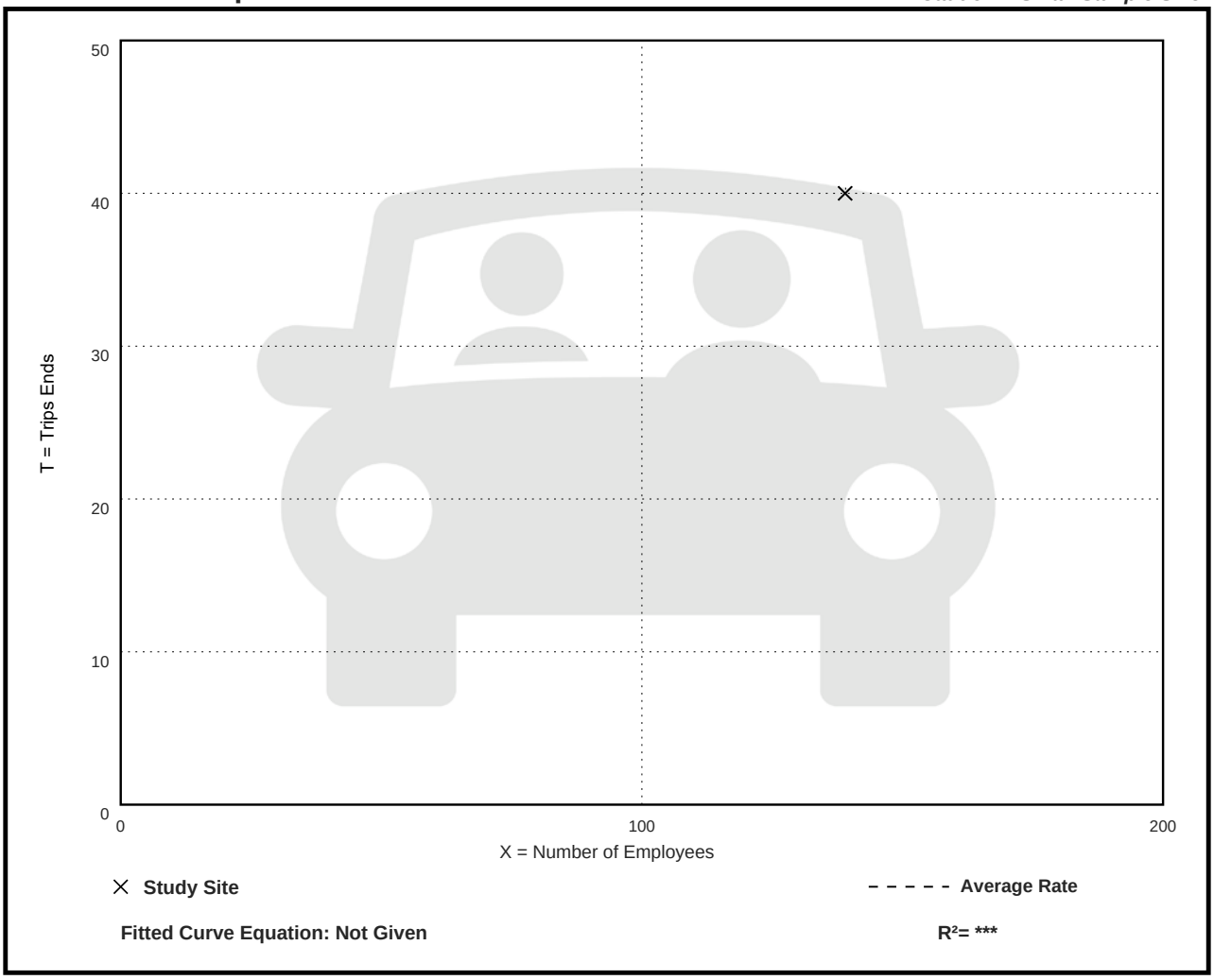
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Employees: 139
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.29	0.29 - 0.29	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

General Light Industrial
(110)

Vehicle Trip Ends vs: Employees
On a: Sunday

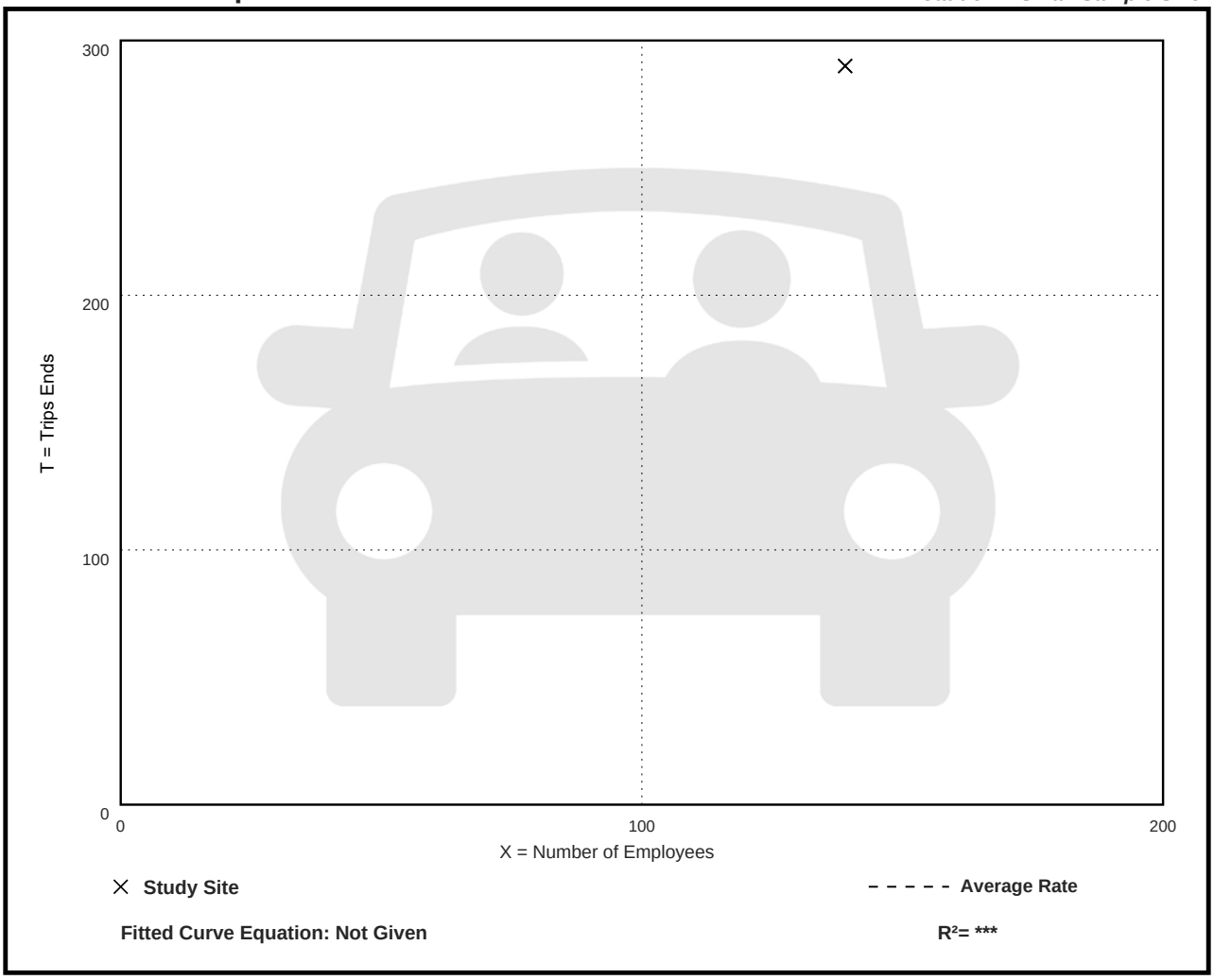
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Employees: 139
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
2.09	2.09 - 2.09	***

Data Plot and Equation

Caution – Small Sample Size



General Light Industrial
(110)

Vehicle Trip Ends vs: Employees
On a: Sunday, Peak Hour of Generator

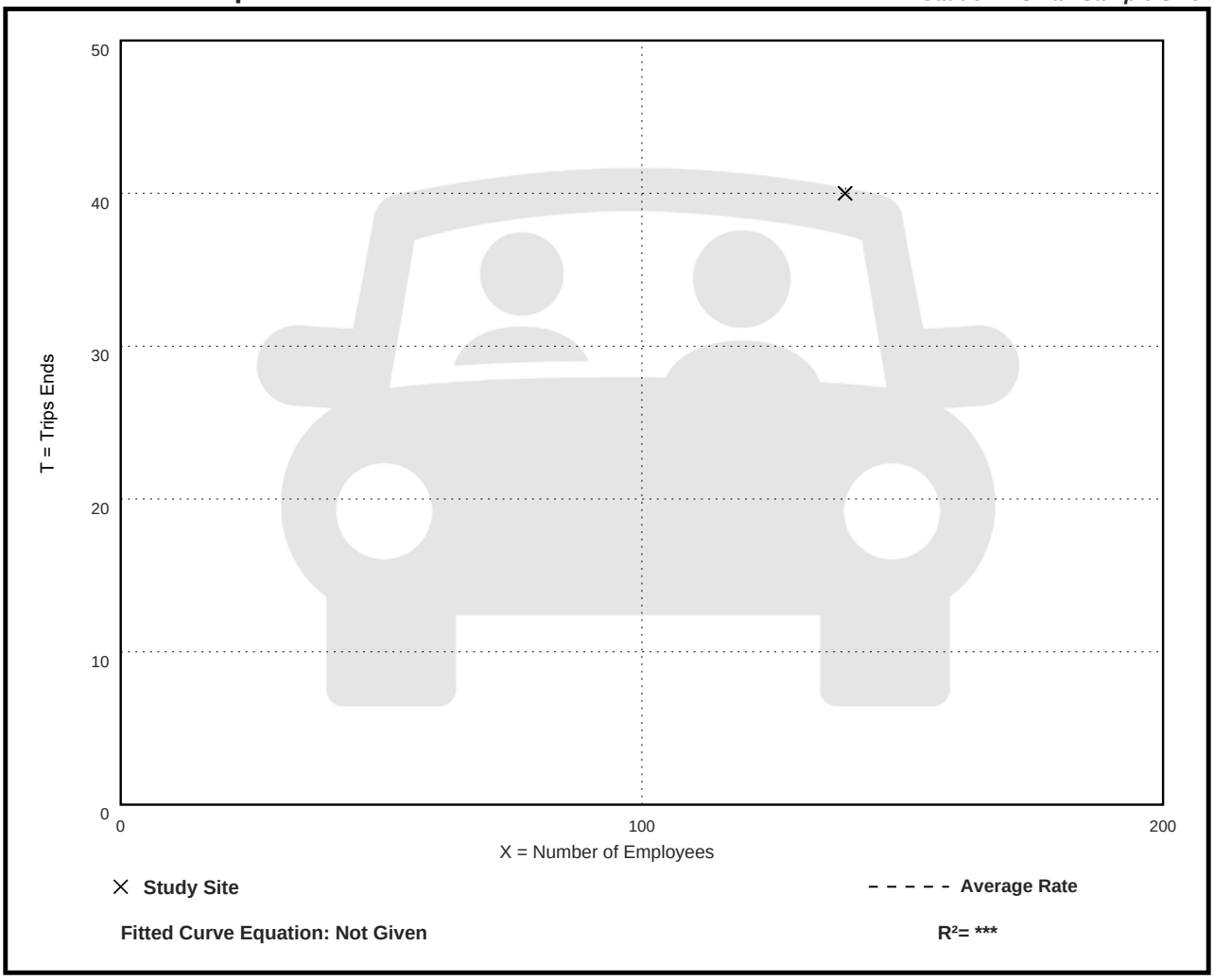
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Employees: 139
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.29	0.29 - 0.29	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= ***

General Light Industrial
(110)

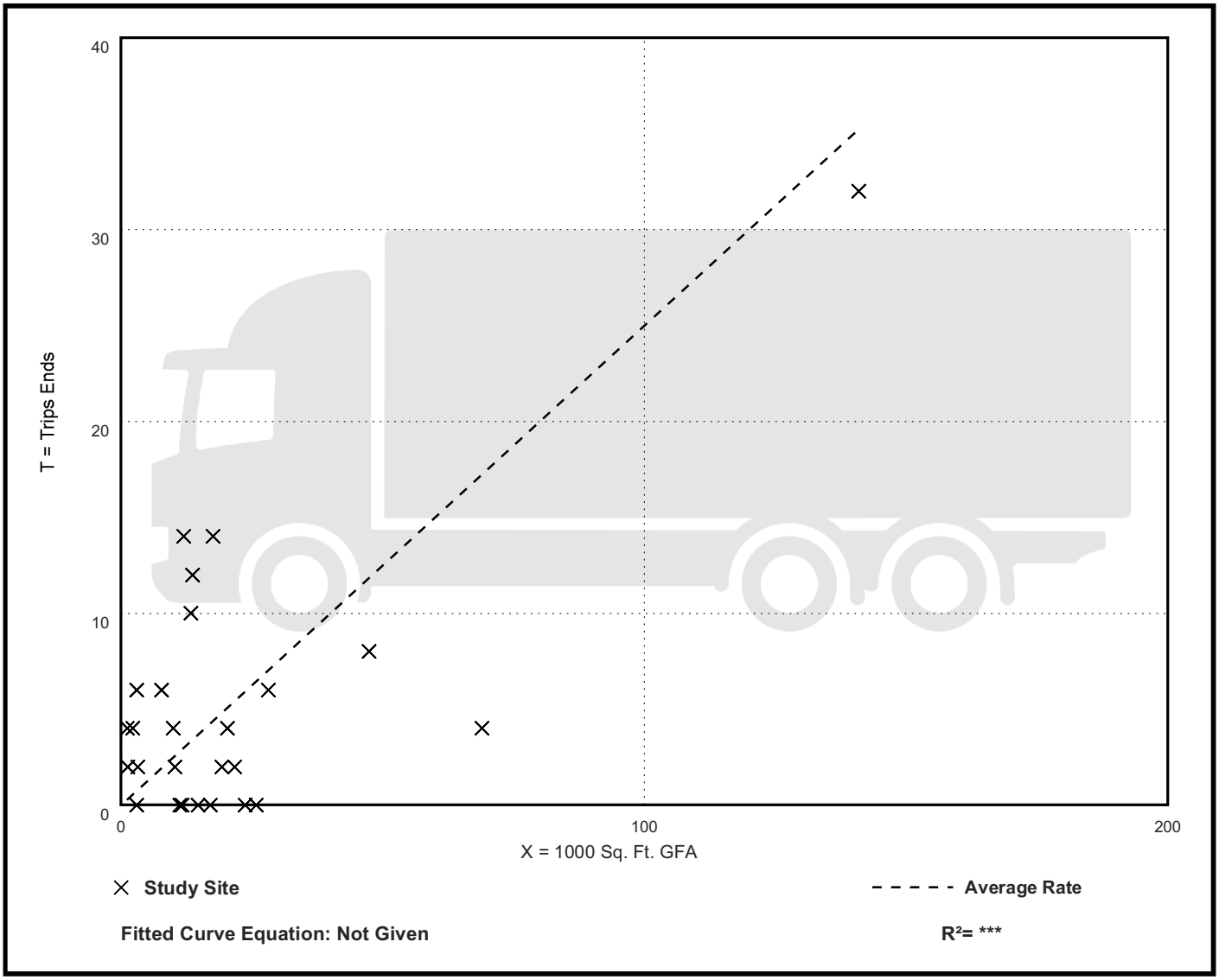
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 26
Avg. 1000 Sq. Ft. GFA: 21
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.25	0.00 - 3.51	0.36

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ***

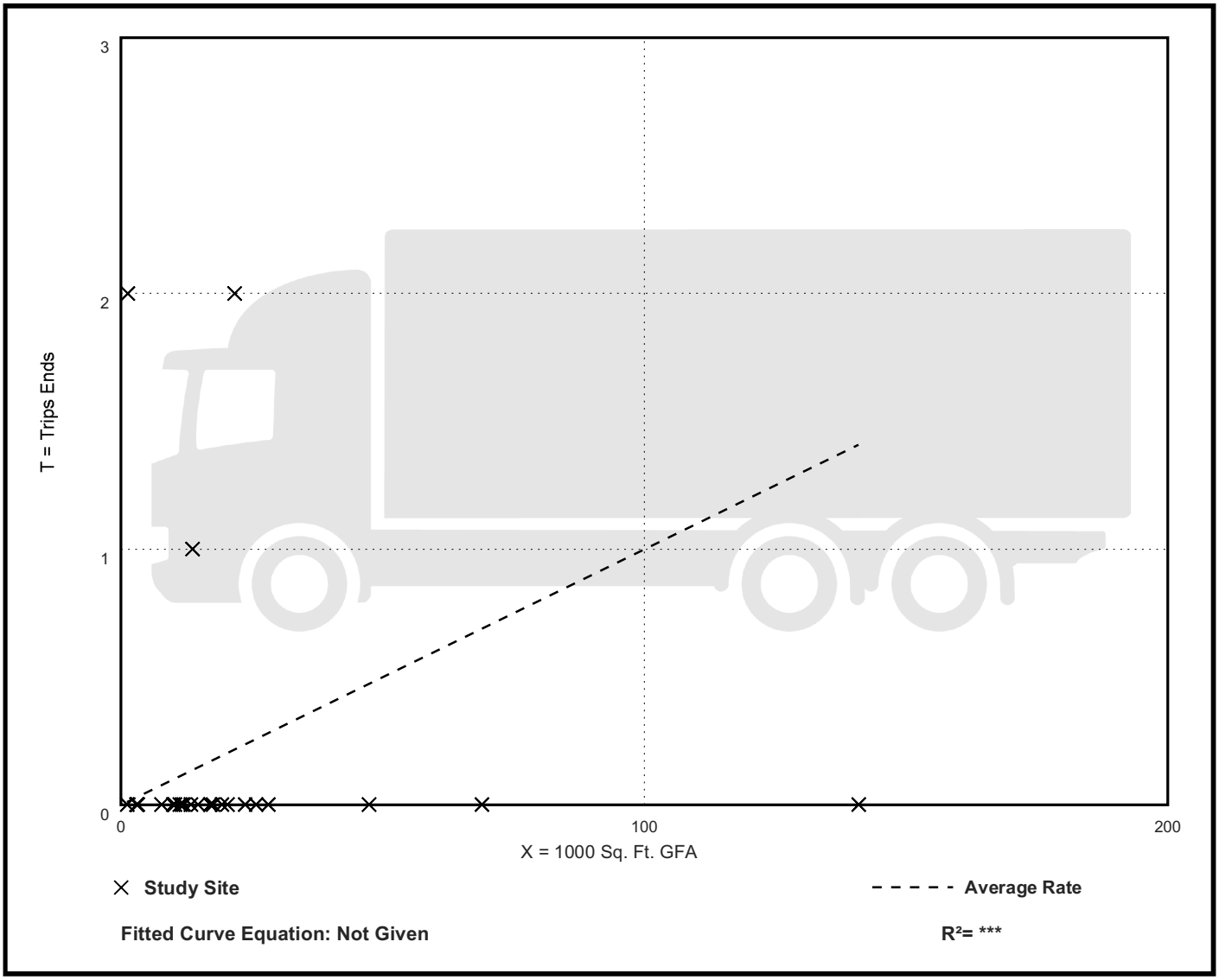
General Light Industrial
(110)

Truck 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: 25
Avg. 1000 Sq. Ft. GFA: 22
Directional Distribution: 60% entering, 40% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.01	0.00 - 1.59	0.08

Data Plot and Equation



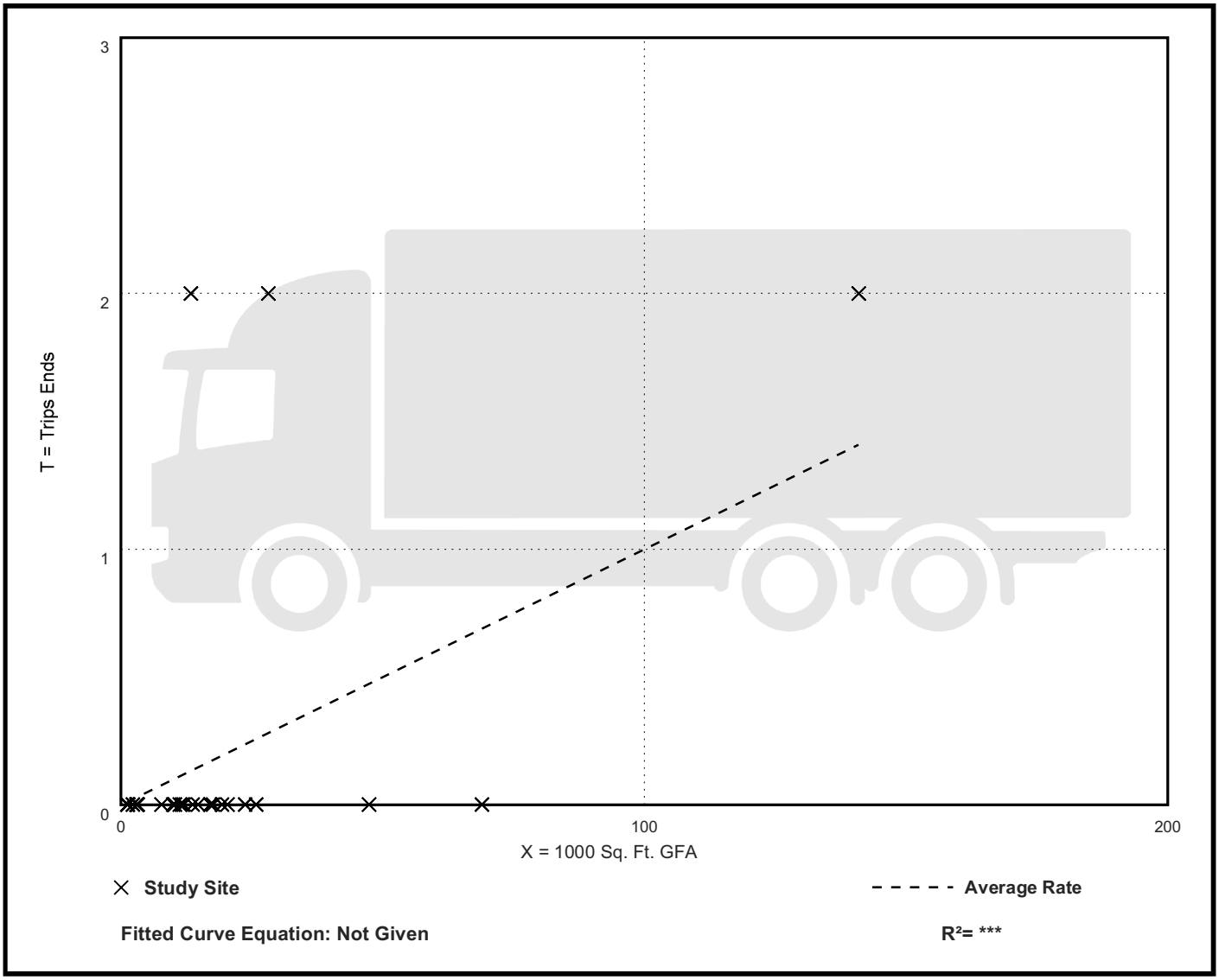
General Light Industrial
(110)

Truck 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: 25
Avg. 1000 Sq. Ft. GFA: 21
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.01	0.00 - 0.15	0.03

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

General Light Industrial
(110)

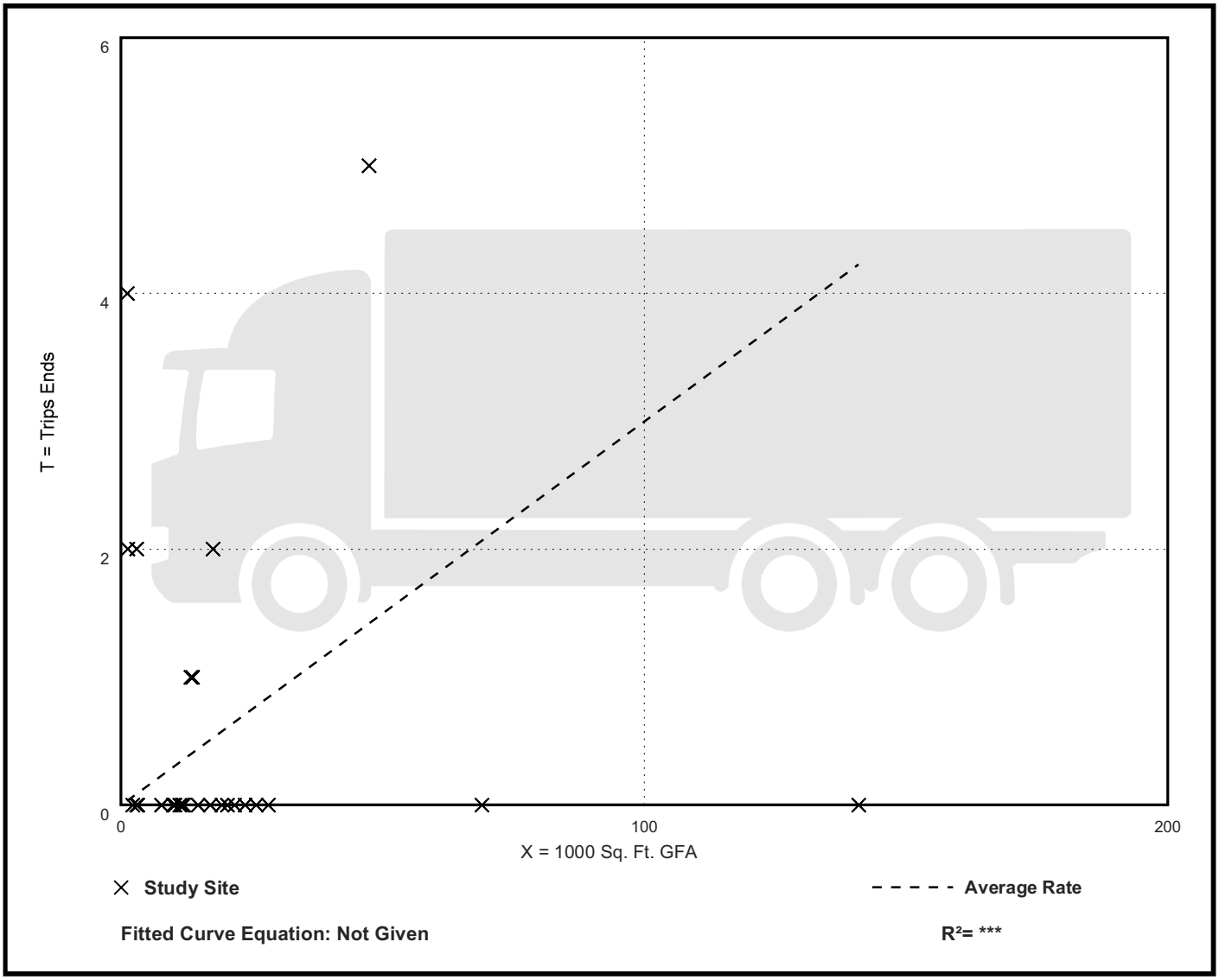
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 26
Avg. 1000 Sq. Ft. GFA: 21
Directional Distribution: 47% entering, 53% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.03	0.00 - 3.51	0.19

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

General Light Industrial
(110)

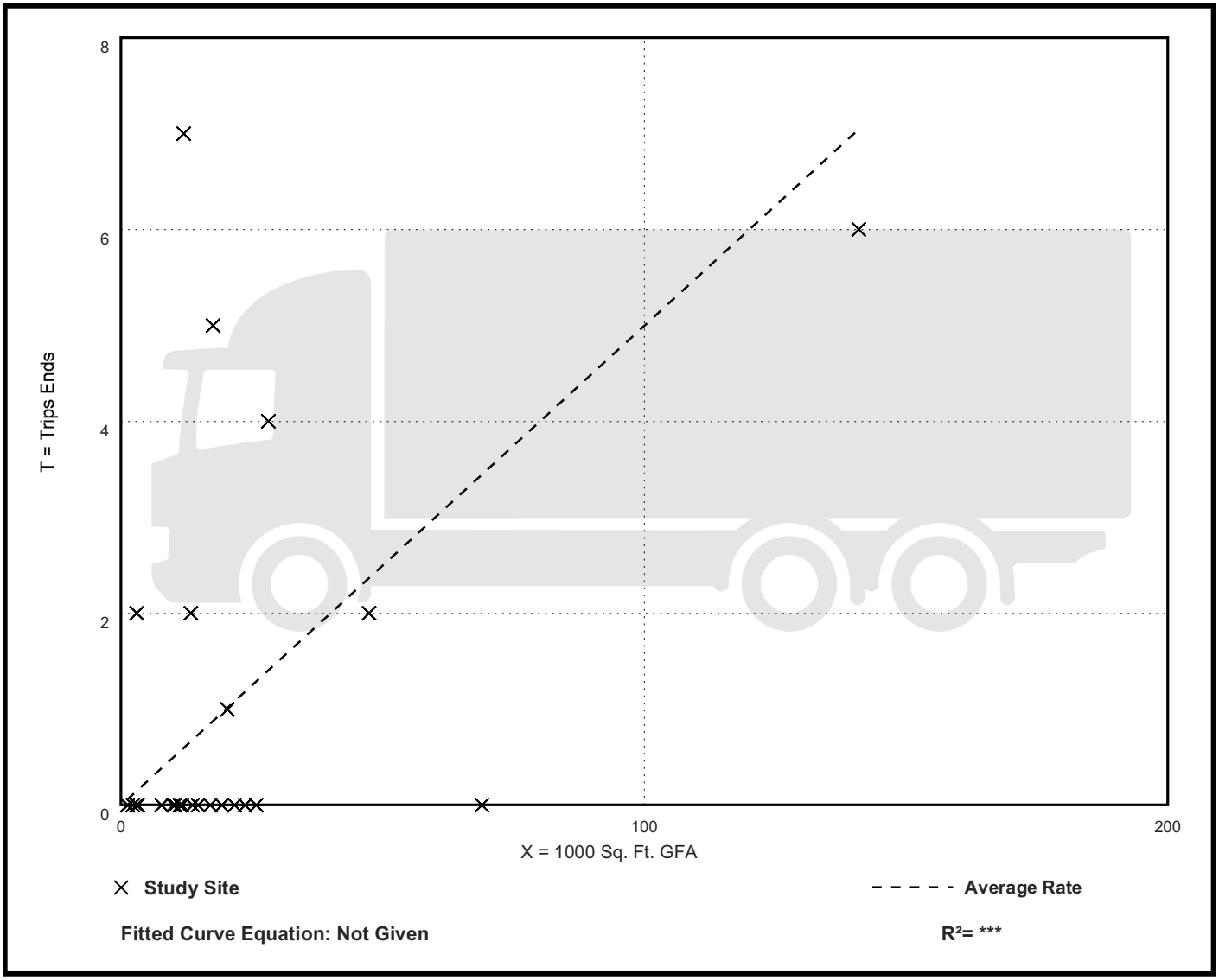
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 26
Avg. 1000 Sq. Ft. GFA: 21
Directional Distribution: 52% entering, 48% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.05	0.00 - 0.67	0.11

Data Plot and Equation



General Light Industrial
(110)

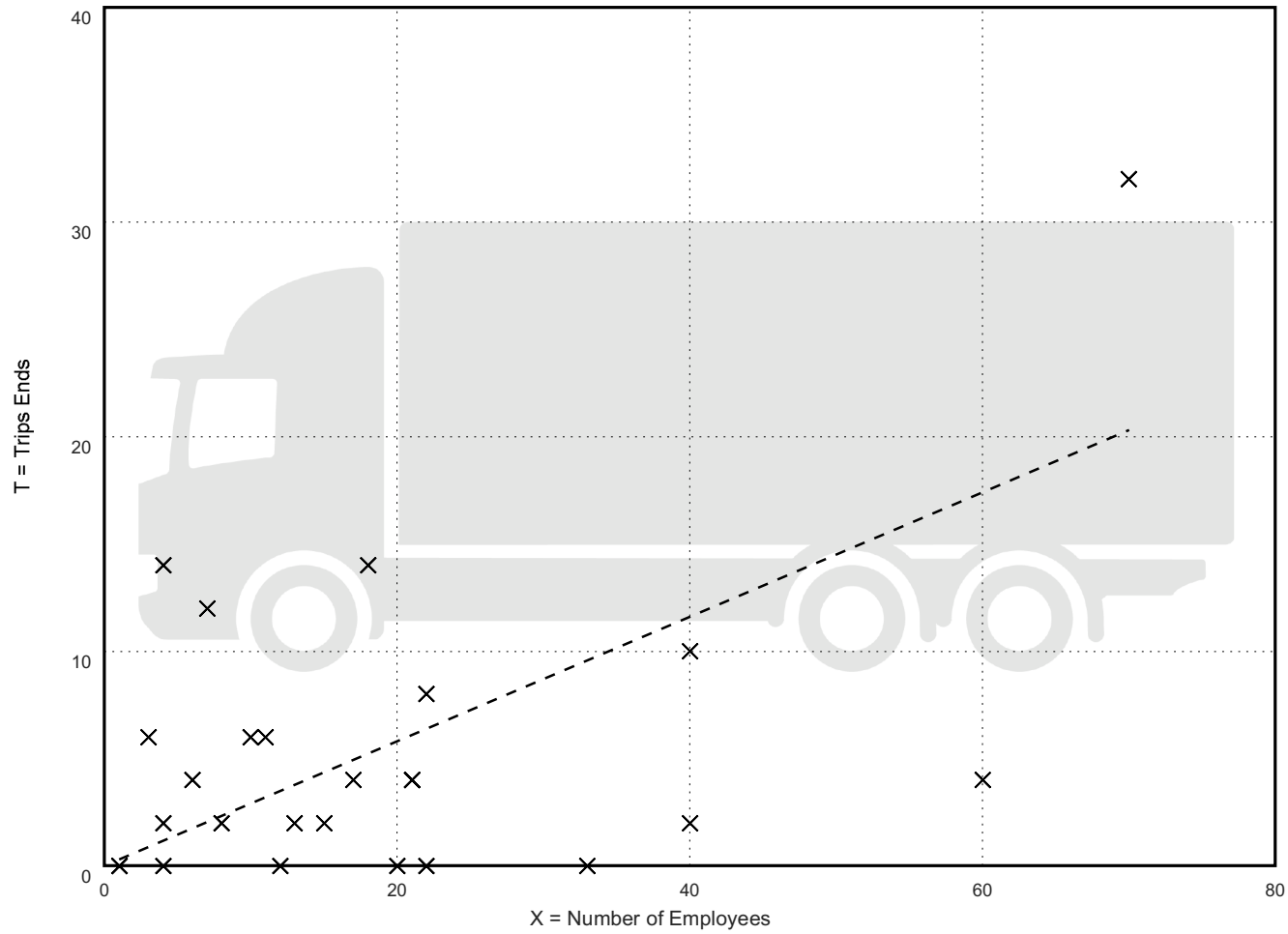
Truck Trip Ends vs: Employees
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 26
Avg. Num. of Employees: 19
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.29	0.00 - 3.50	0.43

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ***

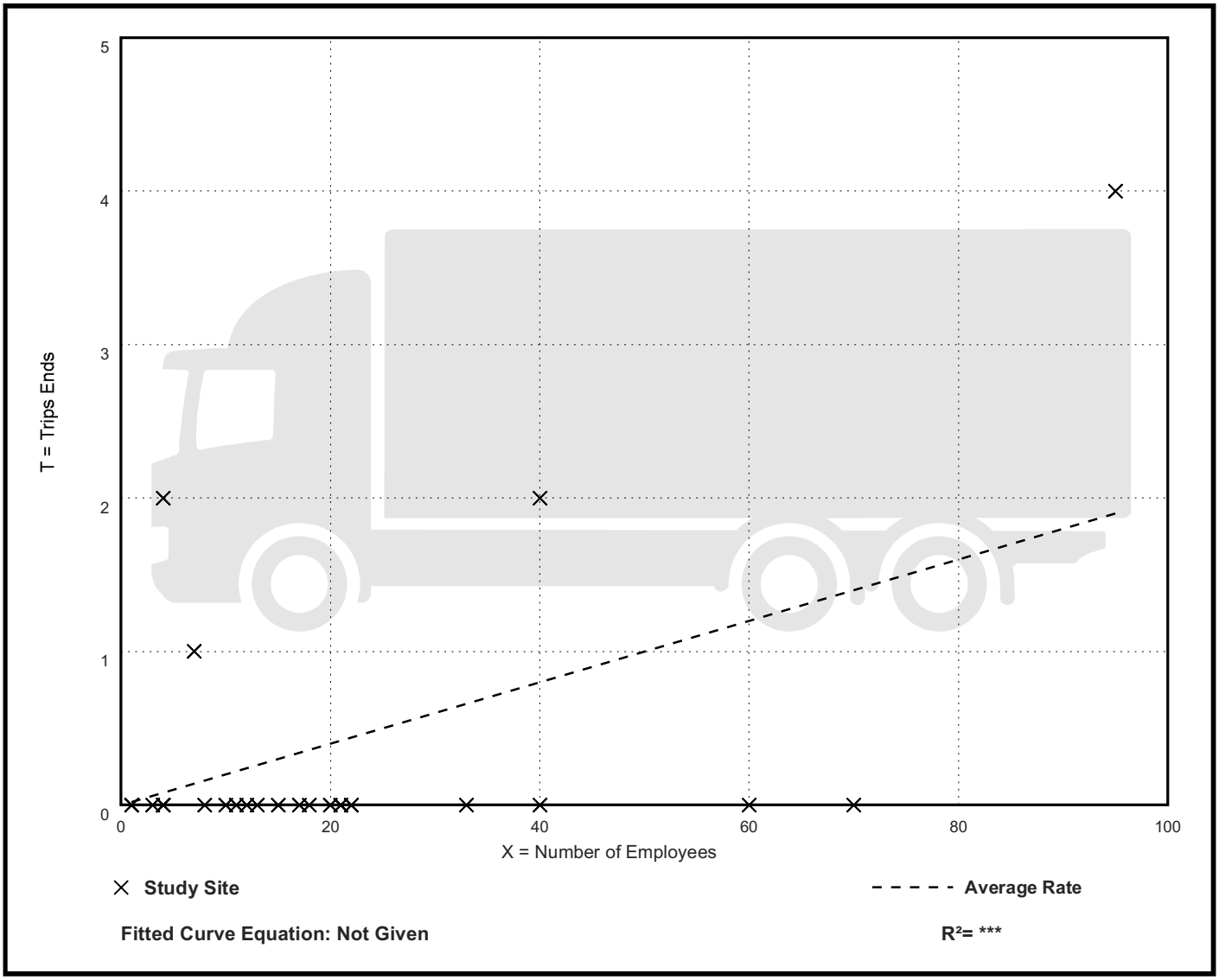
General Light Industrial
(110)

Truck Trip Ends vs: Employees
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: 26
Avg. Num. of Employees: 22
Directional Distribution: 60% entering, 40% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 0.50	0.05

Data Plot and Equation



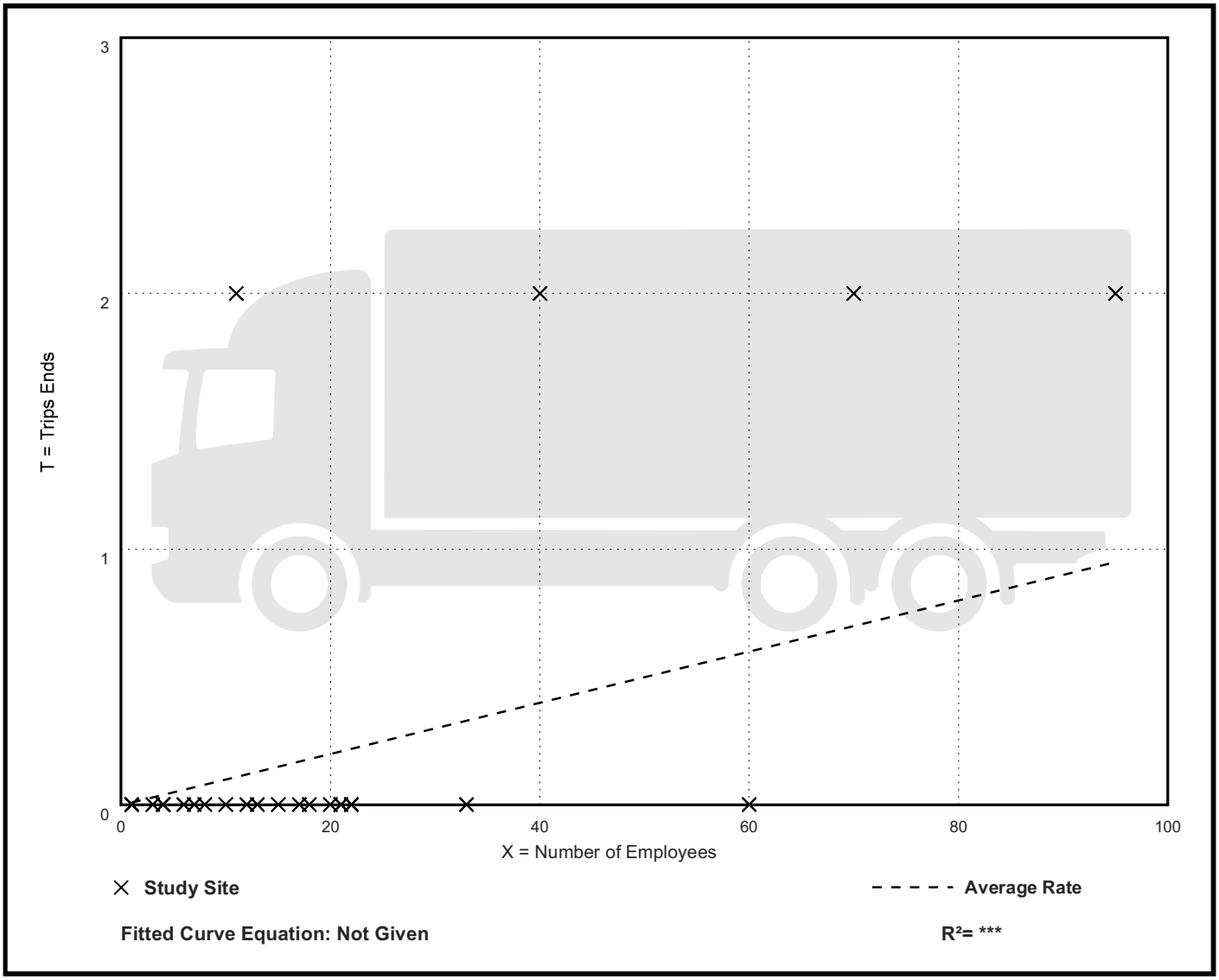
General Light Industrial
(110)

Truck Trip Ends vs: Employees
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: 26
Avg. Num. of Employees: 21
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.01	0.00 - 0.18	0.03

Data Plot and Equation



General Light Industrial
(110)

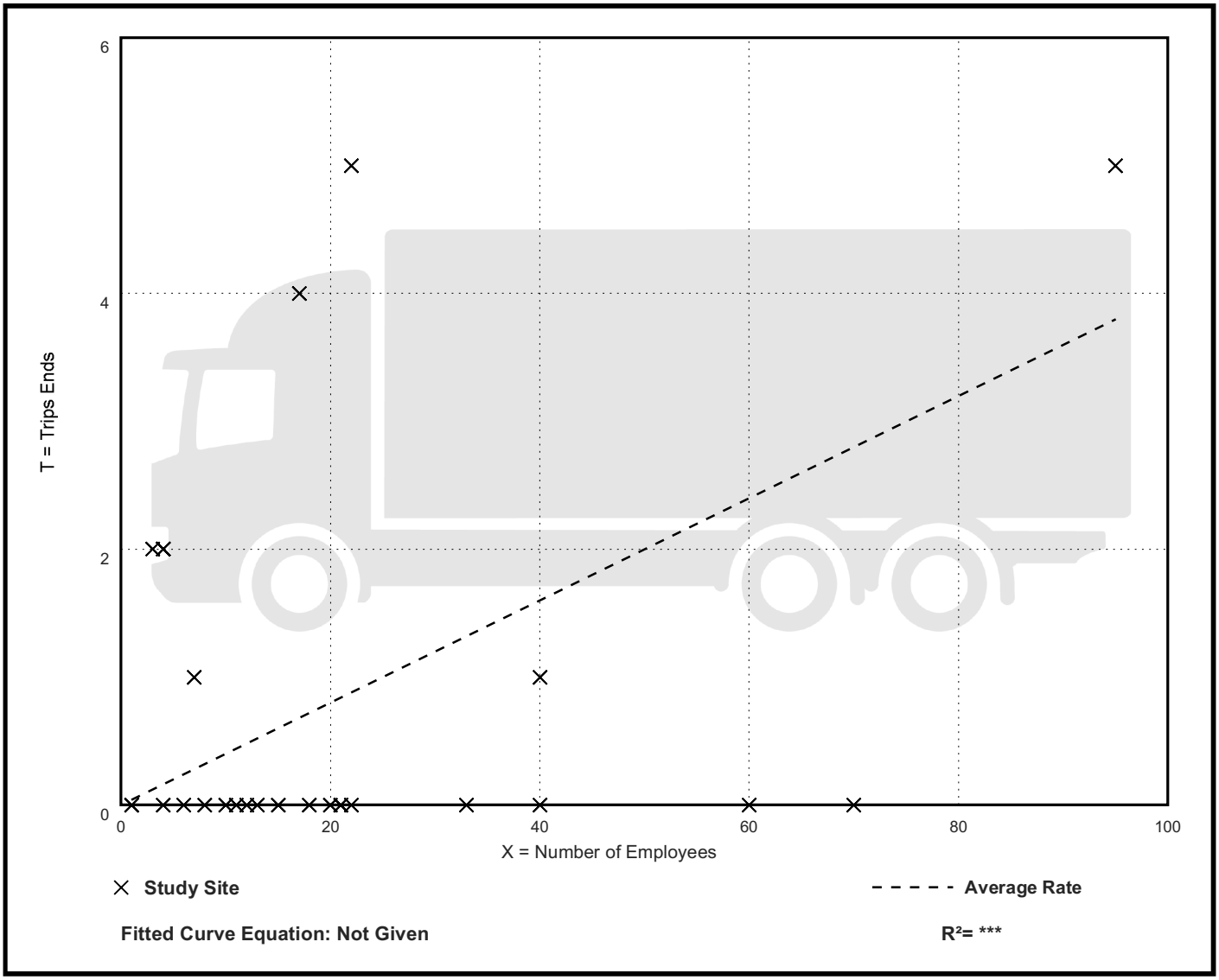
Truck Trip Ends vs: Employees
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 27
Avg. Num. of Employees: 21
Directional Distribution: 47% entering, 53% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.04	0.00 - 0.67	0.09

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ***

General Light Industrial
(110)

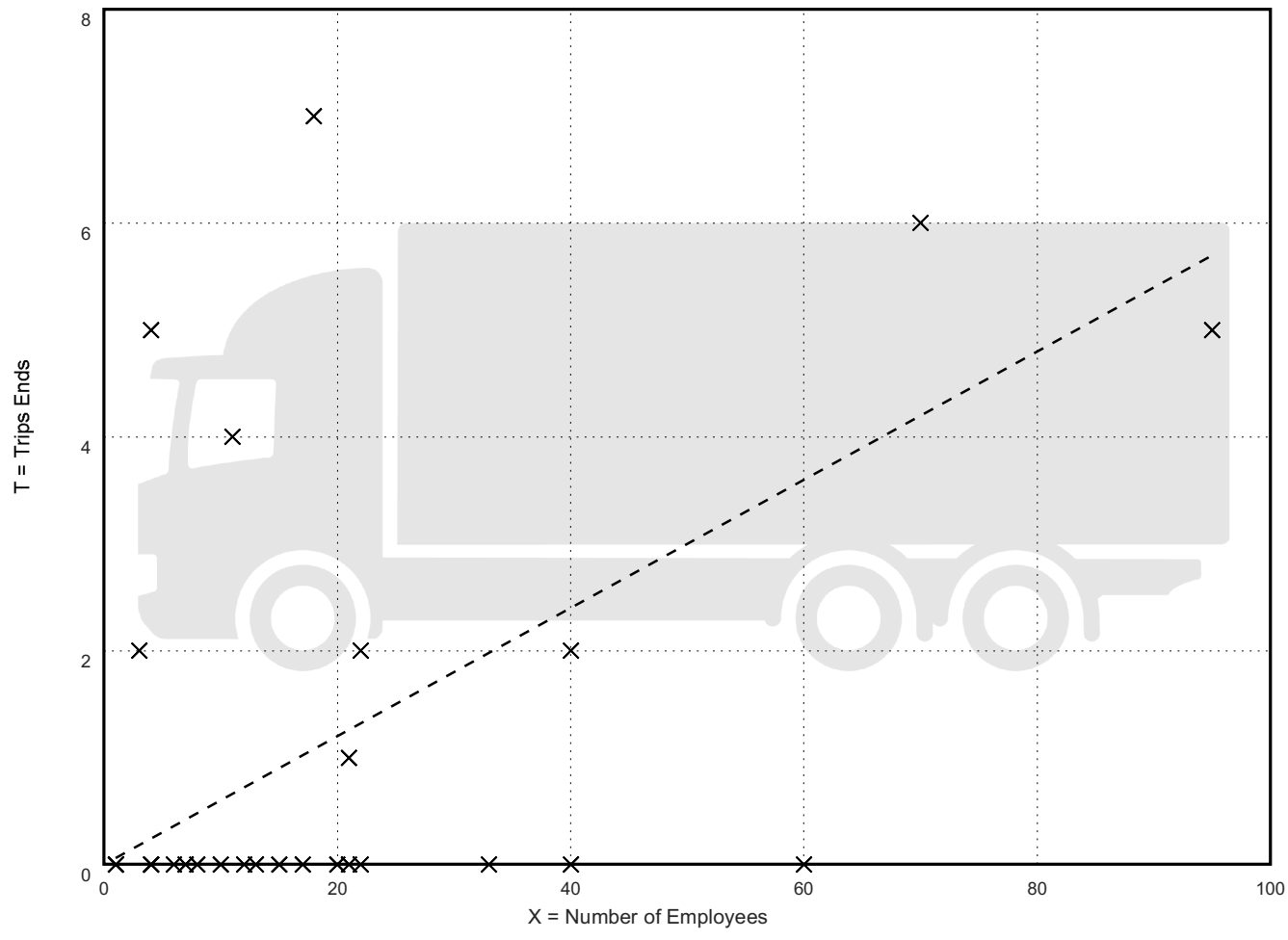
Truck Trip Ends vs: Employees
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 27
Avg. Num. of Employees: 21
Directional Distribution: 52% entering, 48% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.06	0.00 - 1.25	0.14

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ***

Land Use: 130
Industrial Park

Description

An industrial park contains several individual industrial or related facilities. It is characterized by a mix of manufacturing, service, and warehouse facilities with a wide variation in the proportion of each type of use from one location to another. Many industrial parks contain highly diversified facilities. Some parks in the database have a large number of small businesses and others have one or two dominant industries. General light industrial (Land Use 110) and manufacturing (Land Use 140) are related uses.

Additional Data

The sites were surveyed in the 1980s, the 2000s, 2010s, and the 2020s in California, Georgia, New Jersey, Massachusetts, New York, Ontario (CAN), and Pennsylvania.

Source Numbers

106, 162, 184, 251, 277, 422, 706, 747, 753, 937, 1032, 1070

Industrial Park
(130)

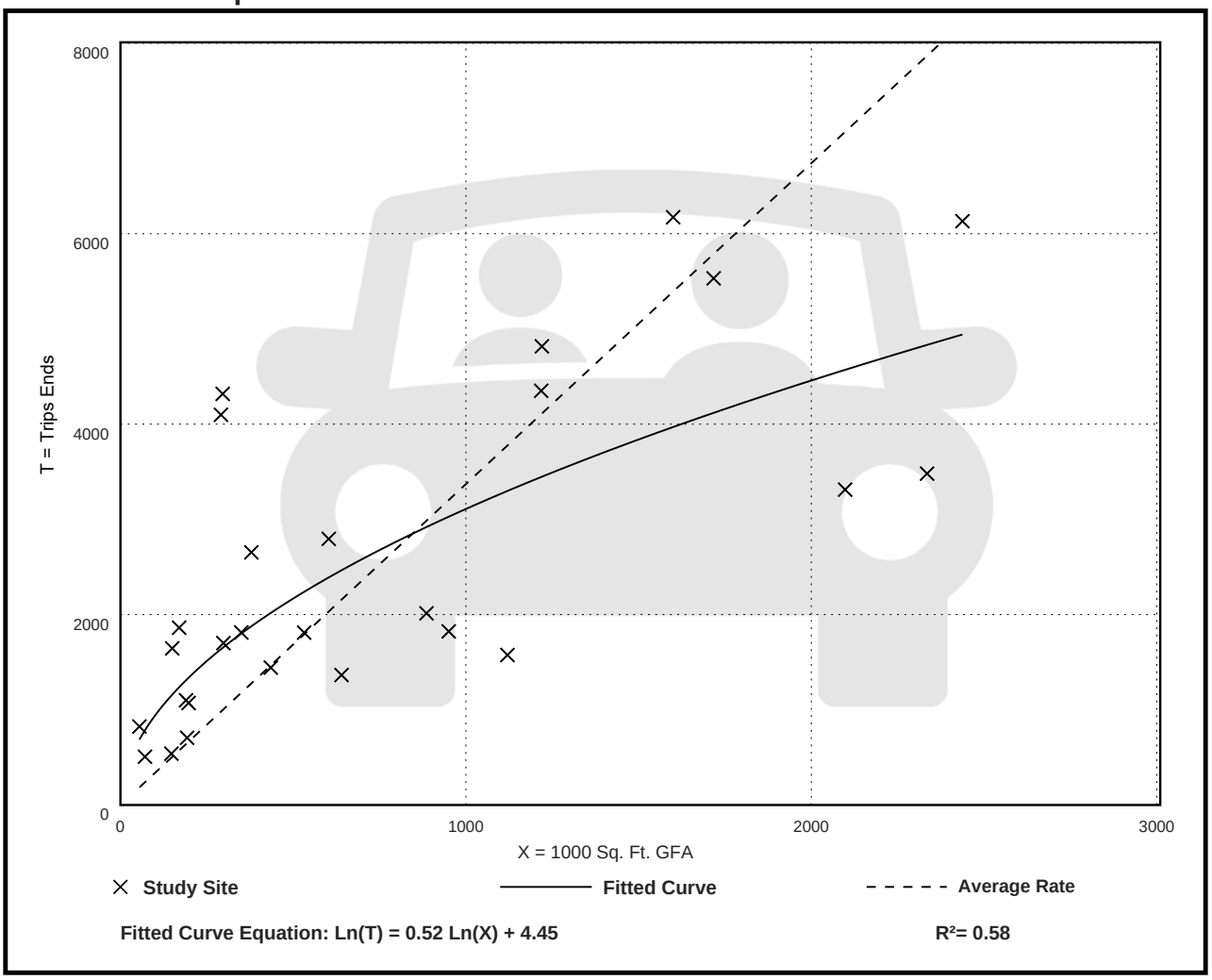
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 27
Avg. 1000 Sq. Ft. GFA: 762
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.37	1.41 - 14.98	2.60

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.52 Ln(X) + 4.45

R^2= 0.58

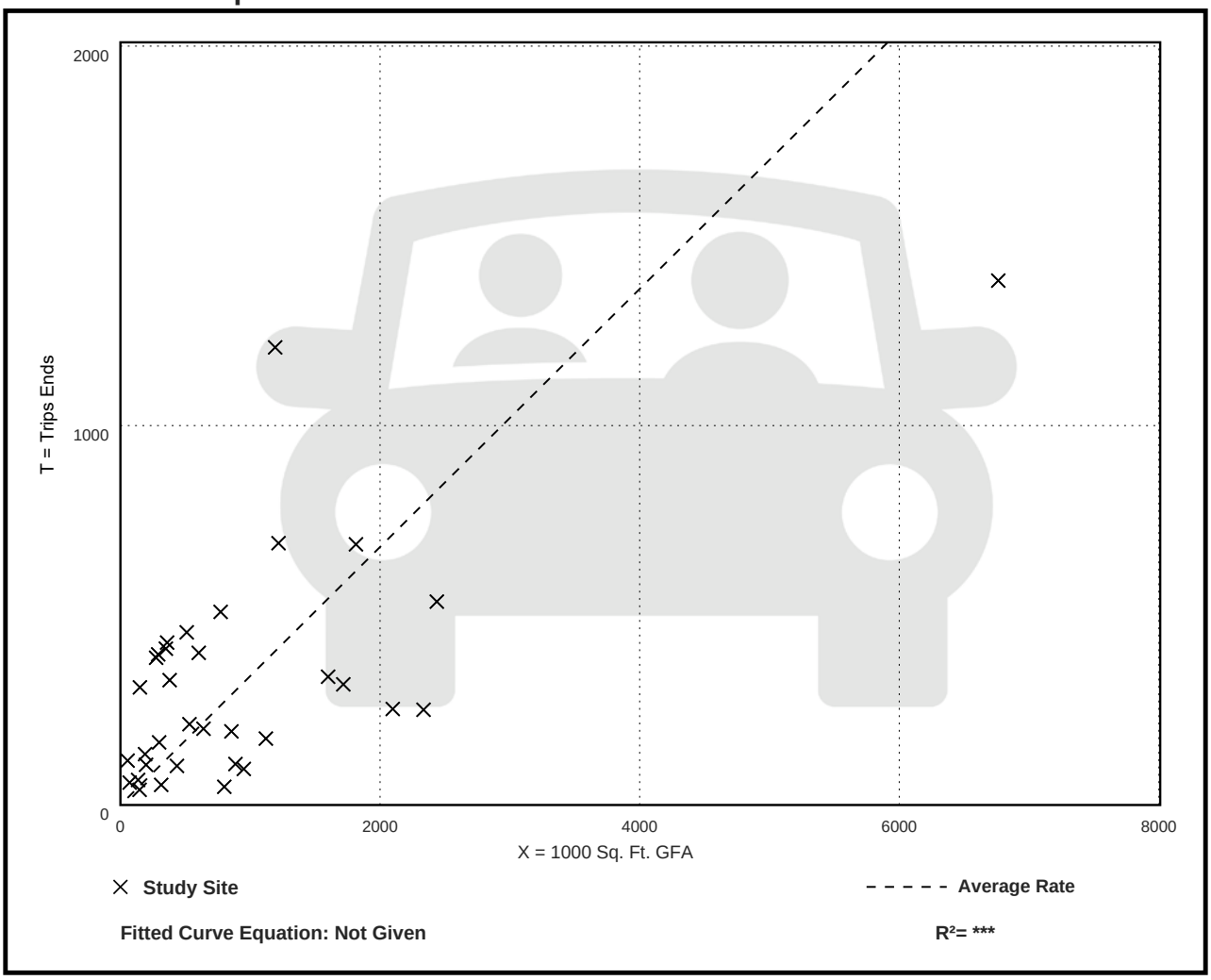
Industrial Park
(130)

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: 34
Avg. 1000 Sq. Ft. GFA: 956
Directional Distribution: 81% entering, 19% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.34	0.06 - 2.13	0.33

Data Plot and Equation



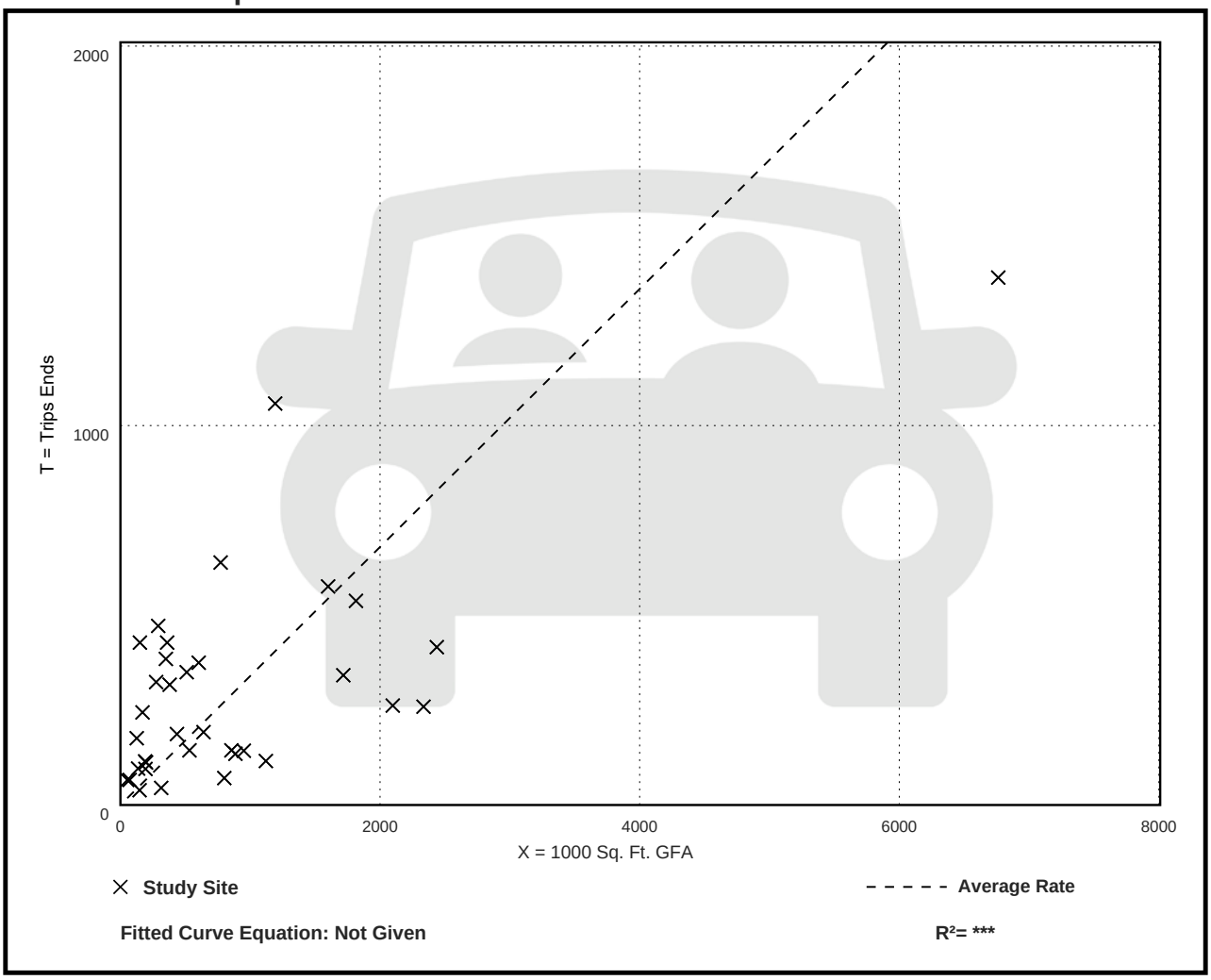
Industrial Park
(130)

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: 35
Avg. 1000 Sq. Ft. GFA: 899
Directional Distribution: 22% entering, 78% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.34	0.09 - 2.85	0.36

Data Plot and Equation



Industrial Park
(130)

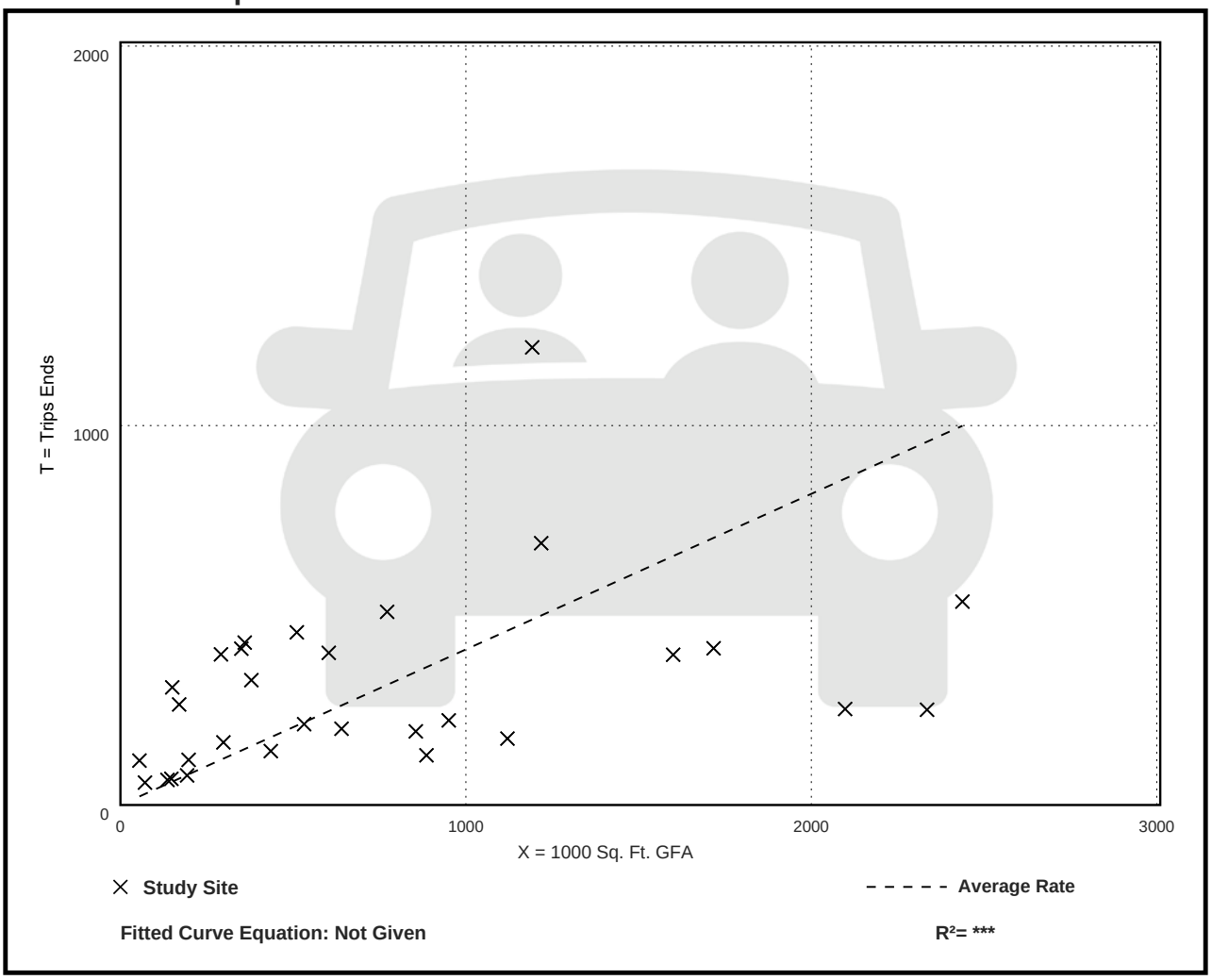
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 30
Avg. 1000 Sq. Ft. GFA: 757
Directional Distribution: 87% entering, 13% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.41	0.11 - 2.13	0.37

Data Plot and Equation



Industrial Park
(130)

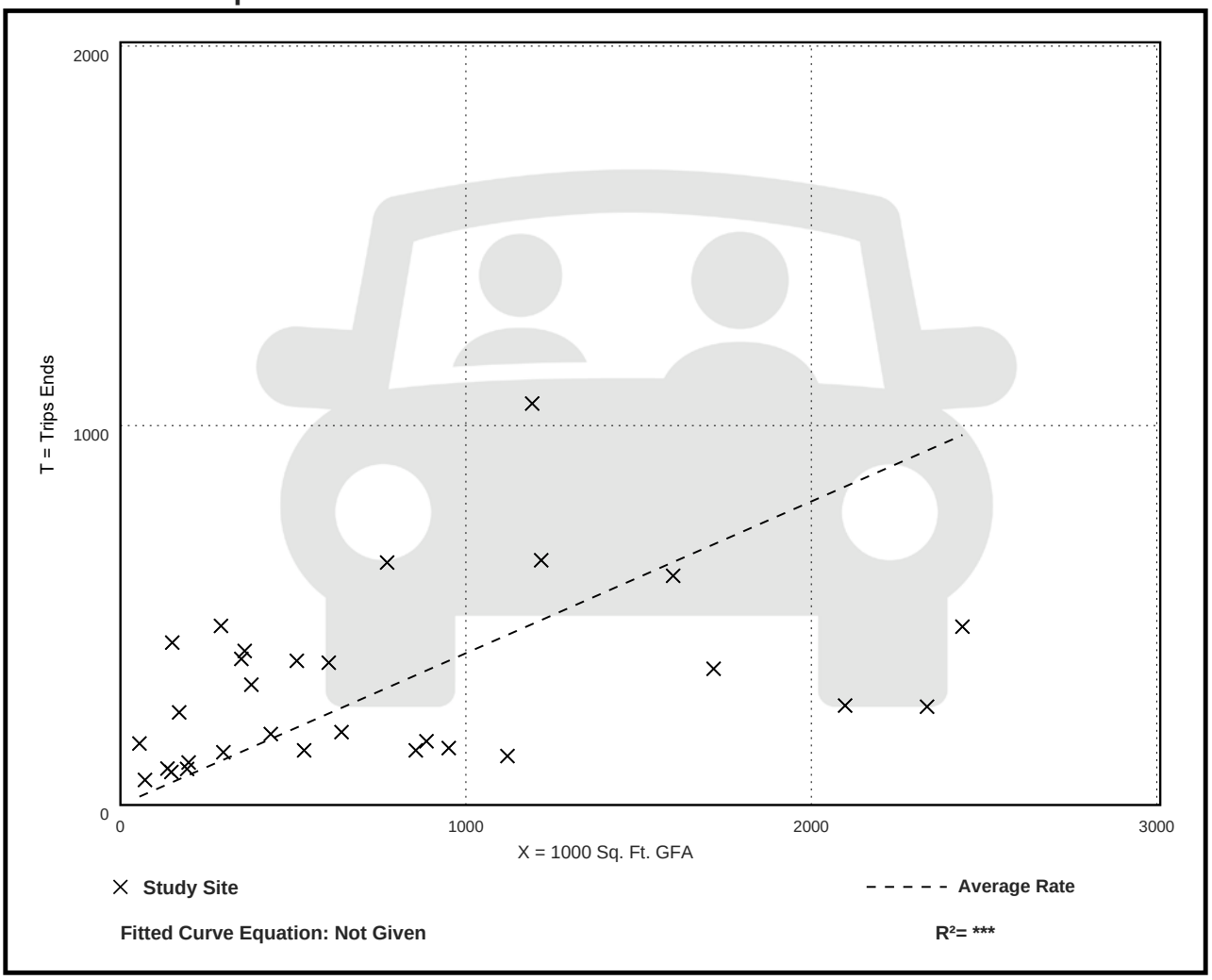
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 30
Avg. 1000 Sq. Ft. GFA: 757
Directional Distribution: 21% entering, 79% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.40	0.11 - 2.95	0.41

Data Plot and Equation



Industrial Park
(130)

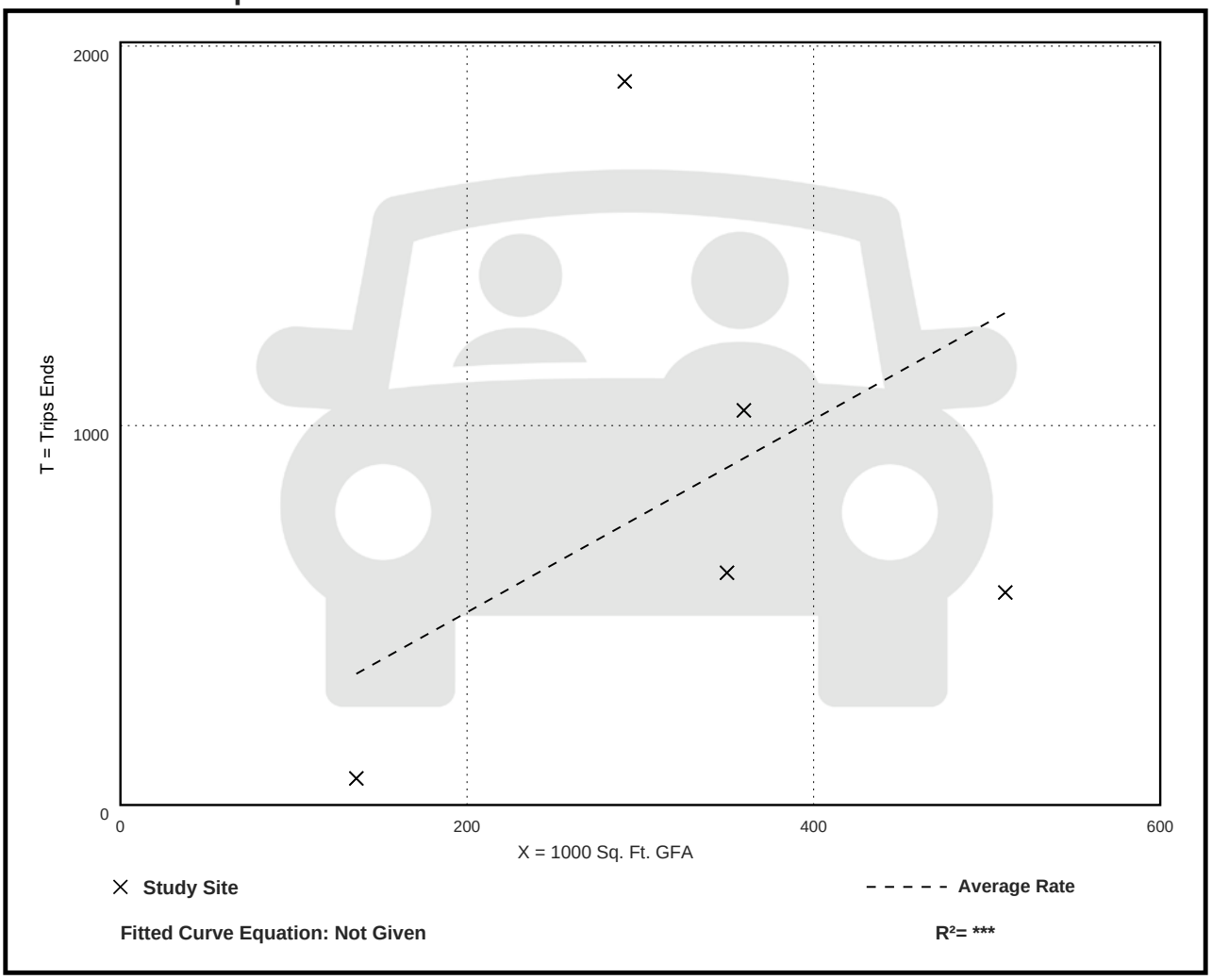
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. 1000 Sq. Ft. GFA: 329
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.54	0.51 - 6.55	2.23

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

Industrial Park
(130)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday, Peak Hour of Generator

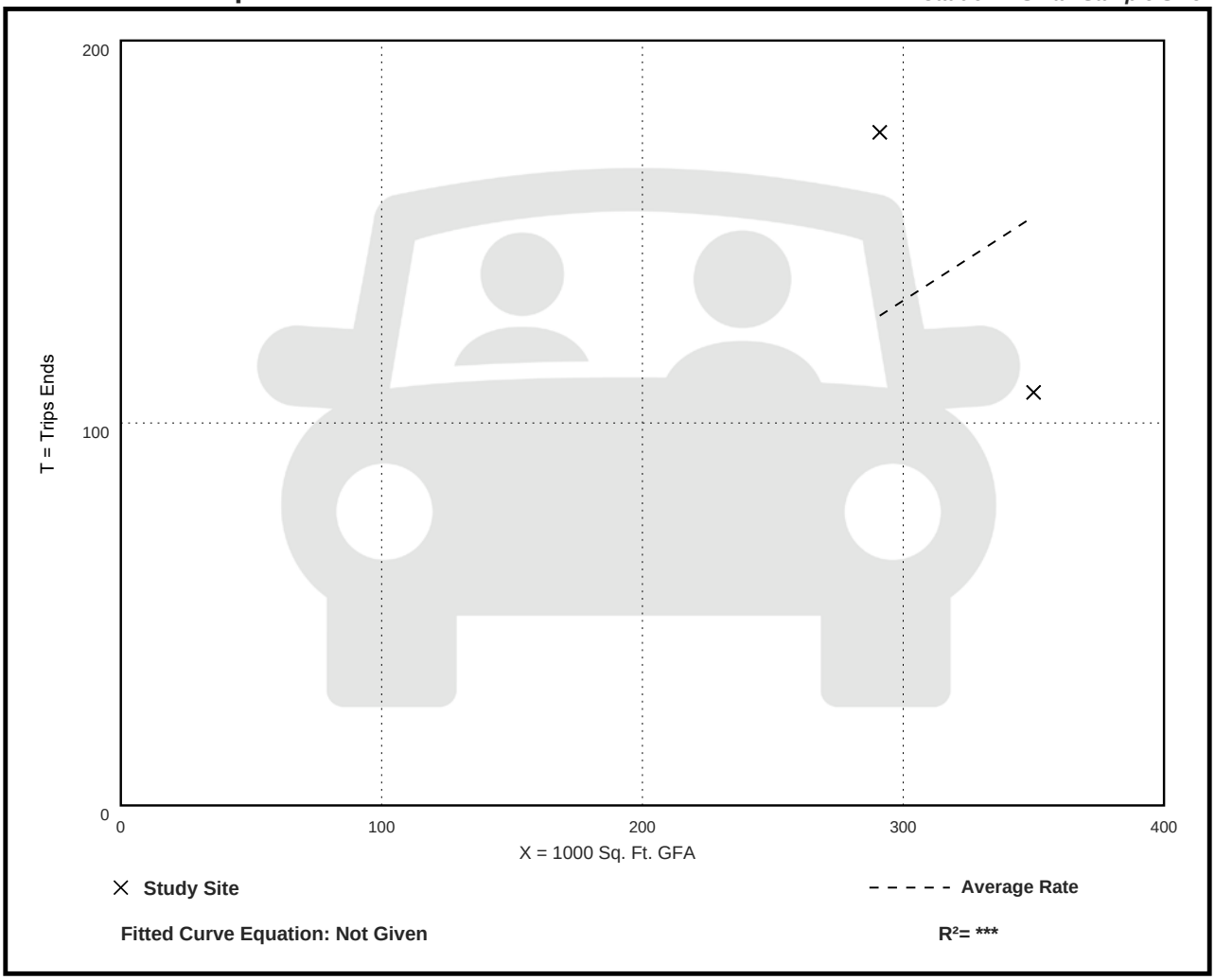
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 321
Directional Distribution: 32% entering, 68% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.44	0.31 - 0.60	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

Industrial Park
(130)

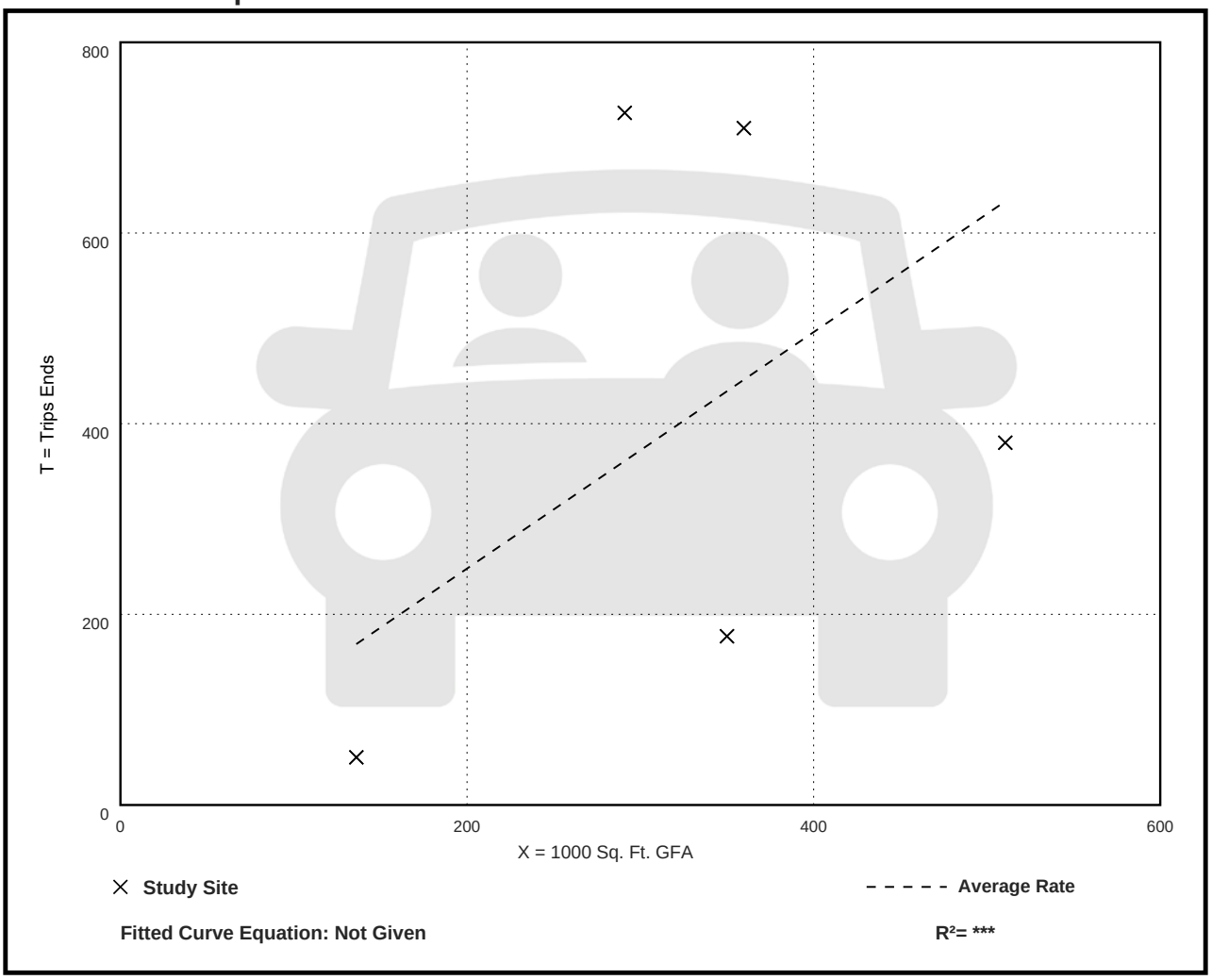
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Sunday

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. 1000 Sq. Ft. GFA: 329
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.24	0.37 - 2.49	0.90

Data Plot and Equation



Industrial Park
(130)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Sunday, Peak Hour of Generator

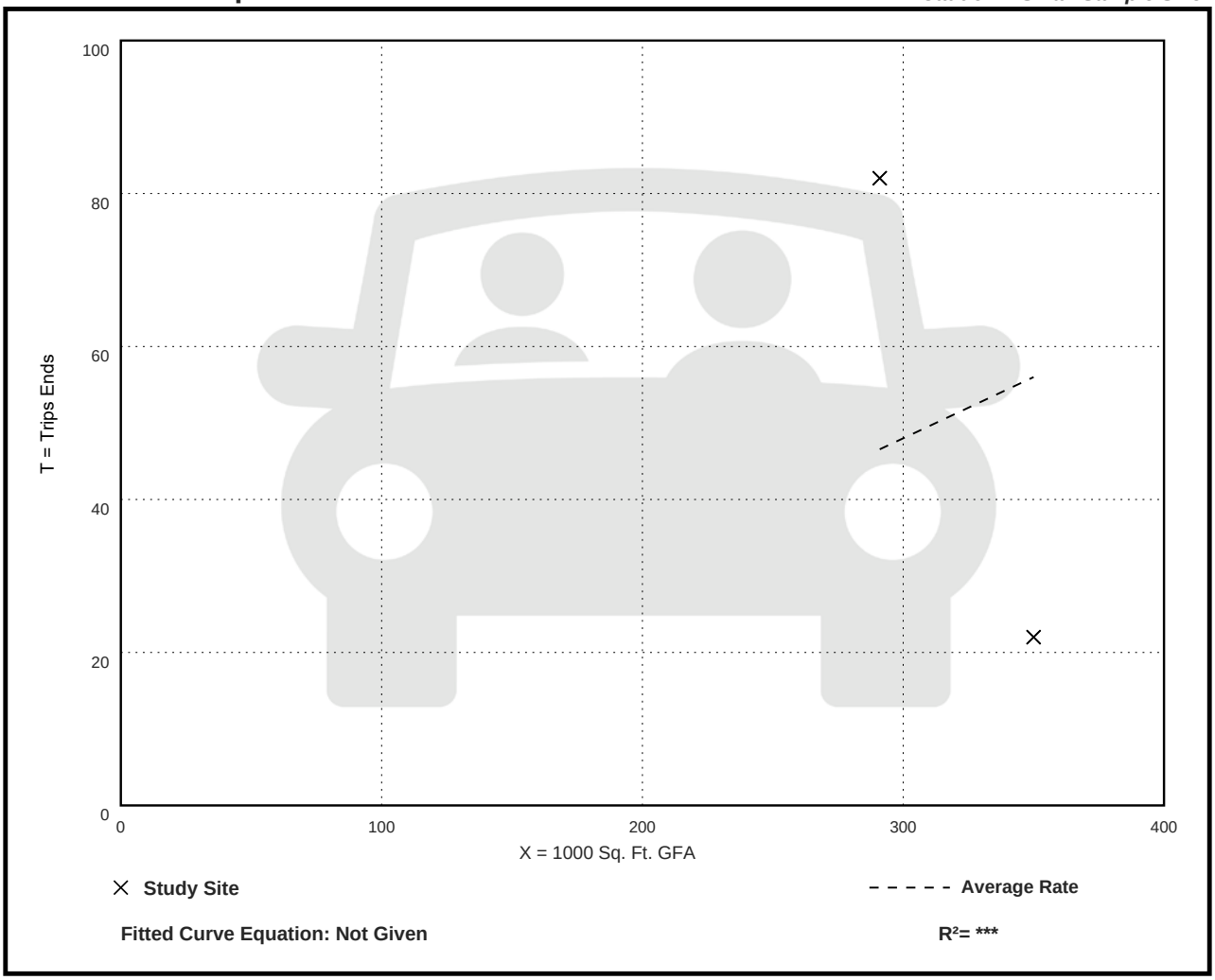
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 321
Directional Distribution: 46% entering, 54% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.16	0.06 - 0.28	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

Industrial Park
(130)

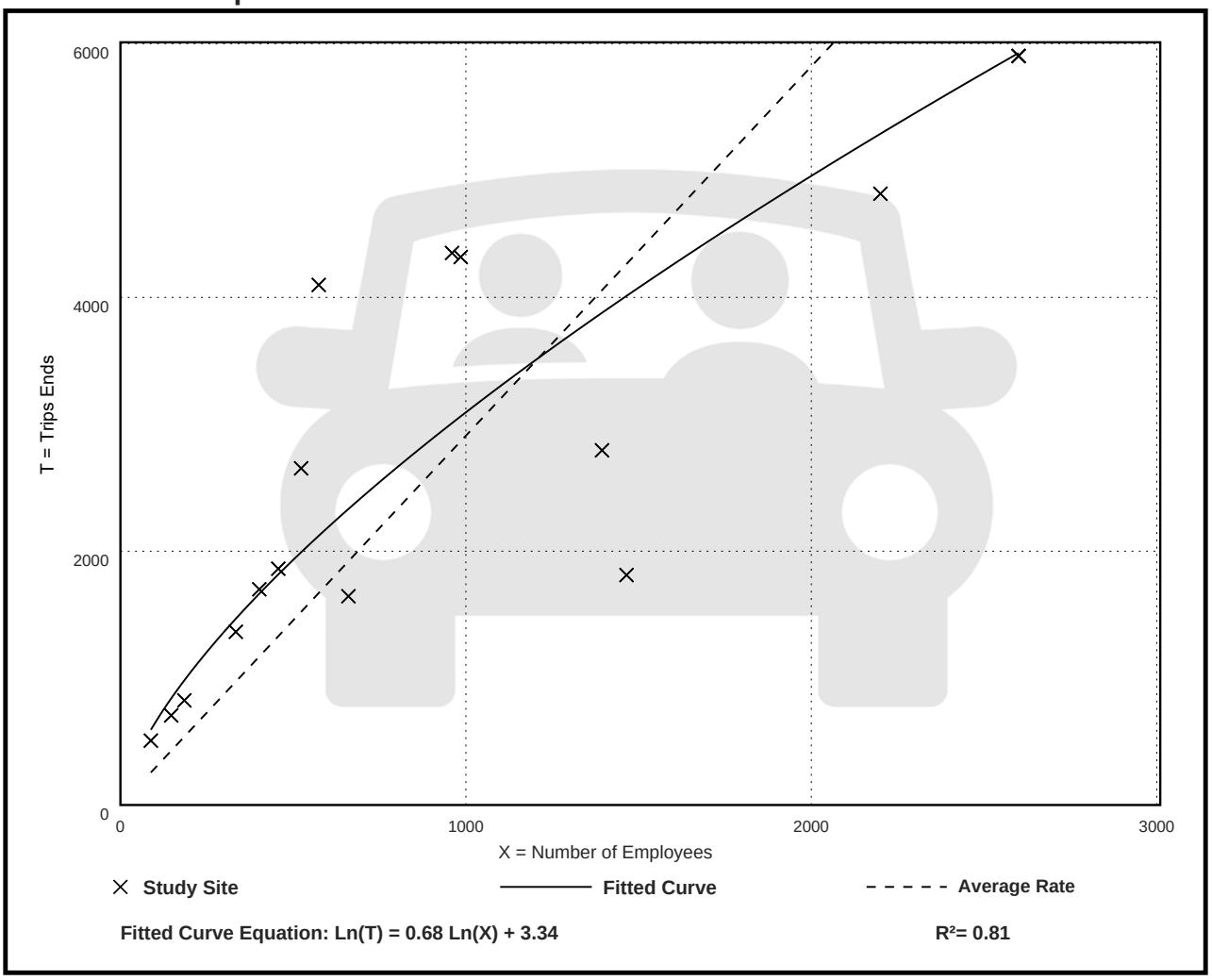
Vehicle Trip Ends vs: Employees
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 16
Avg. Num. of Employees: 973
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
2.91	1.24 - 7.14	1.42

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.68 Ln(X) + 3.34

R^2= 0.81

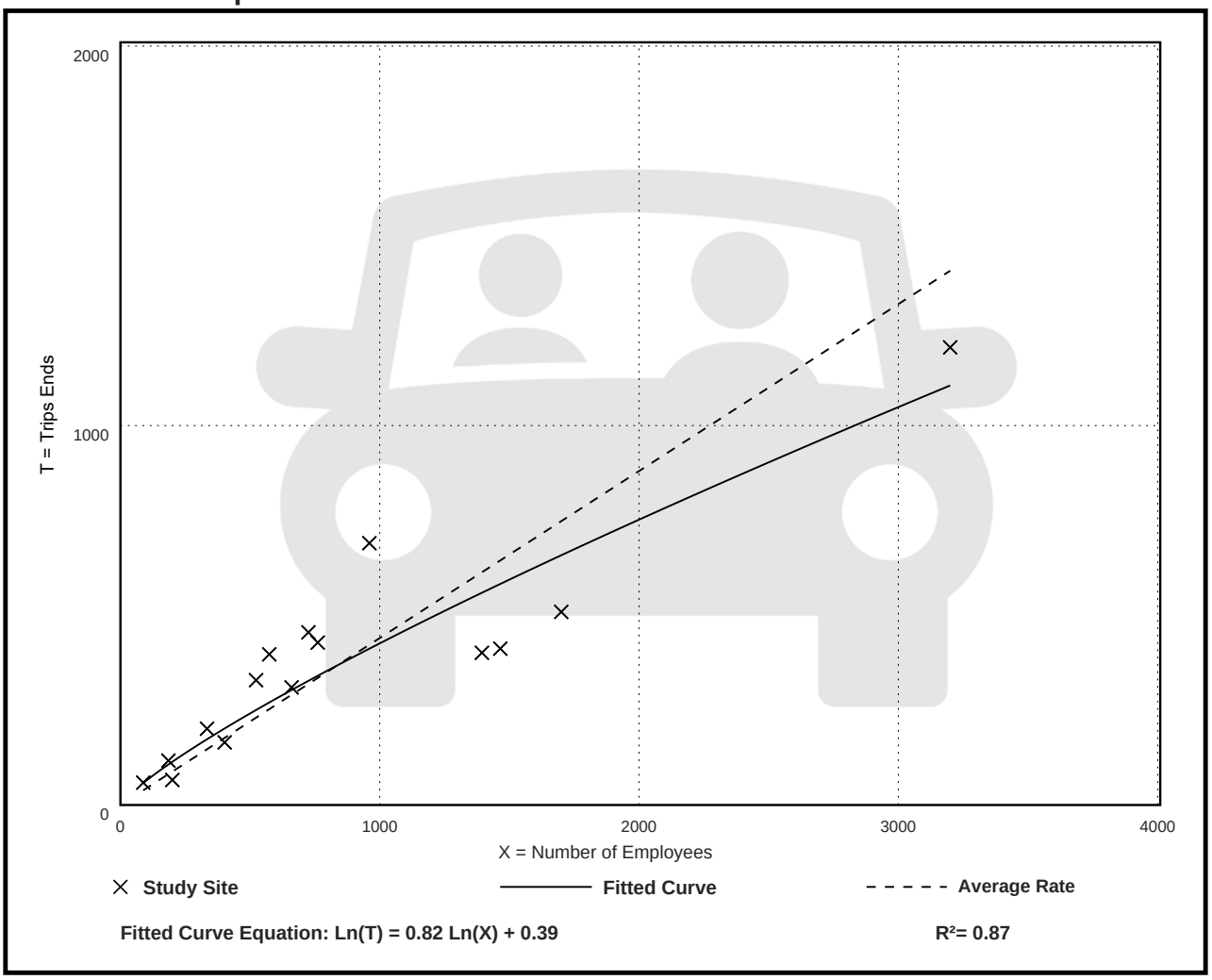
Industrial Park
(130)

Vehicle Trip Ends vs: Employees
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: 15
Avg. Num. of Employees: 878
Directional Distribution: 86% entering, 14% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.44	0.28 - 0.72	0.16

Data Plot and Equation



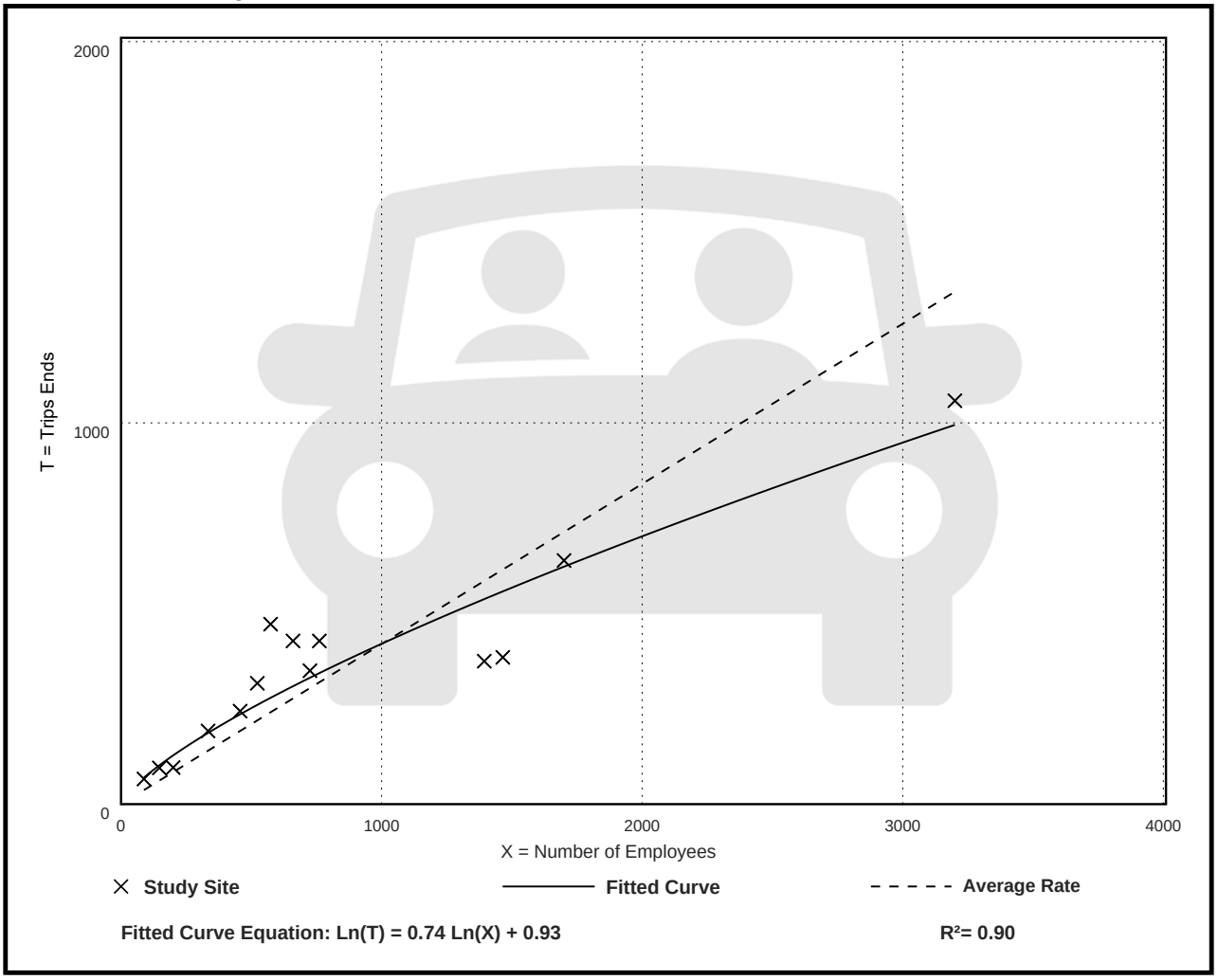
Industrial Park
(130)

Vehicle Trip Ends vs: Employees
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: 14
Avg. Num. of Employees: 873
Directional Distribution: 20% entering, 80% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.42	0.26 - 0.82	0.16

Data Plot and Equation



Industrial Park
(130)

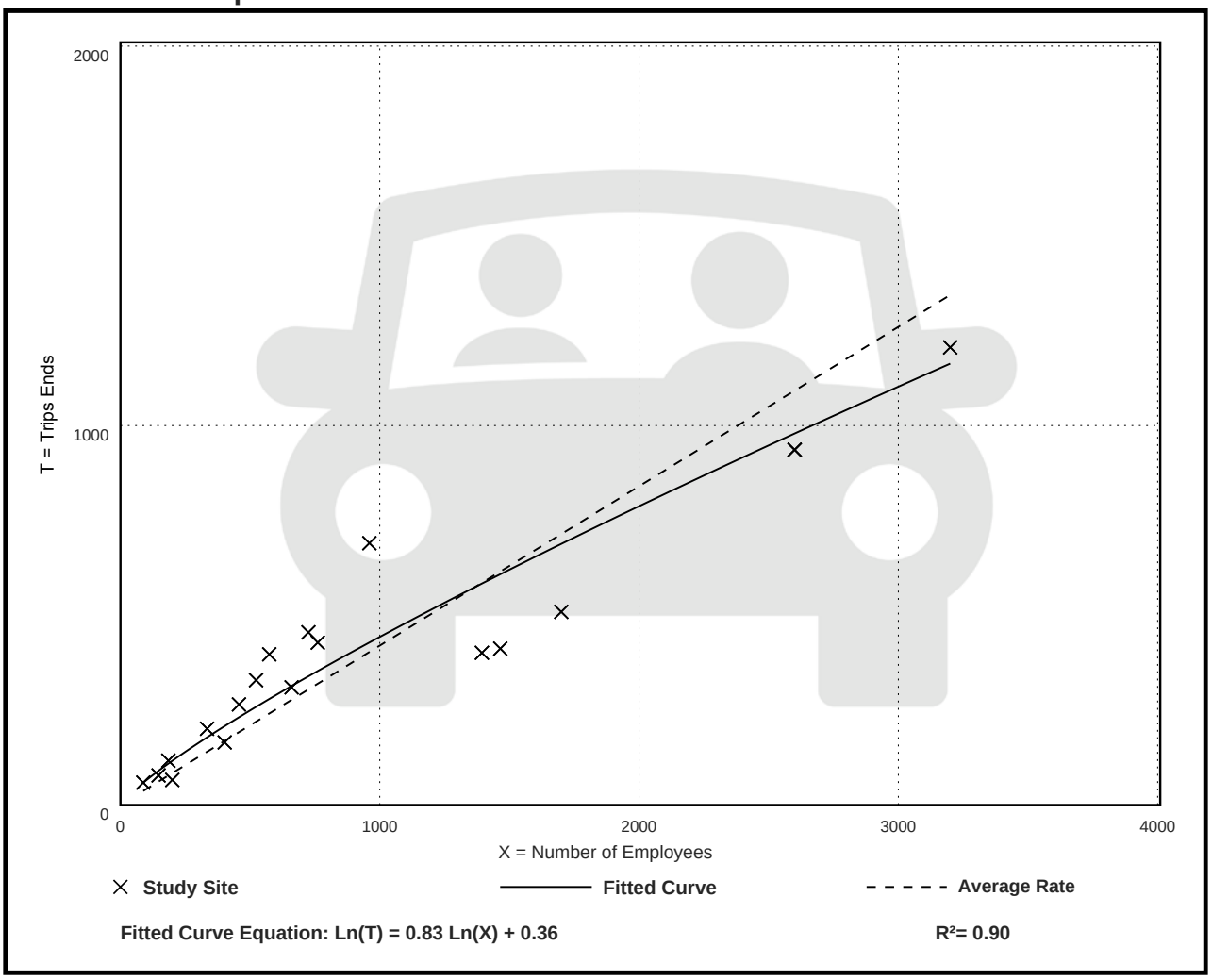
Vehicle Trip Ends vs: Employees
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 19
Avg. Num. of Employees: 999
Directional Distribution: 87% entering, 13% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.42	0.28 - 0.72	0.14

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.83 Ln(X) + 0.36

R^2= 0.90

Industrial Park
(130)

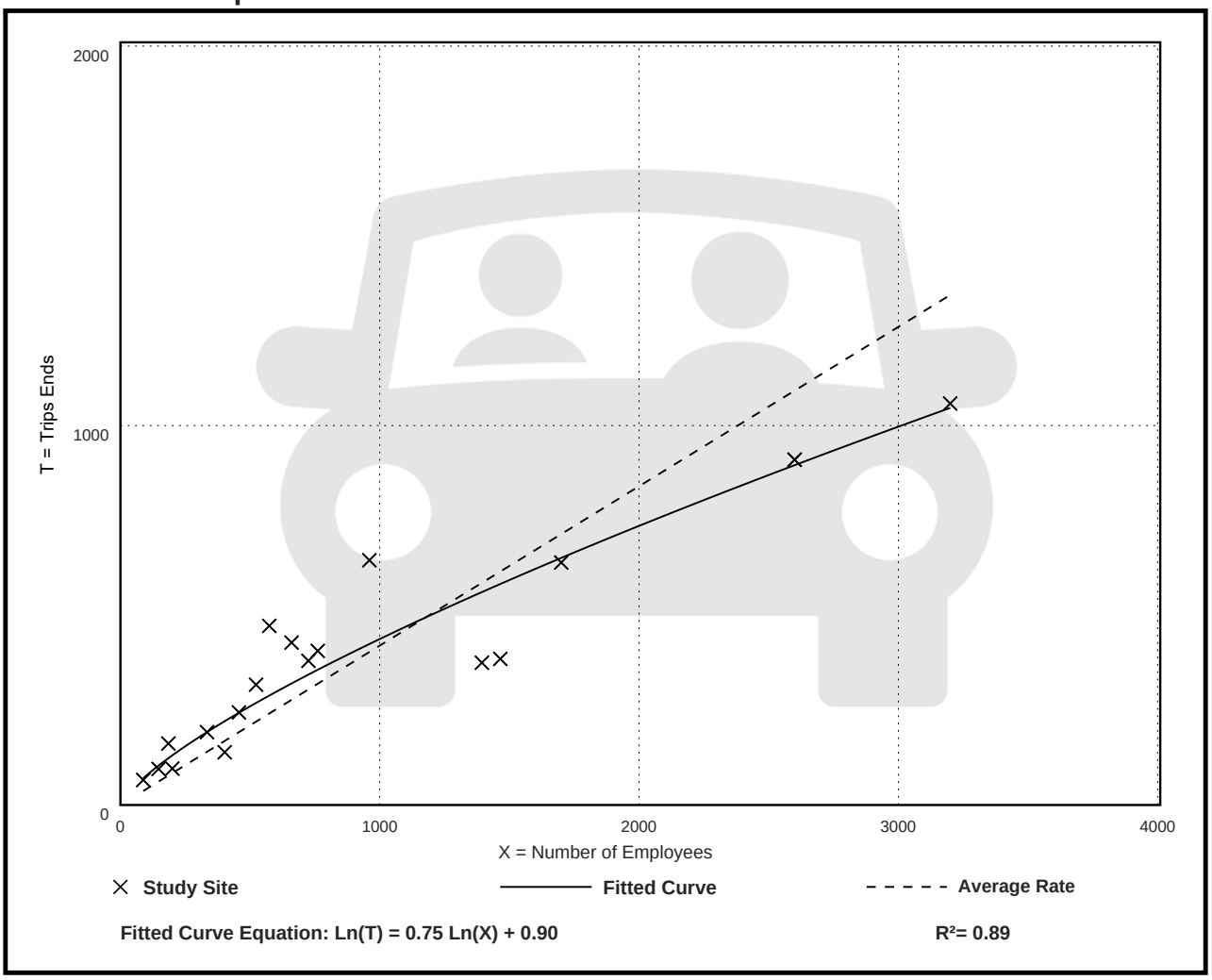
Vehicle Trip Ends vs: Employees
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 19
Avg. Num. of Employees: 999
Directional Distribution: 21% entering, 79% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.42	0.26 - 0.88	0.15

Data Plot and Equation



Industrial Park
(130)

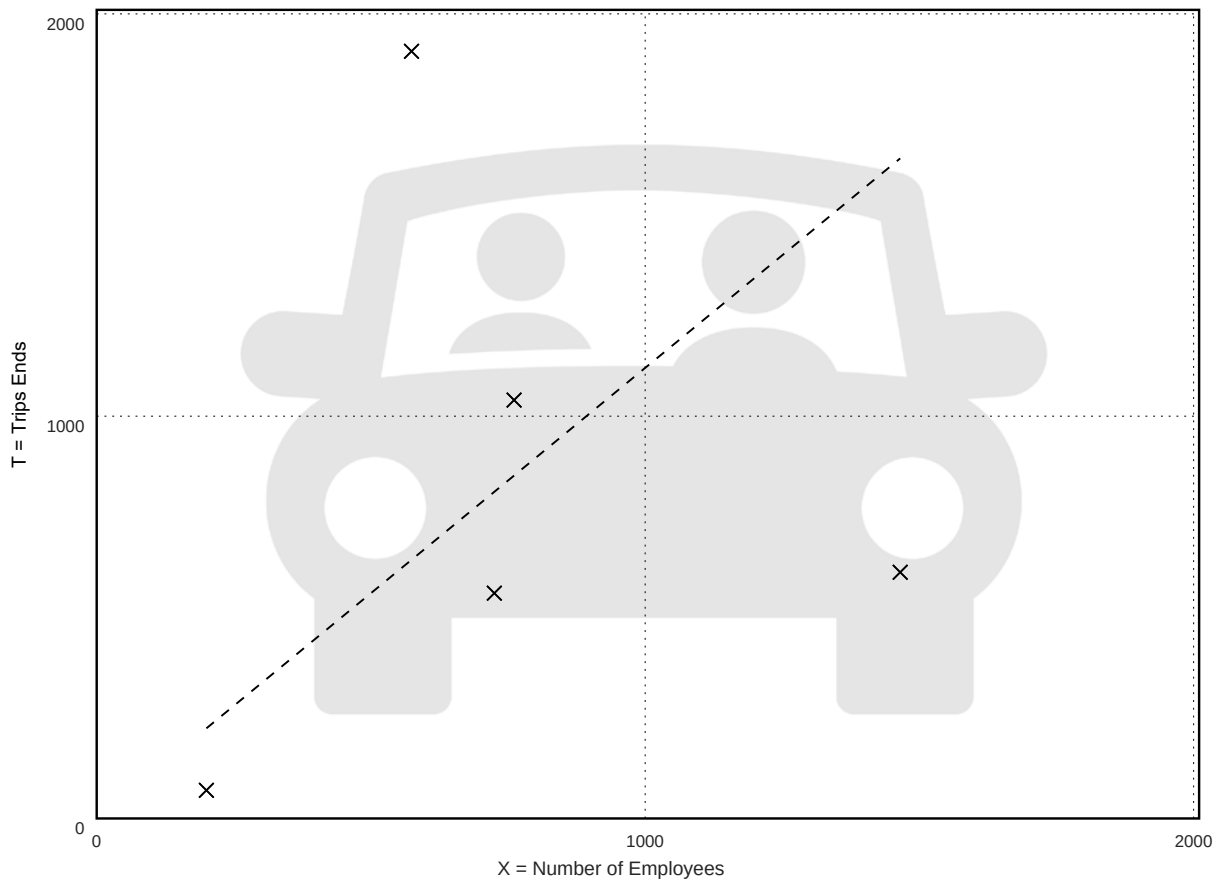
Vehicle Trip Ends vs: Employees
On a: Saturday

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. Num. of Employees: 745
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
1.12	0.35 - 3.32	1.12

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

Industrial Park
(130)

Vehicle Trip Ends vs: Employees
On a: Saturday, Peak Hour of Generator

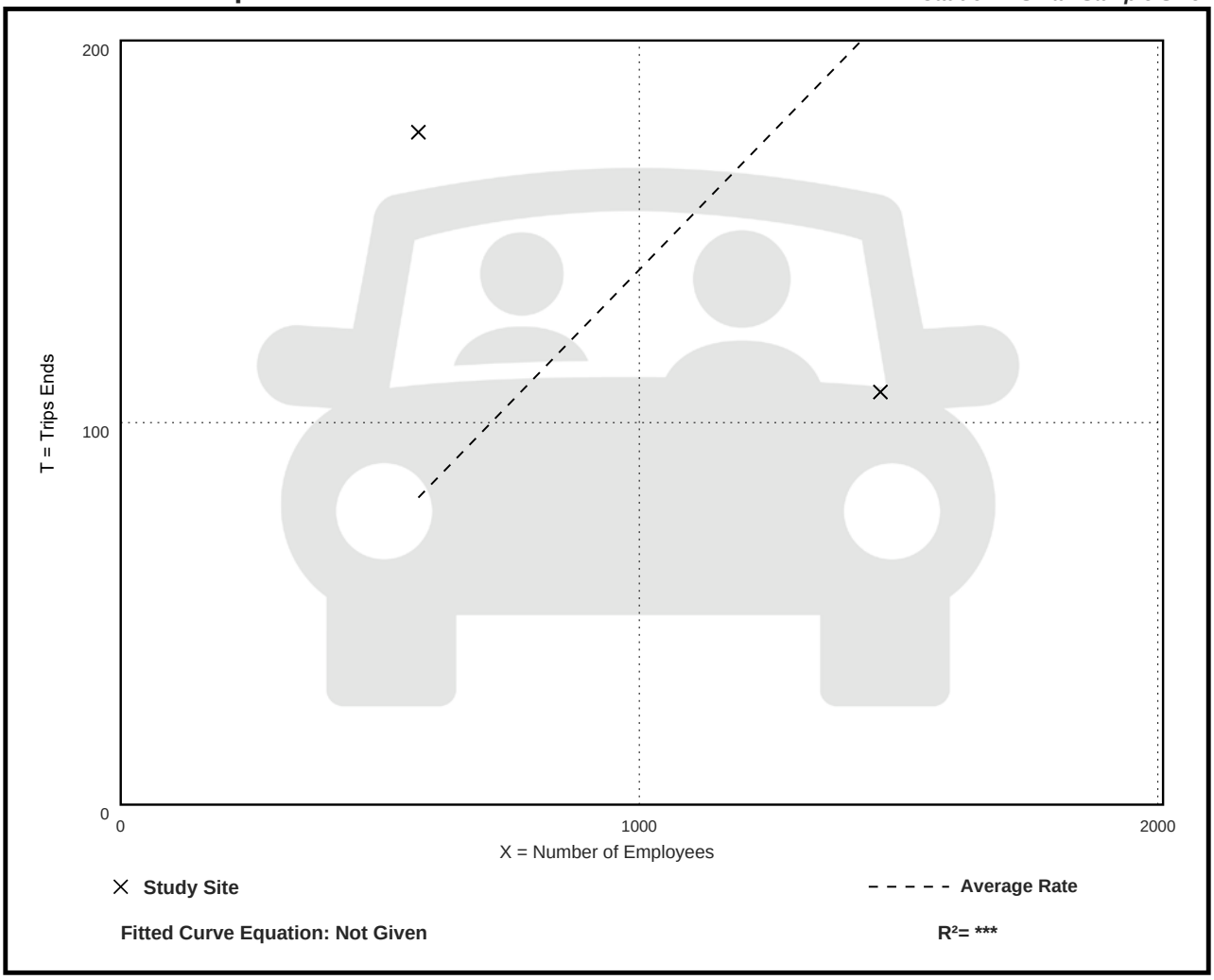
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. Num. of Employees: 1020
Directional Distribution: 32% entering, 68% exiting

Vehicle Trip Generation per Employee

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

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= ***

Industrial Park
(130)

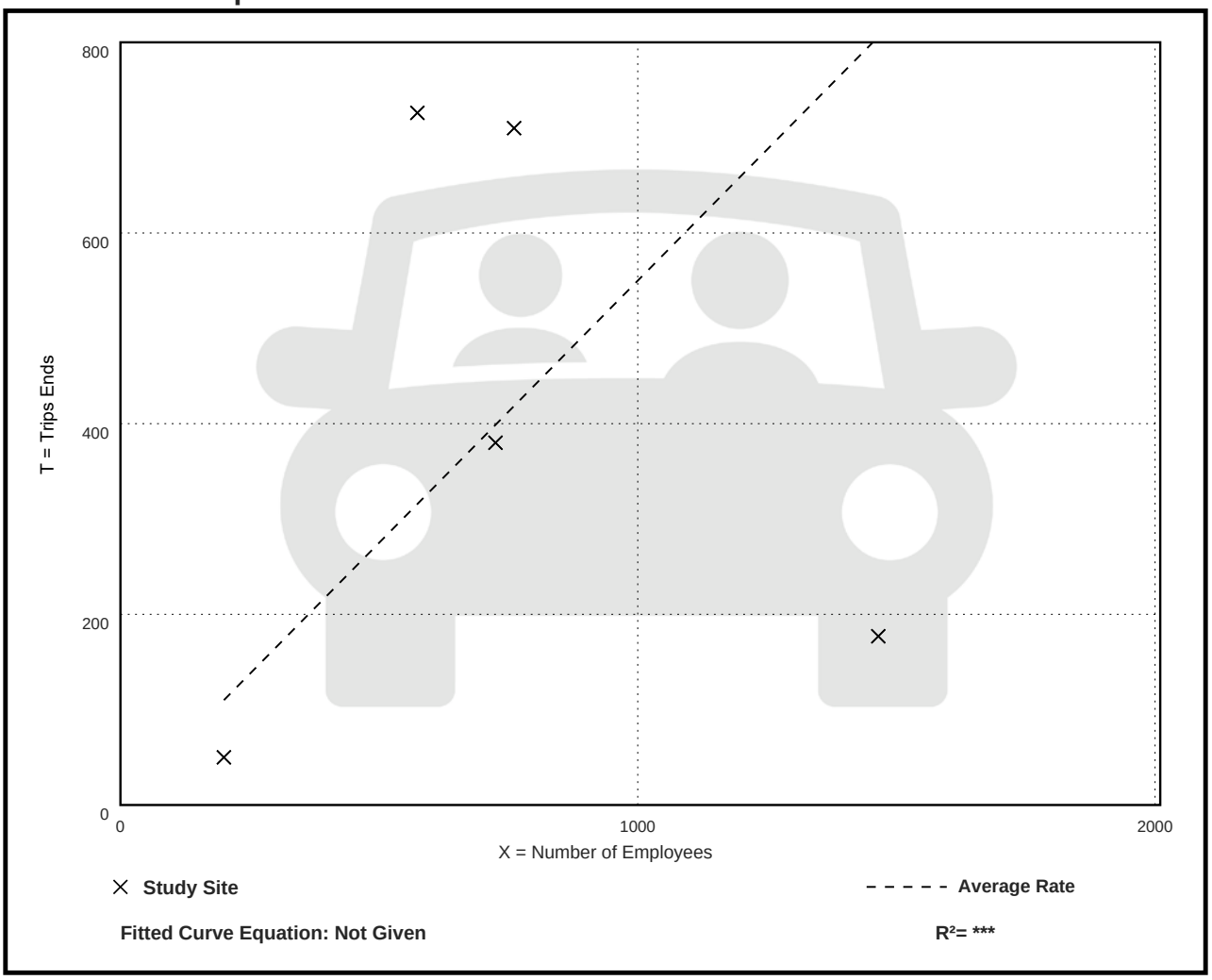
Vehicle Trip Ends vs: Employees
On a: Sunday

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. Num. of Employees: 745
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.55	0.12 - 1.26	0.48

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ***

Industrial Park
(130)

Vehicle Trip Ends vs: Employees
On a: Sunday, Peak Hour of Generator

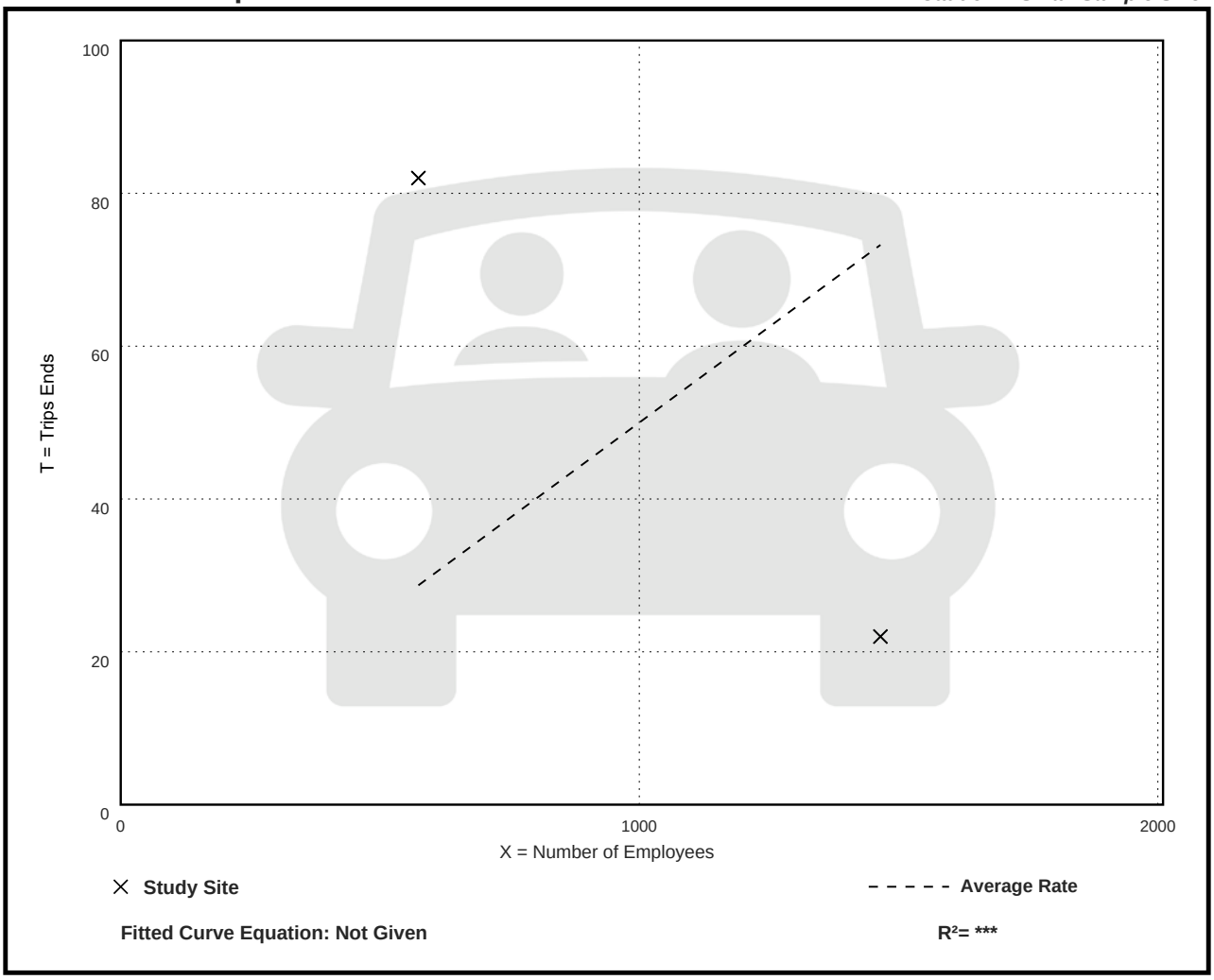
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. Num. of Employees: 1020
Directional Distribution: 46% entering, 54% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.05	0.02 - 0.14	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= ***

Industrial Park
(130)

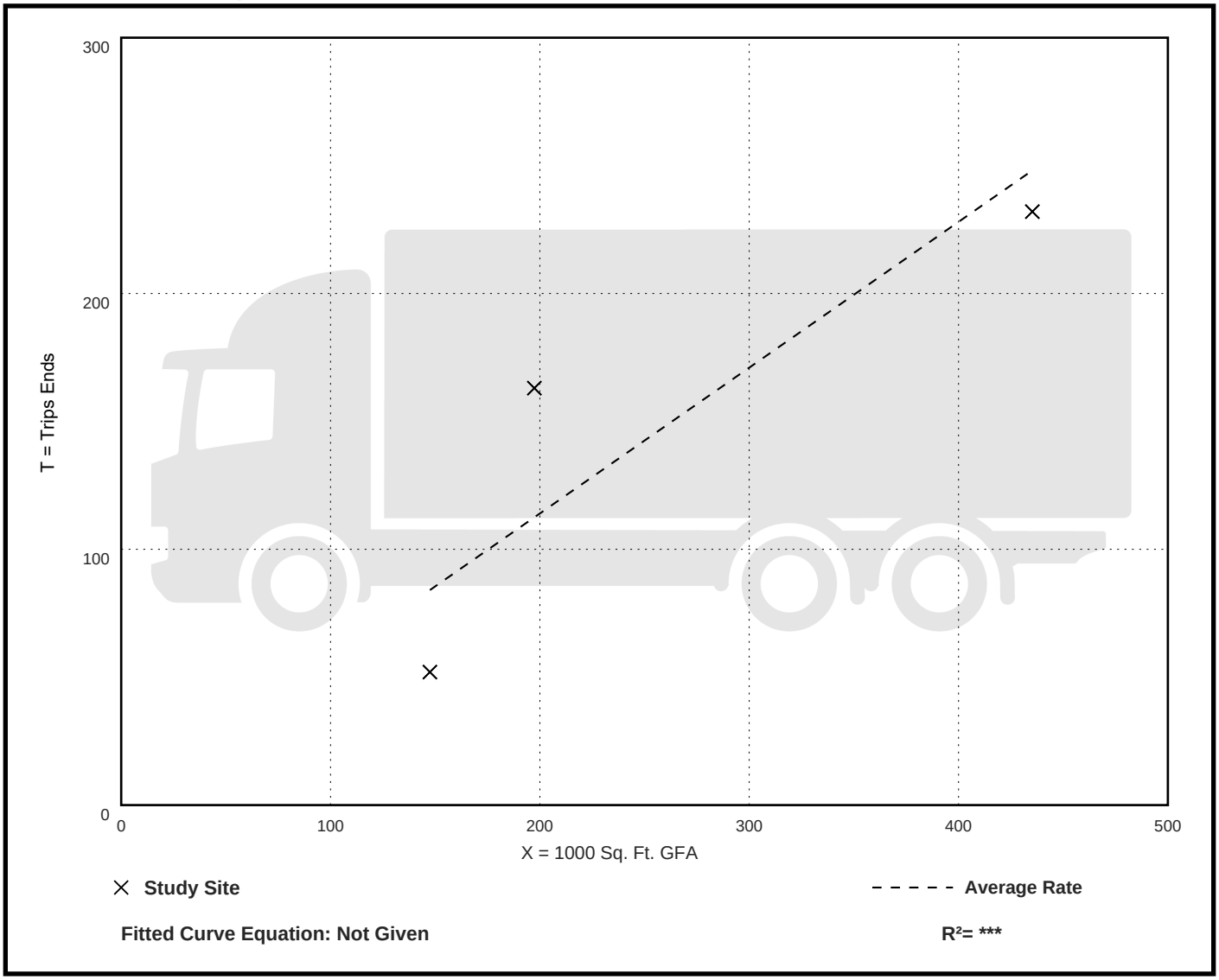
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 3
Avg. 1000 Sq. Ft. GFA: 260
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.57	0.35 - 0.83	0.20

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

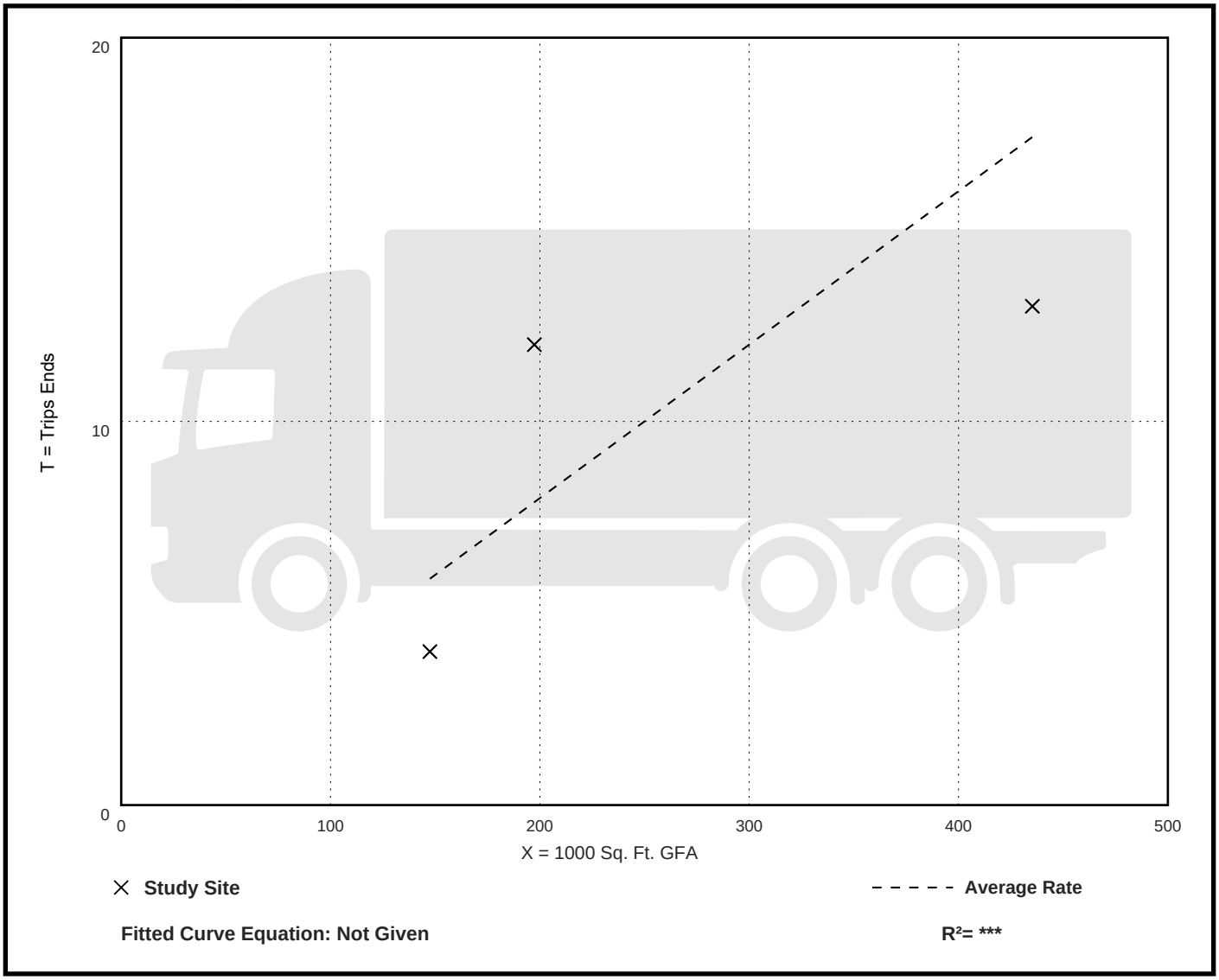
Industrial Park
(130)

Truck 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: 3
Avg. 1000 Sq. Ft. GFA: 260
Directional Distribution: 45% entering, 55% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.04	0.03 - 0.06	0.02

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

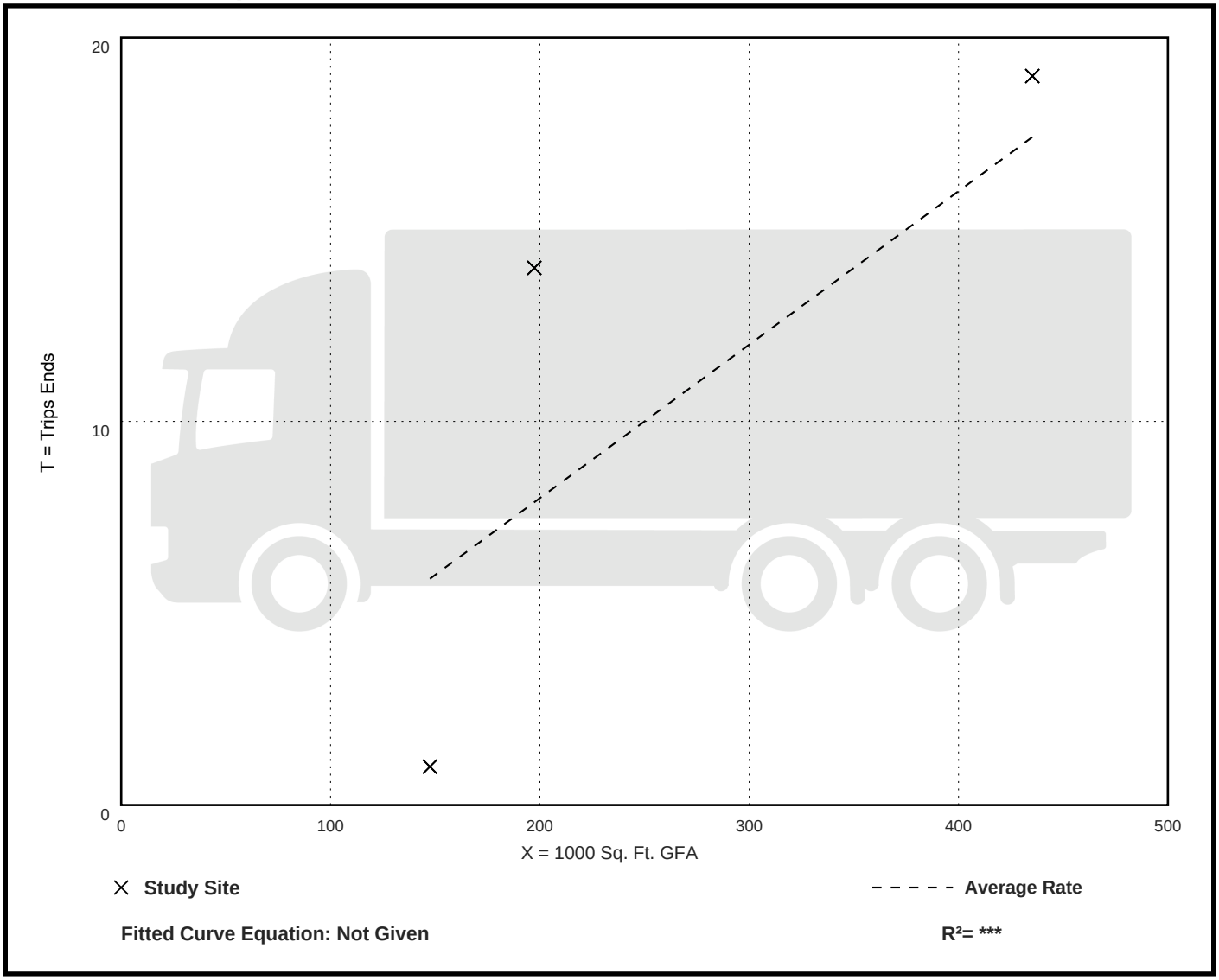
Industrial Park
(130)

Truck 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: 3
Avg. 1000 Sq. Ft. GFA: 260
Directional Distribution: 38% entering, 62% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.04	0.01 - 0.07	0.03

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

Industrial Park
(130)

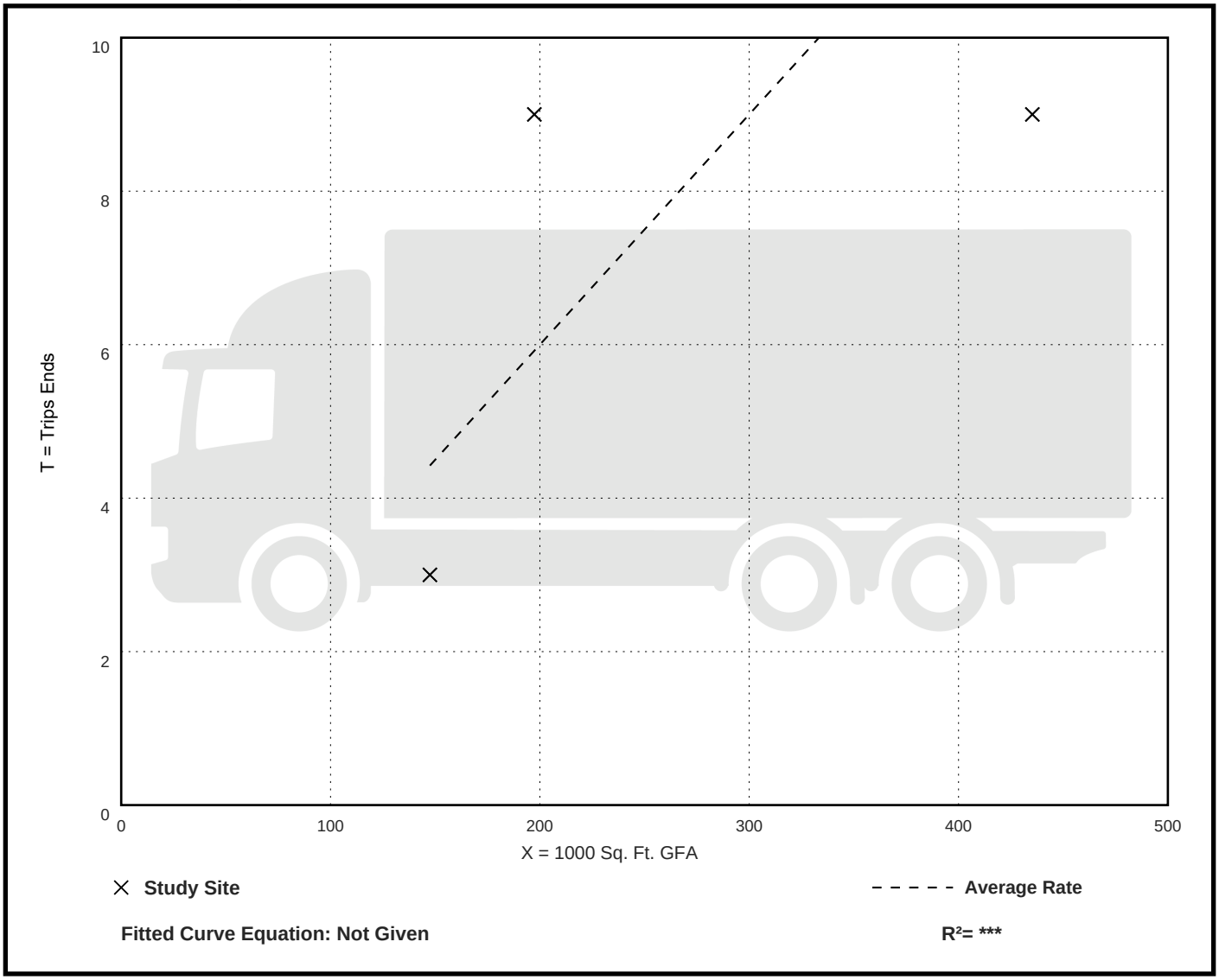
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 3
Avg. 1000 Sq. Ft. GFA: 260
Directional Distribution: 67% entering, 33% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.03	0.02 - 0.05	0.01

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

Industrial Park
(130)

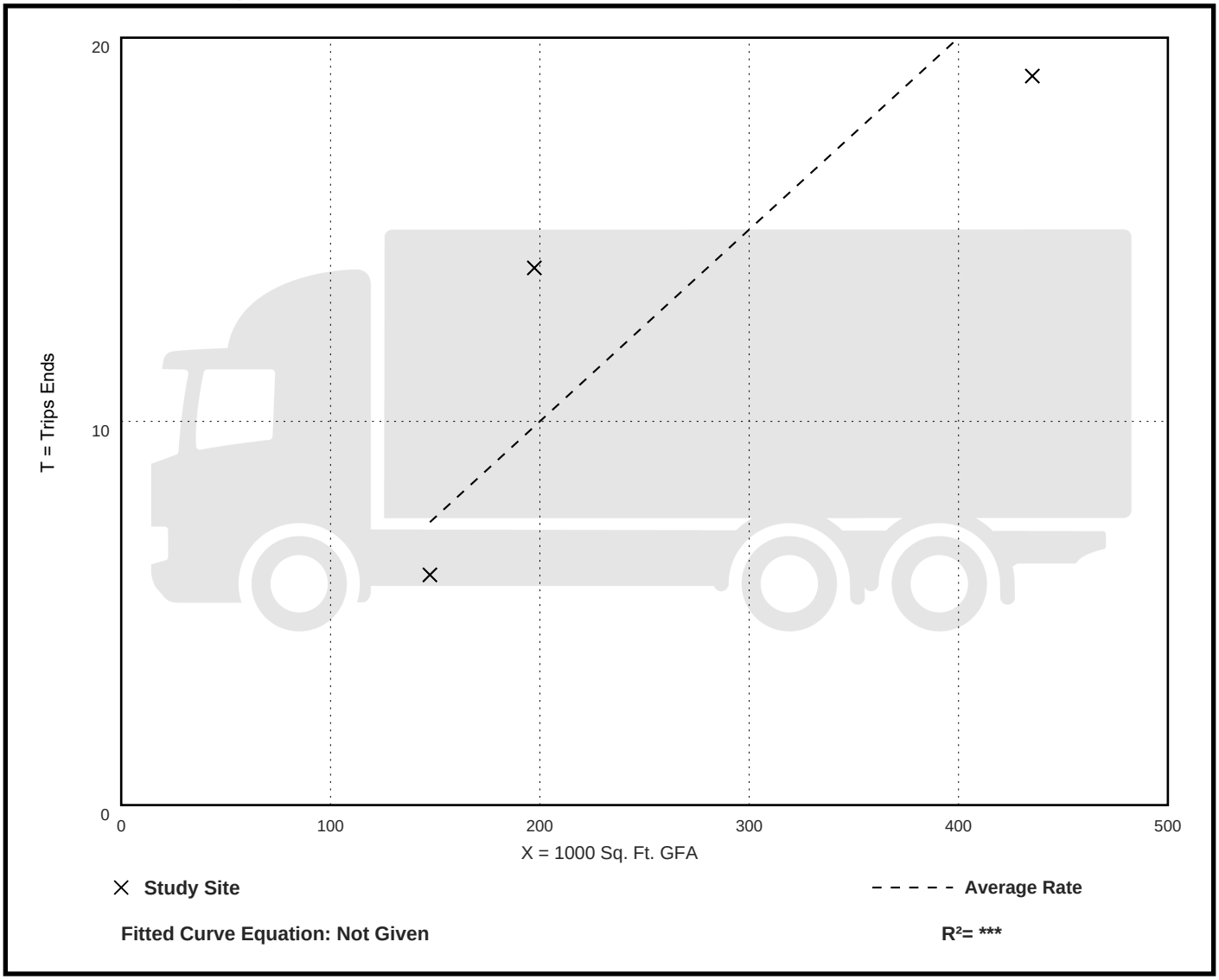
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 3
Avg. 1000 Sq. Ft. GFA: 260
Directional Distribution: 38% entering, 62% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.05	0.04 - 0.07	0.01

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

Land Use: 140
Manufacturing

Description

A manufacturing facility is an area where the primary activity is the conversion of raw materials or parts into finished products. Size and type of activity may vary substantially from one facility to another. In addition to the actual production of goods, a manufacturing facility typically has an office and may provide space for warehouse, research, and associated functions. General light industrial (Land Use 110) and industrial park (Land Use 130) 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, Minnesota, Missouri, New Jersey, New York, Oregon, Pennsylvania, South Dakota, Texas, Vermont, Washington, and West Virginia.

Source Numbers

177, 179, 184, 241, 357, 384, 418, 443, 583, 598, 611, 728, 747, 875, 879, 940, 969, 1067, 1068, 1082

Manufacturing
(140)

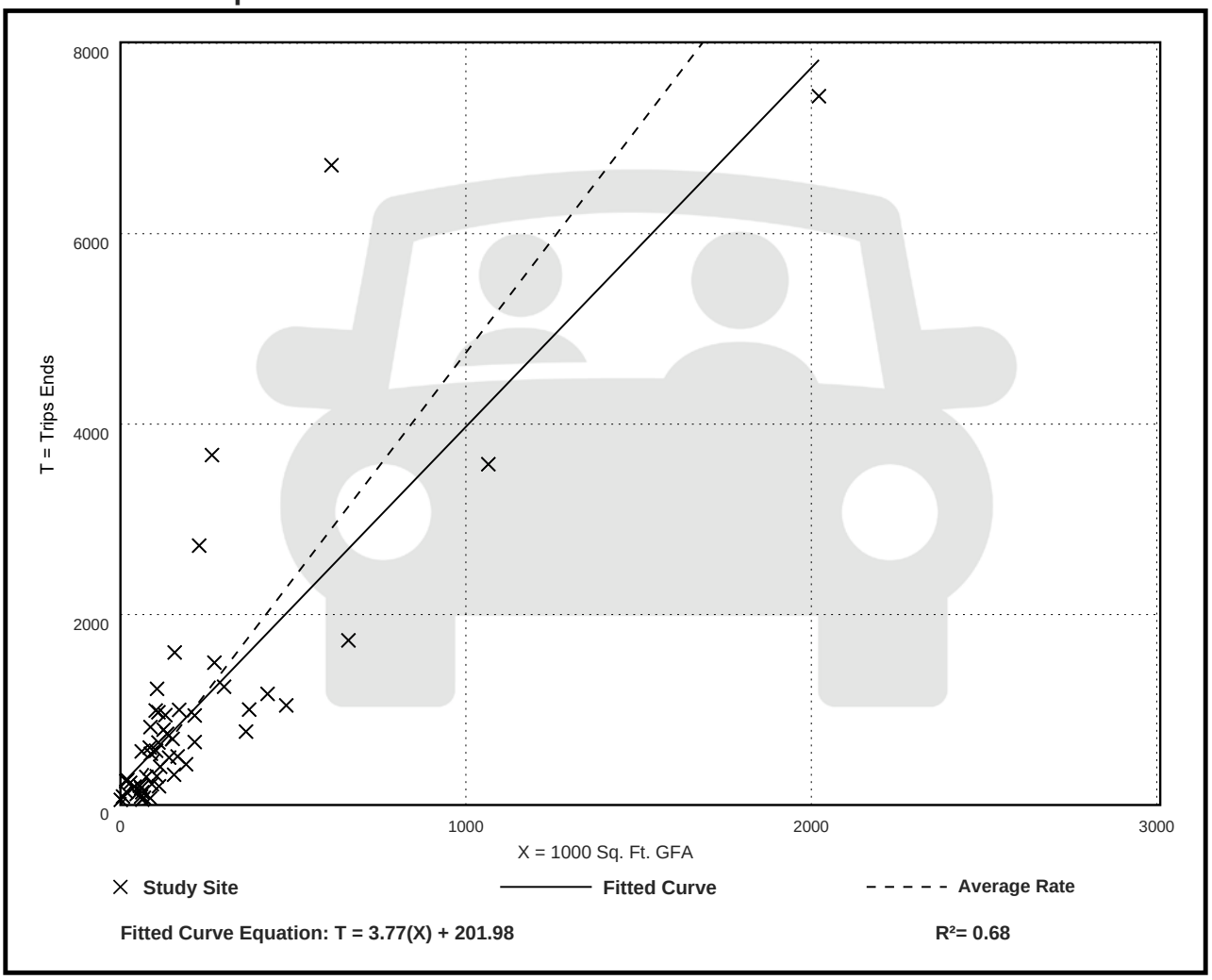
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 53
Avg. 1000 Sq. Ft. GFA: 208
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
4.75	0.83 - 49.50	3.20

Data Plot and Equation



Fitted Curve Equation: T = 3.77(X) + 201.98

R^2= 0.68

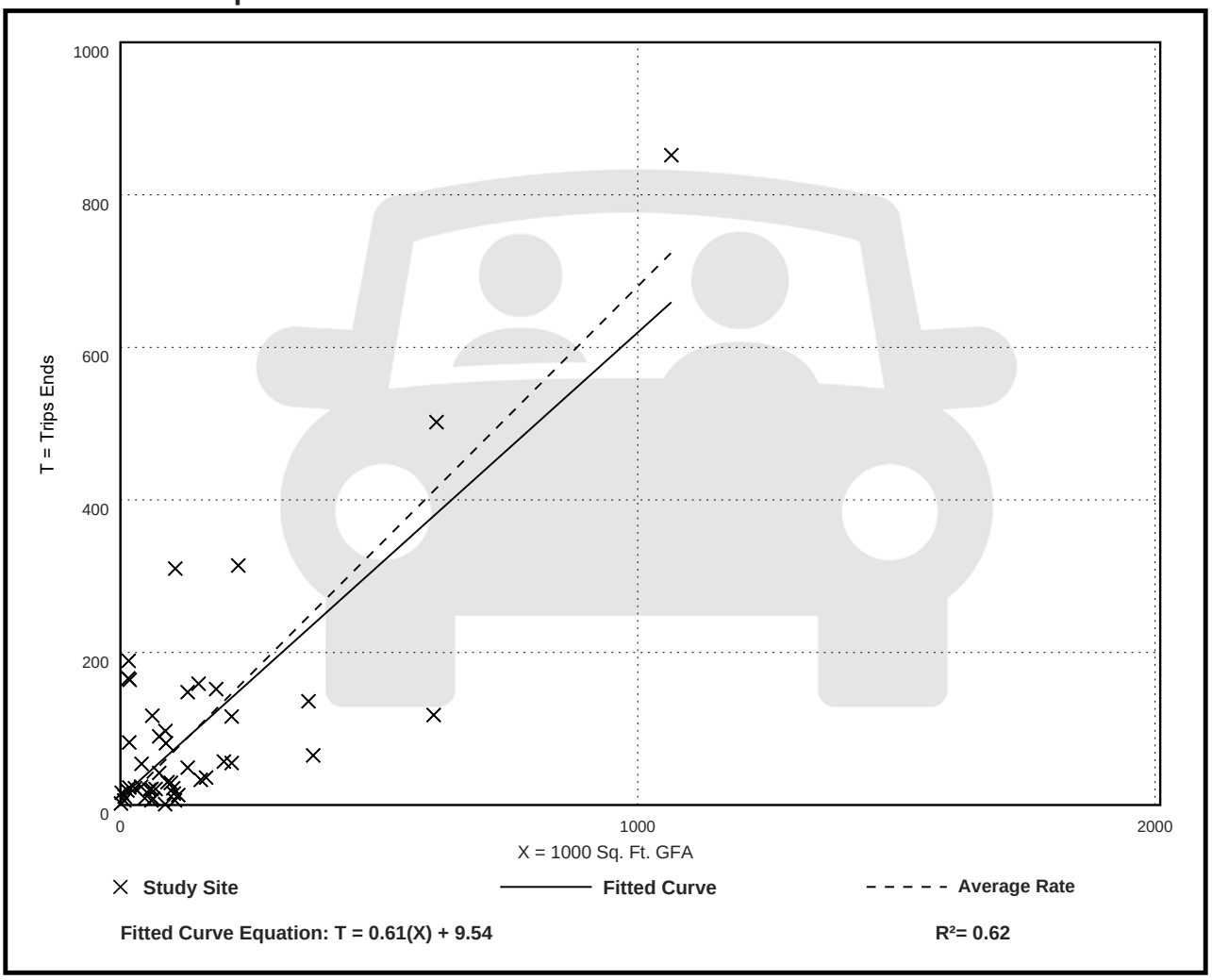
Manufacturing
(140)

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: 48
Avg. 1000 Sq. Ft. GFA: 138
Directional Distribution: 76% entering, 24% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.68	0.01 - 11.93	1.03

Data Plot and Equation



Fitted Curve Equation: T = 0.61(X) + 9.54

R^2= 0.62

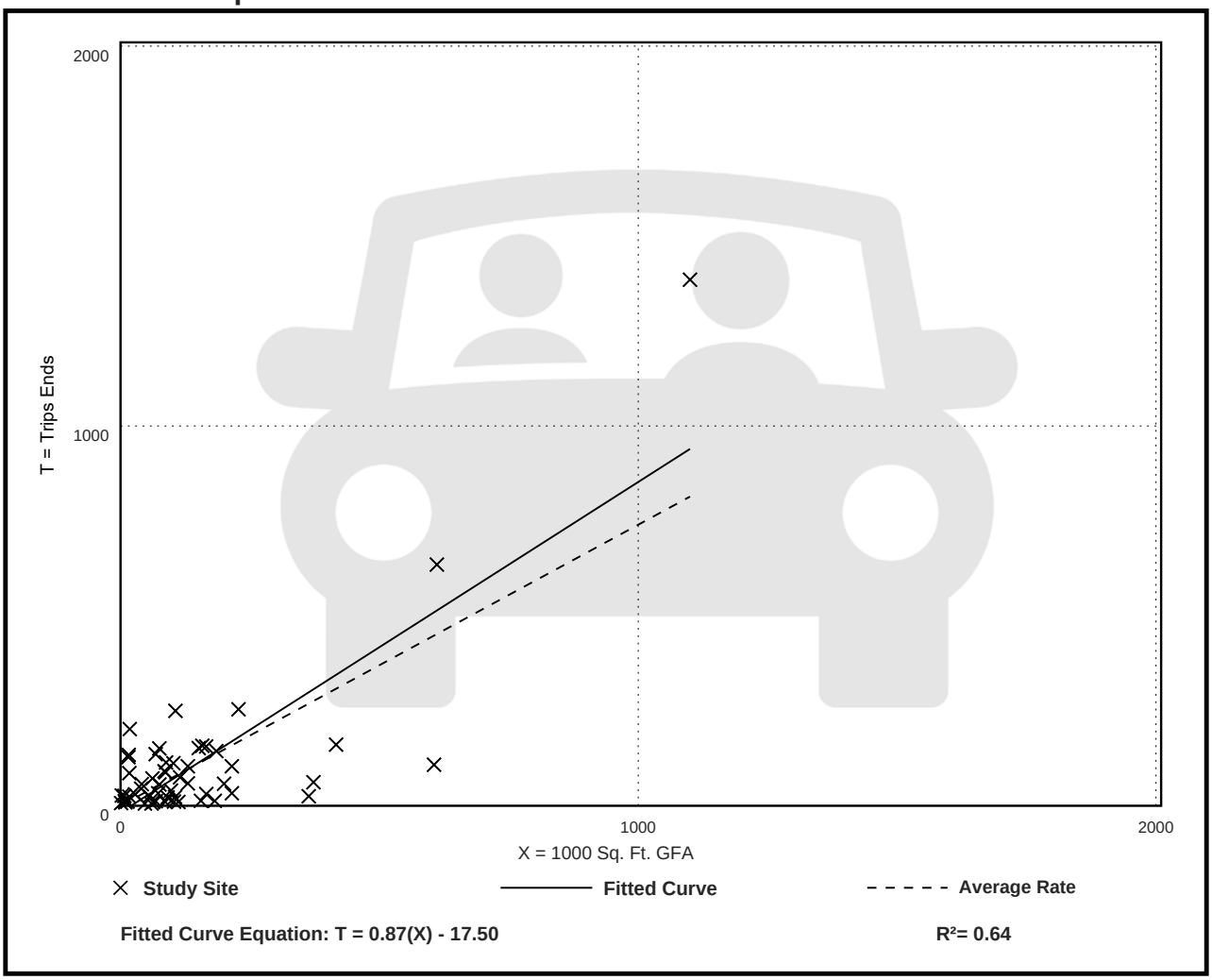
Manufacturing
(140)

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: 55
Avg. 1000 Sq. Ft. GFA: 142
Directional Distribution: 31% entering, 69% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.74	0.07 - 11.37	0.93

Data Plot and Equation



Fitted Curve Equation: T = 0.87(X) - 17.50

R^2= 0.64

Manufacturing
(140)

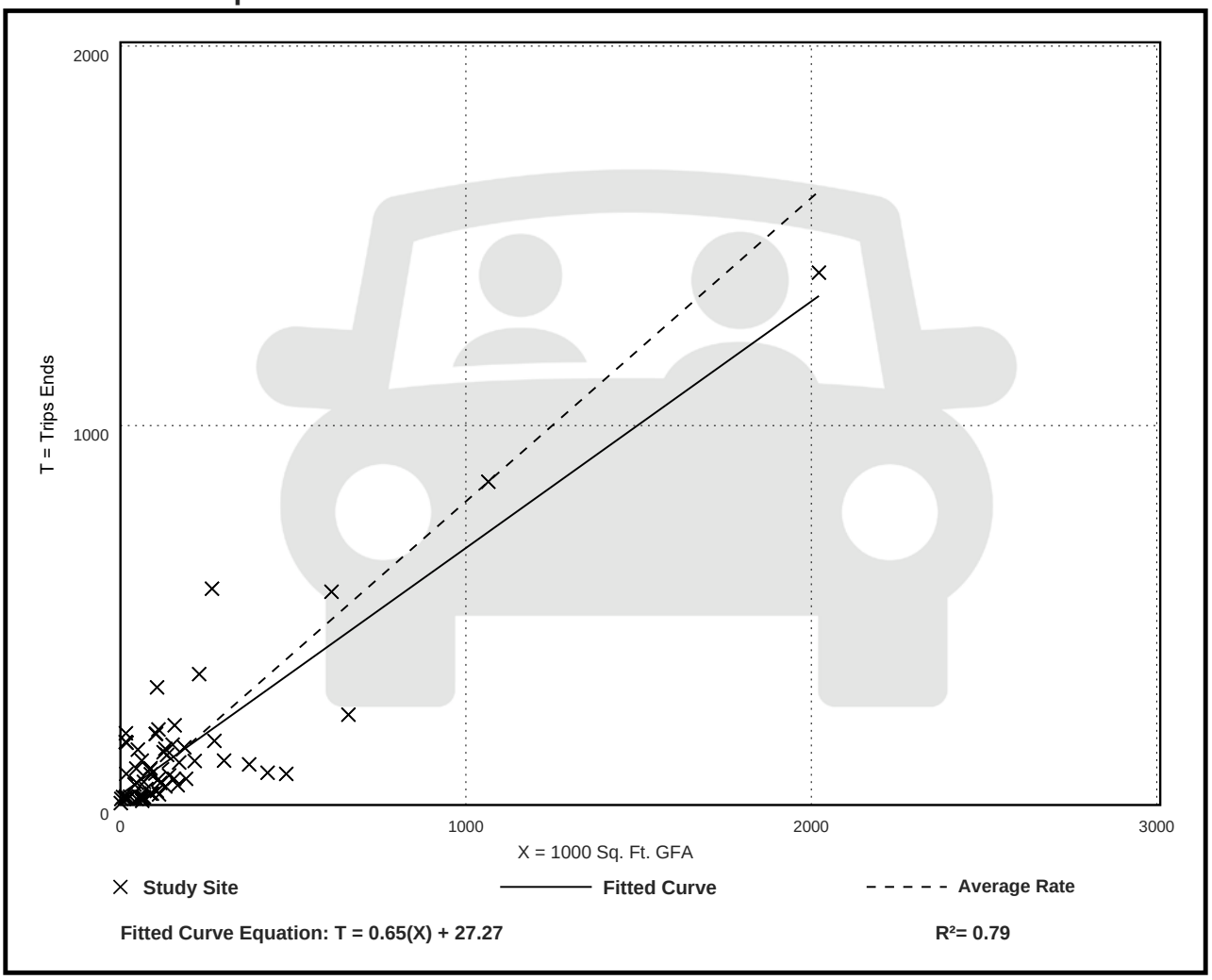
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 62
Avg. 1000 Sq. Ft. GFA: 178
Directional Distribution: 73% entering, 27% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.80	0.17 - 11.93	0.87

Data Plot and Equation



Fitted Curve Equation: T = 0.65(X) + 27.27

R^2= 0.79

Manufacturing
(140)

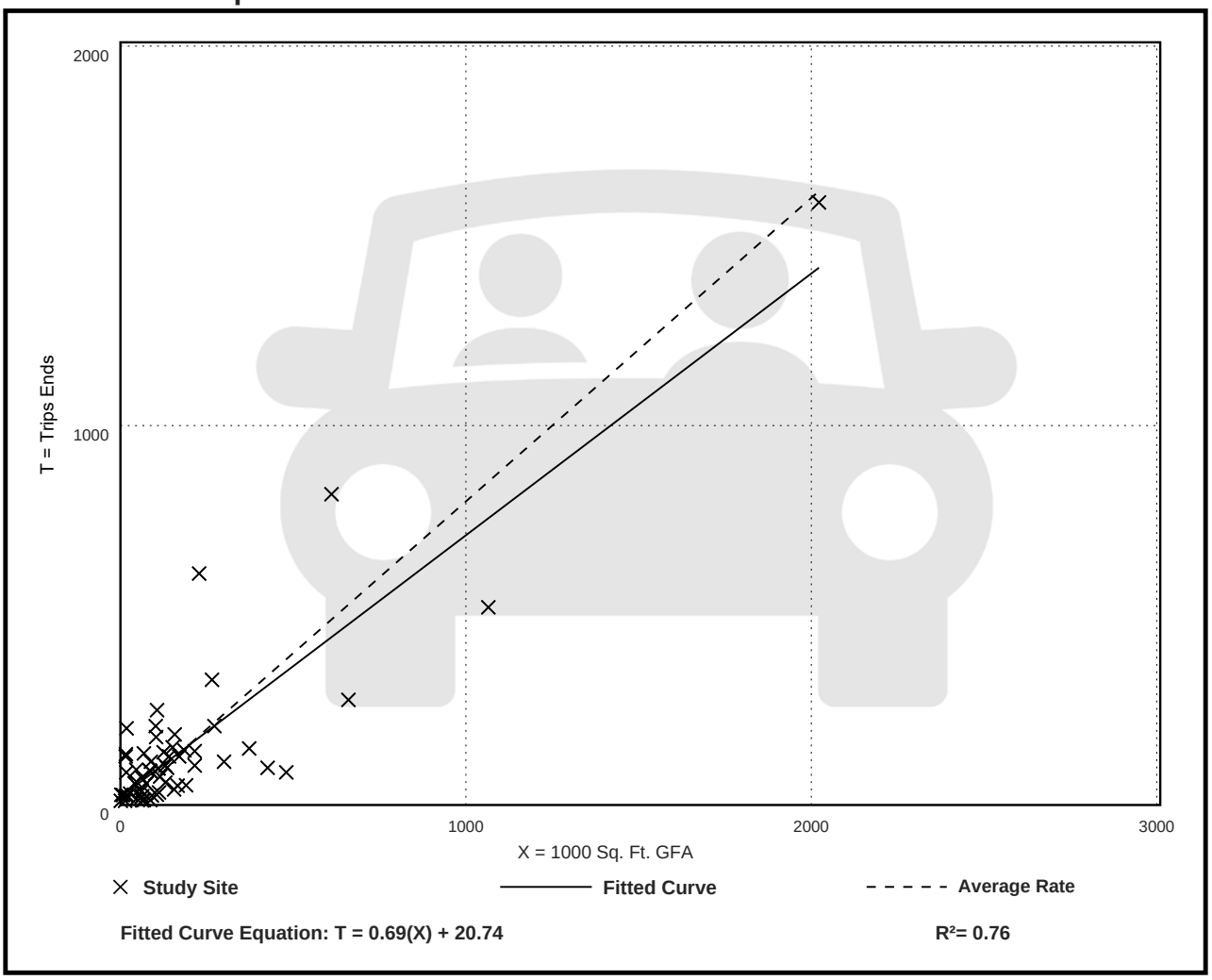
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 62
Avg. 1000 Sq. Ft. GFA: 180
Directional Distribution: 42% entering, 58% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.80	0.15 - 11.37	0.82

Data Plot and Equation



Fitted Curve Equation: T = 0.69(X) + 20.74

R^2= 0.76

Manufacturing
(140)

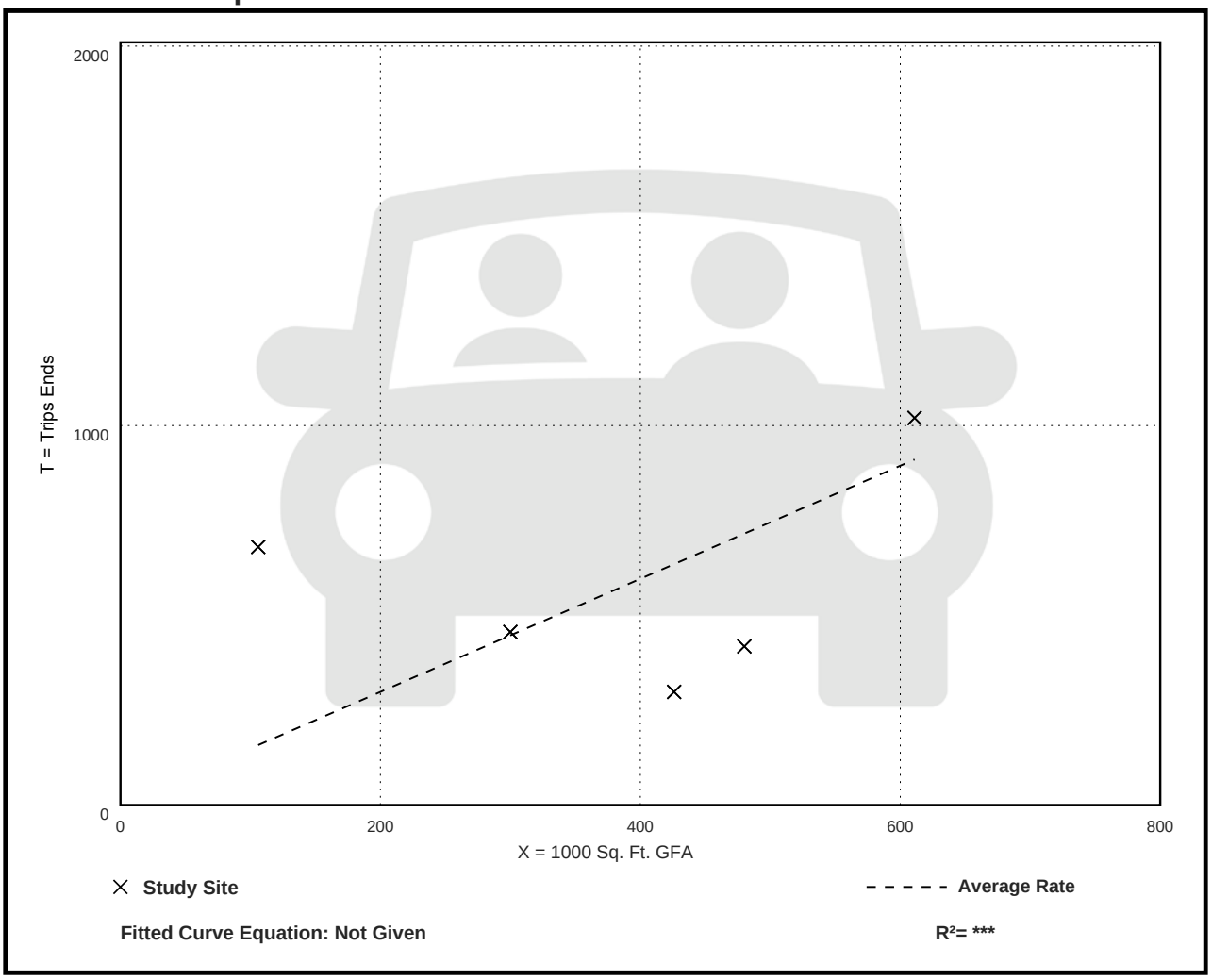
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. 1000 Sq. Ft. GFA: 385
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.49	0.70 - 6.42	1.41

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

Manufacturing
(140)

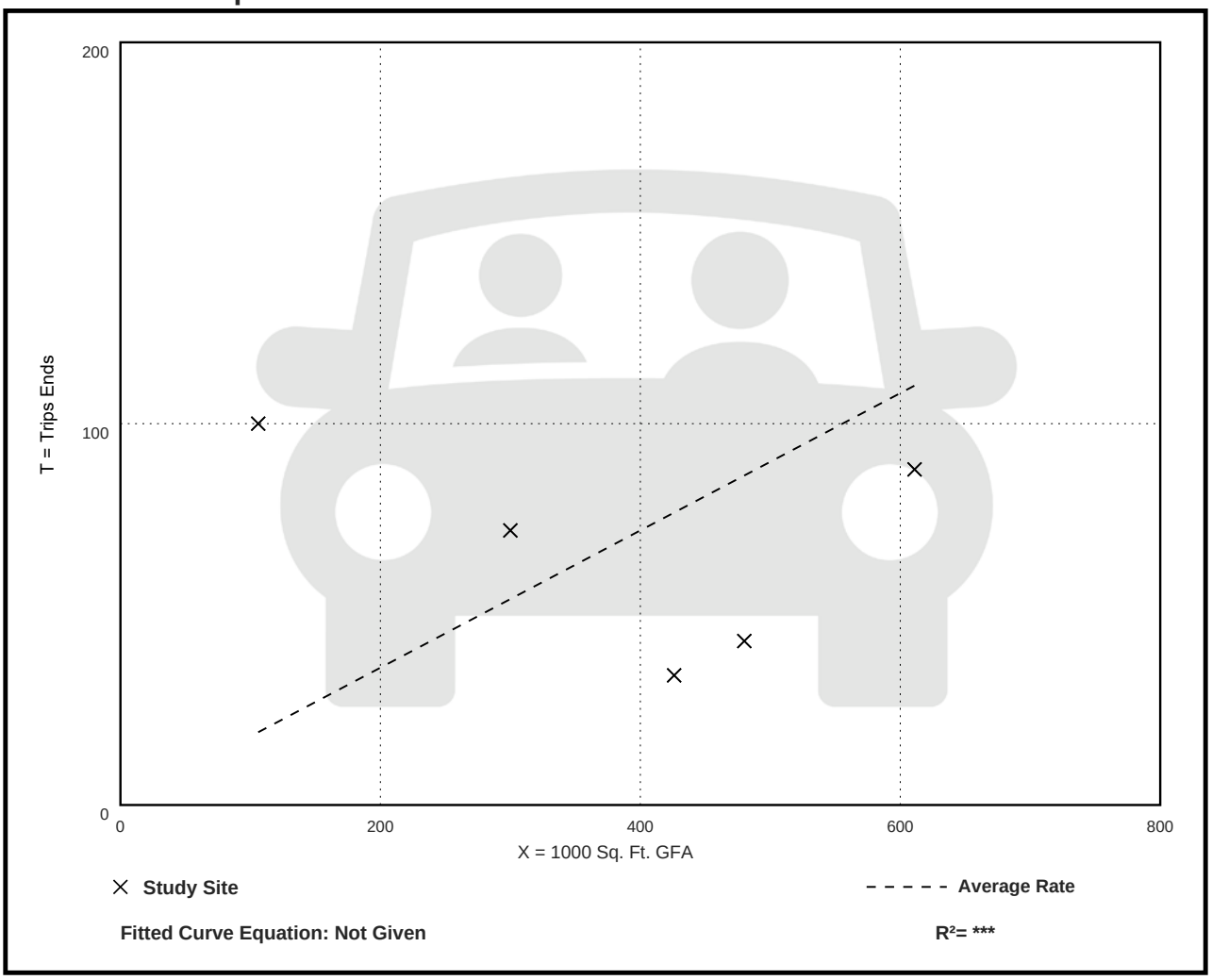
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. 1000 Sq. Ft. GFA: 385
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.18	0.08 - 0.94	0.22

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

Manufacturing
(140)

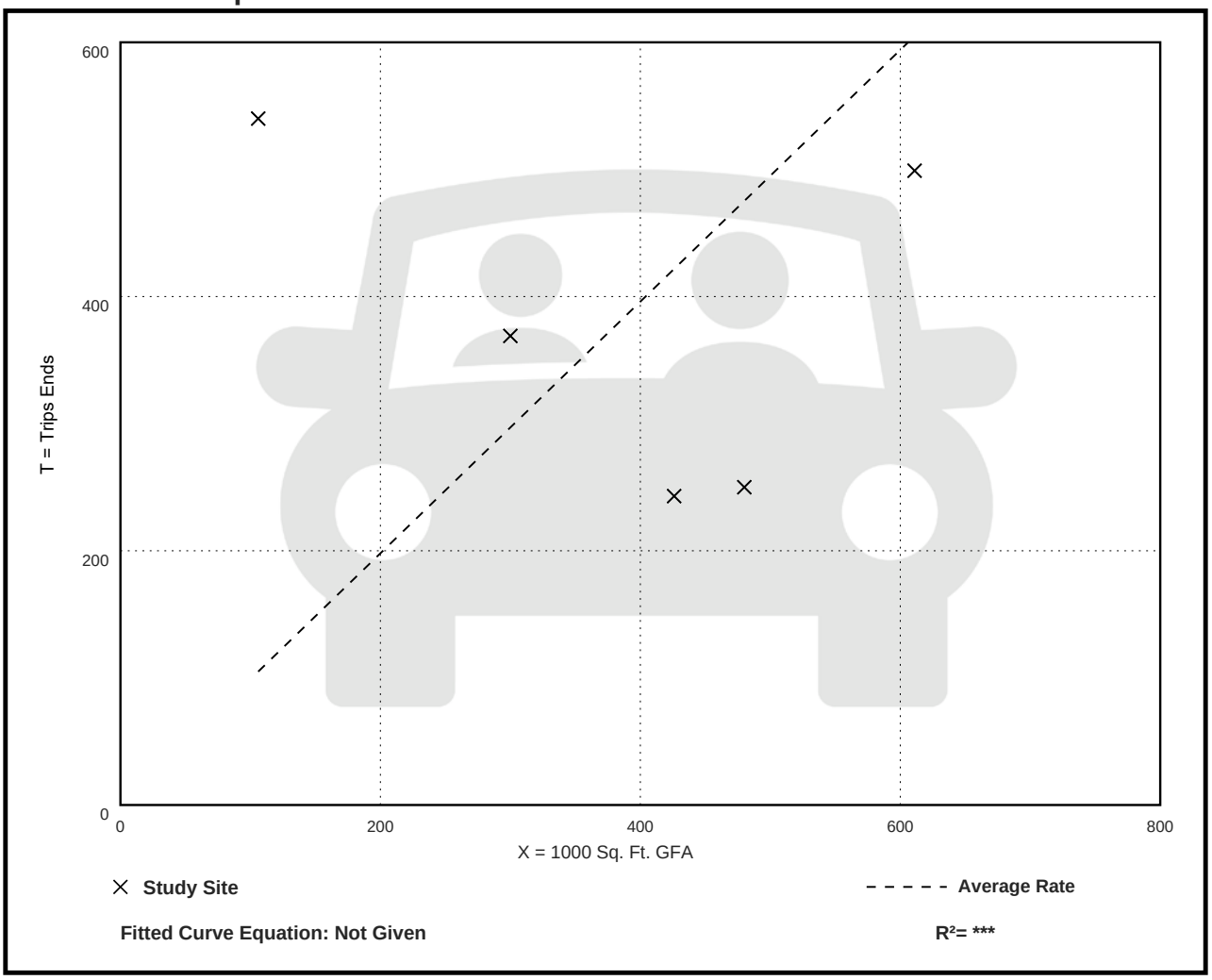
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Sunday

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. 1000 Sq. Ft. GFA: 385
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.99	0.52 - 5.09	1.14

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

Manufacturing
(140)

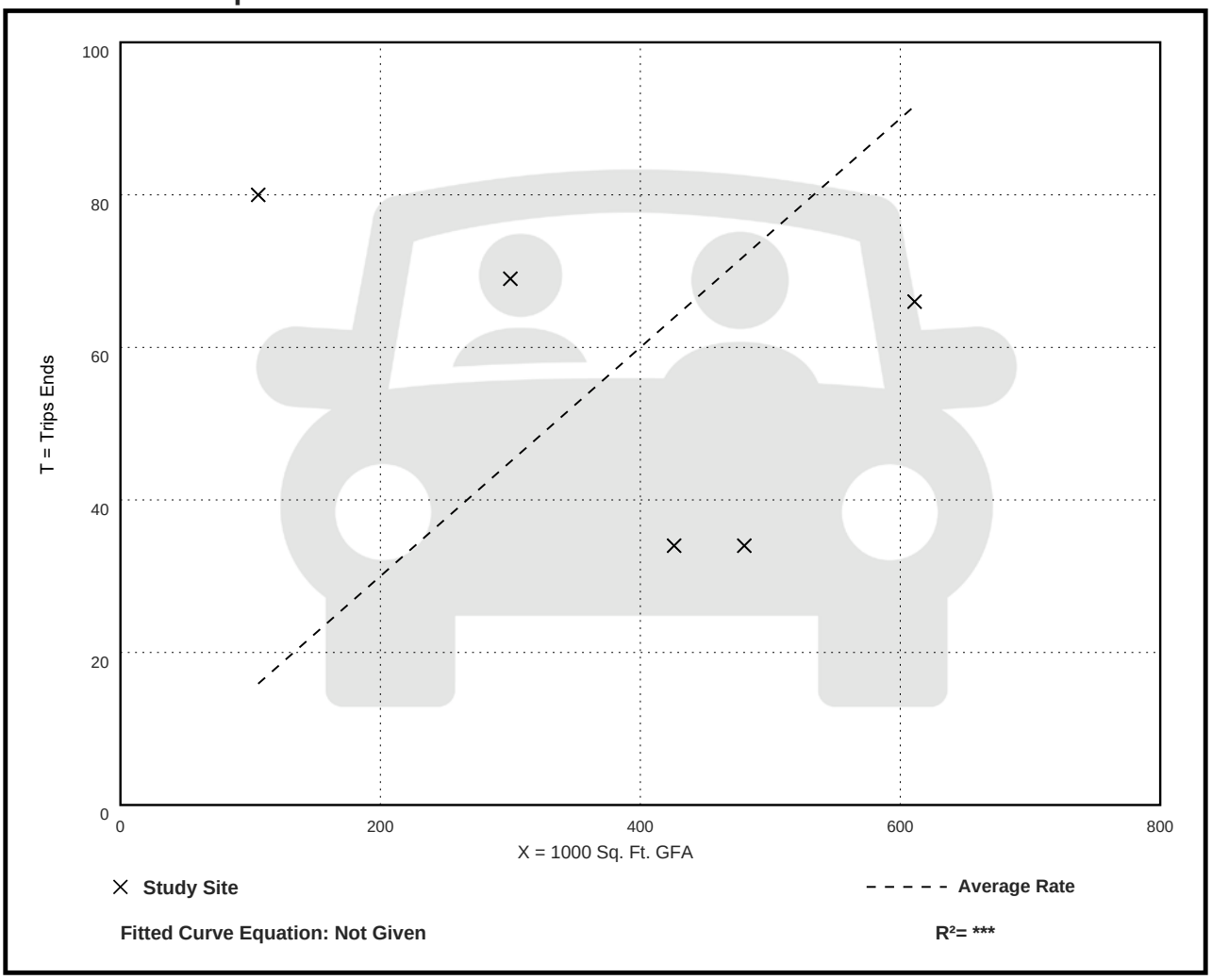
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Sunday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. 1000 Sq. Ft. GFA: 385
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.15	0.07 - 0.75	0.17

Data Plot and Equation



Manufacturing
(140)

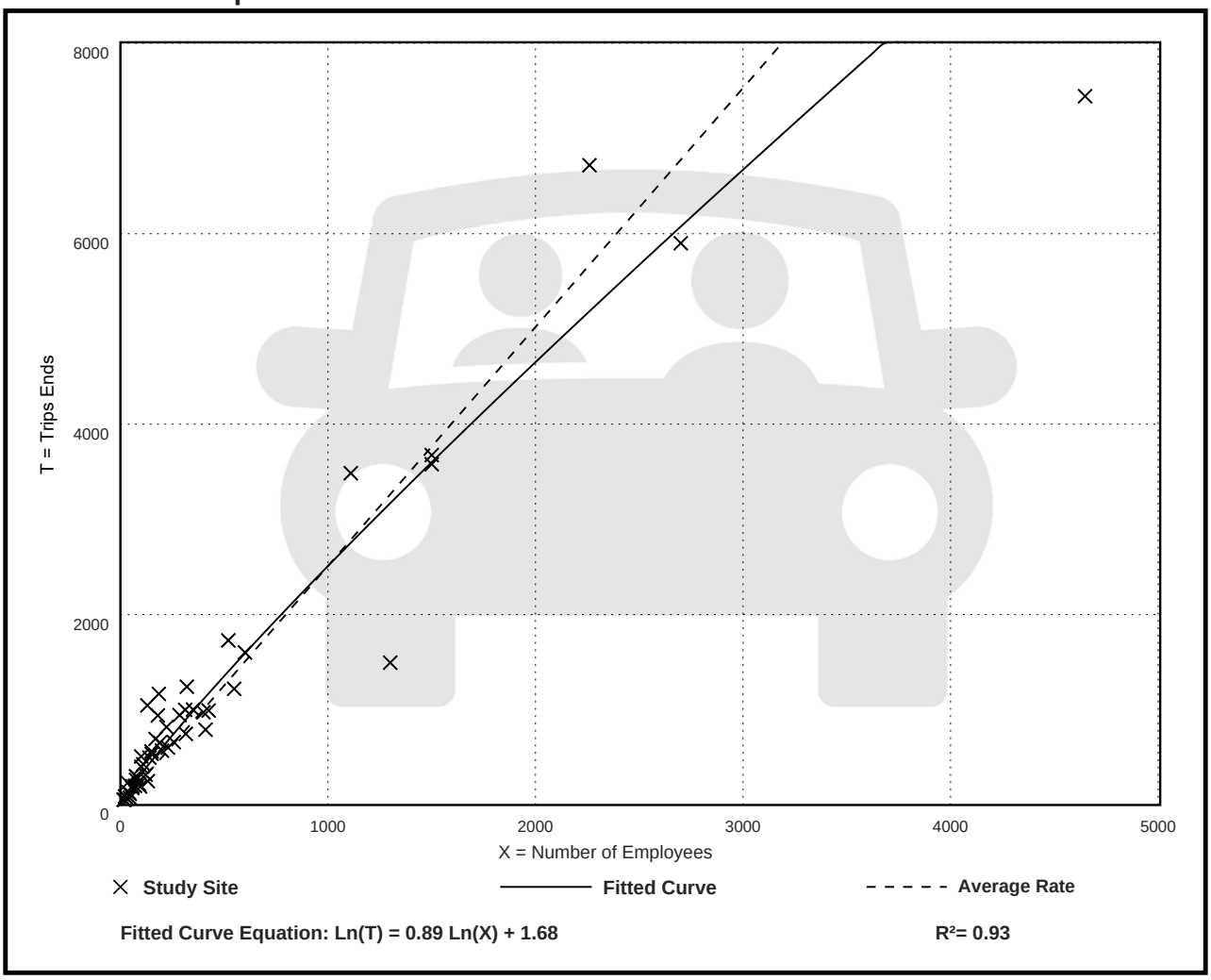
Vehicle Trip Ends vs: Employees
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 53
Avg. Num. of Employees: 437
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
2.51	1.15 - 8.05	0.96

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.89 Ln(X) + 1.68

R^2= 0.93

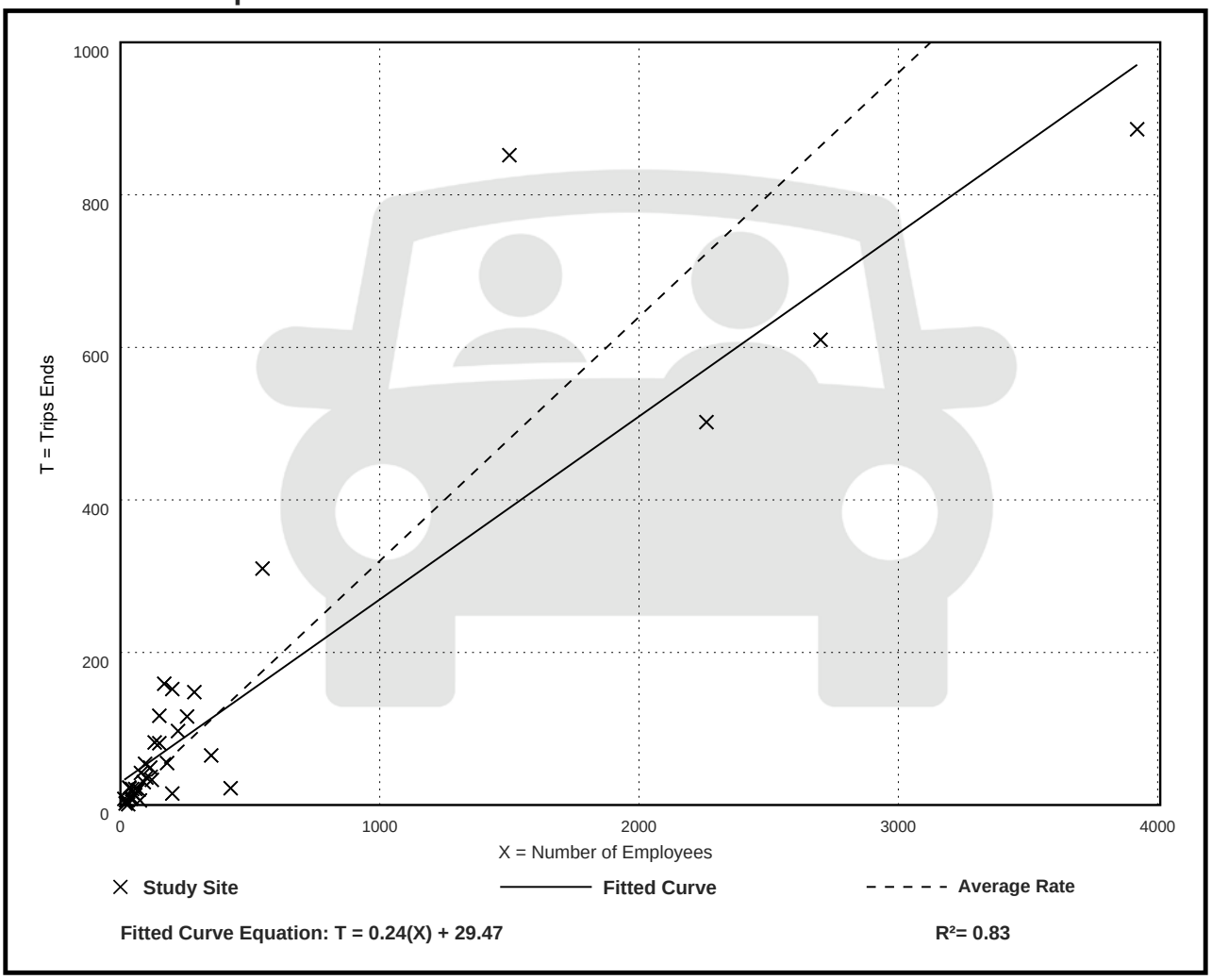
Manufacturing
(140)

Vehicle Trip Ends vs: Employees
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: 37
Avg. Num. of Employees: 400
Directional Distribution: 73% entering, 27% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.32	0.03 - 0.94	0.18

Data Plot and Equation



Fitted Curve Equation: T = 0.24(X) + 29.47

R^2= 0.83

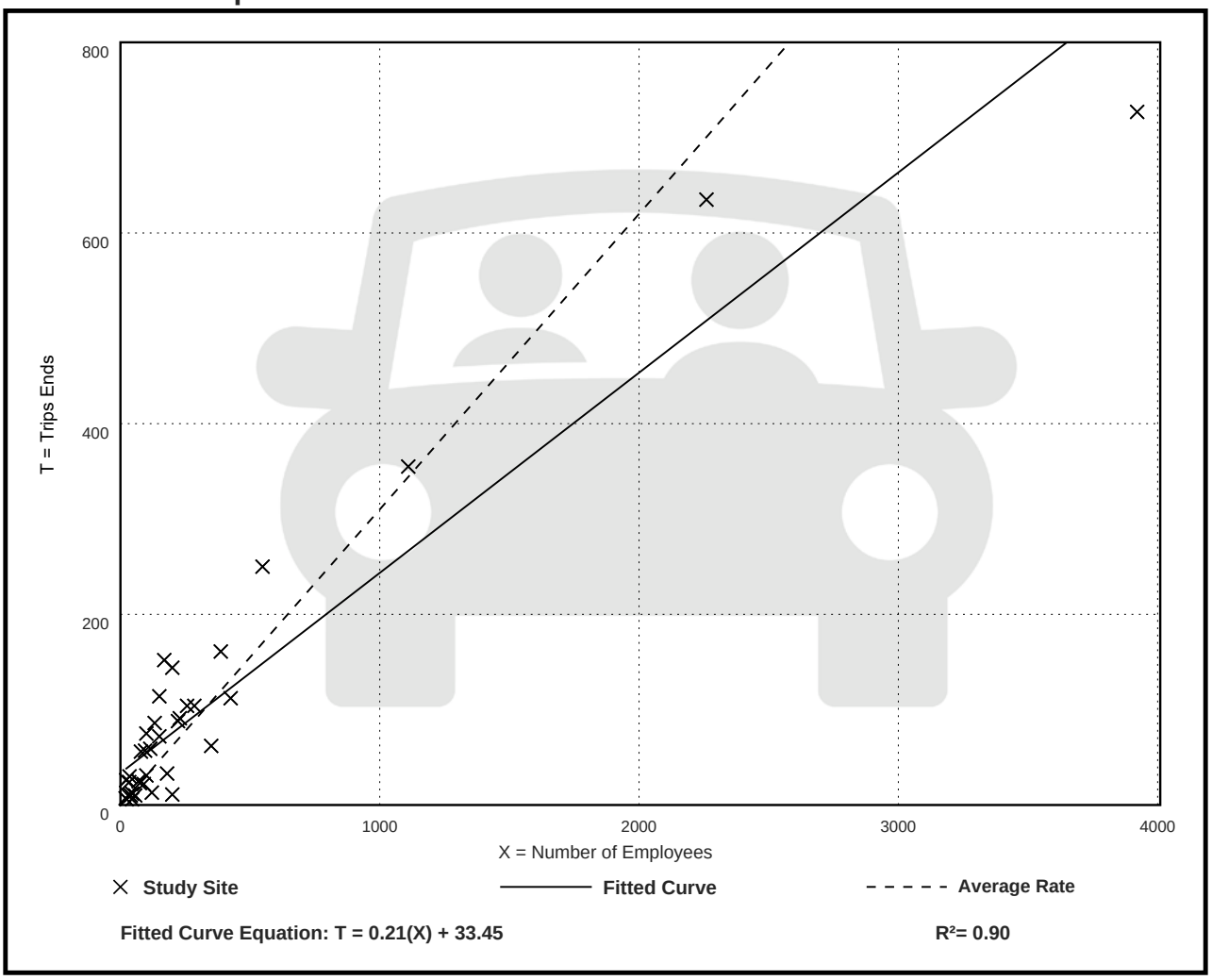
Manufacturing
(140)

Vehicle Trip Ends vs: Employees
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: 37
Avg. Num. of Employees: 334
Directional Distribution: 37% entering, 63% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.31	0.06 - 1.18	0.17

Data Plot and Equation



Fitted Curve Equation: T = 0.21(X) + 33.45

R^2= 0.90

Manufacturing
(140)

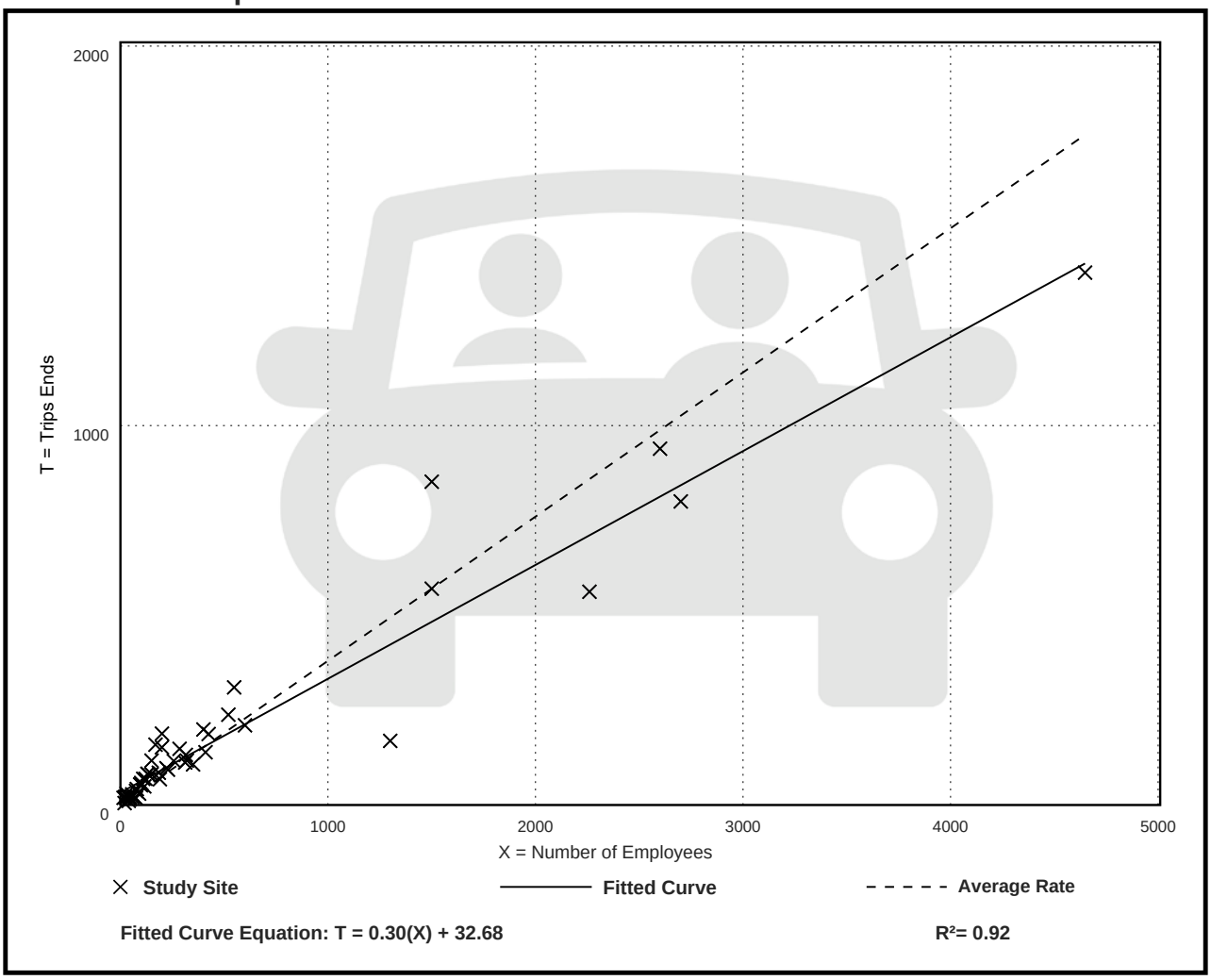
Vehicle Trip Ends vs: Employees
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 54
Avg. Num. of Employees: 459
Directional Distribution: 83% entering, 17% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.38	0.13 - 1.27	0.15

Data Plot and Equation



Fitted Curve Equation: T = 0.30(X) + 32.68

R^2= 0.92

Manufacturing
(140)

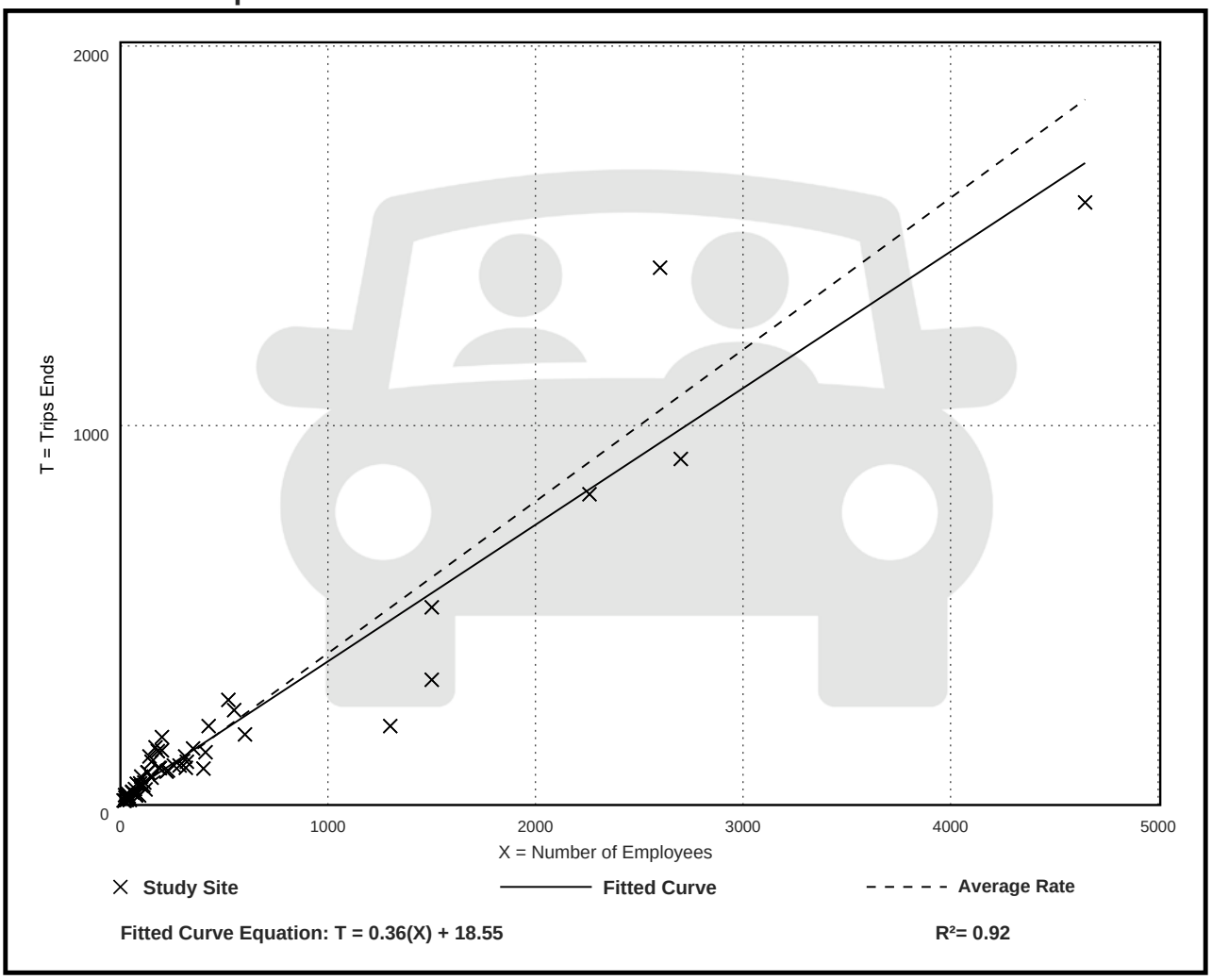
Vehicle Trip Ends vs: Employees
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 55
Avg. Num. of Employees: 454
Directional Distribution: 39% entering, 61% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.40	0.16 - 1.18	0.15

Data Plot and Equation



Fitted Curve Equation: T = 0.36(X) + 18.55

R^2= 0.92

Manufacturing
(140)

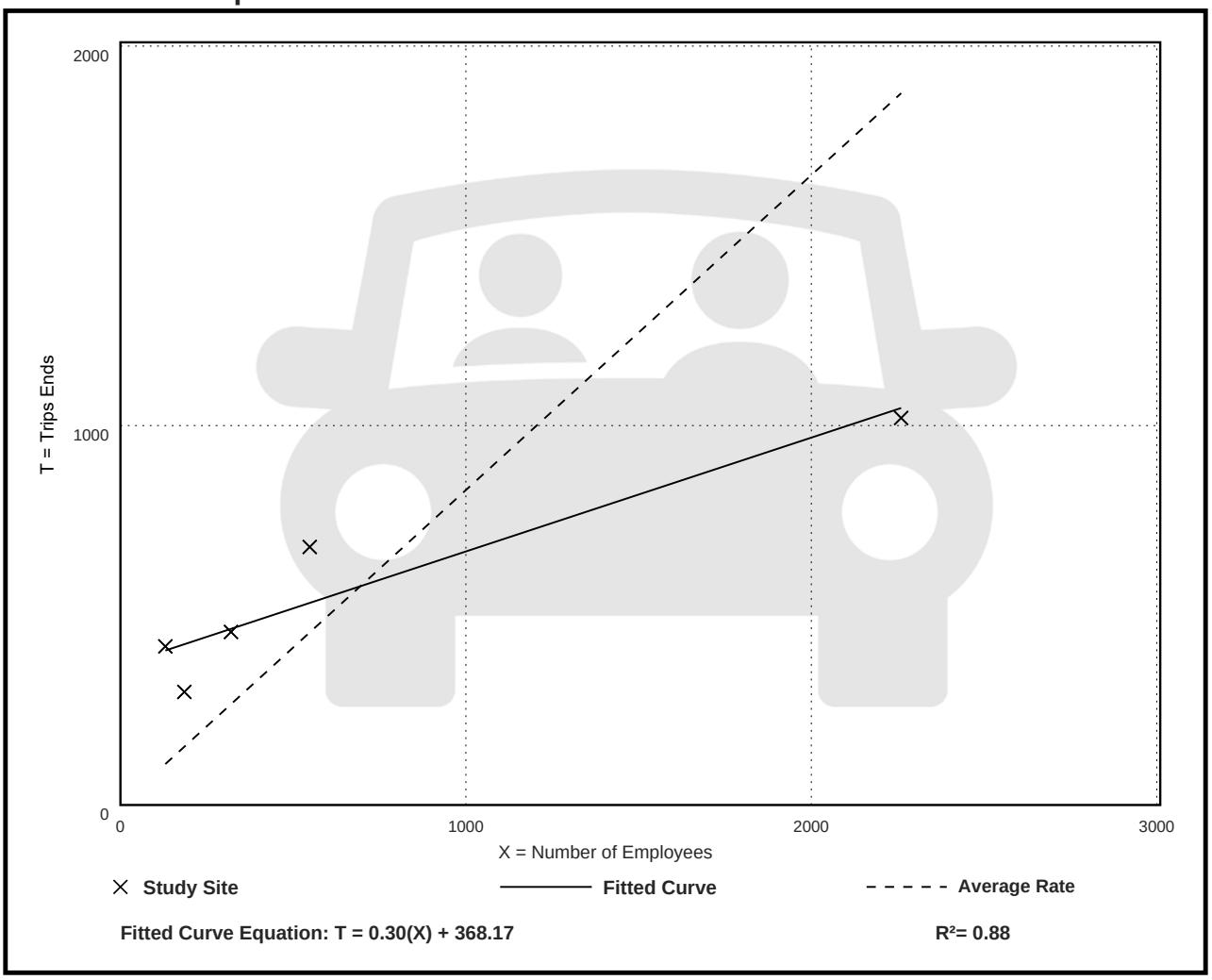
Vehicle Trip Ends vs: Employees
On a: Saturday

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. Num. of Employees: 689
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.83	0.45 - 3.22	0.71

Data Plot and Equation



Fitted Curve Equation: T = 0.30(X) + 368.17

R^2= 0.88

Manufacturing
(140)

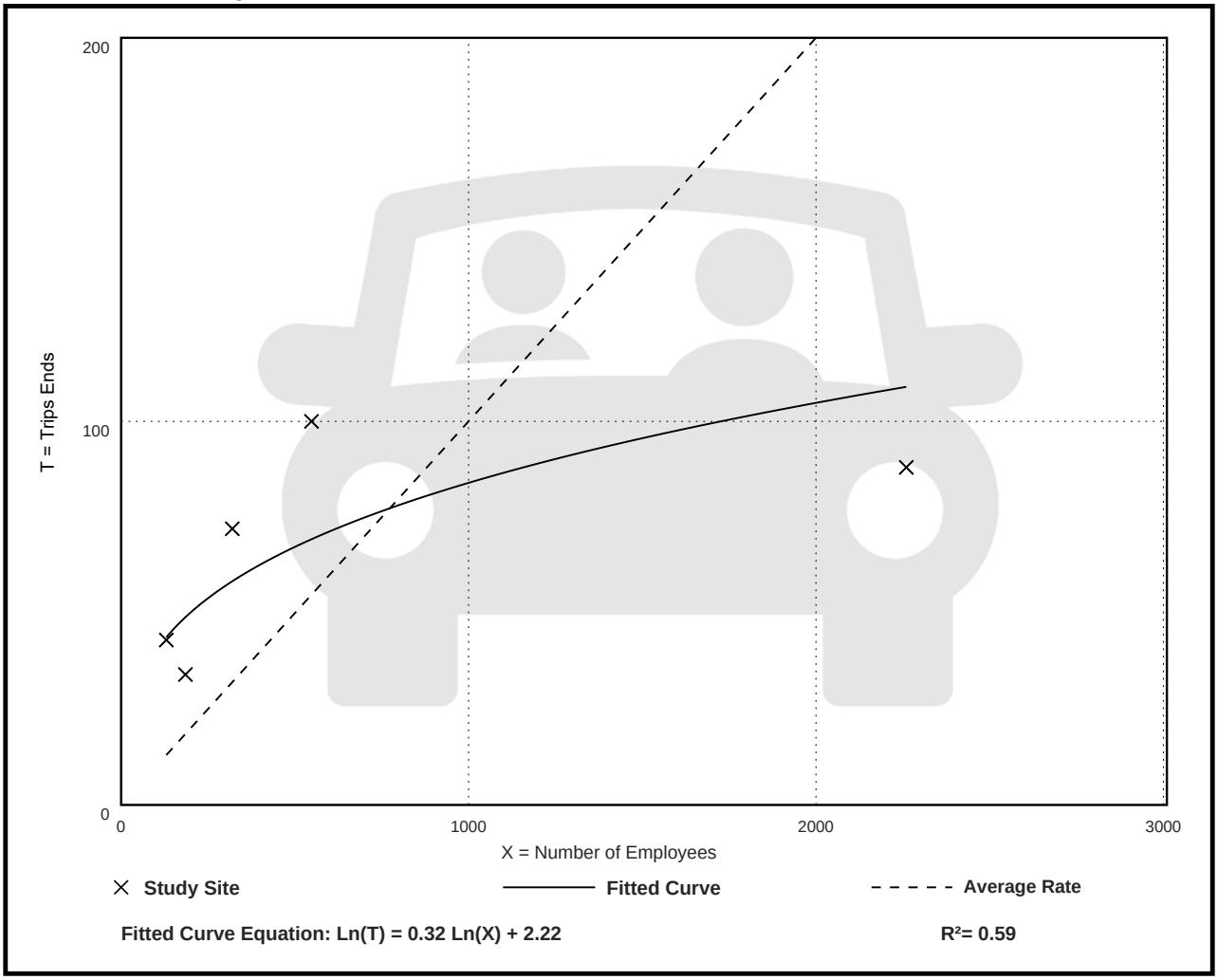
Vehicle Trip Ends vs: Employees
On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. Num. of Employees: 689
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.10	0.04 - 0.33	0.10

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.32 Ln(X) + 2.22

R^2= 0.59

Manufacturing
(140)

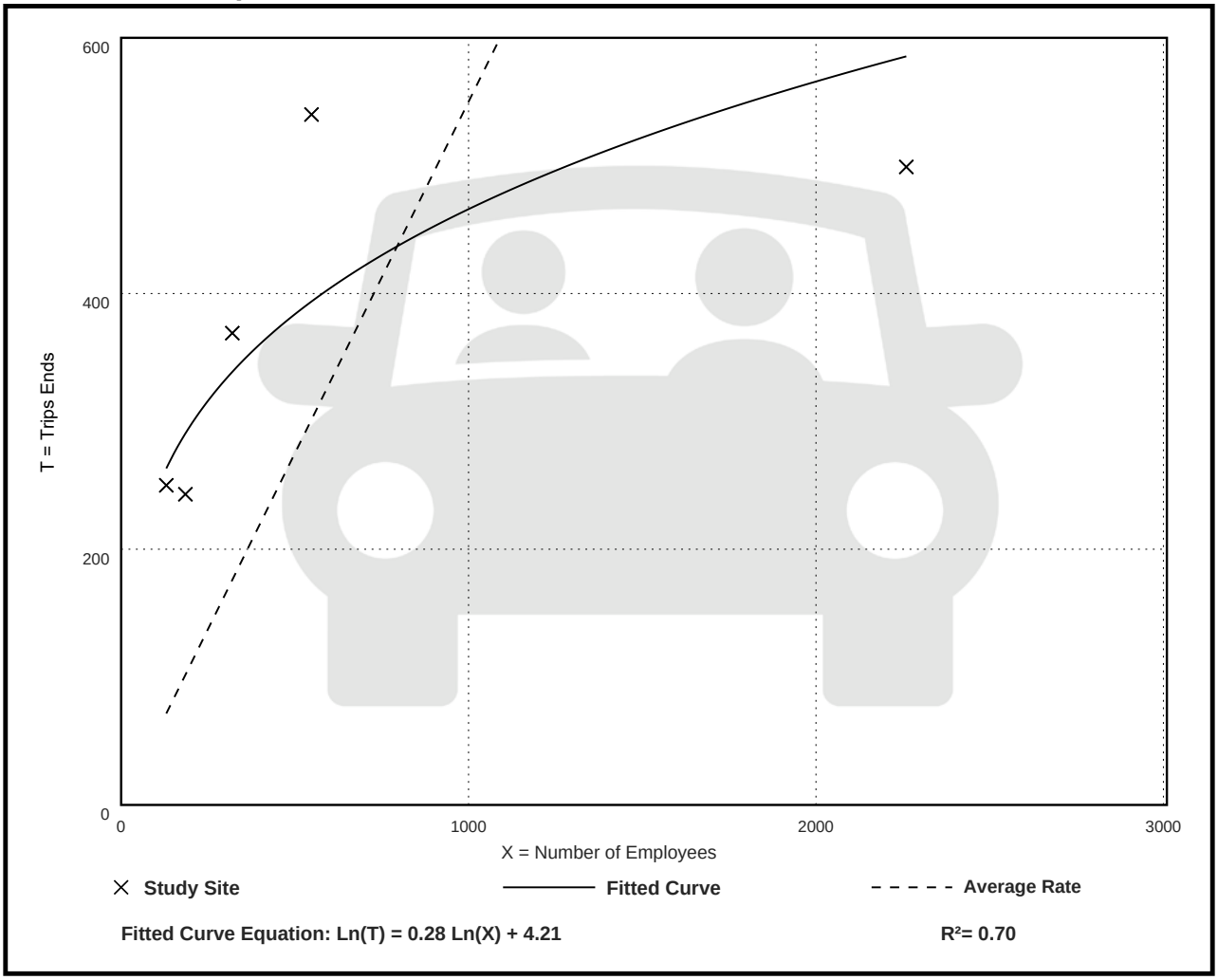
Vehicle Trip Ends vs: Employees
On a: Sunday

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. Num. of Employees: 689
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.55	0.22 - 1.92	0.55

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.28 Ln(X) + 4.21

R^2= 0.70

Manufacturing
(140)

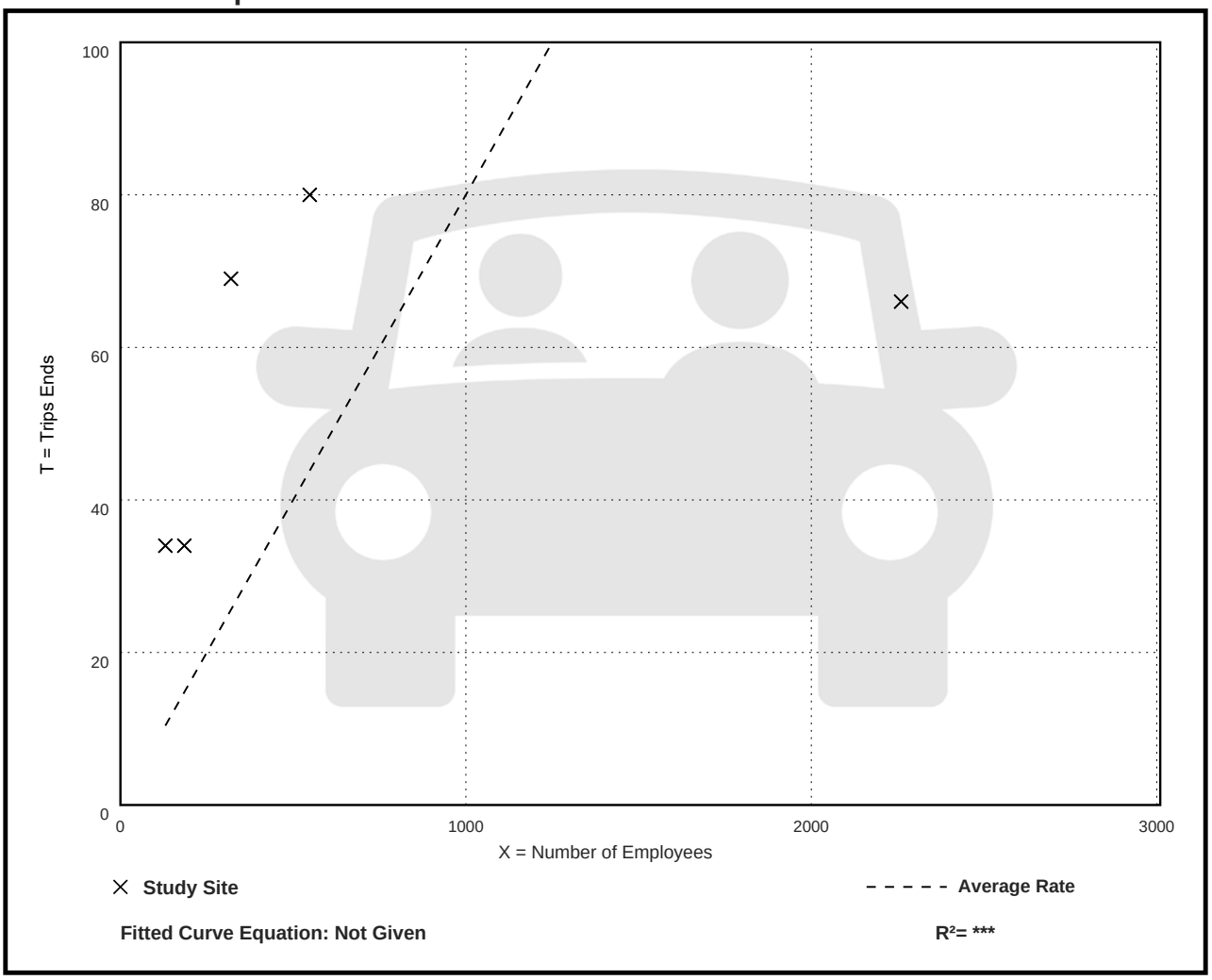
Vehicle Trip Ends vs: Employees
On a: Sunday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. Num. of Employees: 689
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.08	0.03 - 0.26	0.09

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ***

Manufacturing
(140)

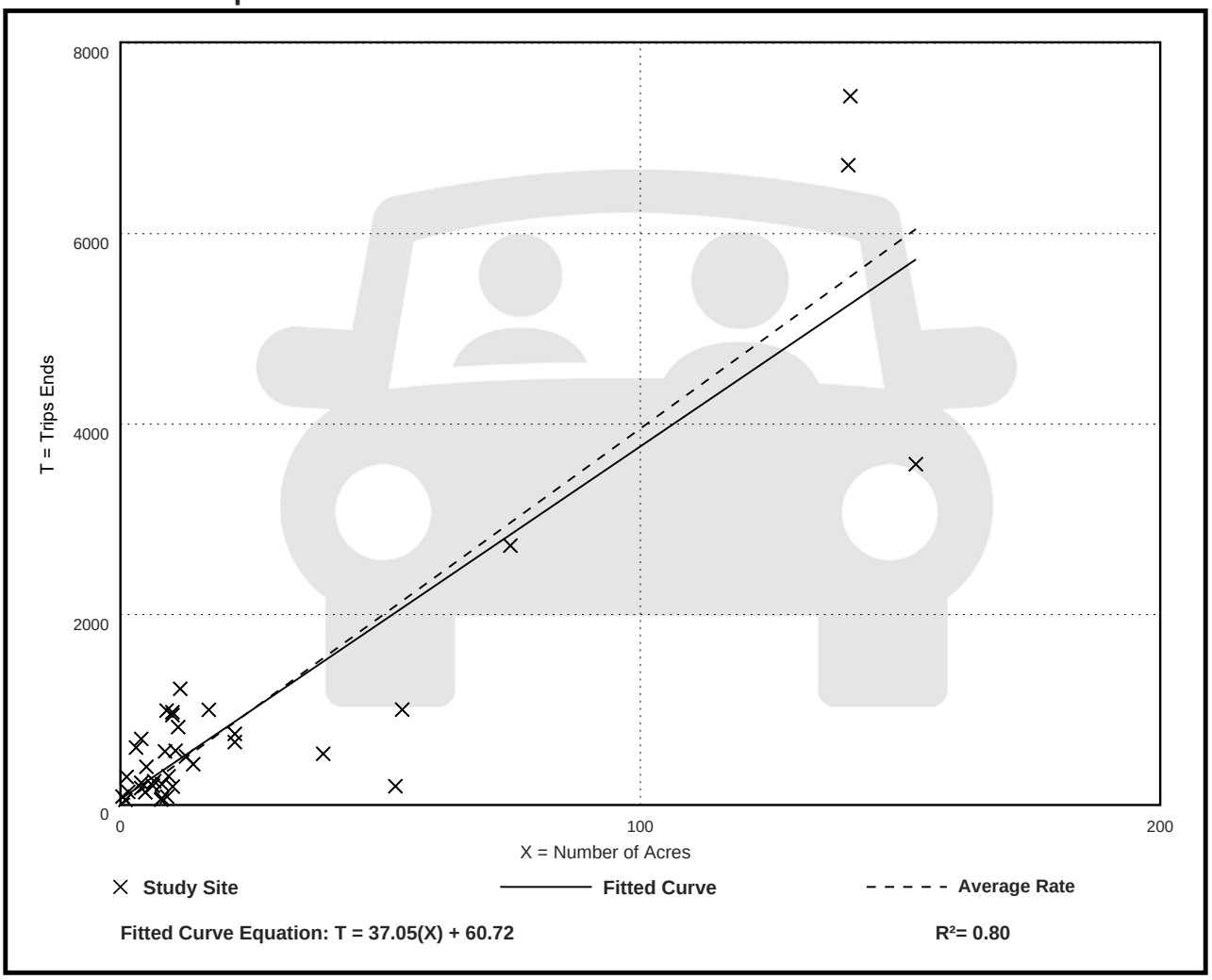
Vehicle Trip Ends vs: Acres
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 37
Avg. Num. of Acres: 24
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
39.53	3.72 - 245.83	27.04

Data Plot and Equation



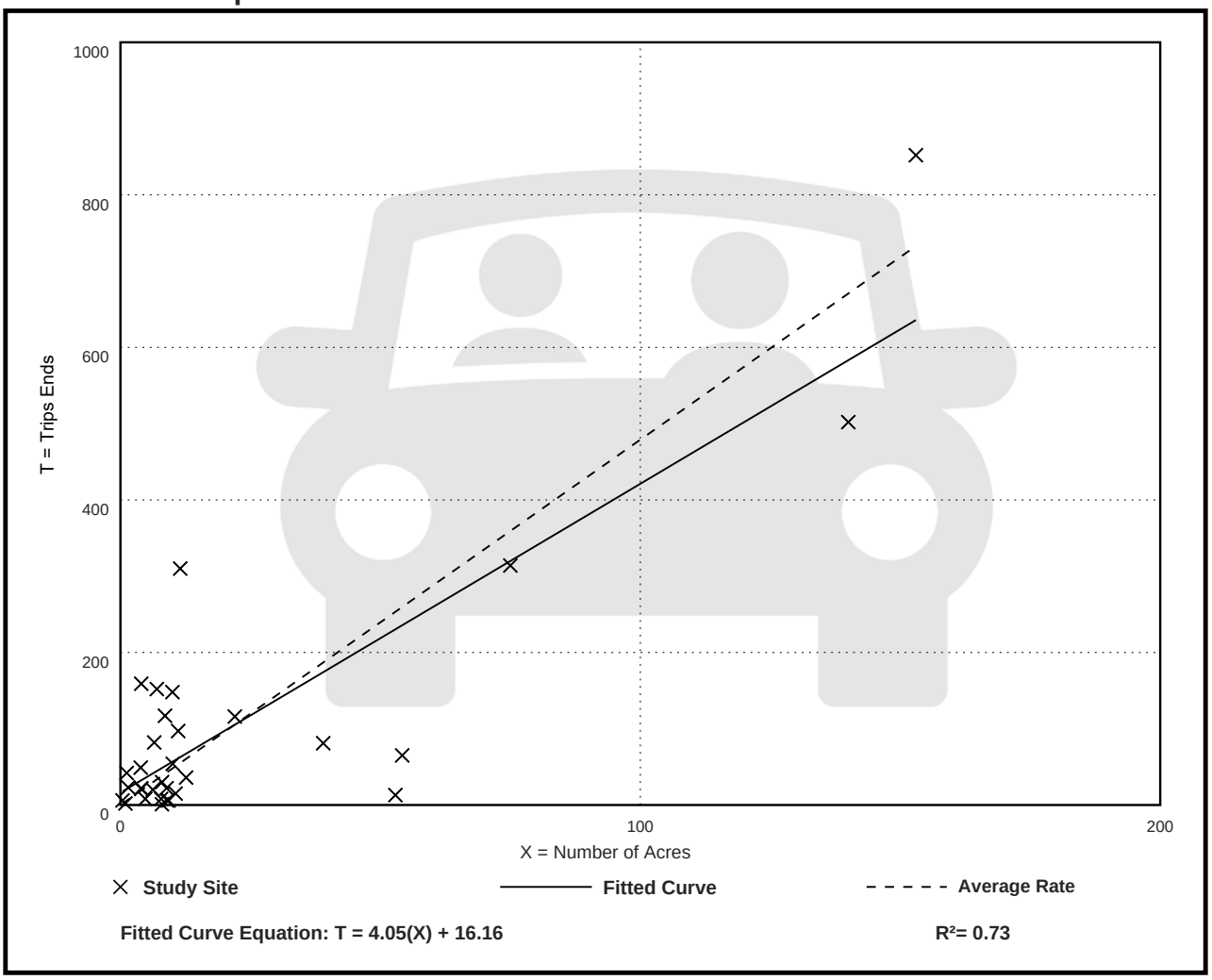
Manufacturing
(140)

Vehicle Trip Ends vs: Acres
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: 32
Avg. Num. of Acres: 22
Directional Distribution: 86% entering, 14% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
4.79	0.13 - 39.75	5.36

Data Plot and Equation



Fitted Curve Equation: T = 4.05(X) + 16.16

R^2= 0.73

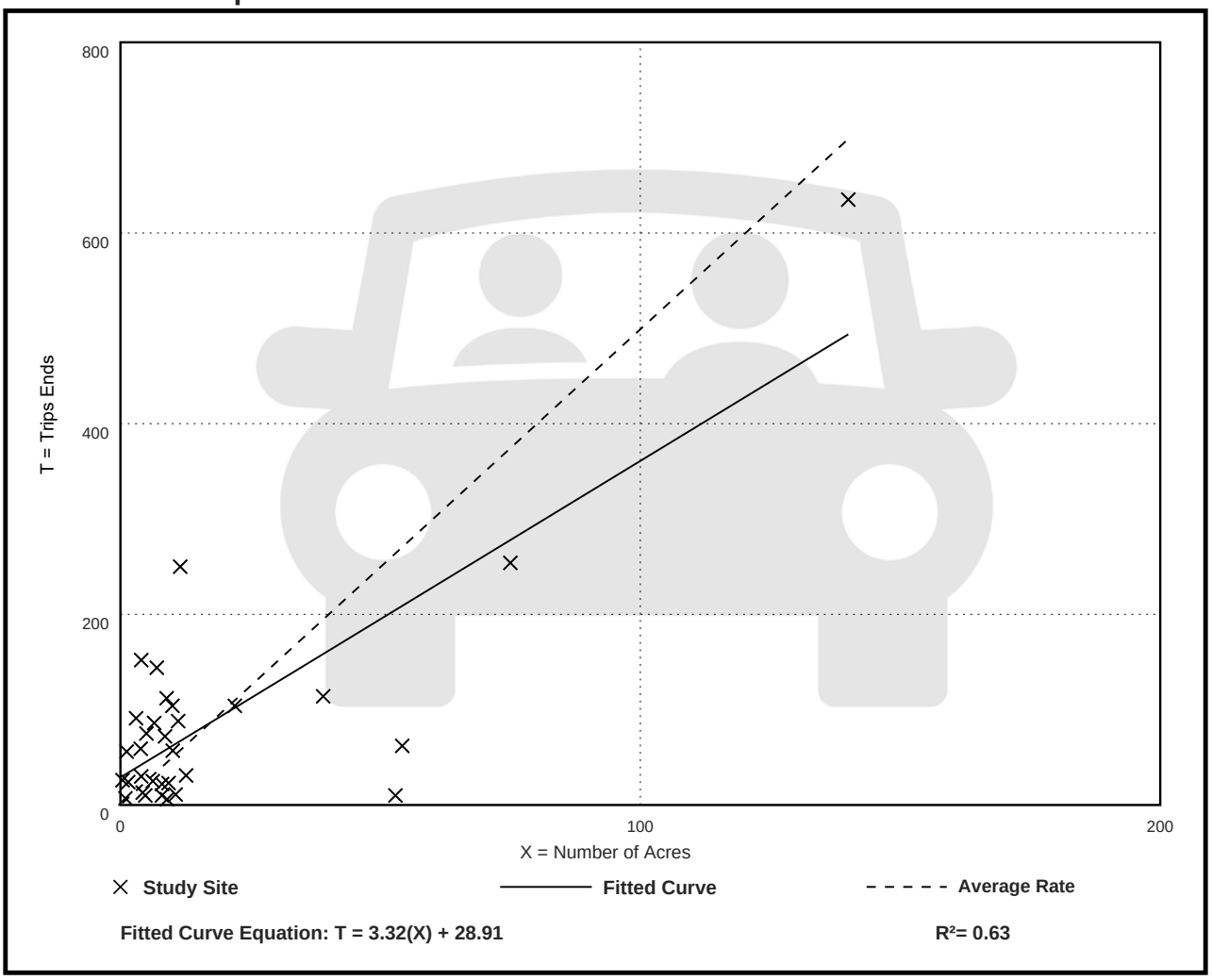
Manufacturing
(140)

Vehicle Trip Ends vs: Acres
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: 32
Avg. Num. of Acres: 17
Directional Distribution: 39% entering, 61% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
4.99	0.19 - 65.00	6.17

Data Plot and Equation



Manufacturing
(140)

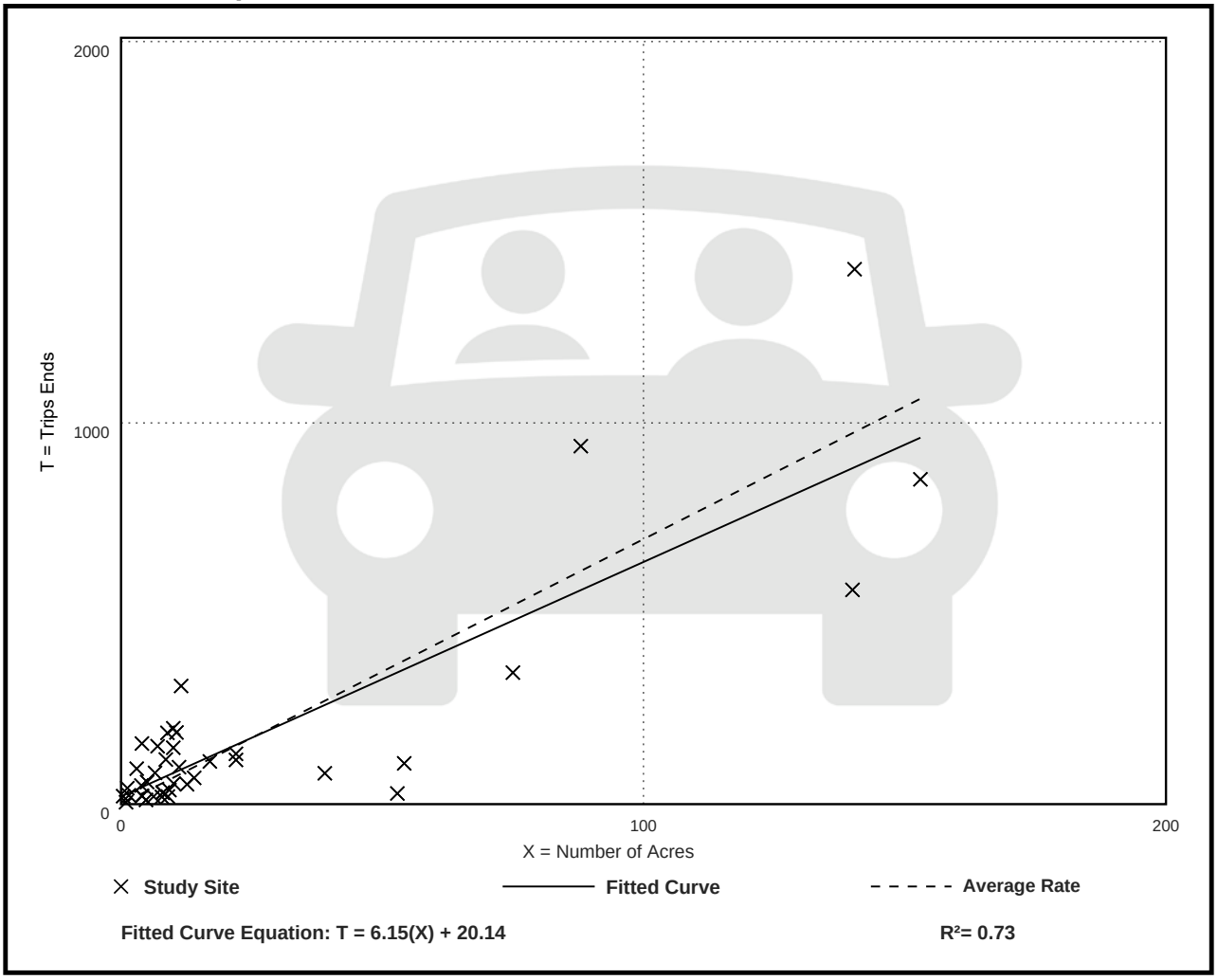
Vehicle Trip Ends vs: Acres
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 40
Avg. Num. of Acres: 25
Directional Distribution: 75% entering, 25% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
6.95	0.53 - 52.50	5.55

Data Plot and Equation



Manufacturing
(140)

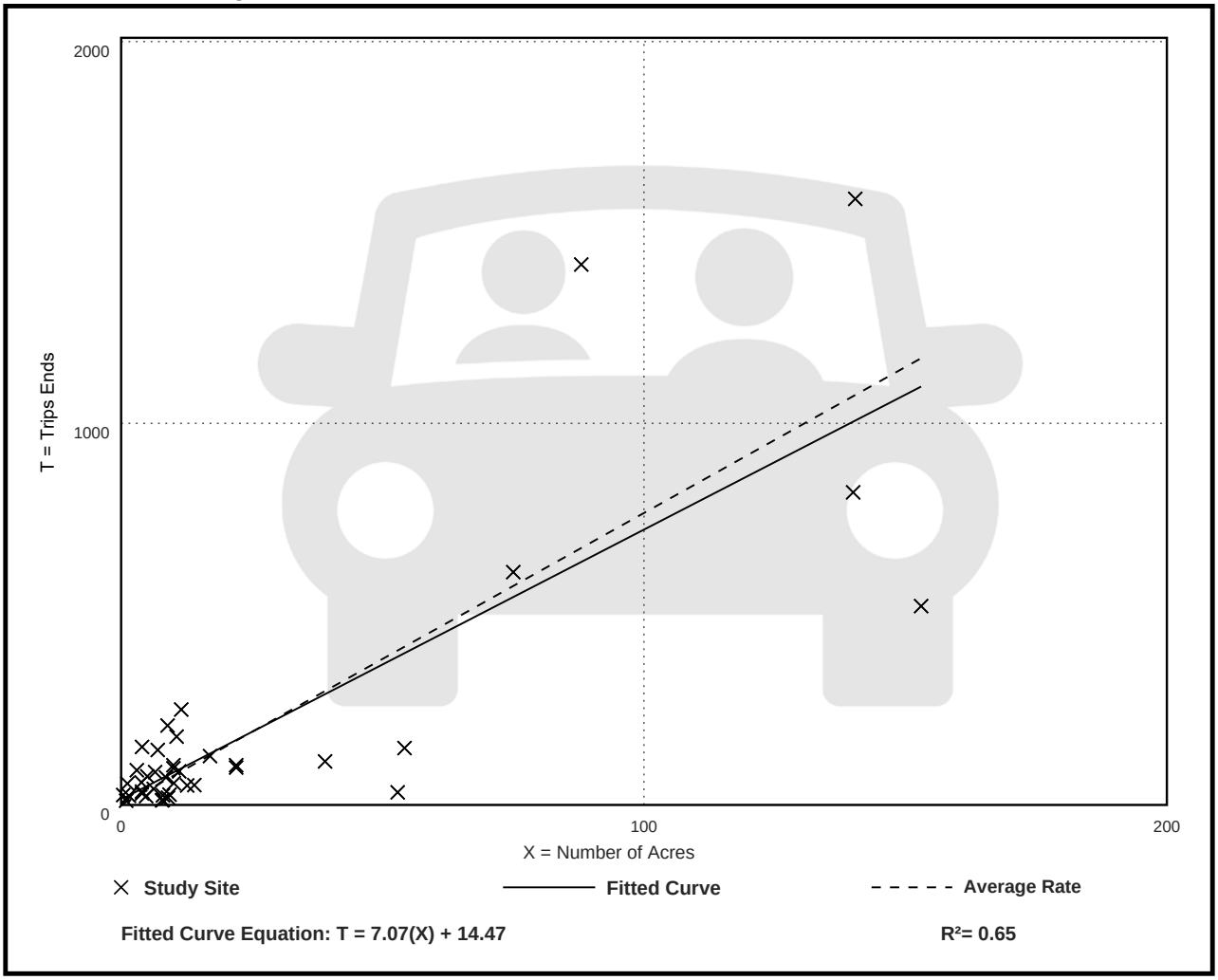
Vehicle Trip Ends vs: Acres
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 40
Avg. Num. of Acres: 25
Directional Distribution: 44% entering, 56% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
7.65	0.62 - 65.00	5.90

Data Plot and Equation



Fitted Curve Equation: T = 7.07(X) + 14.47

R^2= 0.65

Manufacturing
(140)

Vehicle Trip Ends vs: Acres
On a: Saturday

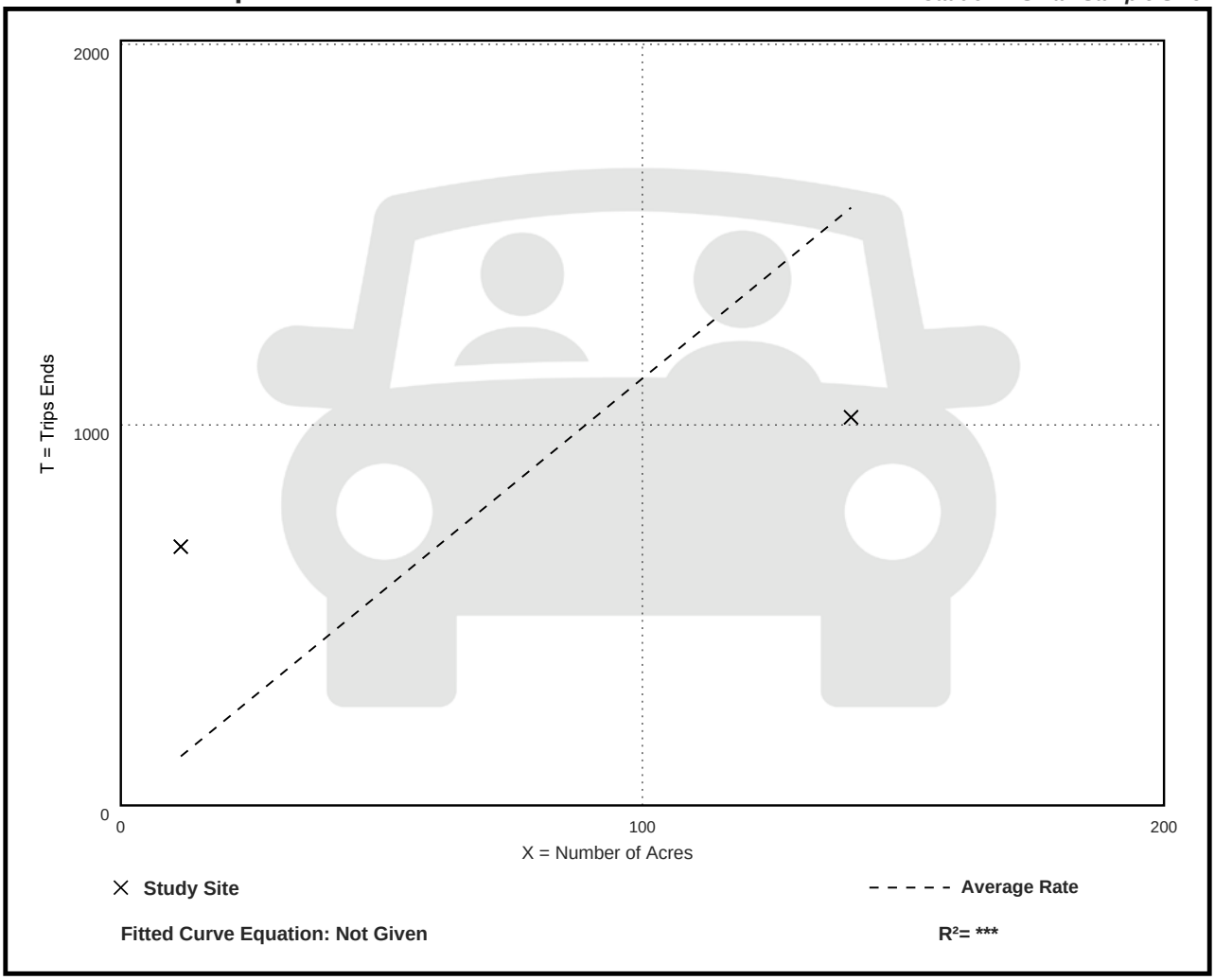
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. Num. of Acres: 76
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
11.22	7.29 - 59.13	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

Manufacturing
(140)

Vehicle Trip Ends vs: Acres
On a: Saturday, Peak Hour of Generator

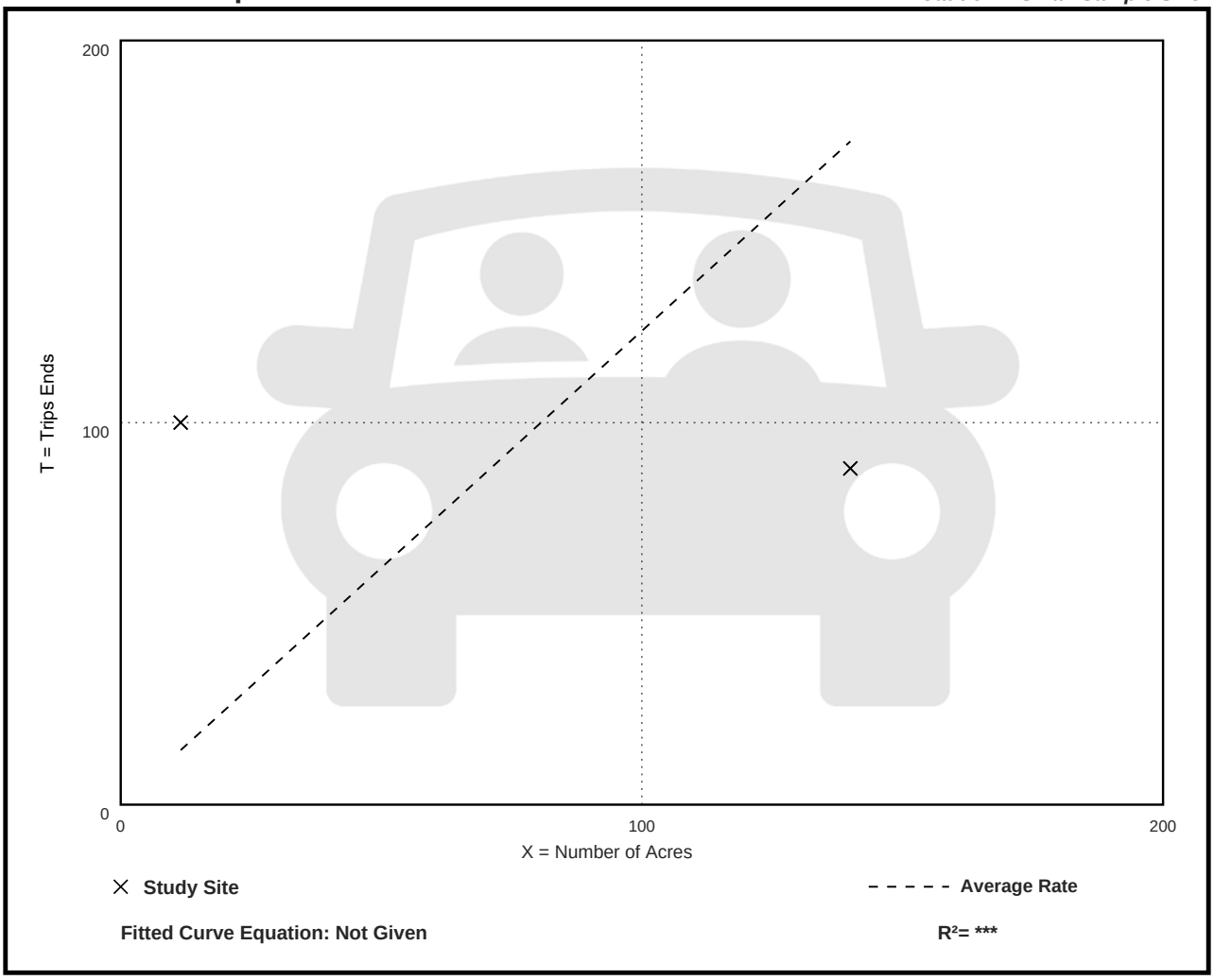
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. Num. of Acres: 76
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
1.24	0.63 - 8.70	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= ***

Manufacturing
(140)

Vehicle Trip Ends vs: Acres
On a: Sunday

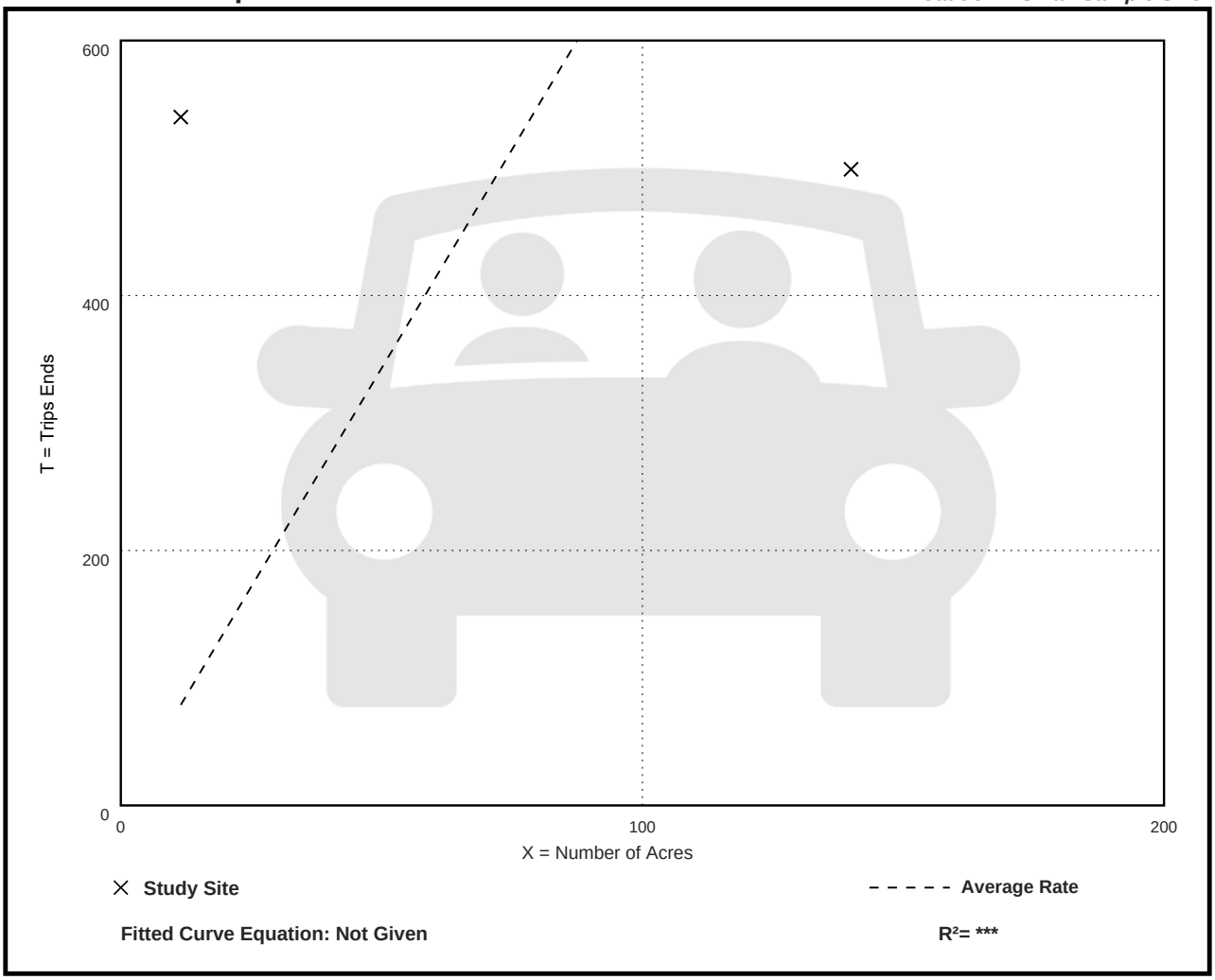
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. Num. of Acres: 76
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
6.86	3.56 - 46.96	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

Manufacturing
(140)

Vehicle Trip Ends vs: Acres
On a: Sunday, Peak Hour of Generator

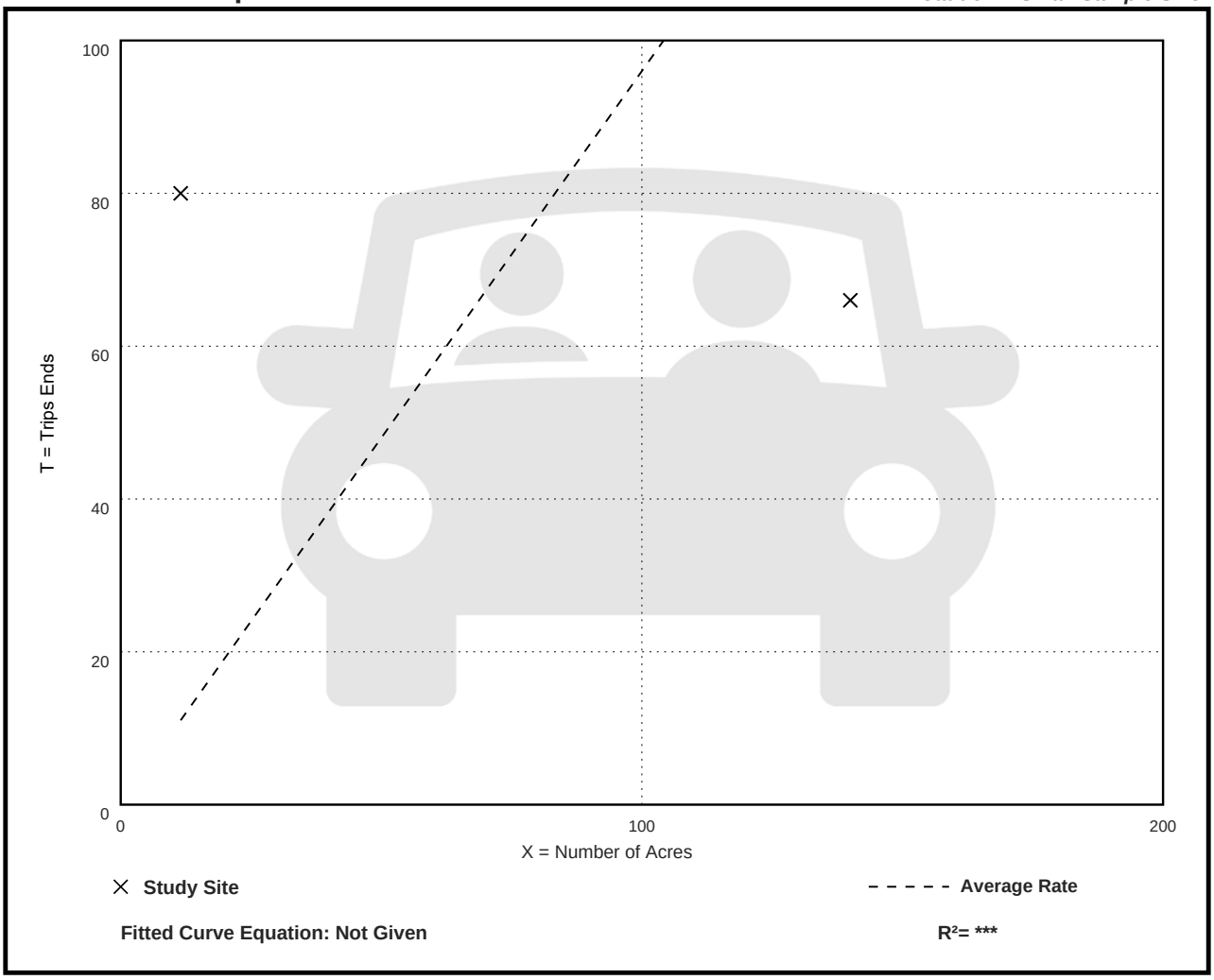
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. Num. of Acres: 76
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
0.96	0.47 - 6.96	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= ***

Manufacturing
(140)

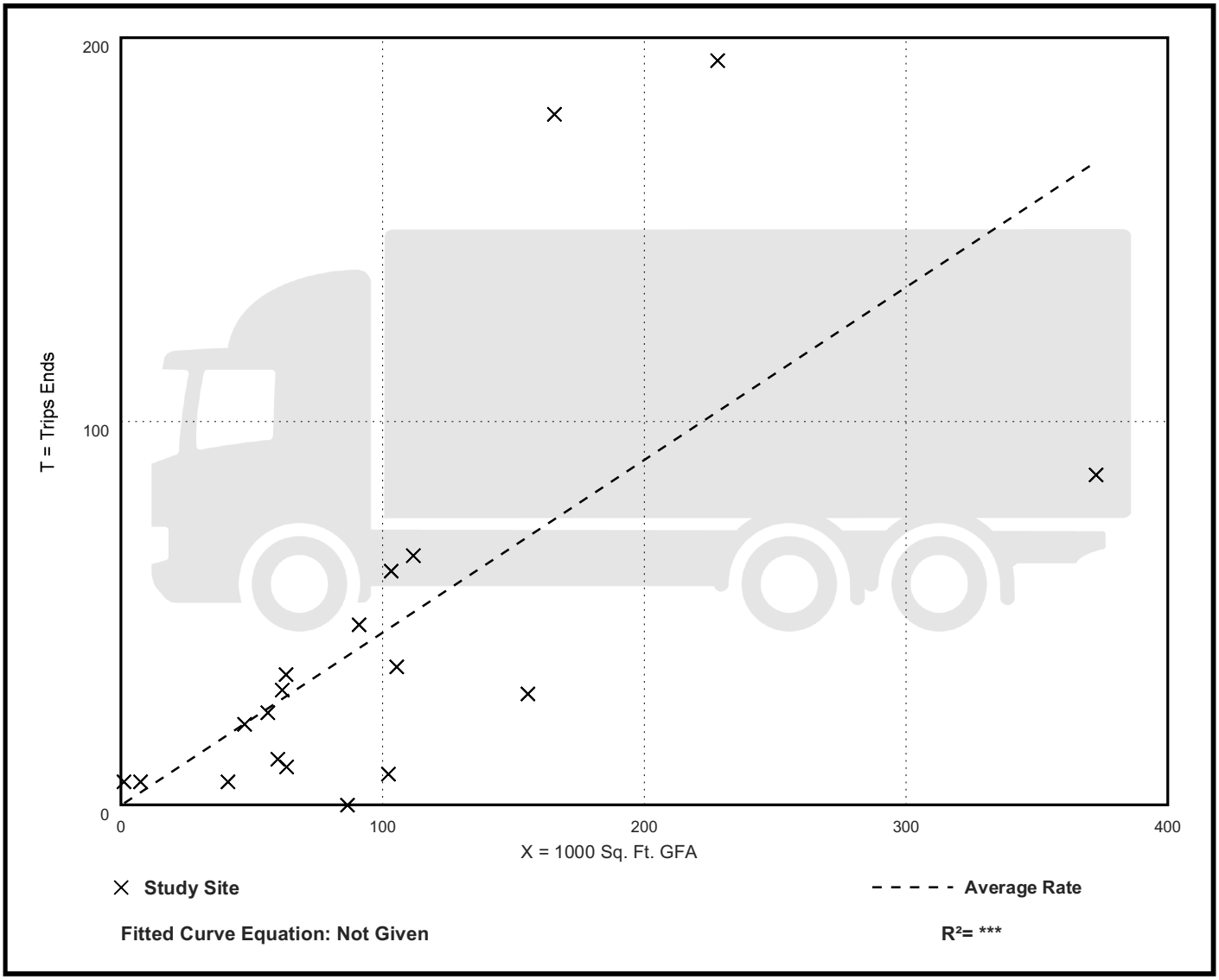
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 19
Avg. 1000 Sq. Ft. GFA: 101
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.45	0.00 - 5.50	0.34

Data Plot and Equation



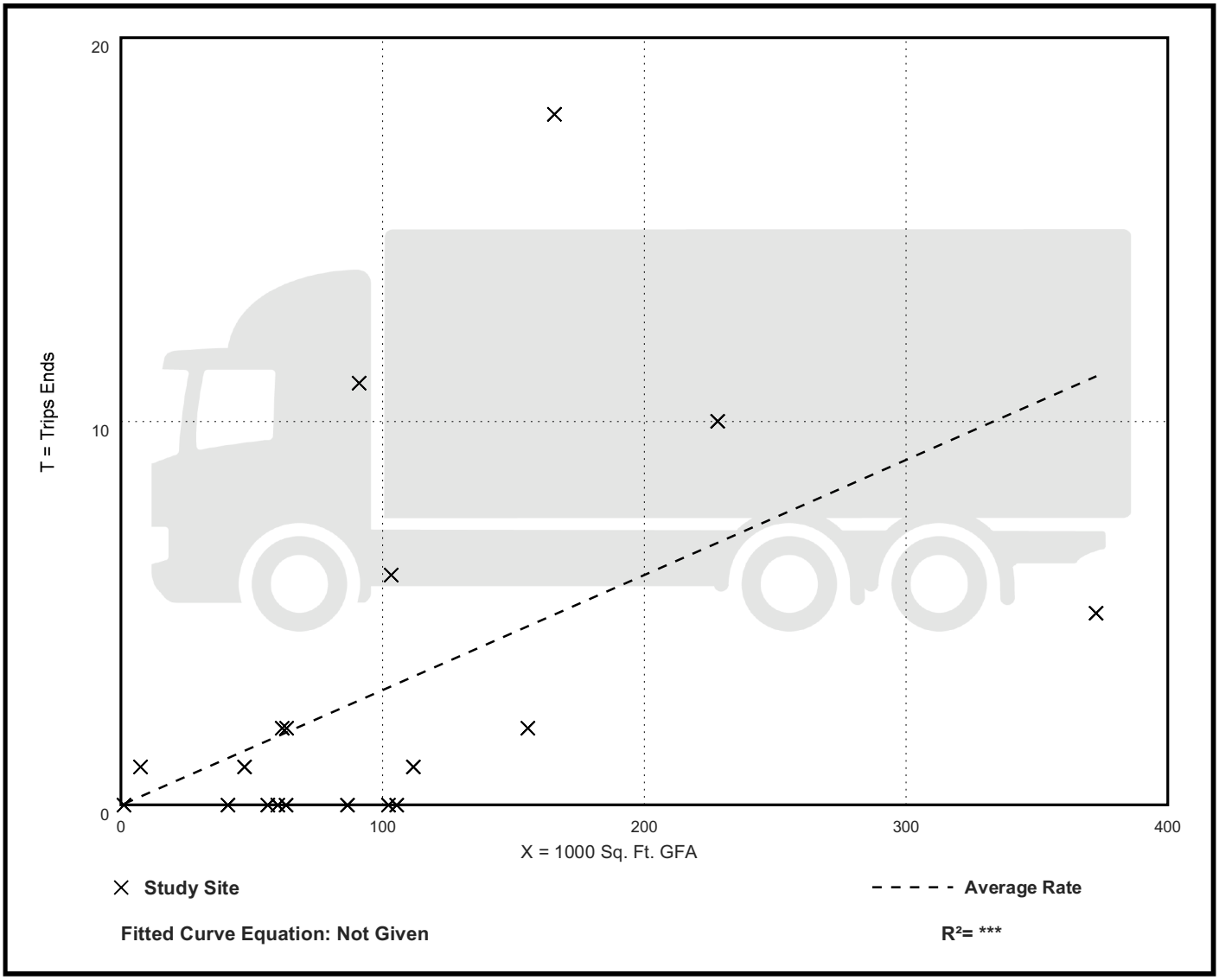
Manufacturing
(140)

Truck 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: 19
Avg. 1000 Sq. Ft. GFA: 101
Directional Distribution: 56% entering, 44% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.03	0.00 - 0.14	0.04

Data Plot and Equation



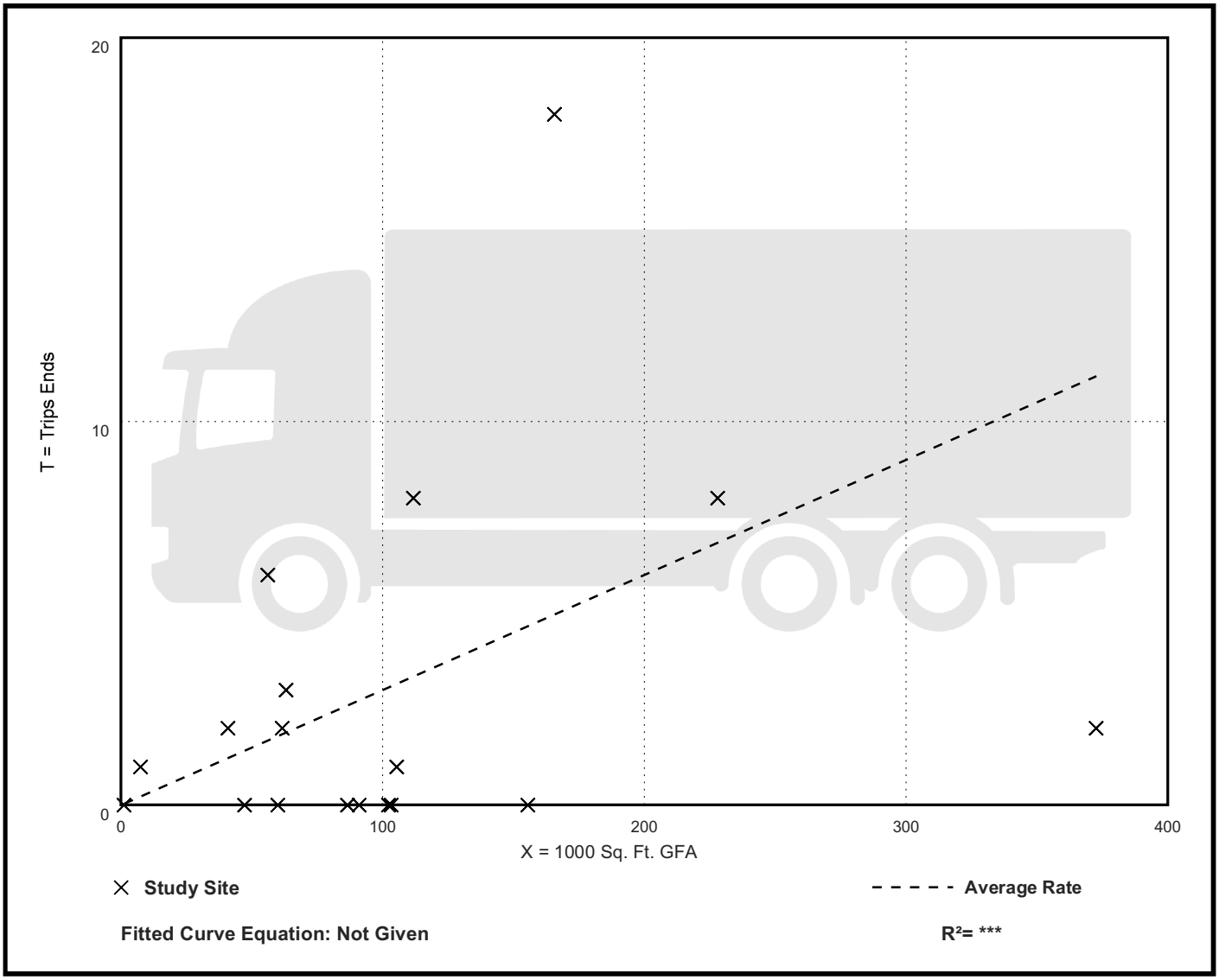
Manufacturing
(140)

Truck 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: 18
Avg. 1000 Sq. Ft. GFA: 103
Directional Distribution: 41% entering, 59% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.03	0.00 - 0.14	0.04

Data Plot and Equation



Manufacturing
(140)

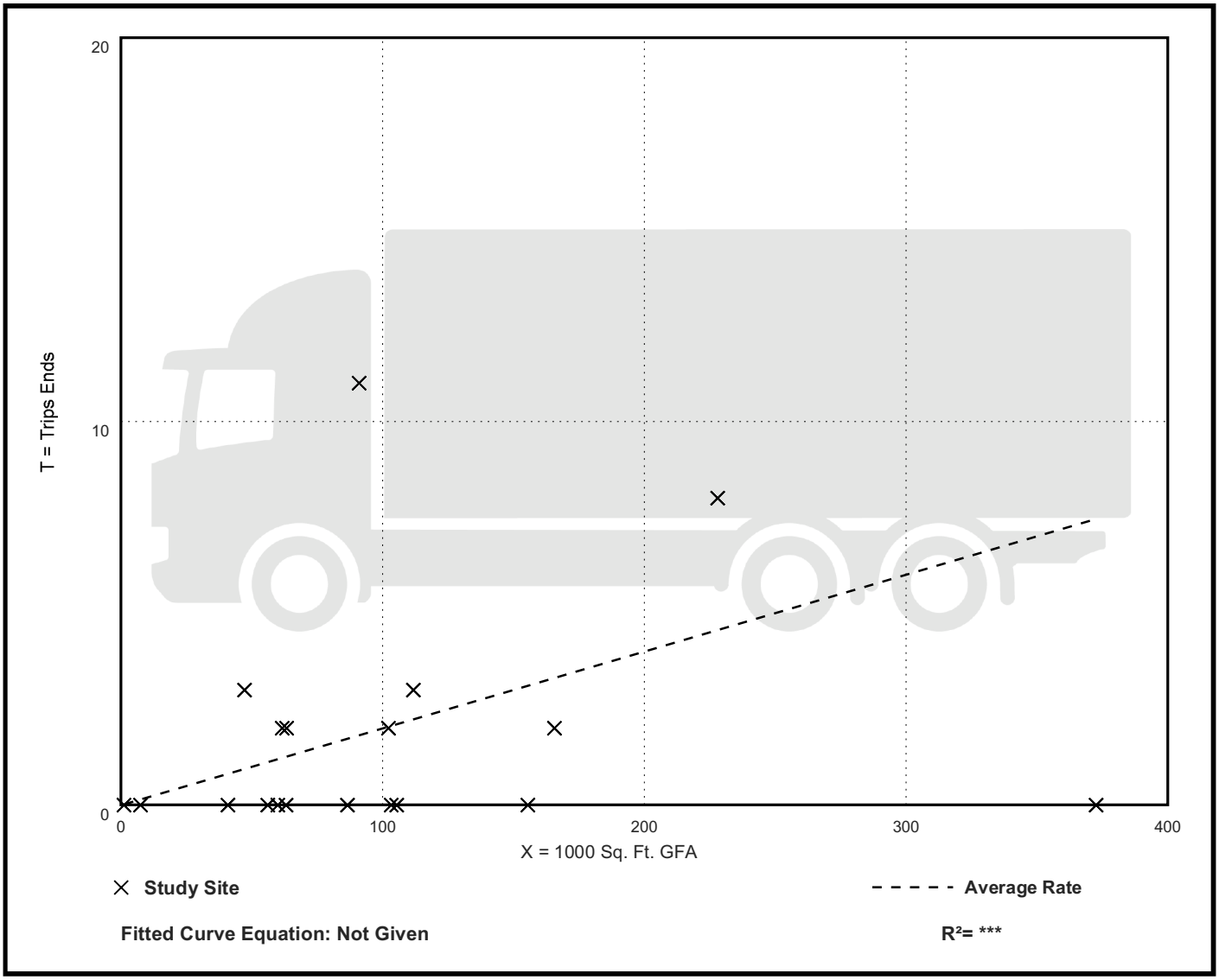
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 19
Avg. 1000 Sq. Ft. GFA: 101
Directional Distribution: 42% entering, 58% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 0.12	0.03

Data Plot and Equation



Manufacturing
(140)

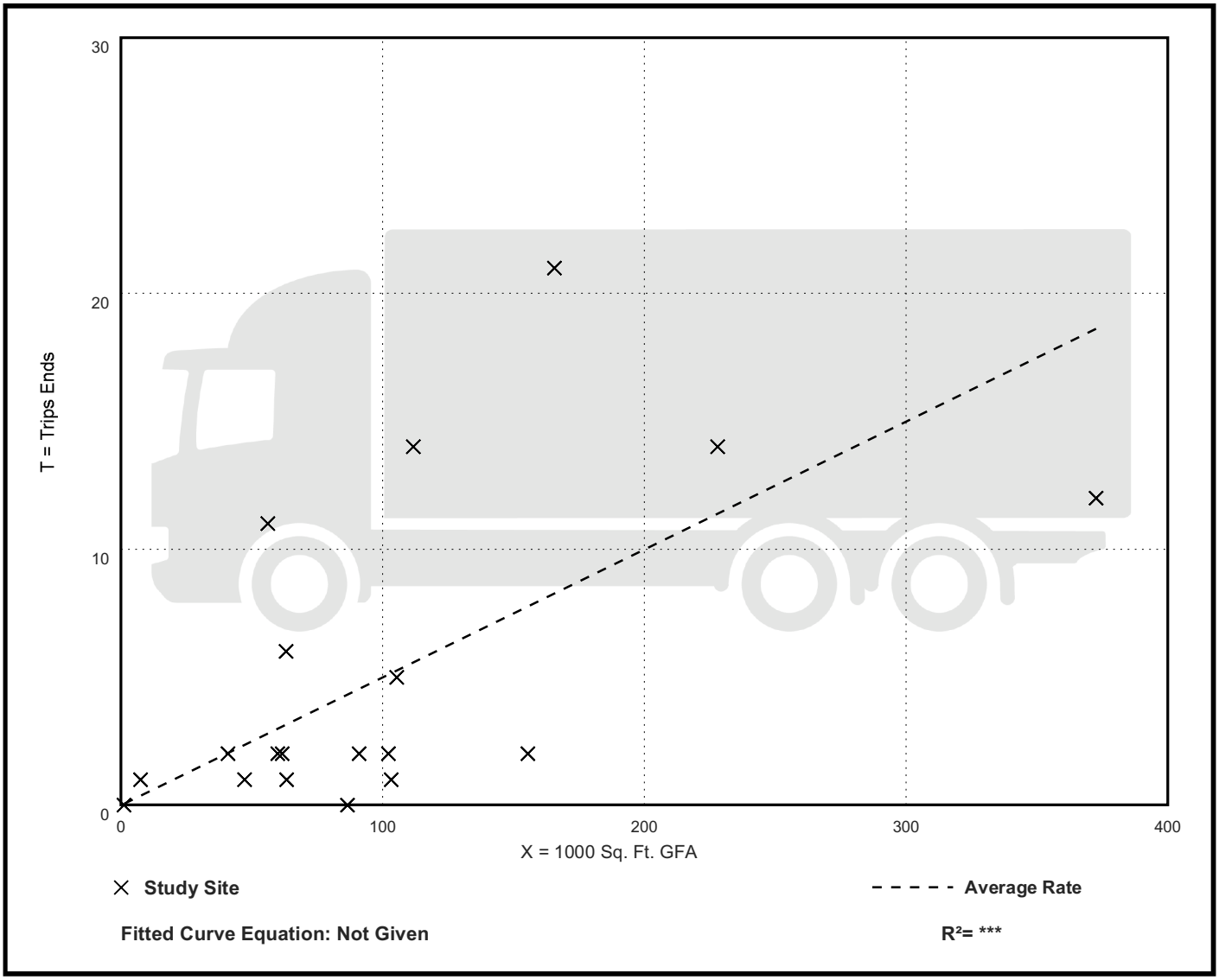
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 19
Avg. 1000 Sq. Ft. GFA: 101
Directional Distribution: 43% entering, 57% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.05	0.00 - 0.20	0.05

Data Plot and Equation



Manufacturing
(140)

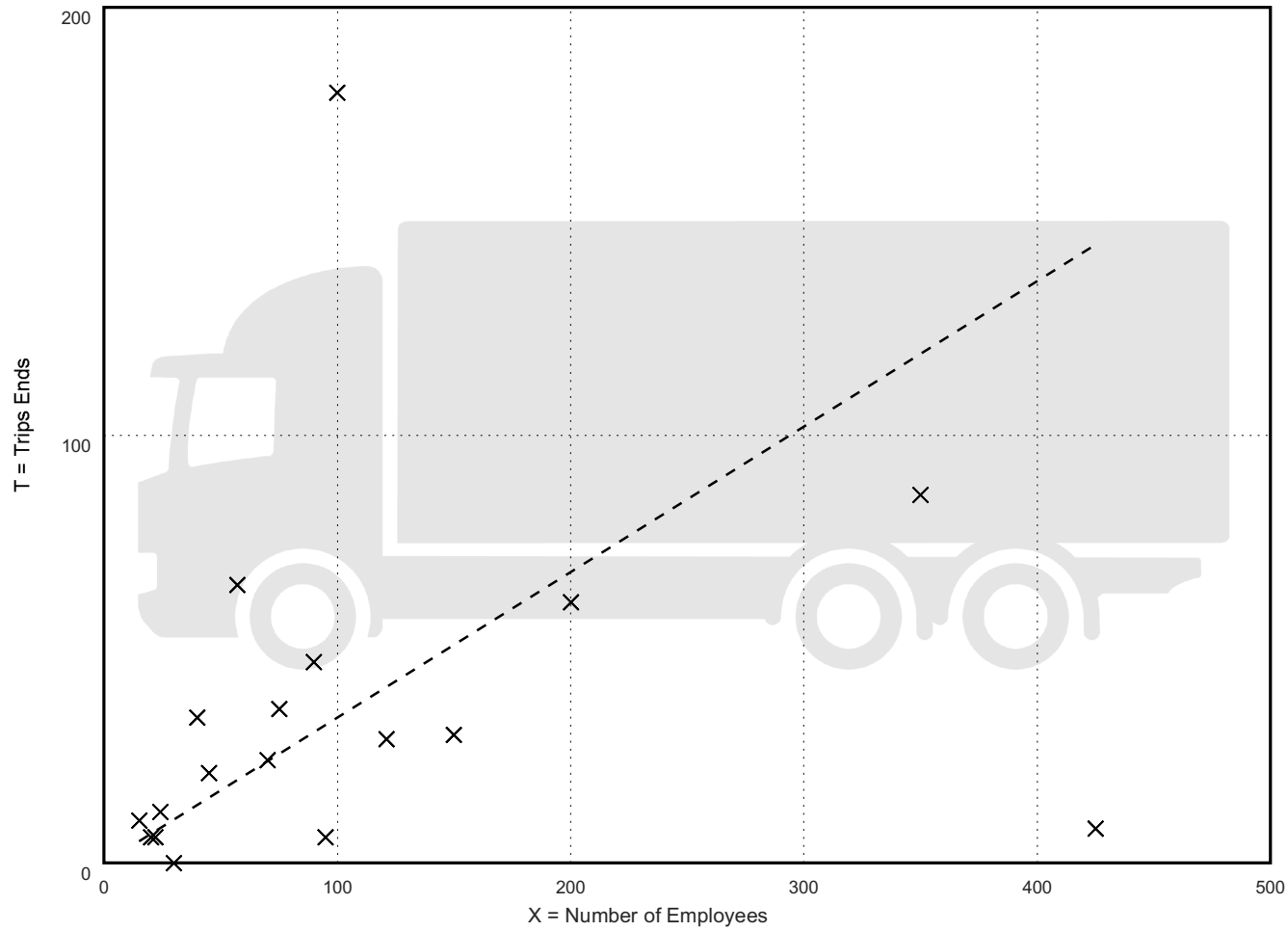
Truck Trip Ends vs: Employees
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 18
Avg. Num. of Employees: 107
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.34	0.00 - 1.80	0.43

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ***

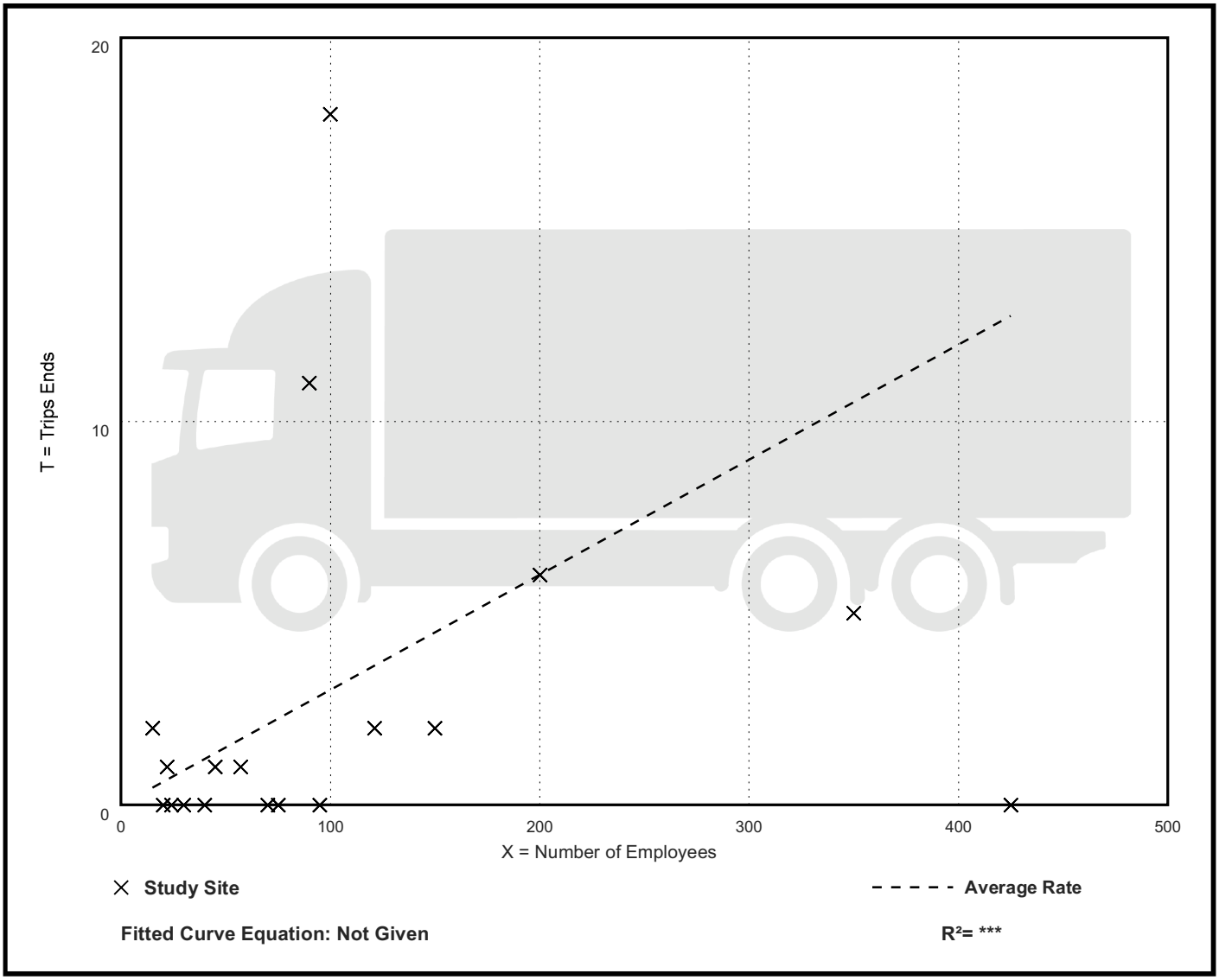
Manufacturing
(140)

Truck Trip Ends vs: Employees
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: 18
Avg. Num. of Employees: 107
Directional Distribution: 59% entering, 41% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.03	0.00 - 0.18	0.05

Data Plot and Equation



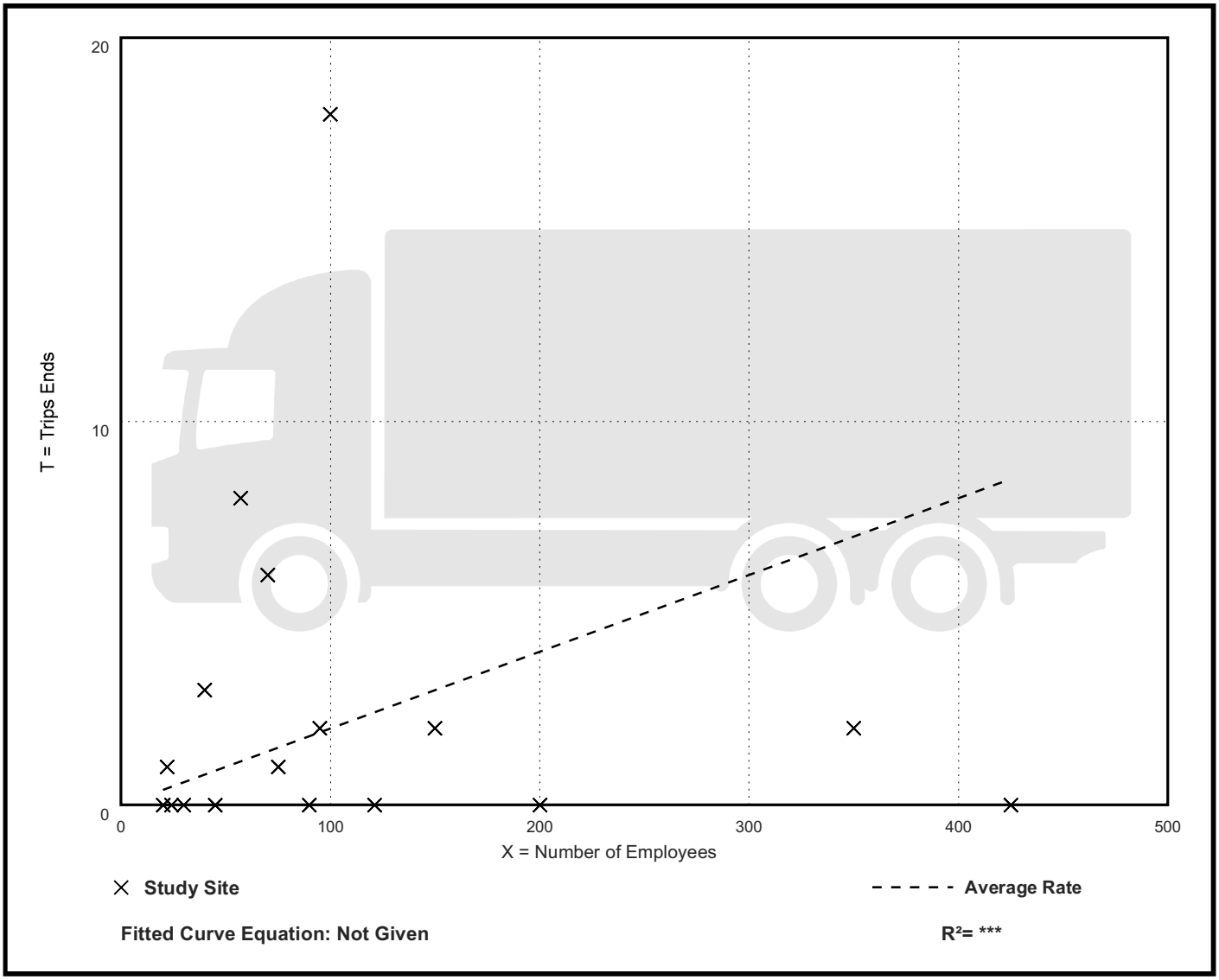
Manufacturing
(140)

Truck Trip Ends vs: Employees
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: 17
Avg. Num. of Employees: 113
Directional Distribution: 37% entering, 63% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 0.18	0.05

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ***

Manufacturing
(140)

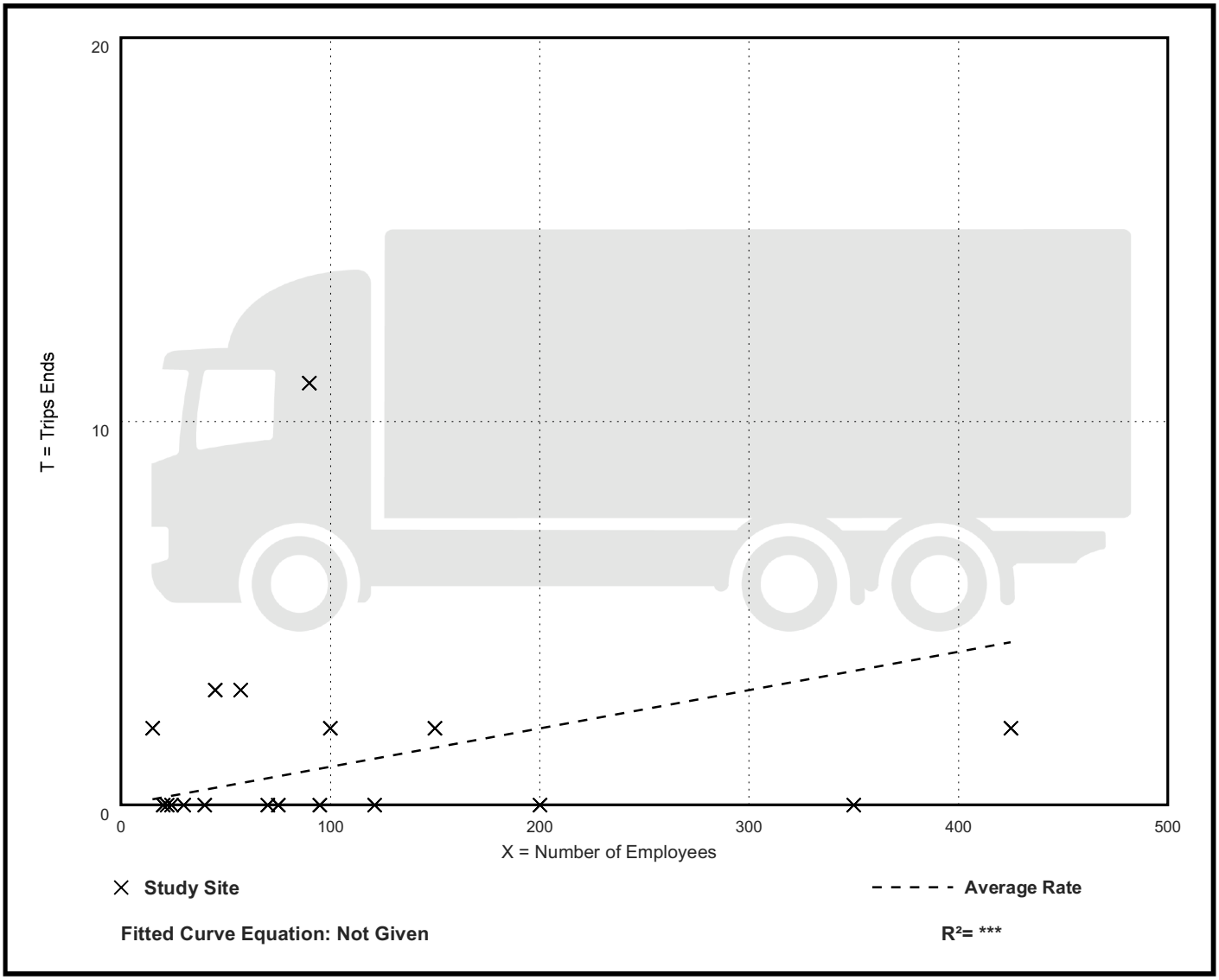
Truck Trip Ends vs: Employees
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 18
Avg. Num. of Employees: 107
Directional Distribution: 44% entering, 56% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.01	0.00 - 0.13	0.03

Data Plot and Equation



Manufacturing
(140)

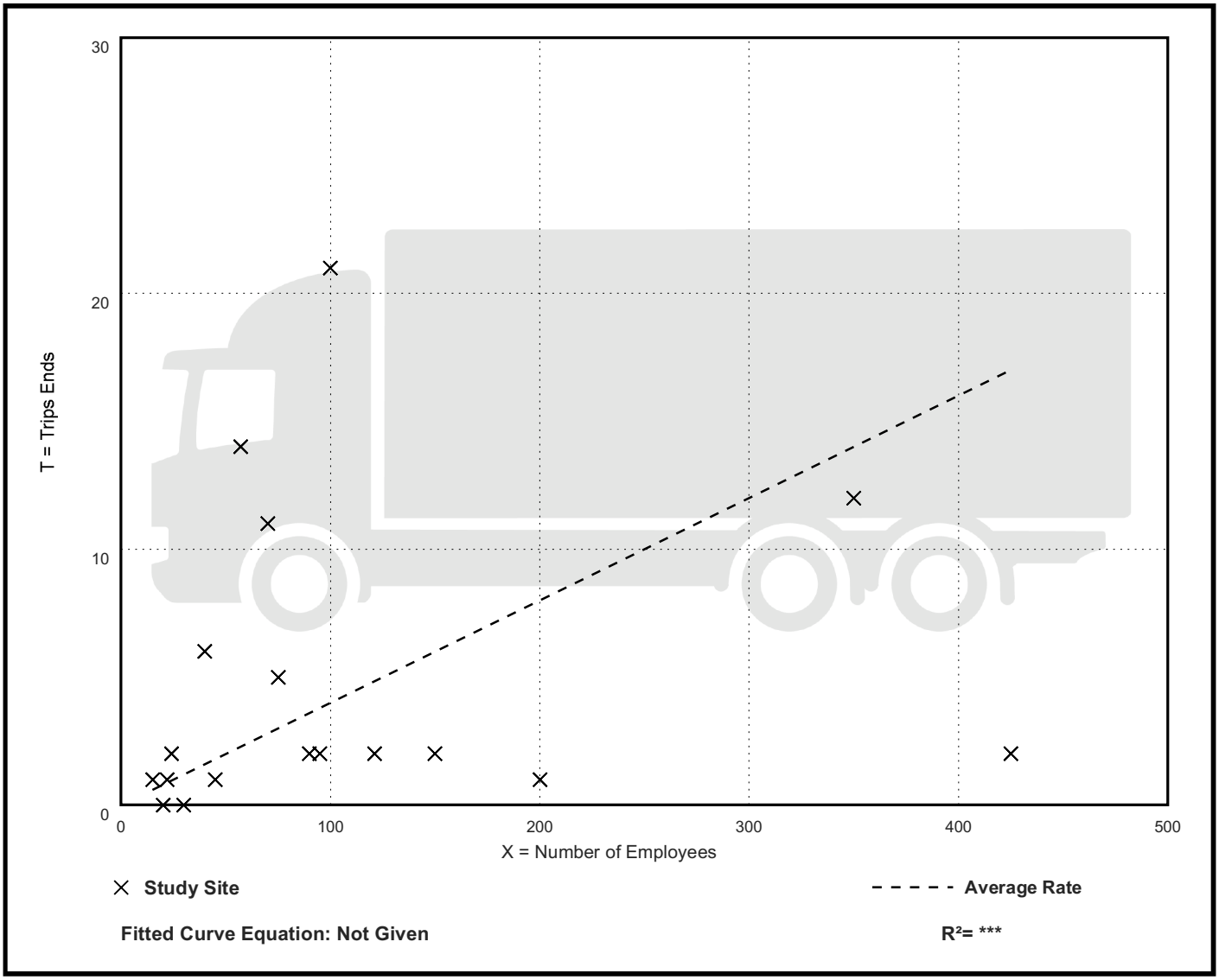
Truck Trip Ends vs: Employees
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 18
Avg. Num. of Employees: 107
Directional Distribution: 45% entering, 55% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.04	0.00 - 0.25	0.07

Data Plot and Equation



Manufacturing
(140)

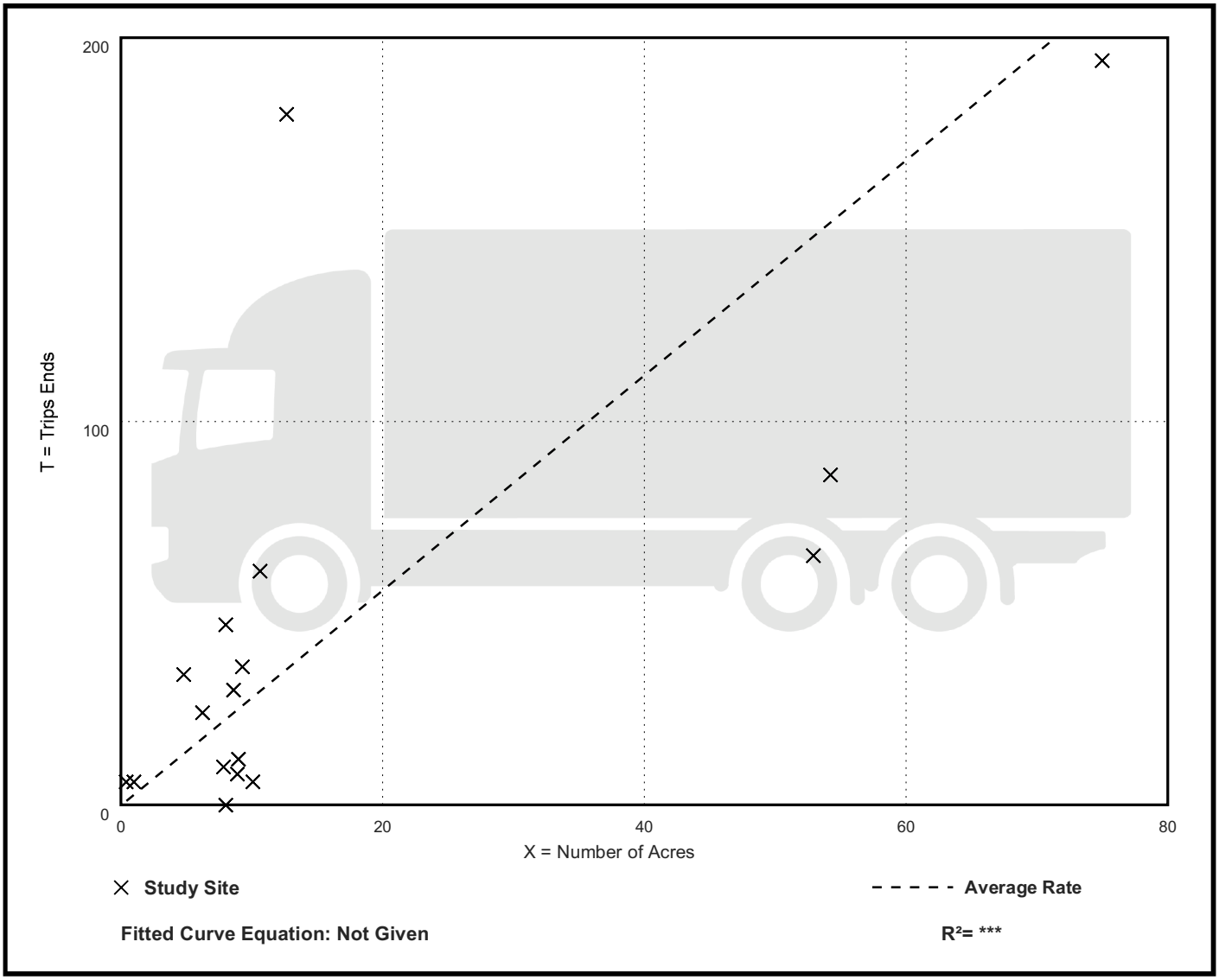
Truck Trip Ends vs: Acres
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 17
Avg. Num. of Acres: 17
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
2.80	0.00 - 15.00	2.98

Data Plot and Equation



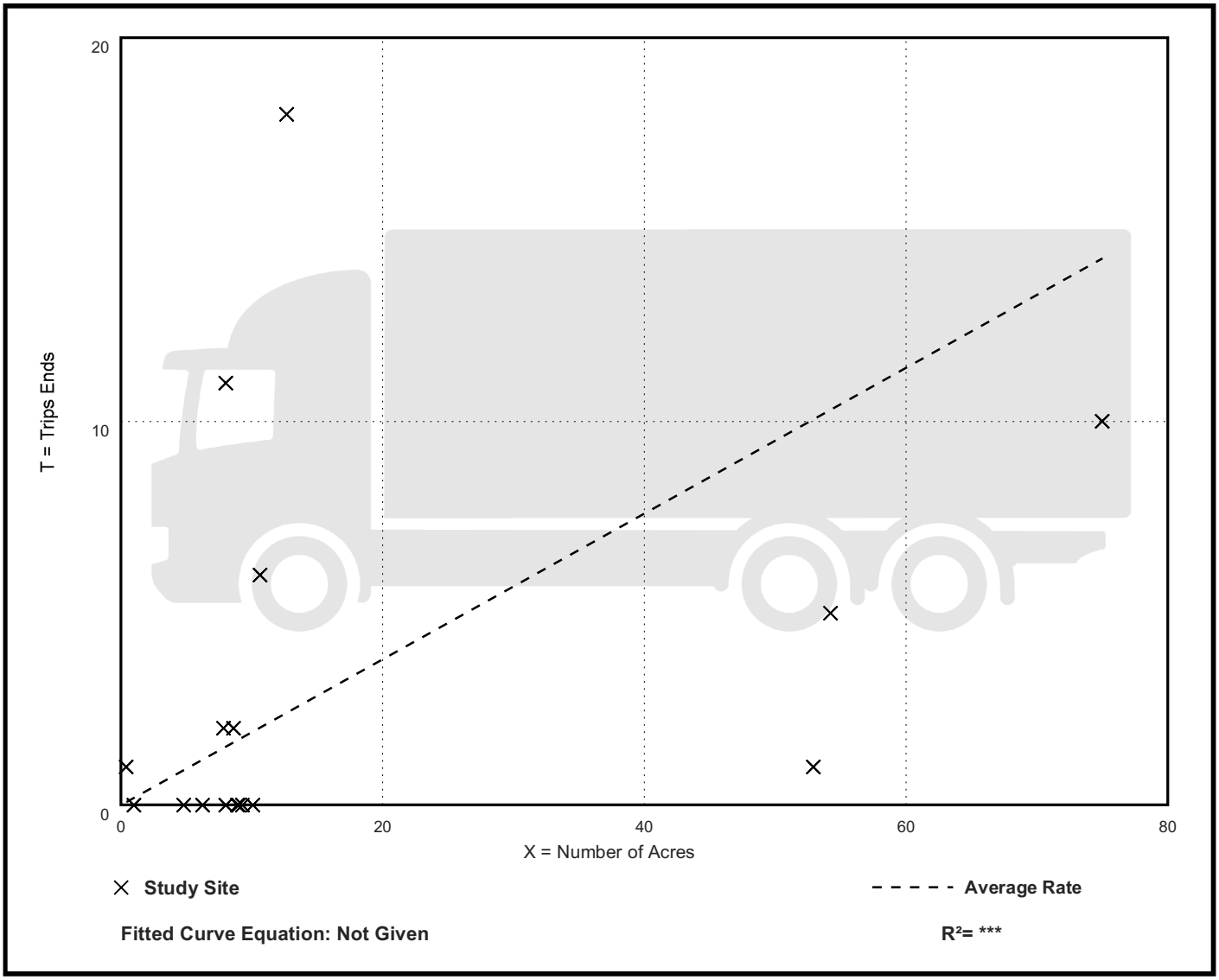
Manufacturing
(140)

Truck Trip Ends vs: Acres
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: 17
Avg. Num. of Acres: 17
Directional Distribution: 55% entering, 45% exiting

Truck Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
0.19	0.00 - 2.50	0.38

Data Plot and Equation



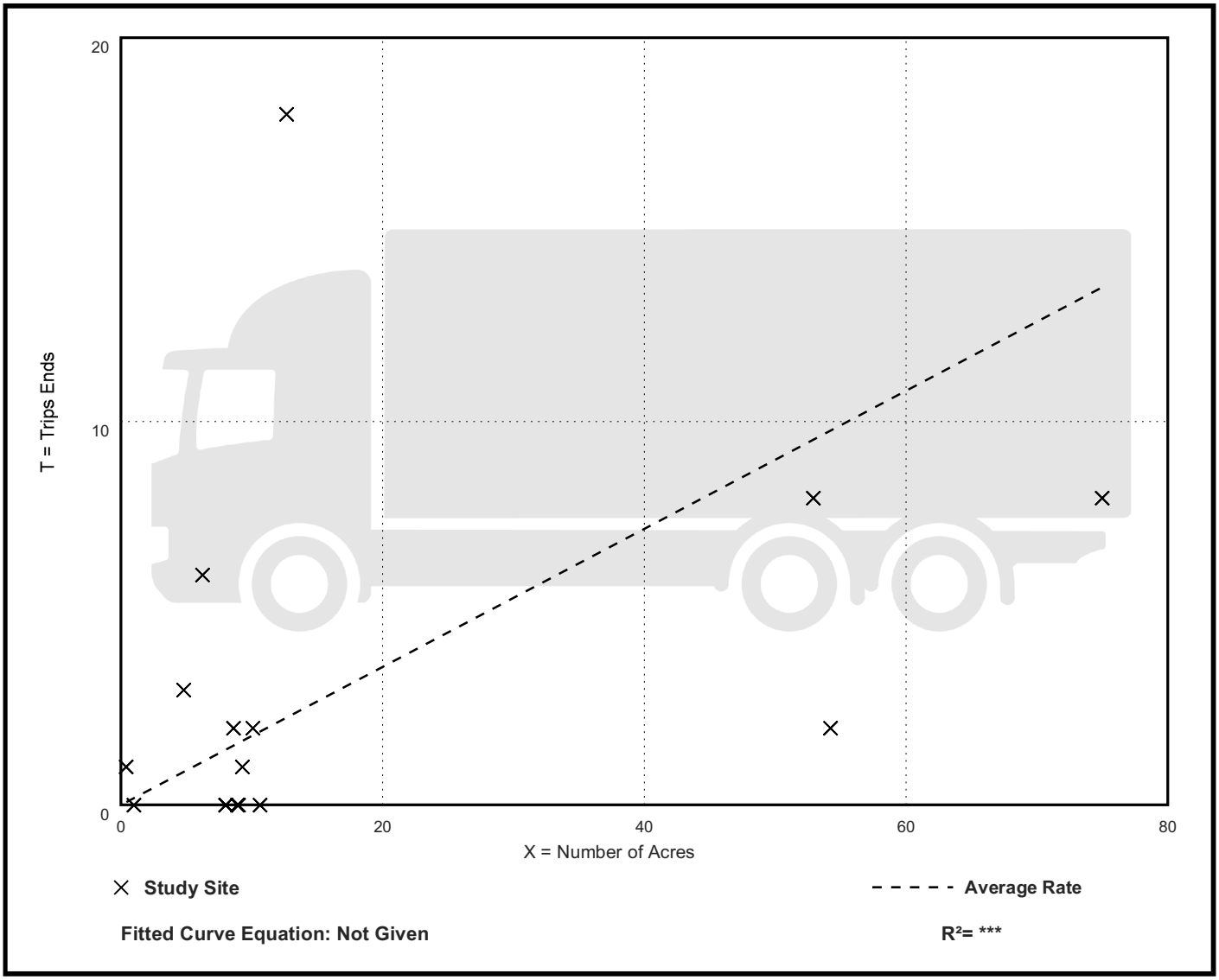
Manufacturing
(140)

Truck Trip Ends vs: Acres
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: 16
Avg. Num. of Acres: 17
Directional Distribution: 41% entering, 59% exiting

Truck Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
0.18	0.00 - 2.50	0.34

Data Plot and Equation



Manufacturing
(140)

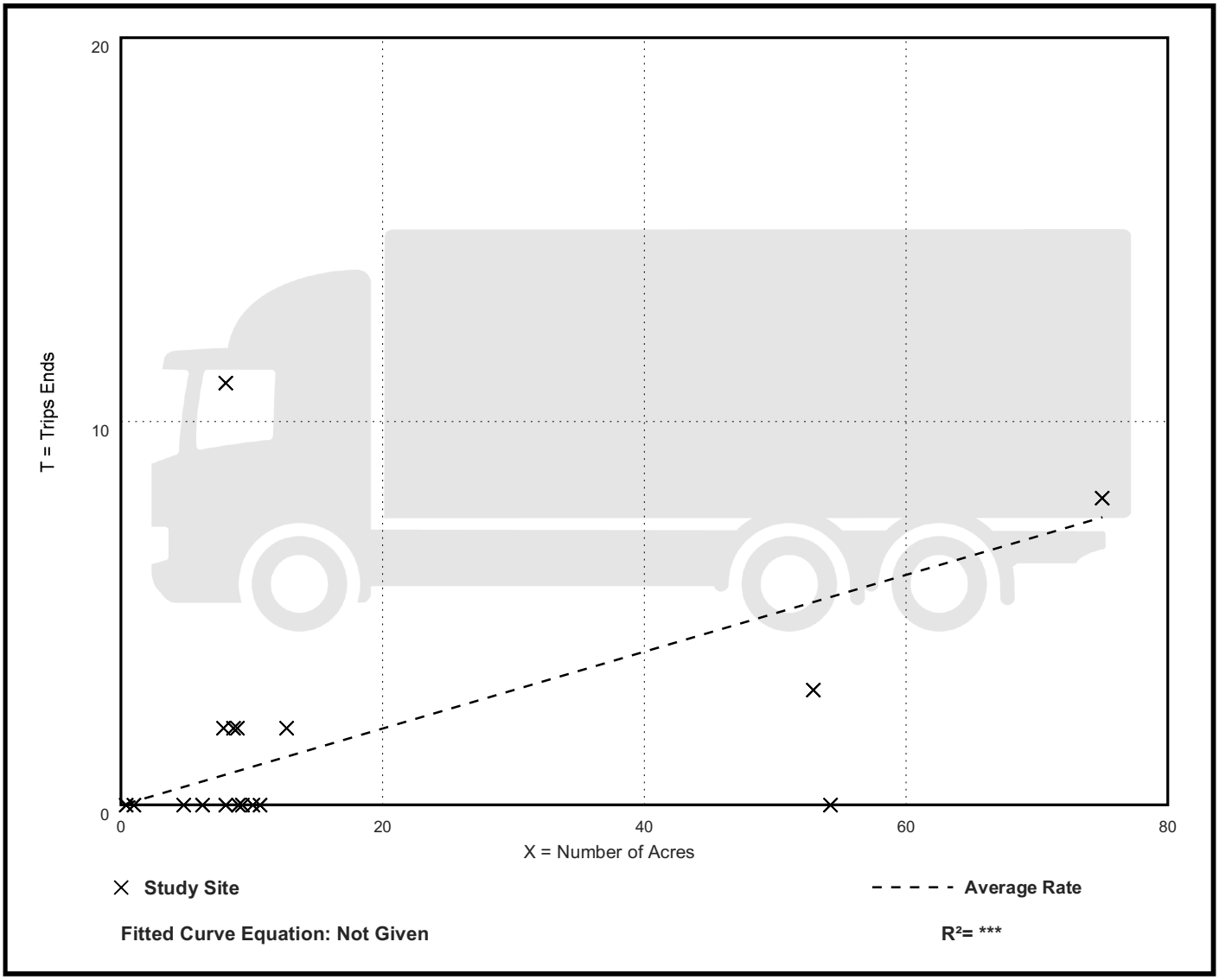
Truck Trip Ends vs: Acres
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 17
Avg. Num. of Acres: 17
Directional Distribution: 43% entering, 57% exiting

Truck Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
0.10	0.00 - 1.38	0.23

Data Plot and Equation



Manufacturing
(140)

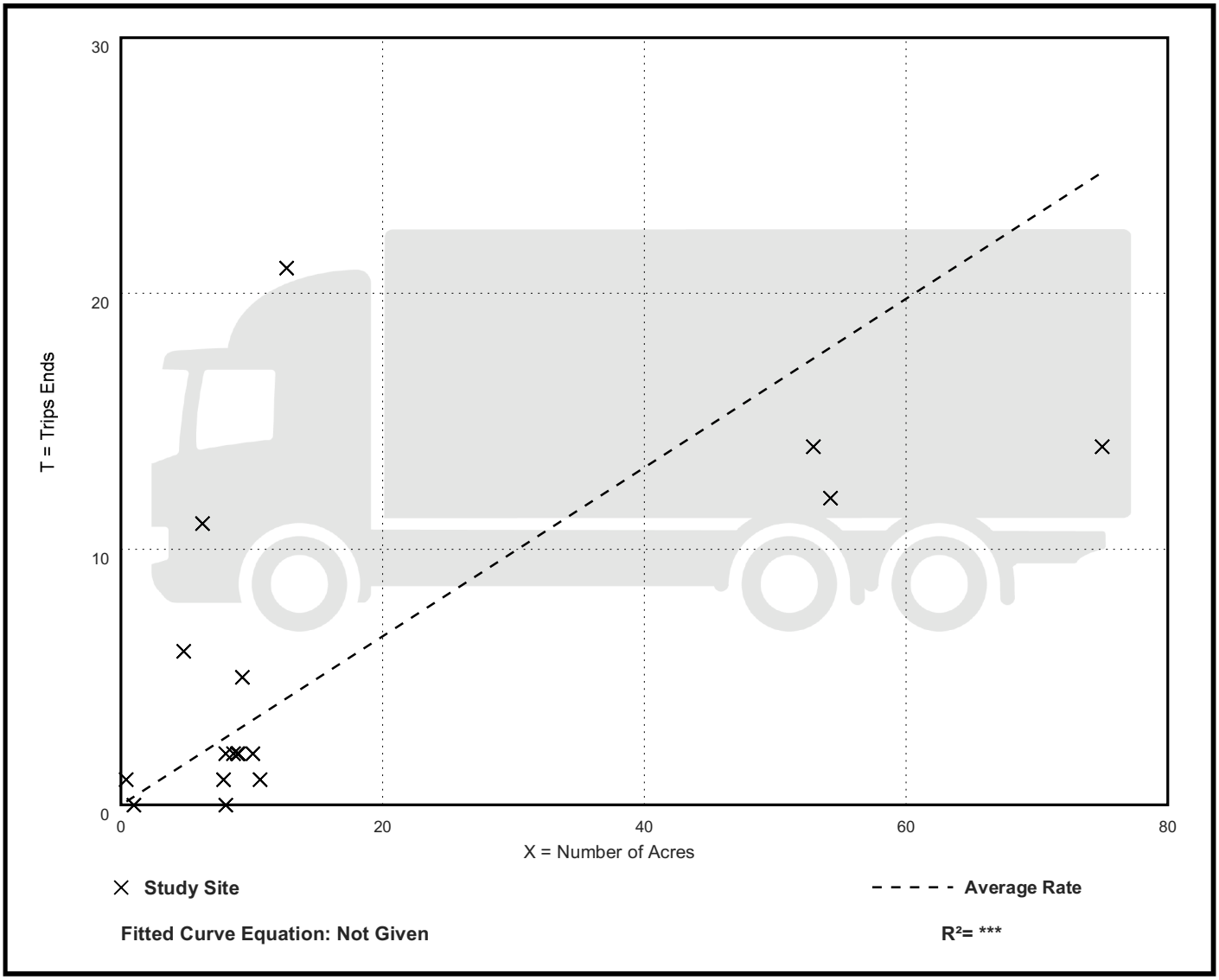
Truck Trip Ends vs: Acres
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 17
Avg. Num. of Acres: 17
Directional Distribution: 43% entering, 57% exiting

Truck Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
0.33	0.00 - 2.50	0.41

Data Plot and Equation



Land Use: 150
Warehousing

Description

A warehouse is primarily devoted to the storage of materials, but it may also include office and maintenance areas. High-cube transload and short-term storage warehouse (Land Use 154), high-cube fulfillment center warehouse (Land Use 155), high-cube parcel hub warehouse (Land Use 156), and high-cube cold storage warehouse (Land Use 157) 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 California, Connecticut, Minnesota, New Jersey, New York, Ohio, Oregon, Pennsylvania, and Texas.

Source Numbers

184, 331, 406, 411, 443, 579, 583, 596, 598, 611, 619, 642, 752, 869, 875, 876, 914, 940, 1050

Warehousing
(150)

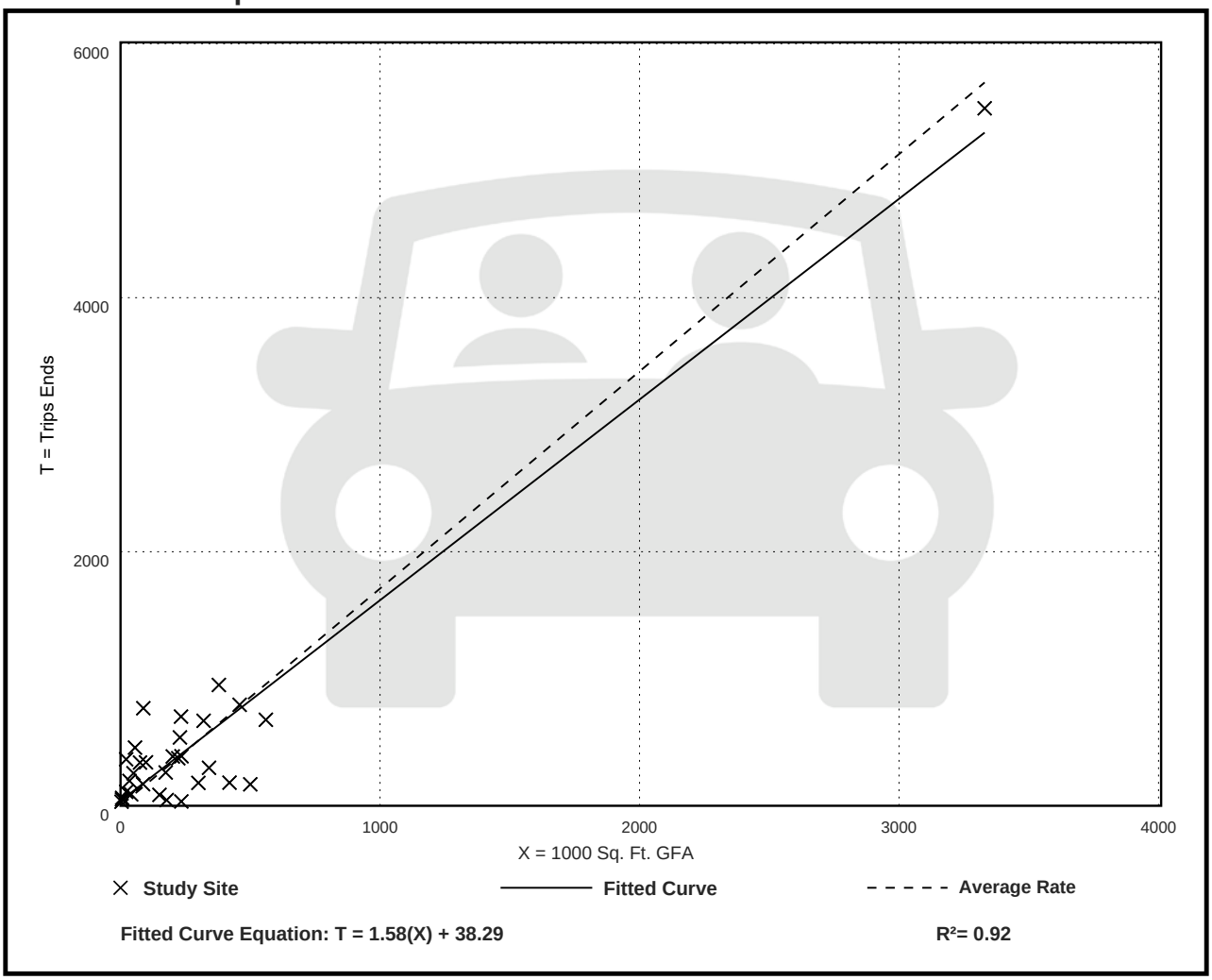
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 31
Avg. 1000 Sq. Ft. GFA: 292
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.71	0.15 - 16.93	1.48

Data Plot and Equation



Fitted Curve Equation: T = 1.58(X) + 38.29

R^2= 0.92

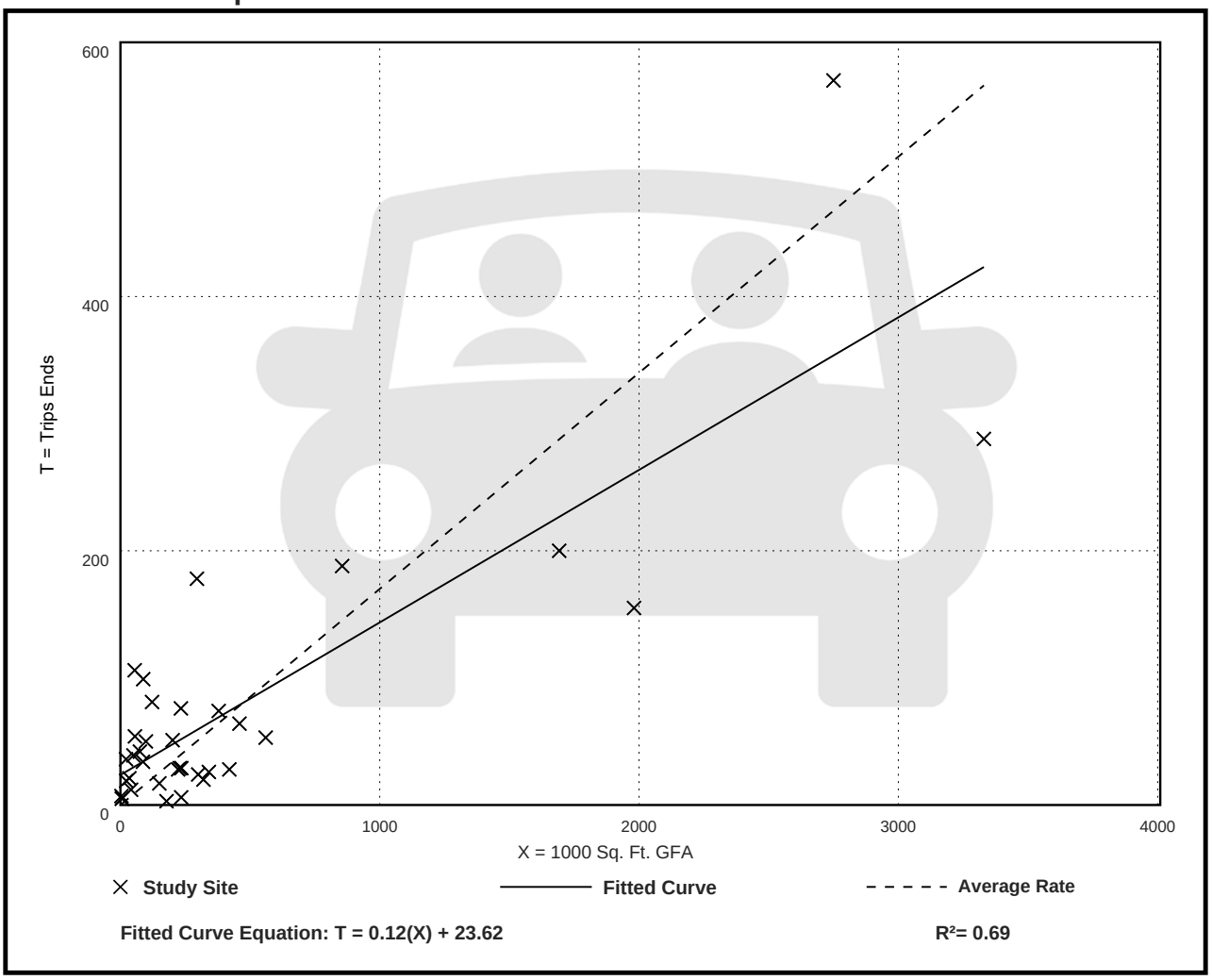
Warehousing
(150)

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: 36
Avg. 1000 Sq. Ft. GFA: 448
Directional Distribution: 77% entering, 23% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.17	0.02 - 1.93	0.19

Data Plot and Equation



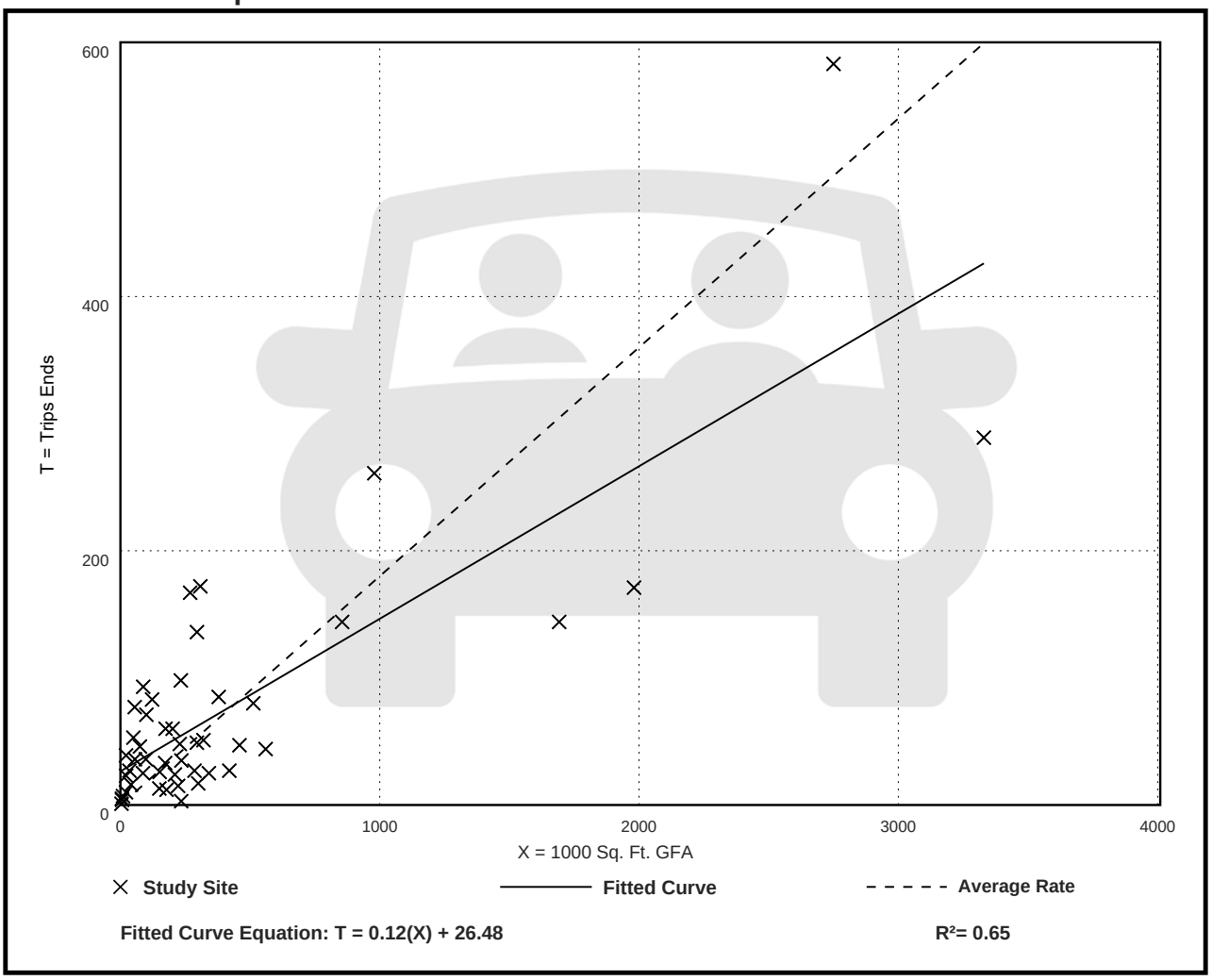
Warehousing
(150)

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: 49
Avg. 1000 Sq. Ft. GFA: 400
Directional Distribution: 28% entering, 72% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.18	0.01 - 1.80	0.18

Data Plot and Equation



Warehousing
(150)

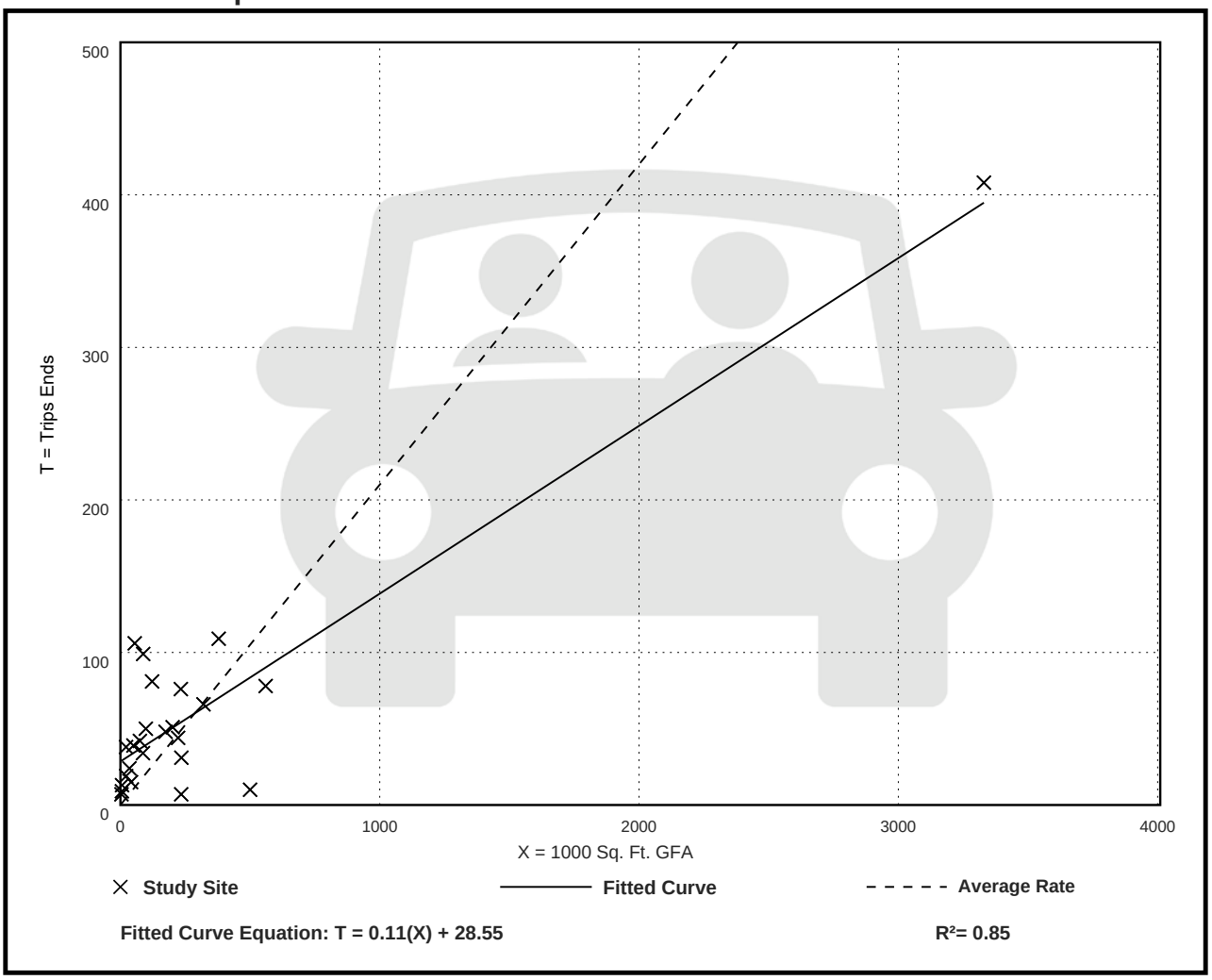
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 25
Avg. 1000 Sq. Ft. GFA: 284
Directional Distribution: 66% entering, 34% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.21	0.02 - 2.08	0.26

Data Plot and Equation



Fitted Curve Equation: T = 0.11(X) + 28.55

R^2= 0.85

Warehousing
(150)

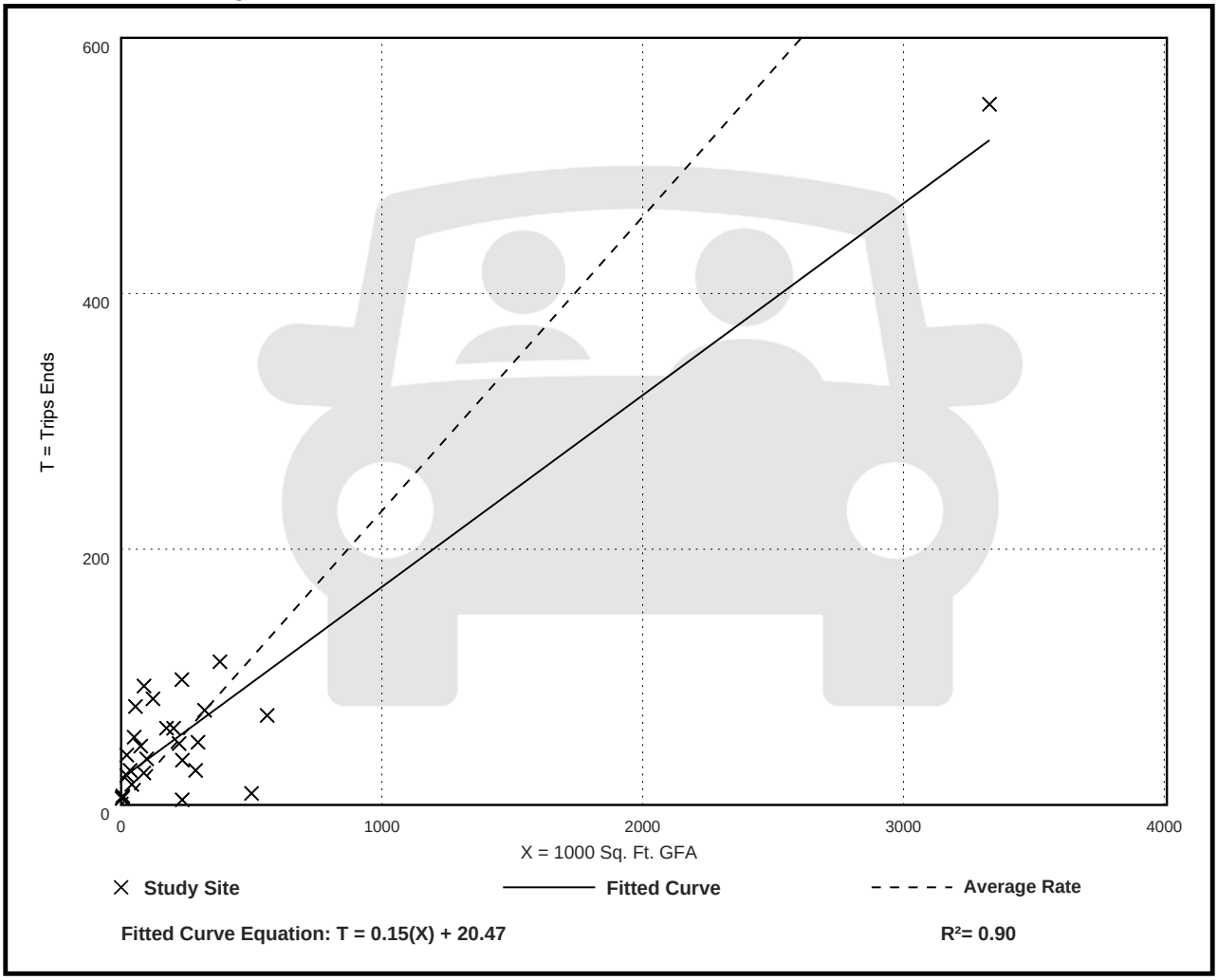
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 27
Avg. 1000 Sq. Ft. GFA: 284
Directional Distribution: 24% entering, 76% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.23	0.02 - 1.80	0.23

Data Plot and Equation



Fitted Curve Equation: T = 0.15(X) + 20.47

R^2= 0.90

Warehousing
(150)

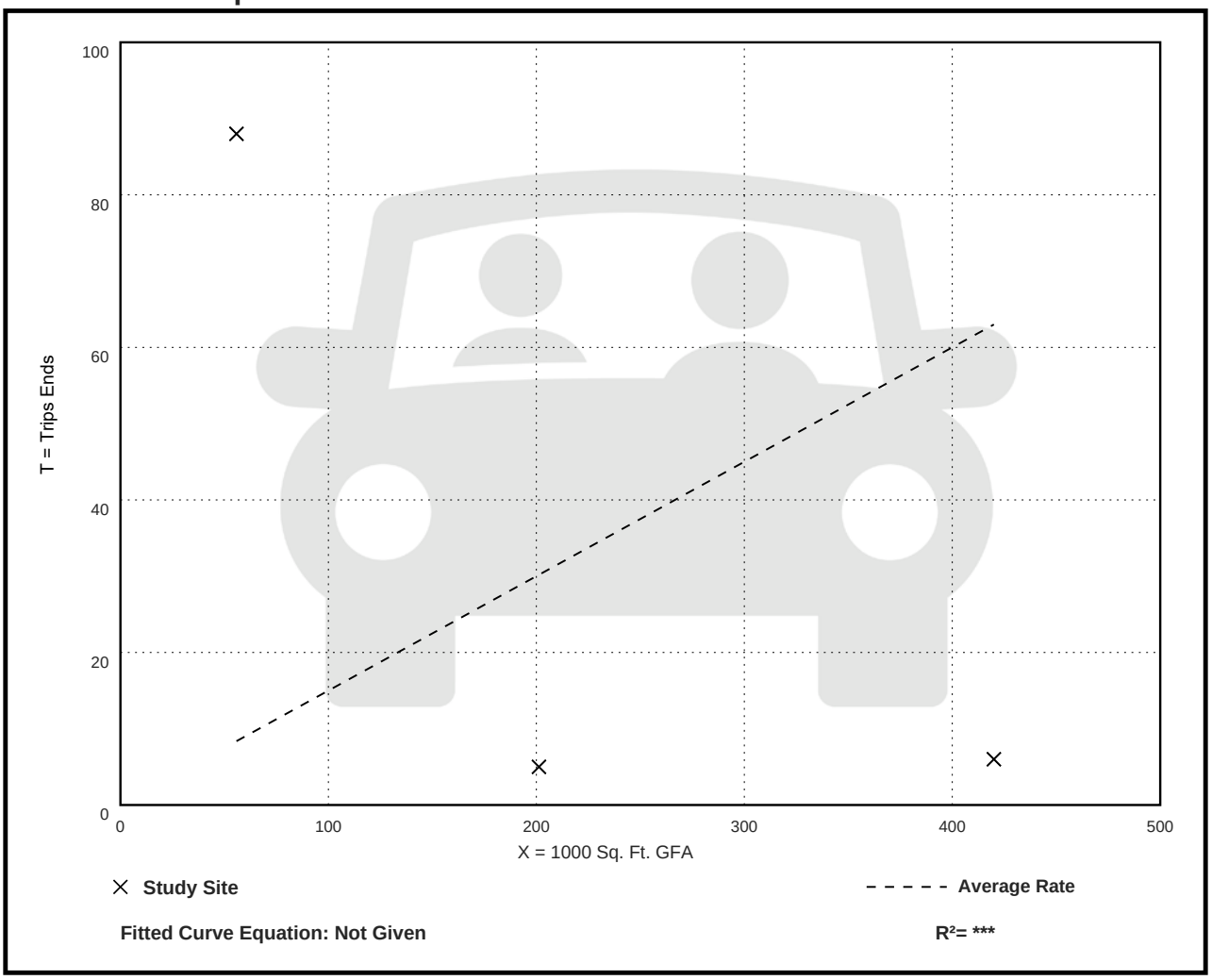
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday

Setting/Location: General Urban/Suburban
Number of Studies: 3
Avg. 1000 Sq. Ft. GFA: 226
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.15	0.01 - 1.58	0.53

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ***

Warehousing
(150)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday, Peak Hour of Generator

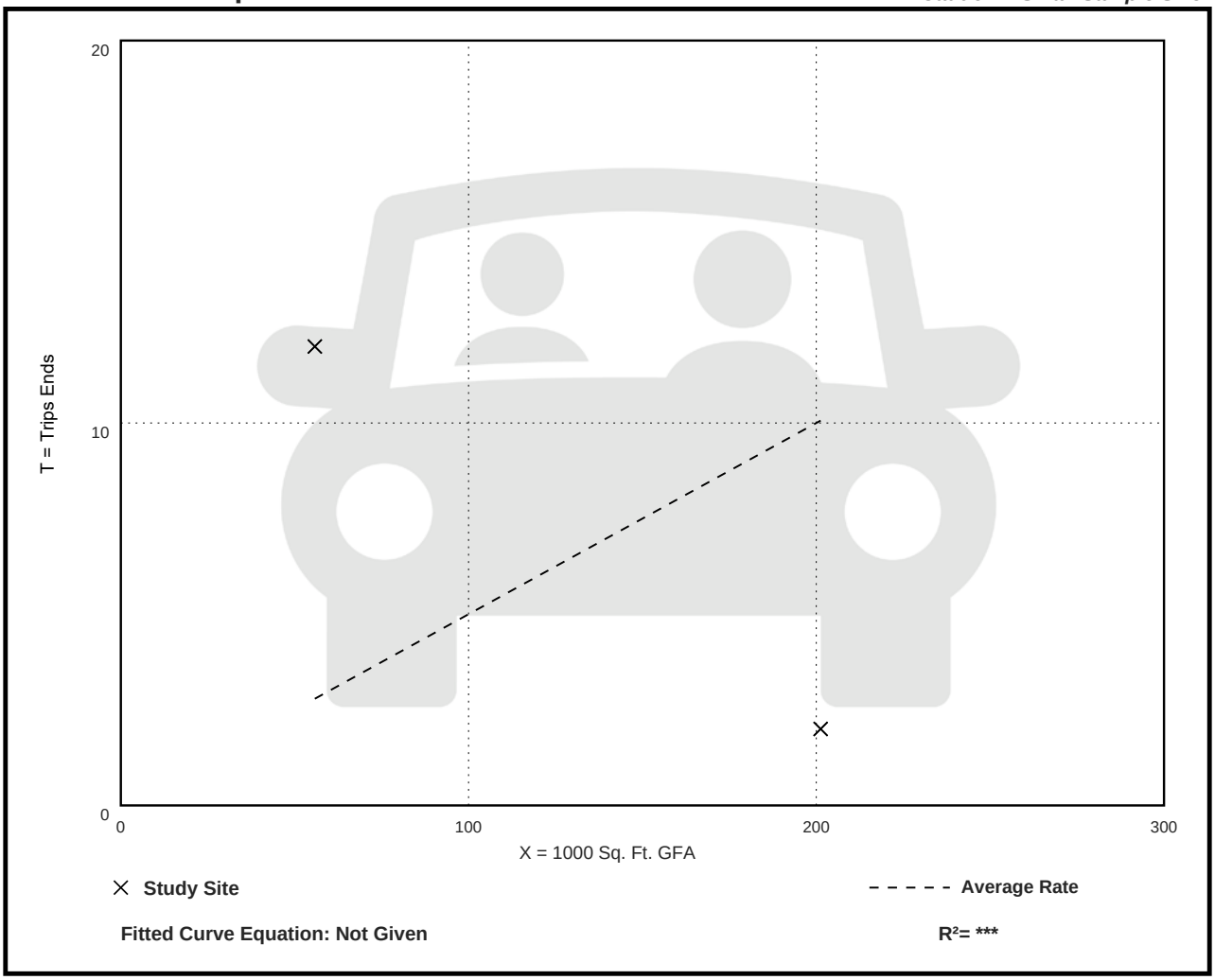
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 129
Directional Distribution: 64% entering, 36% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.05	0.01 - 0.22	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

Warehousing
(150)

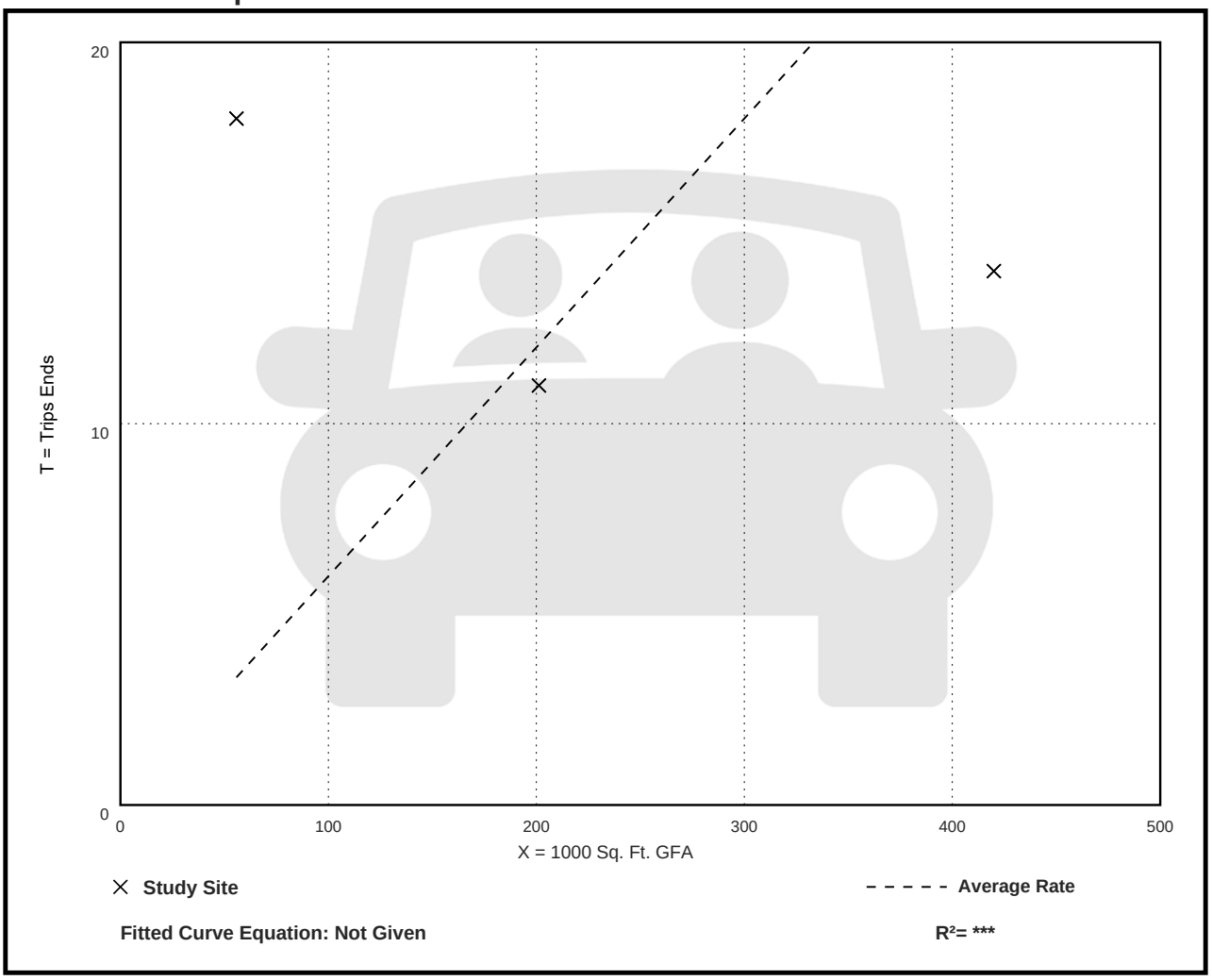
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Sunday

Setting/Location: General Urban/Suburban
Number of Studies: 3
Avg. 1000 Sq. Ft. GFA: 226
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.06	0.03 - 0.32	0.10

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ***

Warehousing
(150)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Sunday, Peak Hour of Generator

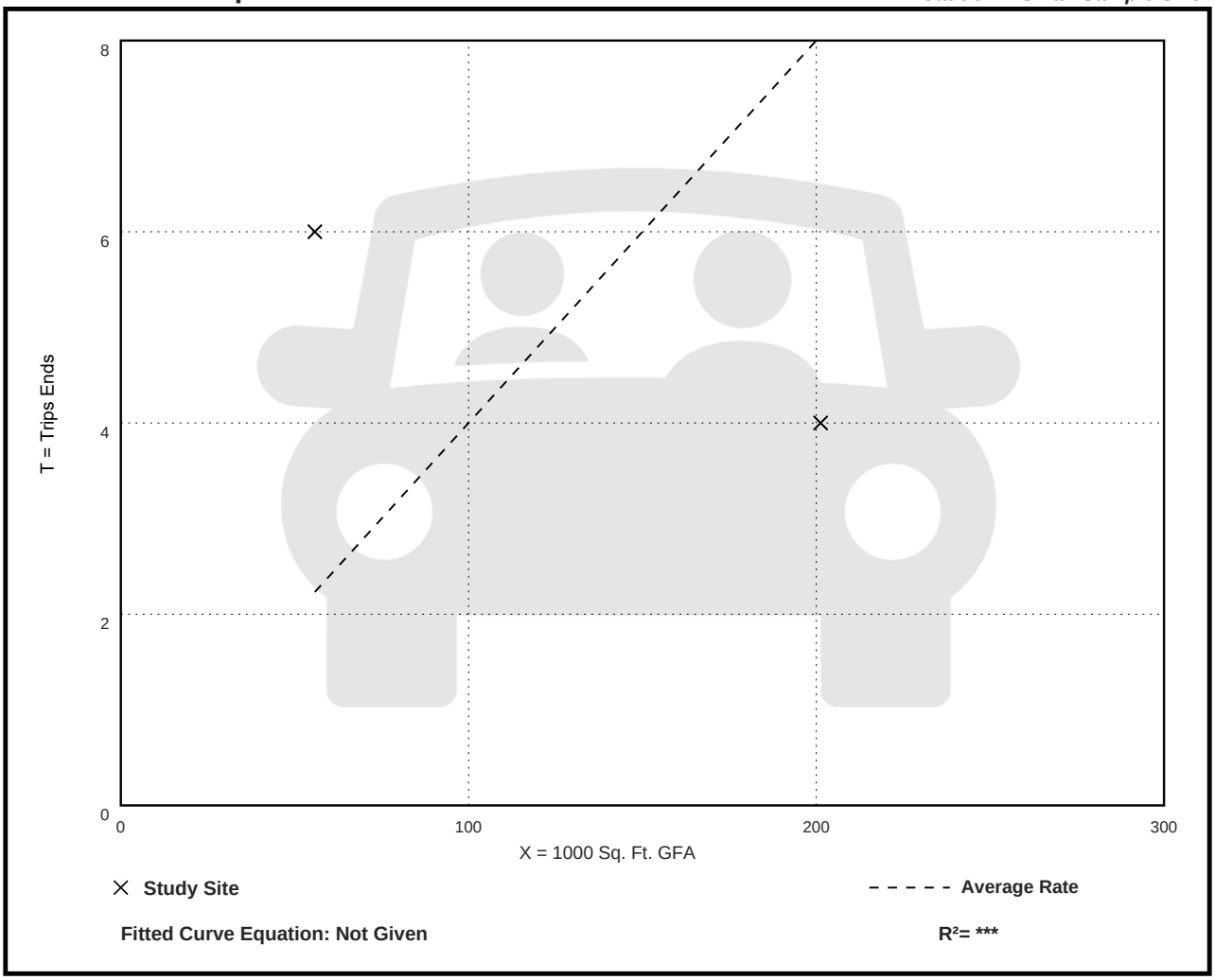
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 129
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.04	0.02 - 0.11	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

Warehousing
(150)

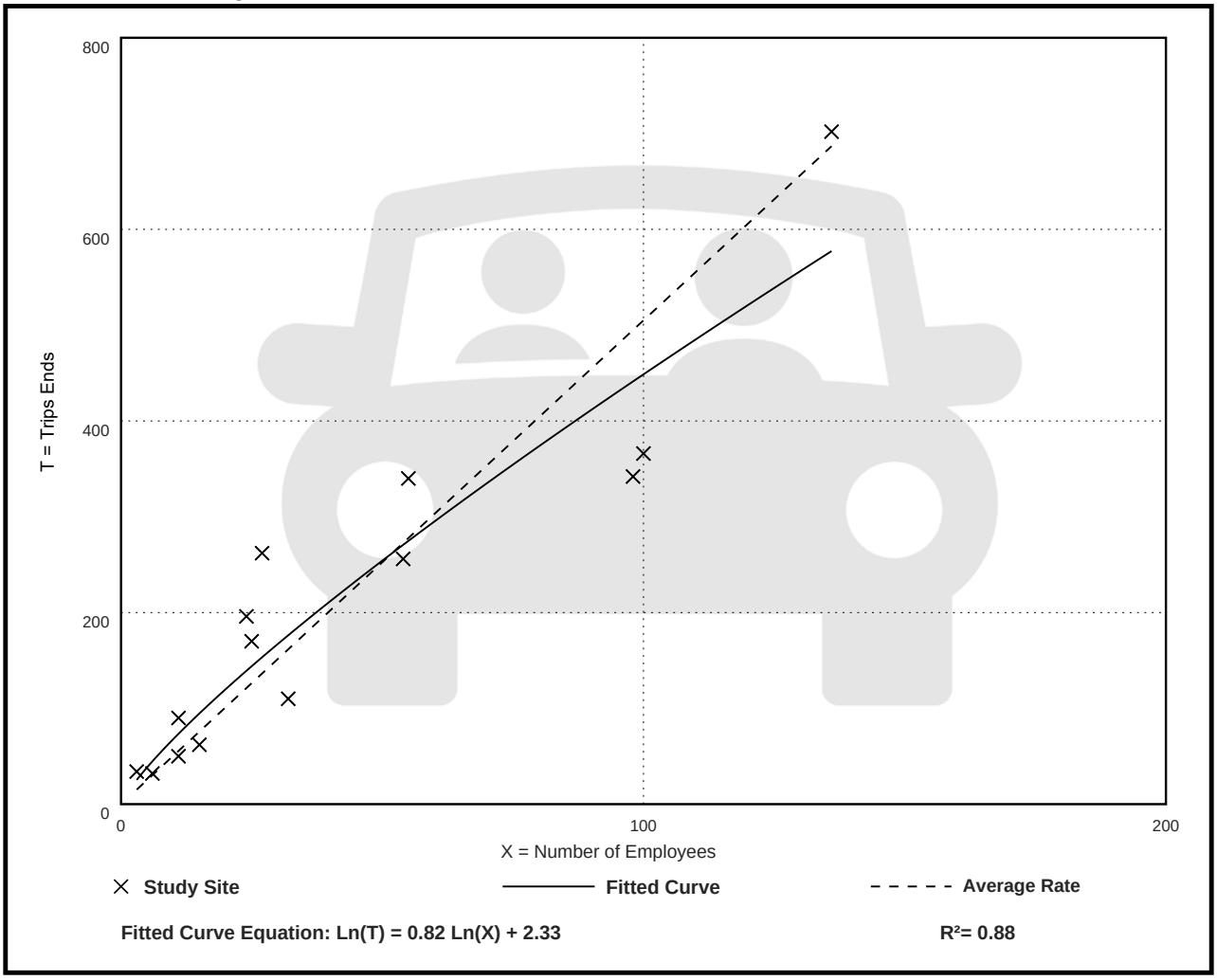
Vehicle Trip Ends vs: Employees
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 14
Avg. Num. of Employees: 43
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
5.05	3.44 - 11.33	1.77

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.82 Ln(X) + 2.33

R^2= 0.88

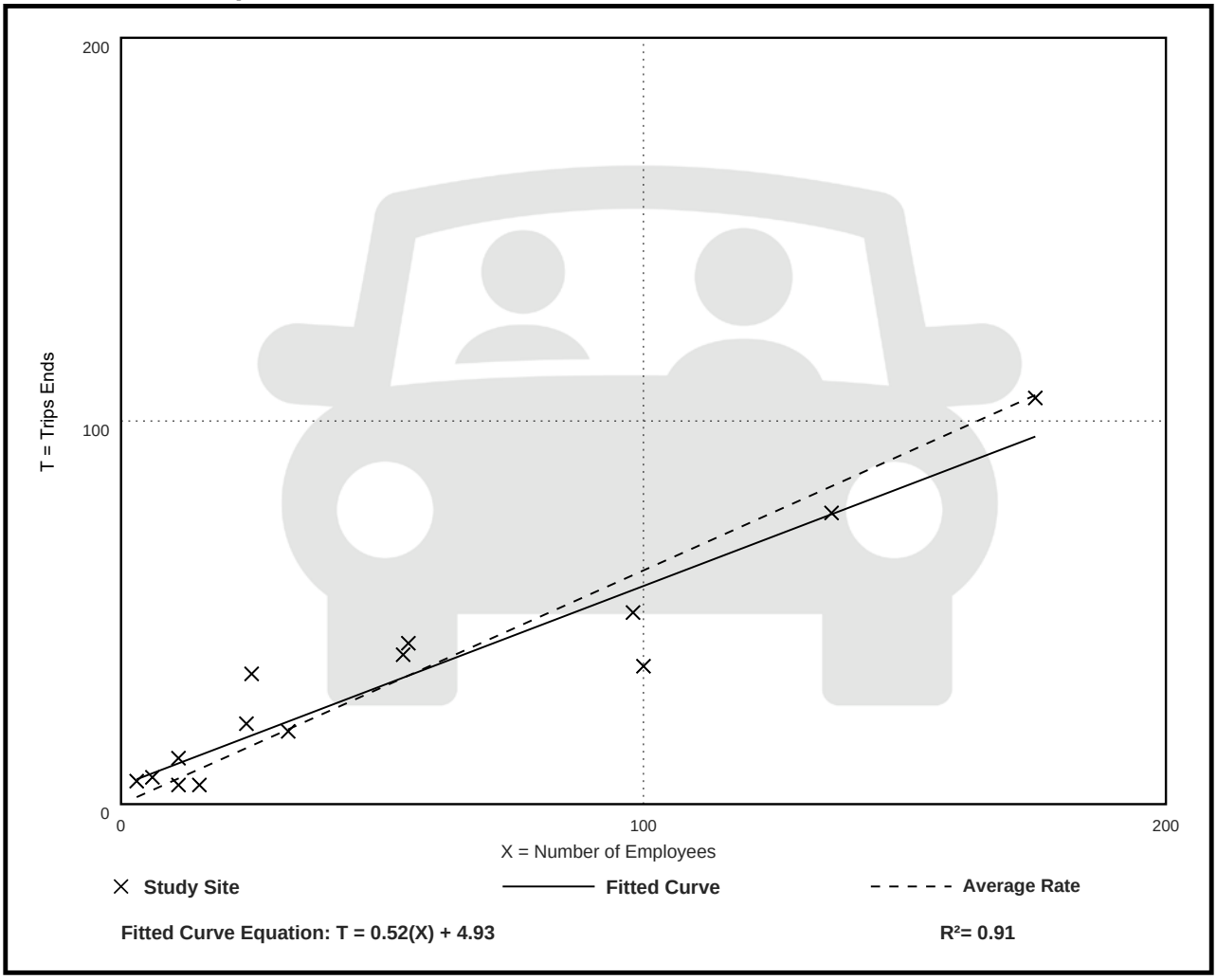
Warehousing
(150)

Vehicle Trip Ends vs: Employees
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: 14
Avg. Num. of Employees: 53
Directional Distribution: 72% entering, 28% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.61	0.33 - 2.00	0.23

Data Plot and Equation



Fitted Curve Equation: T = 0.52(X) + 4.93

R^2= 0.91

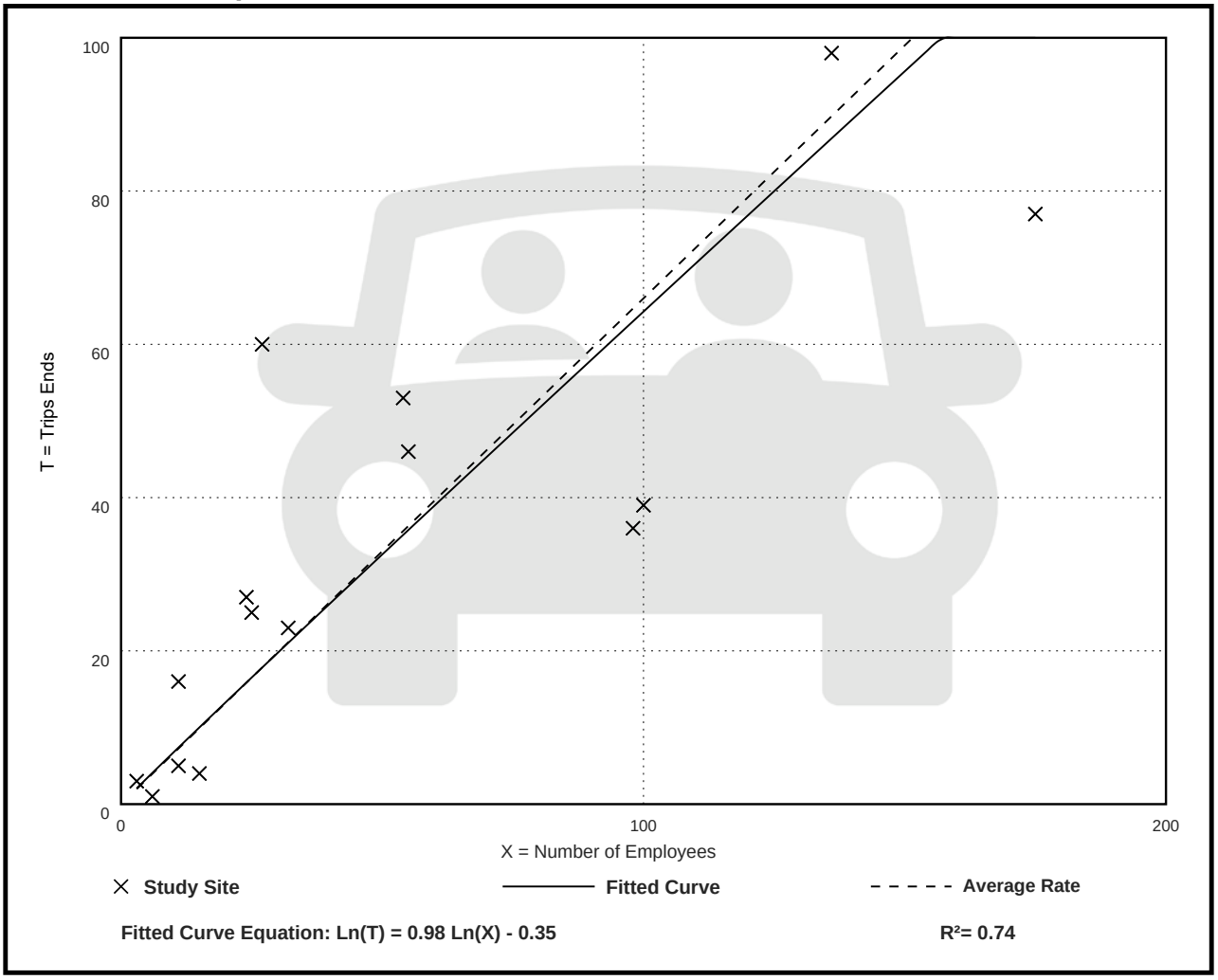
Warehousing
(150)

Vehicle Trip Ends vs: Employees
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: 15
Avg. Num. of Employees: 51
Directional Distribution: 36% entering, 64% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.66	0.17 - 2.22	0.40

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.98 Ln(X) - 0.35

R^2= 0.74

Warehousing
(150)

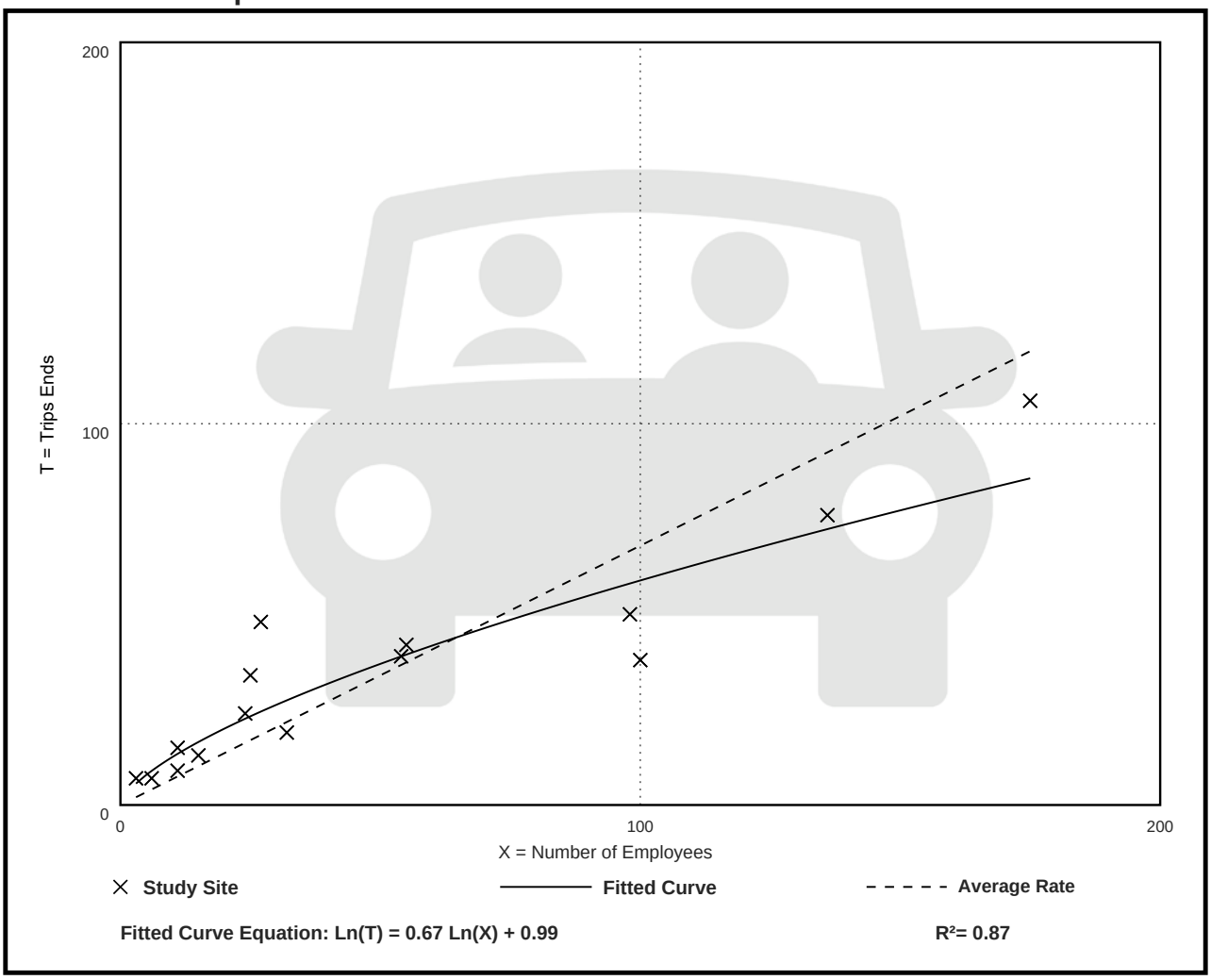
Vehicle Trip Ends vs: Employees
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 15
Avg. Num. of Employees: 51
Directional Distribution: 53% entering, 47% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.68	0.38 - 2.33	0.33

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.67 Ln(X) + 0.99

R^2= 0.87

Warehousing
(150)

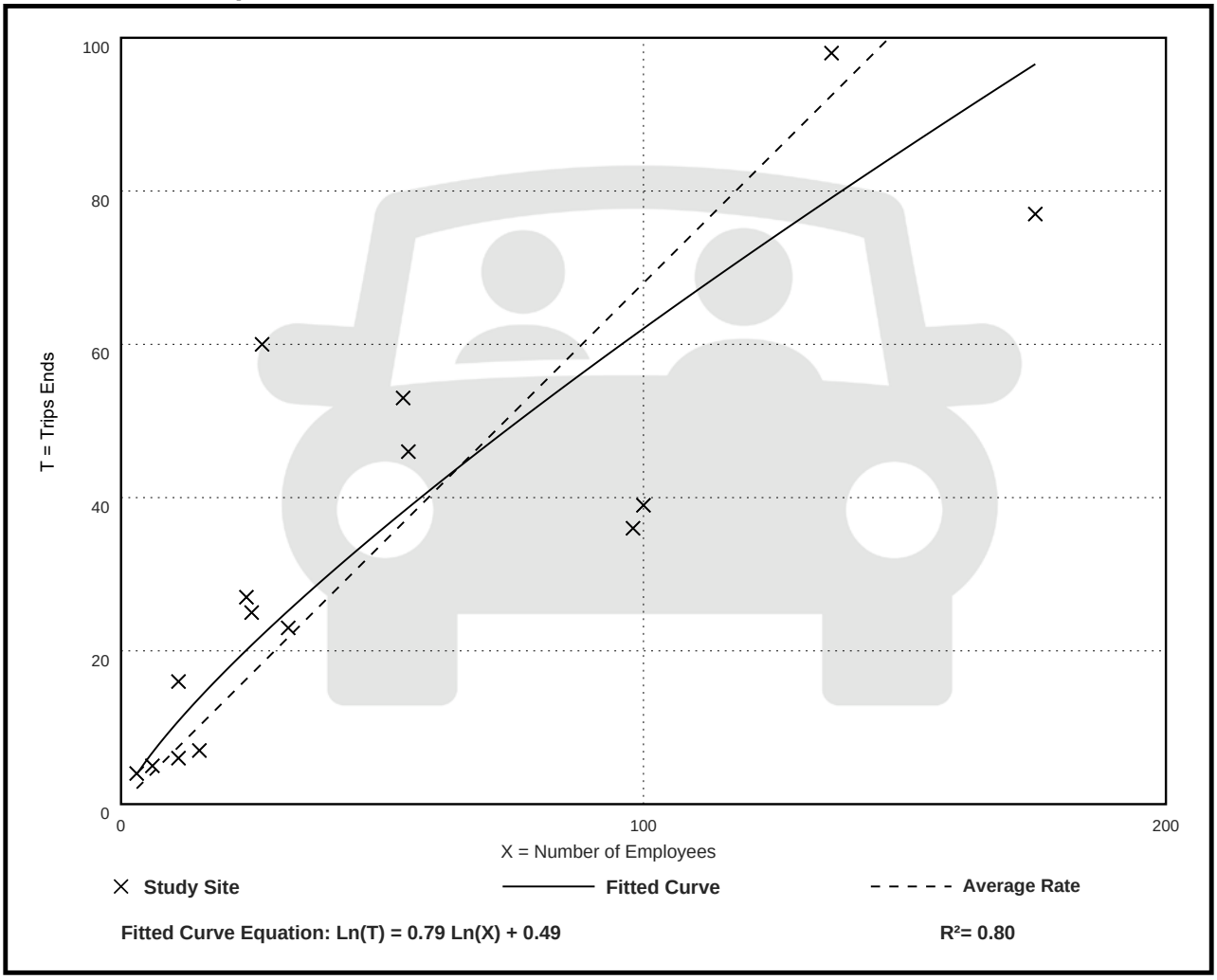
Vehicle Trip Ends vs: Employees
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 15
Avg. Num. of Employees: 51
Directional Distribution: 28% entering, 72% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.68	0.37 - 2.22	0.40

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.79 Ln(X) + 0.49

R^2= 0.80

Warehousing
(150)

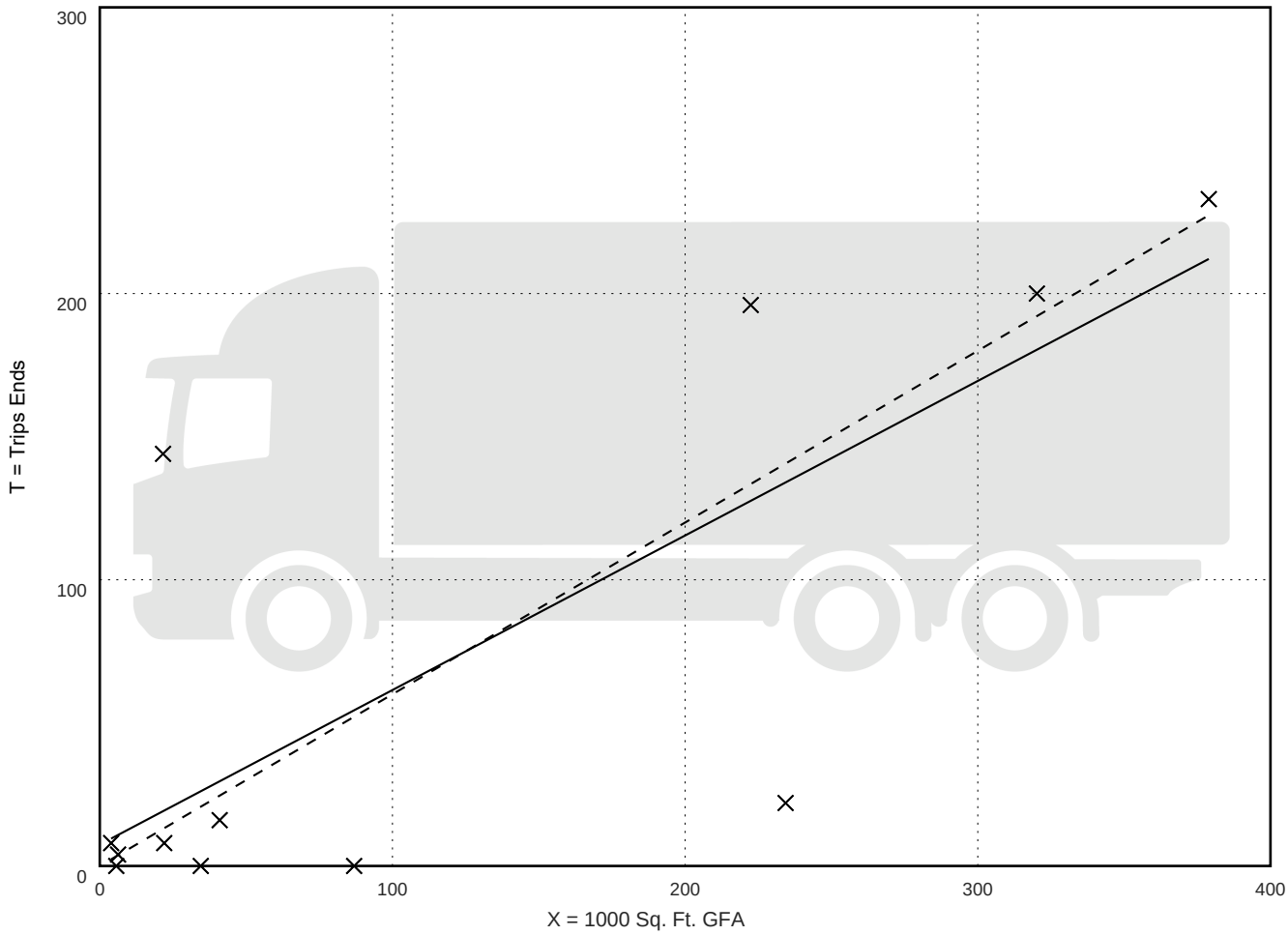
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 12
Avg. 1000 Sq. Ft. GFA: 115
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.60	0.00 - 6.66	0.86

Data Plot and Equation



Fitted Curve Equation: T = 0.54(X) + 7.47

R^2= 0.61

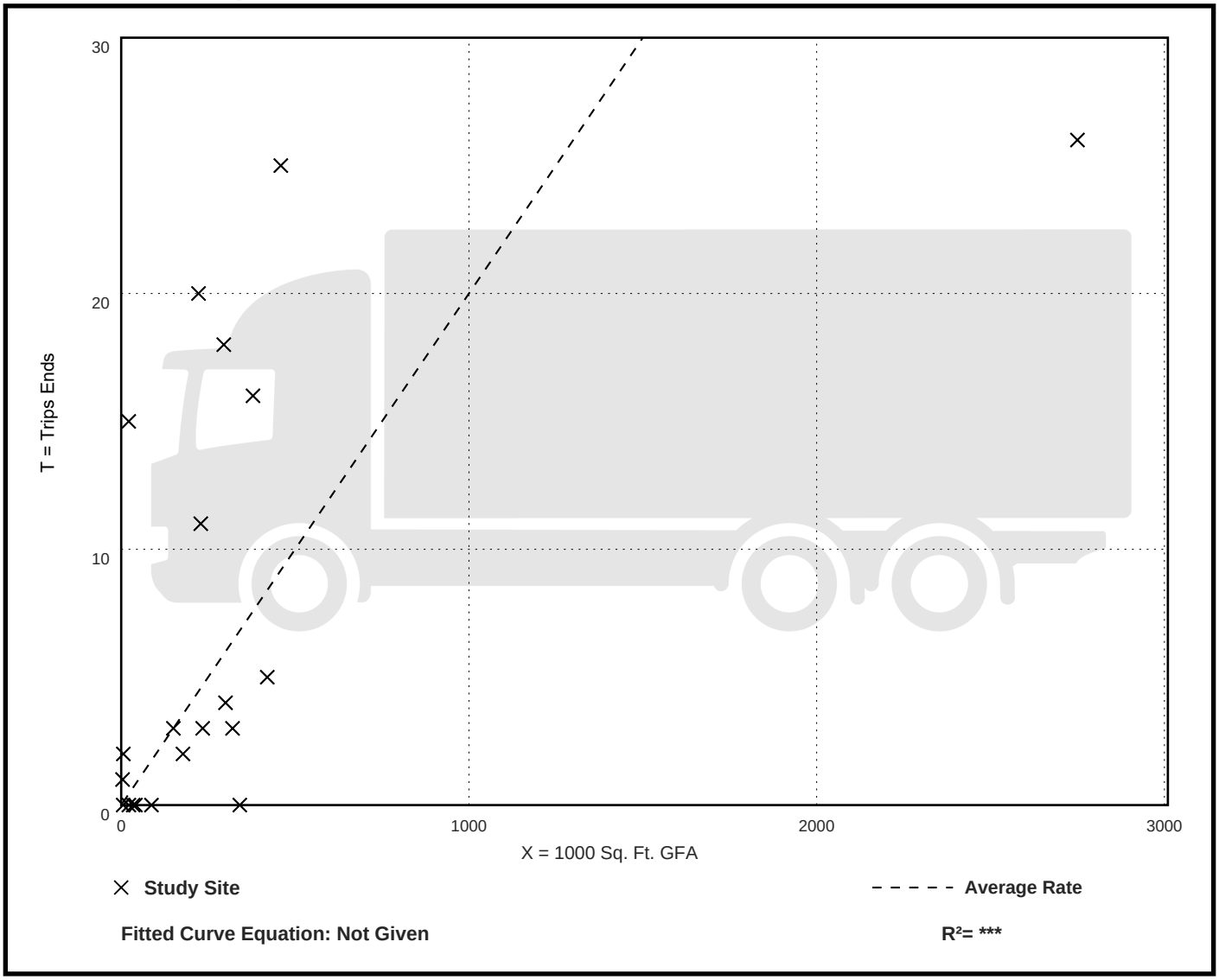
Warehousing
(150)

Truck 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: 21
Avg. 1000 Sq. Ft. GFA: 309
Directional Distribution: 52% entering, 48% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 0.69	0.05

Data Plot and Equation



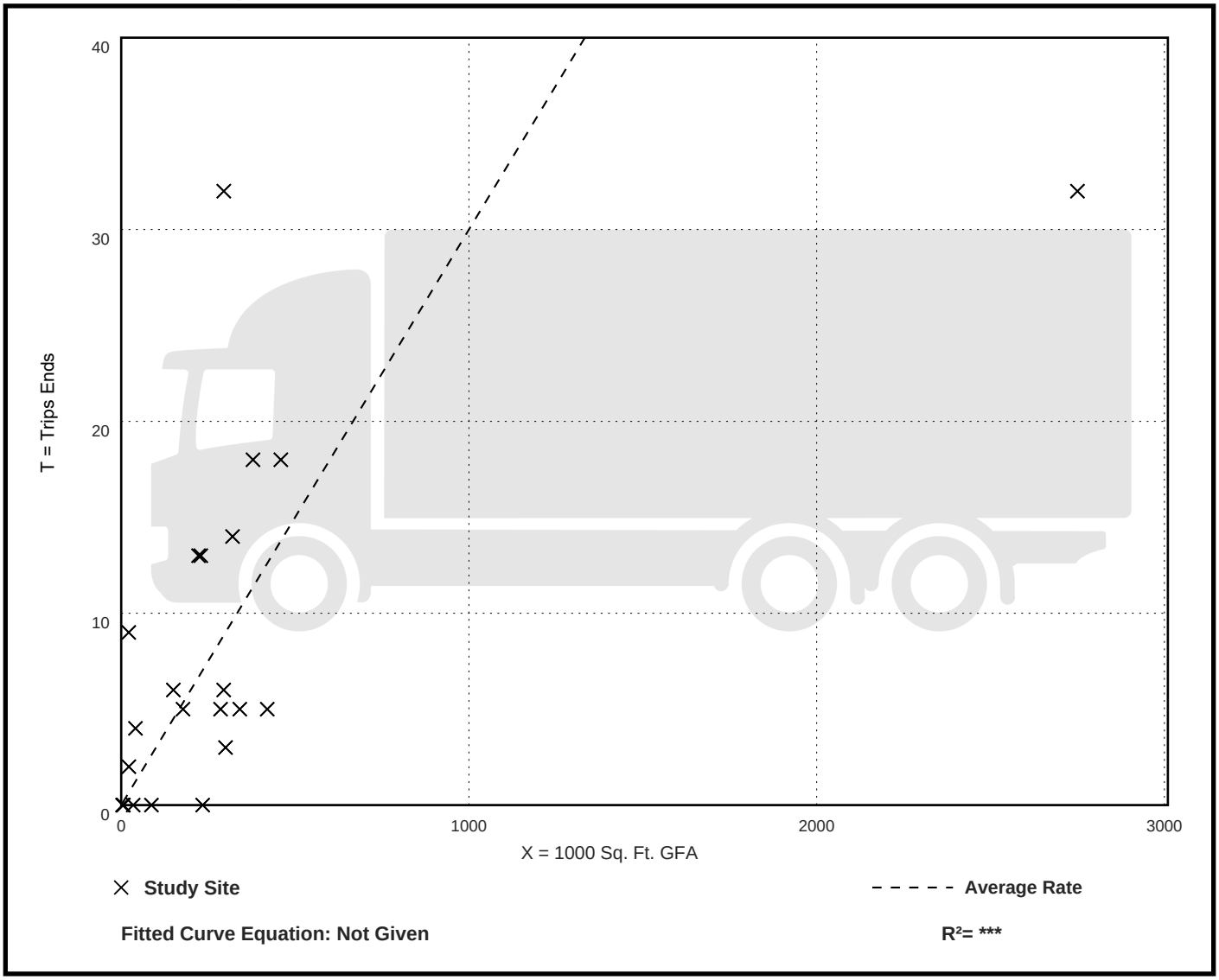
Warehousing
(150)

Truck 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: 23
Avg. 1000 Sq. Ft. GFA: 308
Directional Distribution: 52% entering, 48% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.03	0.00 - 0.42	0.03

Data Plot and Equation



Warehousing
(150)

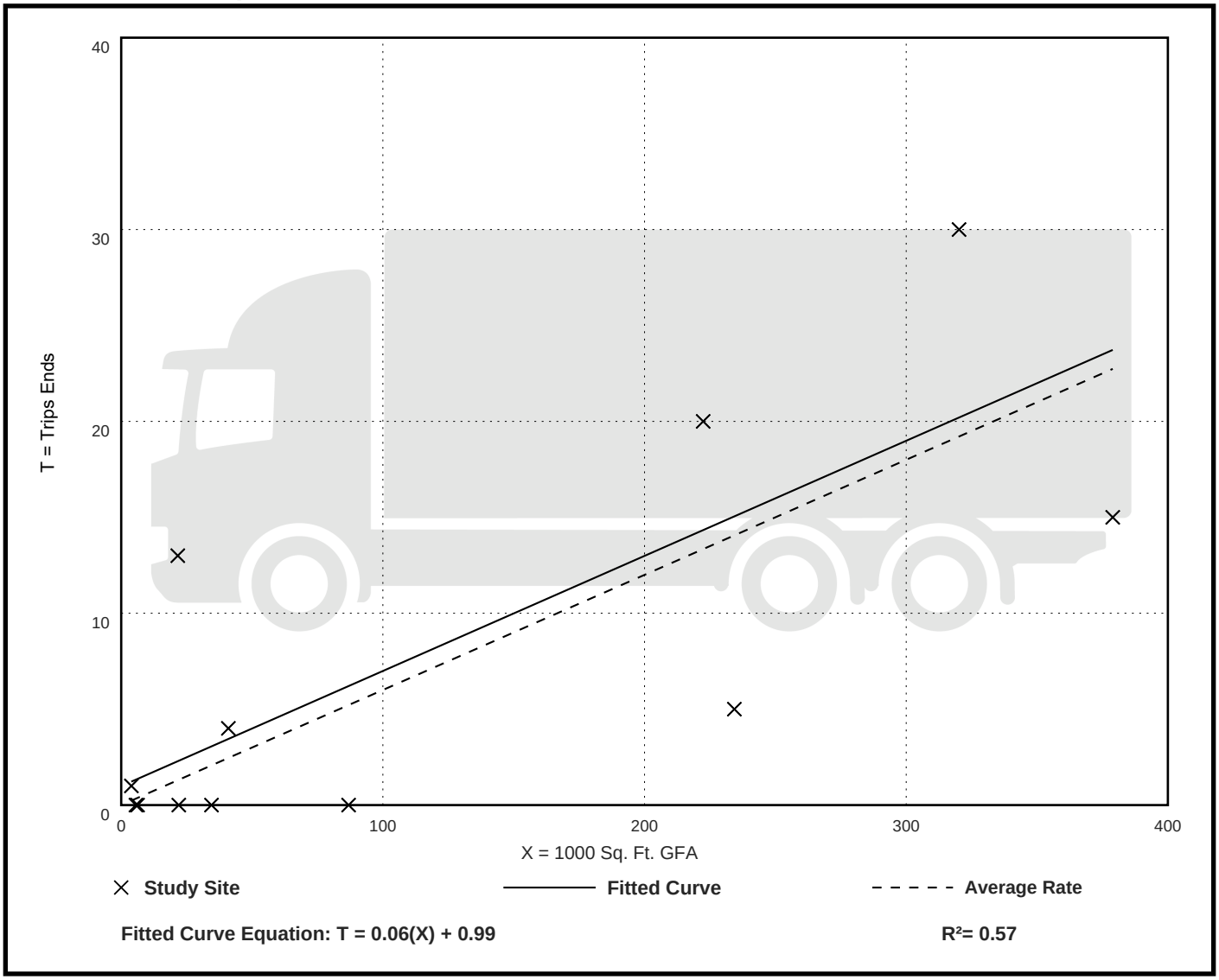
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 12
Avg. 1000 Sq. Ft. GFA: 115
Directional Distribution: 35% entering, 65% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.06	0.00 - 0.60	0.08

Data Plot and Equation



Fitted Curve Equation: T = 0.06(X) + 0.99

R^2= 0.57

Warehousing
(150)

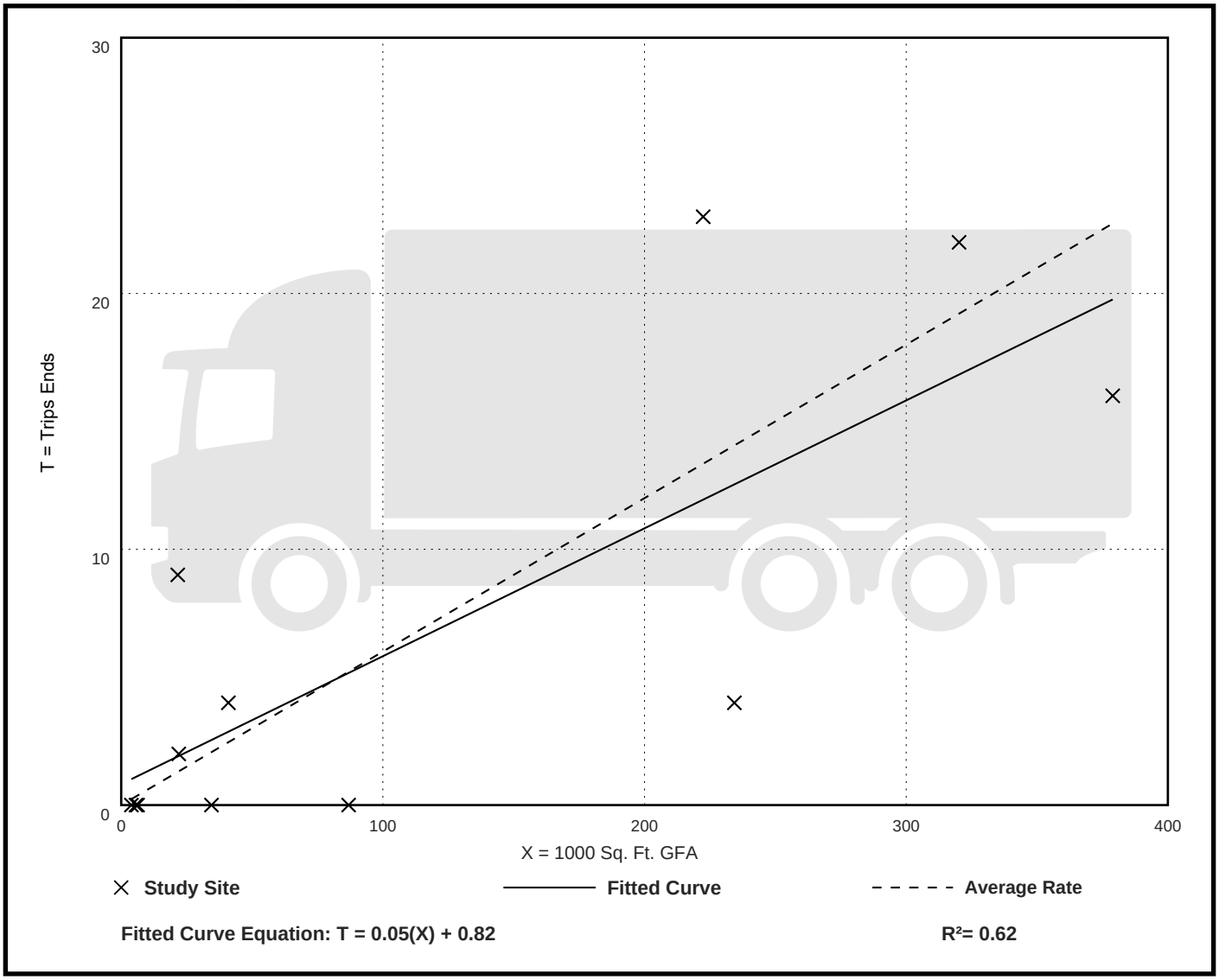
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 12
Avg. 1000 Sq. Ft. GFA: 115
Directional Distribution: 53% entering, 47% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.06	0.00 - 0.42	0.06

Data Plot and Equation



Fitted Curve Equation: T = 0.05(X) + 0.82

R^2= 0.62

Warehousing
(150)

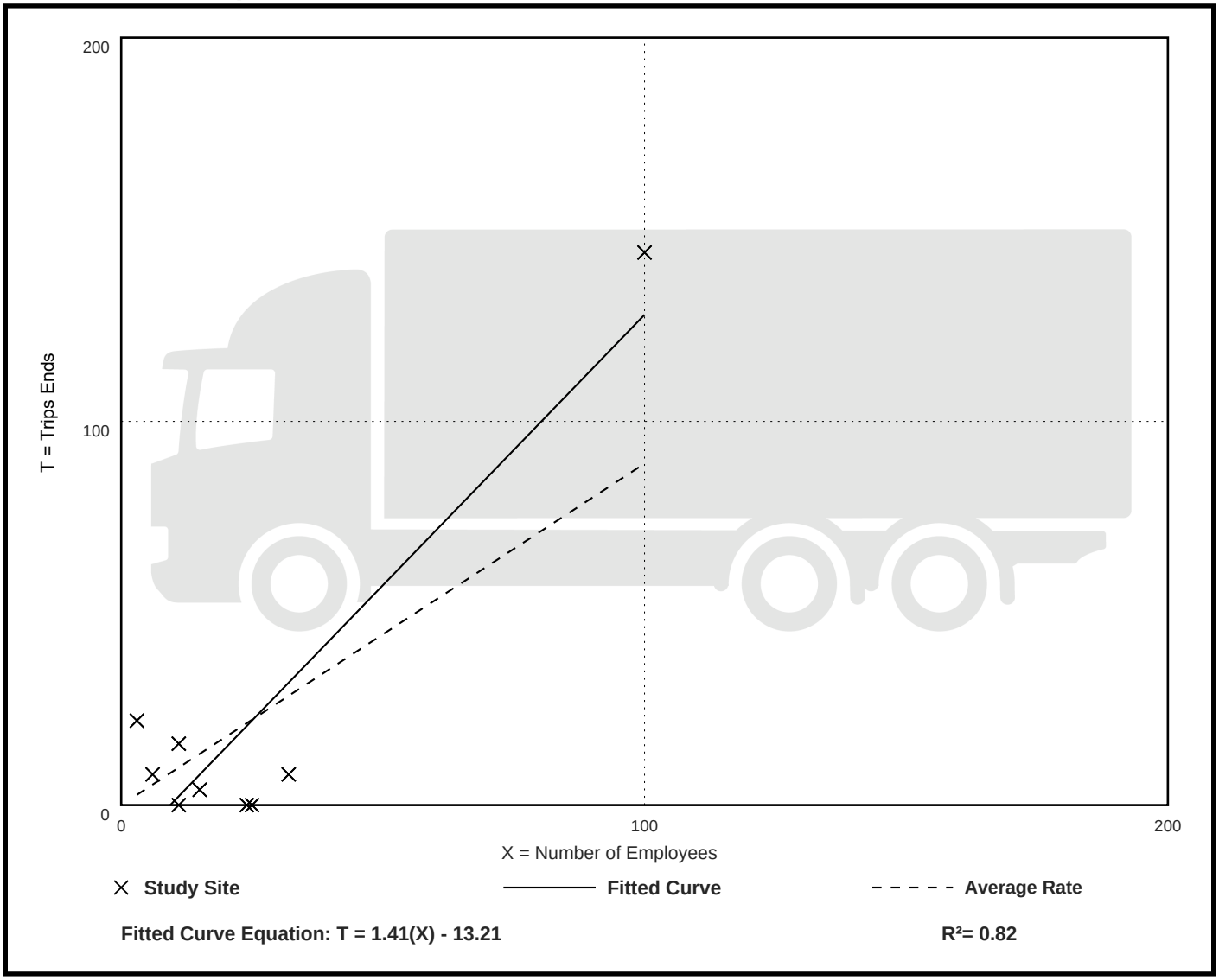
Truck Trip Ends vs: Employees
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 9
Avg. Num. of Employees: 25
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.89	0.00 - 7.33	1.06

Data Plot and Equation



Fitted Curve Equation: T = 1.41(X) - 13.21

R^2= 0.82

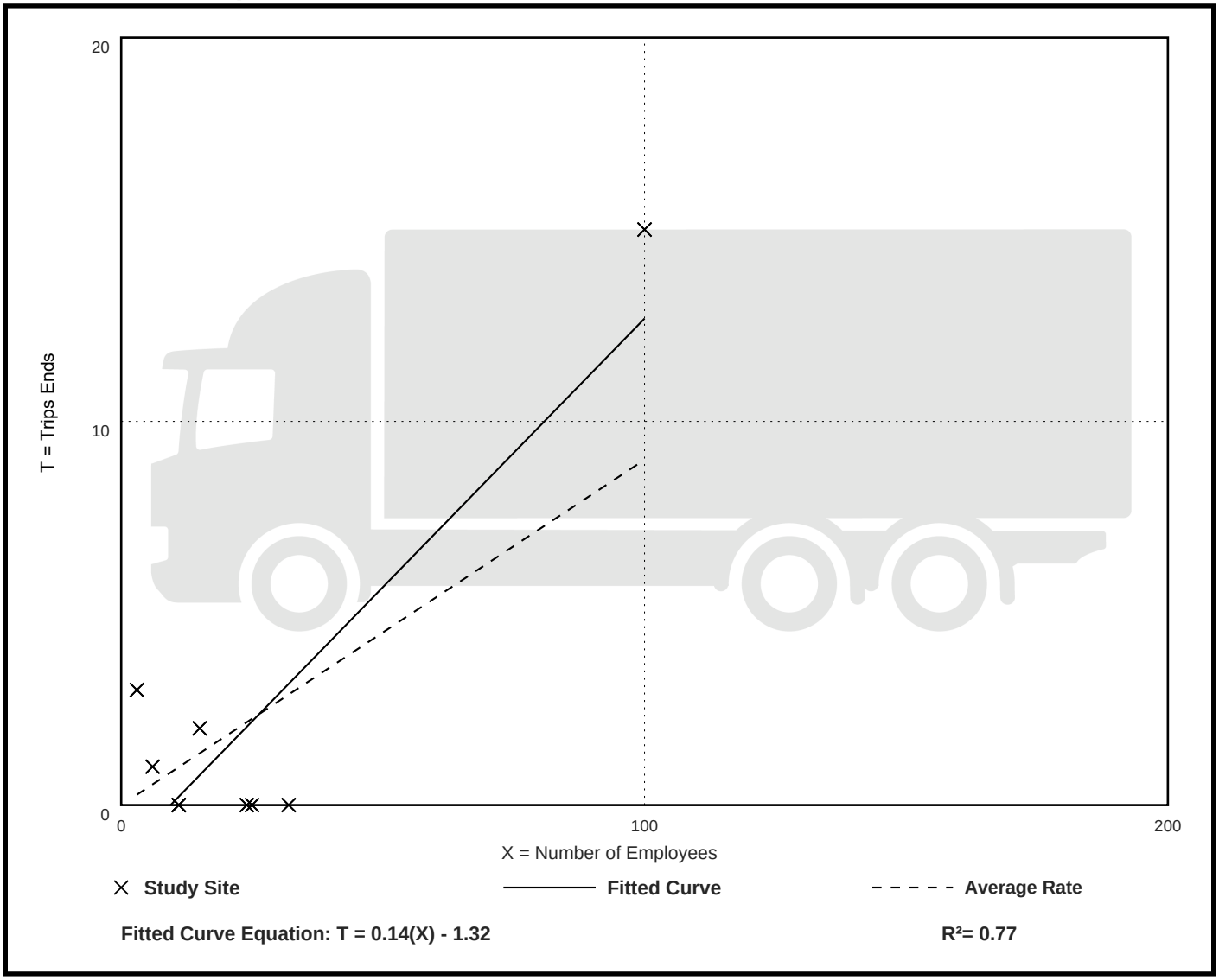
Warehousing
(150)

Truck Trip Ends vs: Employees
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: 9
Avg. Num. of Employees: 25
Directional Distribution: 33% entering, 67% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.09	0.00 - 1.00	0.14

Data Plot and Equation



Fitted Curve Equation: T = 0.14(X) - 1.32

R^2= 0.77

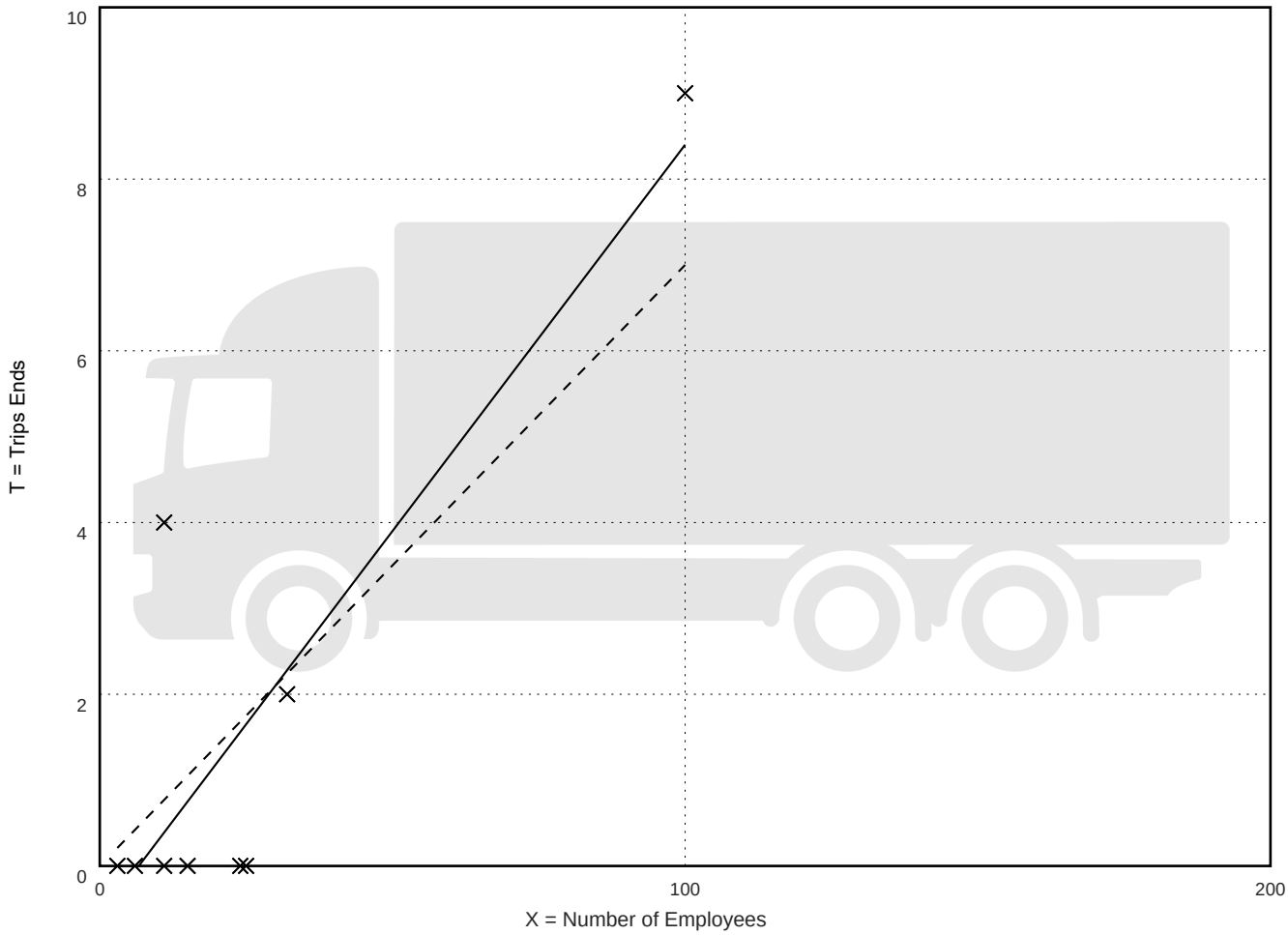
Warehousing
(150)

Truck Trip Ends vs: Employees
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: 9
Avg. Num. of Employees: 25
Directional Distribution: 53% entering, 47% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.07	0.00 - 0.36	0.08

Data Plot and Equation



Fitted Curve Equation: T = 0.09(X) - 0.60

R^2= 0.74

Warehousing
(150)

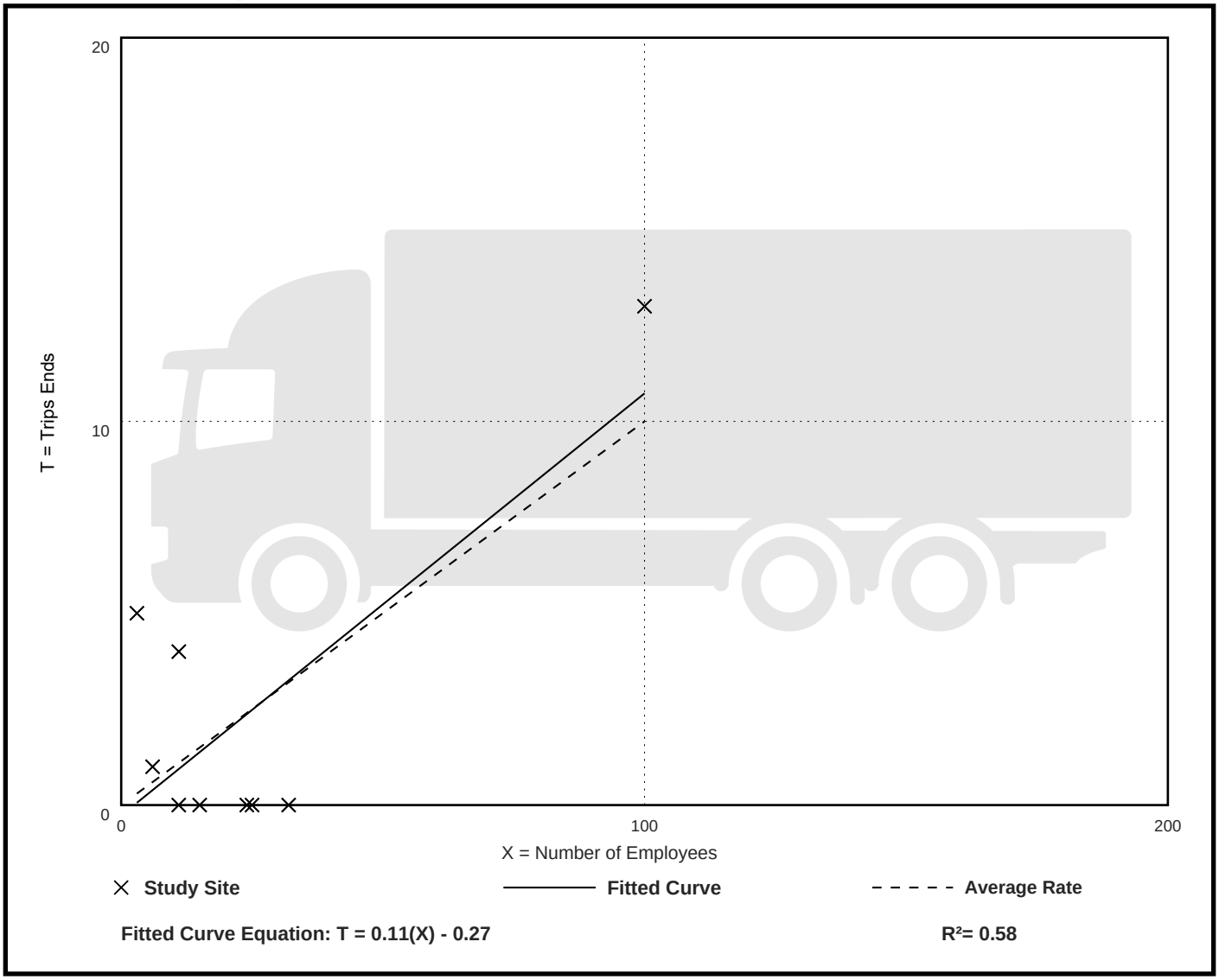
Truck Trip Ends vs: Employees
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 9
Avg. Num. of Employees: 25
Directional Distribution: 35% entering, 65% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.10	0.00 - 1.67	0.21

Data Plot and Equation



Fitted Curve Equation: T = 0.11(X) - 0.27

R^2= 0.58

Warehousing
(150)

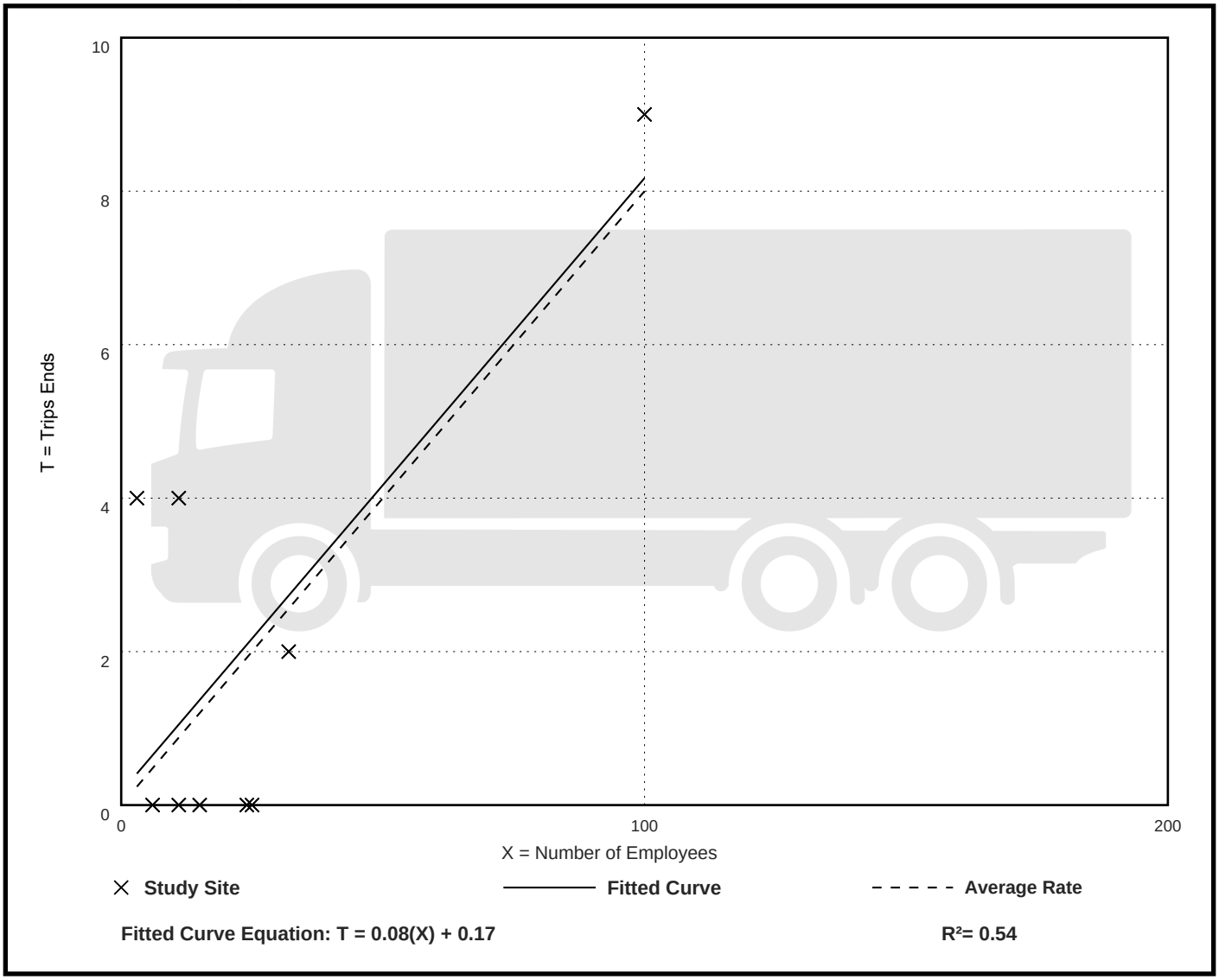
Truck Trip Ends vs: Employees
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 9
Avg. Num. of Employees: 25
Directional Distribution: 53% entering, 47% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.08	0.00 - 1.33	0.17

Data Plot and Equation



Fitted Curve Equation: T = 0.08(X) + 0.17

R^2= 0.54

Land Use: 154
High-Cube Transload and Short-Term Storage Warehouse

Description

A high-cube warehouse (HCW) is a building that typically has at least 200,000 gross square feet of floor area, has a ceiling height of 24 feet or more, and is used primarily for the storage and/or consolidation of manufactured goods (and to a lesser extent, raw materials) prior to their distribution to retail locations or other warehouses. A typical HCW has a high level of on-site automation and logistics management. The automation and logistics enable highly-efficient processing of goods through the HCW. A high-cube warehouse can be free-standing or located in an industrial park.

The HCWs included in this land use include transload and short-term storage facilities. A transload facility has the primary function of consolidation and distribution of pallet loads (or larger) for manufacturers, wholesalers, or retailers. A transload facility typically has little storage duration, high throughput, and its operations are high efficiency. A short-term HCW is a distribution facility often with custom/special features built into the structure for the movement of large volumes of freight with only short-term storage of products.

Some limited assembly and repackaging may occur within the facility.

A high-cube warehouse may contain a mezzanine. In a HCW setting, a mezzanine is a free-standing, semi-permanent structure that is commonly supported by structural steel columns and that is lined with racks or shelves. The gross floor area (GFA) values for the study sites in the database for this land use do NOT include the floor area of the mezzanine. The GFA values represent only the permanent ground-floor square footage.

The amount of office/employee welfare space that is provided within a HCW can be highly variable but is typically an insignificant portion of the overall building square footage. Within the trip generation database, common values are between 3,000 and 5,000 square feet for a Cold Storage HCW and between 5,000 and 10,000 square feet for Transload, Fulfillment Center, and Parcel Hub HCW (all of which are less than one percent of total GFA for a site). Therefore, for the trip generation data plots, any office space that is part of the normal operation of the warehouse is included in the total GFA.

Warehousing (Land Use 150), high-cube fulfillment center warehouse (Land Use 155), high-cube parcel hub warehouse (Land Use 156), and high-cube cold storage warehouse (Land Use 157) are related land uses.

The number of dock doors at a HCW is a potential independent variable. Future data submissions should include that information.

Additional Data

The High-Cube Warehouse/Distribution Center-related land uses underwent specialized consideration through a commissioned study titled “High-Cube Warehouse Vehicle Trip Generation Analysis,” published in October 2016. The results of this study are posted on the ITE website at http://library.ite.org/pub/a3e6679a-e3a8-bf38-7f29-2961becdd498.

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 2000s, and the 2010s in Alberta (CAN), California, Florida, Michigan, New Jersey, Texas, and Washington.

Source Numbers

331, 605, 619, 642, 645, 649, 739, 750, 752, 903, 904, 941, 942, 943, 969

High-Cube Transload and Short-Term Storage Warehouse (154)

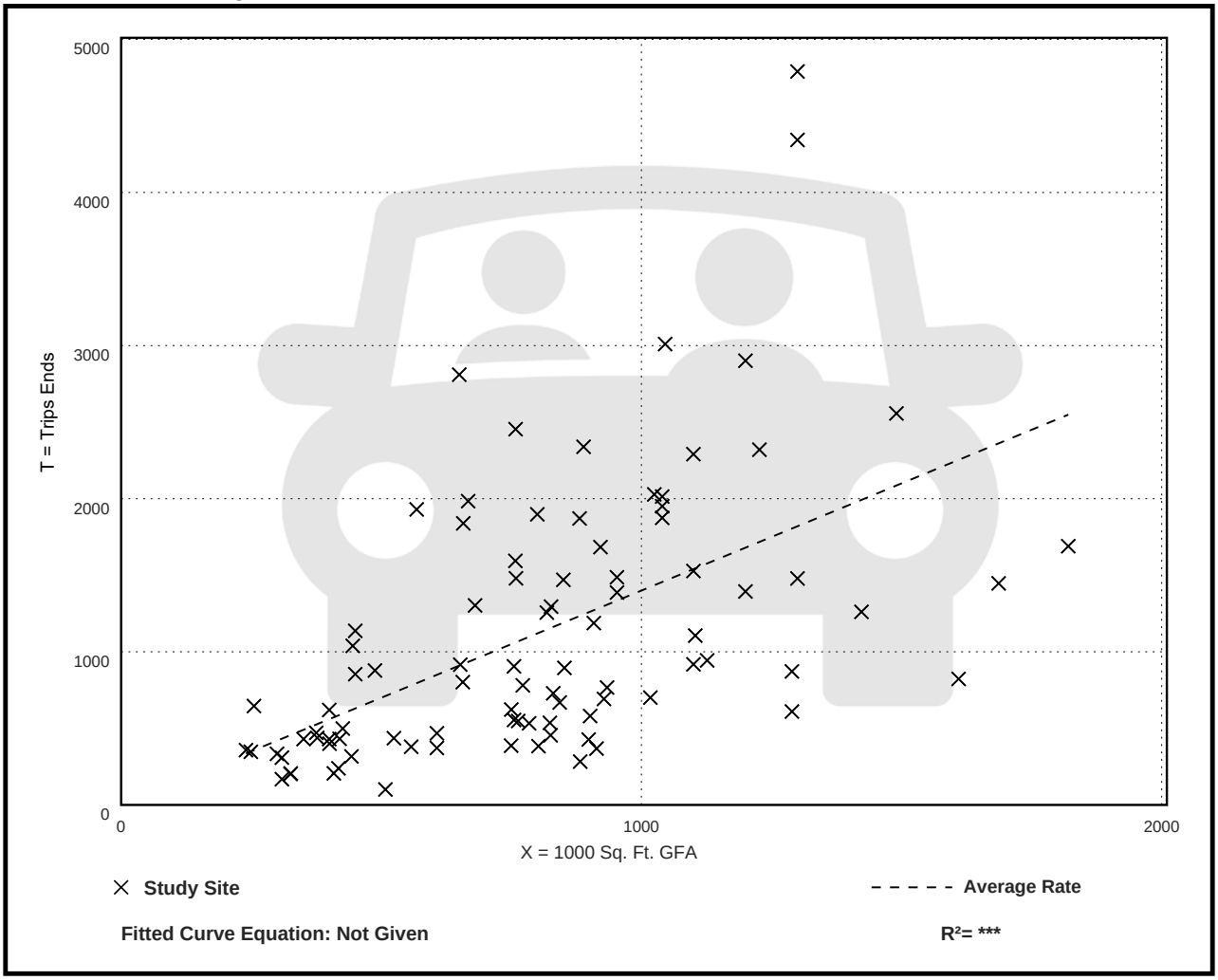
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 91
Avg. 1000 Sq. Ft. GFA: 798
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.40	0.20 - 4.32	0.86

Data Plot and Equation



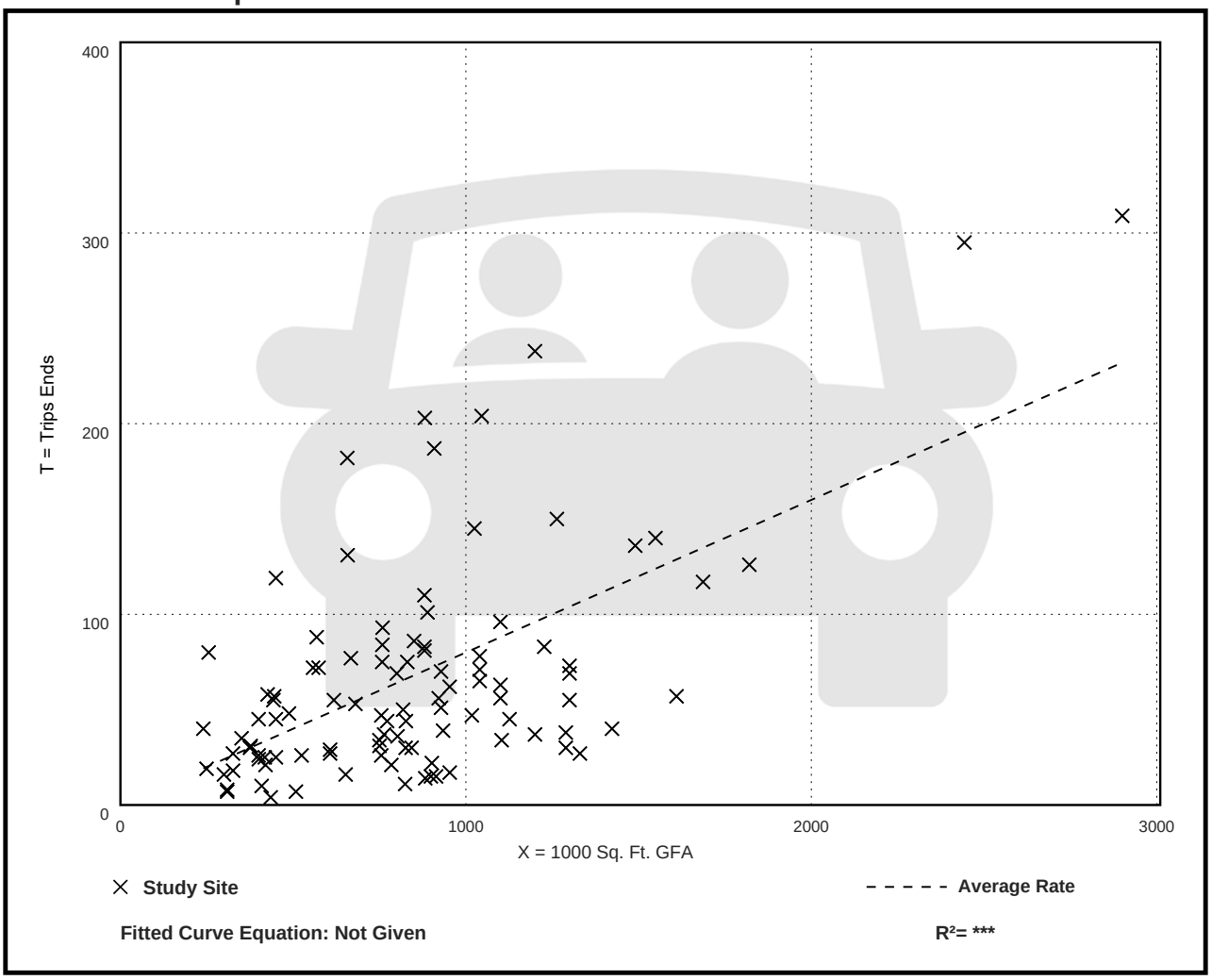
High-Cube Transload and Short-Term Storage Warehouse (154)

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: 102
Avg. 1000 Sq. Ft. GFA: 846
Directional Distribution: 77% entering, 23% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.08	0.01 - 0.31	0.05

Data Plot and Equation



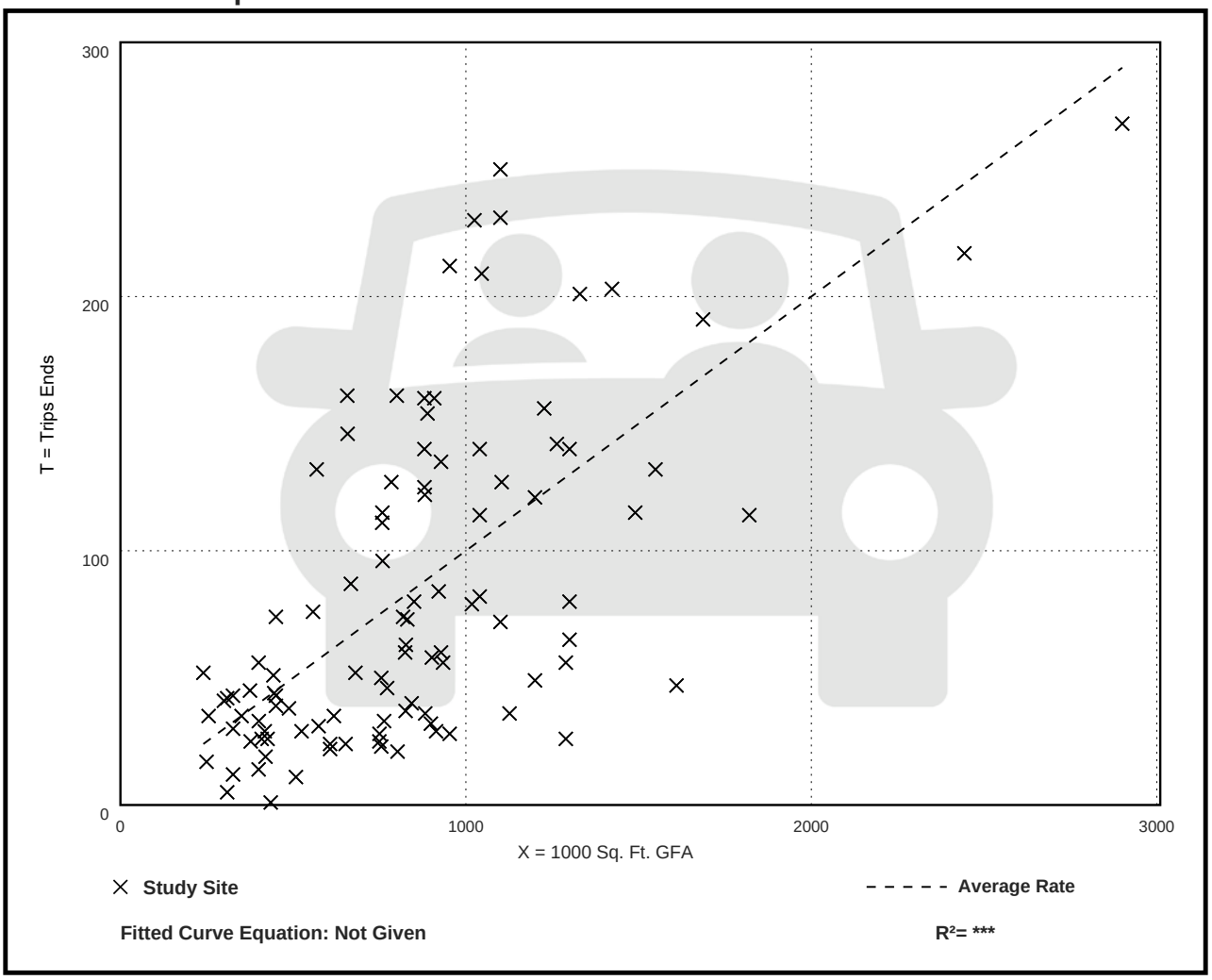
High-Cube Transload and Short-Term Storage Warehouse (154)

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: 103
Avg. 1000 Sq. Ft. GFA: 840
Directional Distribution: 28% entering, 72% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.10	0.00 - 0.25	0.06

Data Plot and Equation



High-Cube Transload and Short-Term Storage Warehouse (154)

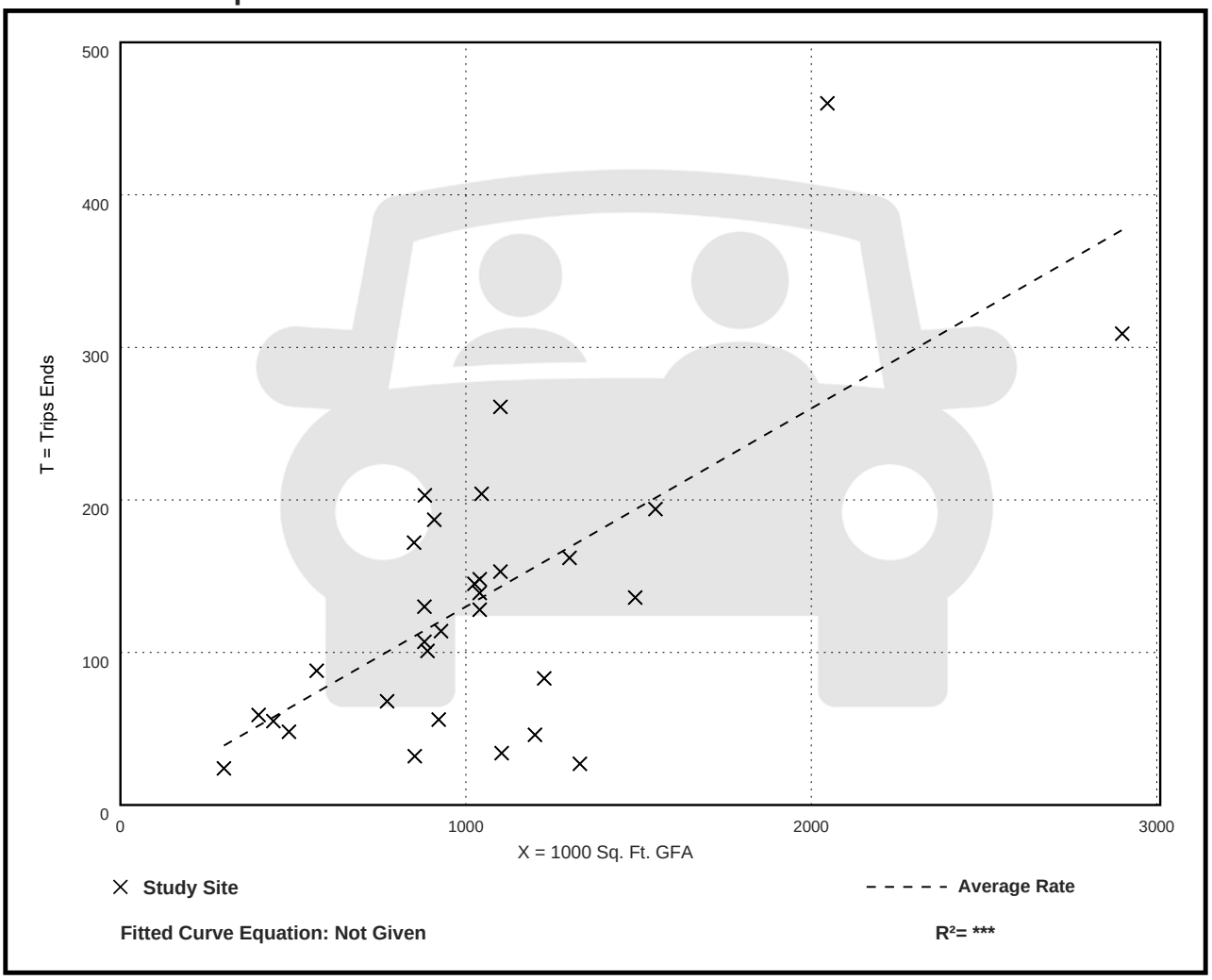
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 31
Avg. 1000 Sq. Ft. GFA: 1048
Directional Distribution: 78% entering, 22% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.13	0.02 - 0.24	0.06

Data Plot and Equation



High-Cube Transload and Short-Term Storage Warehouse (154)

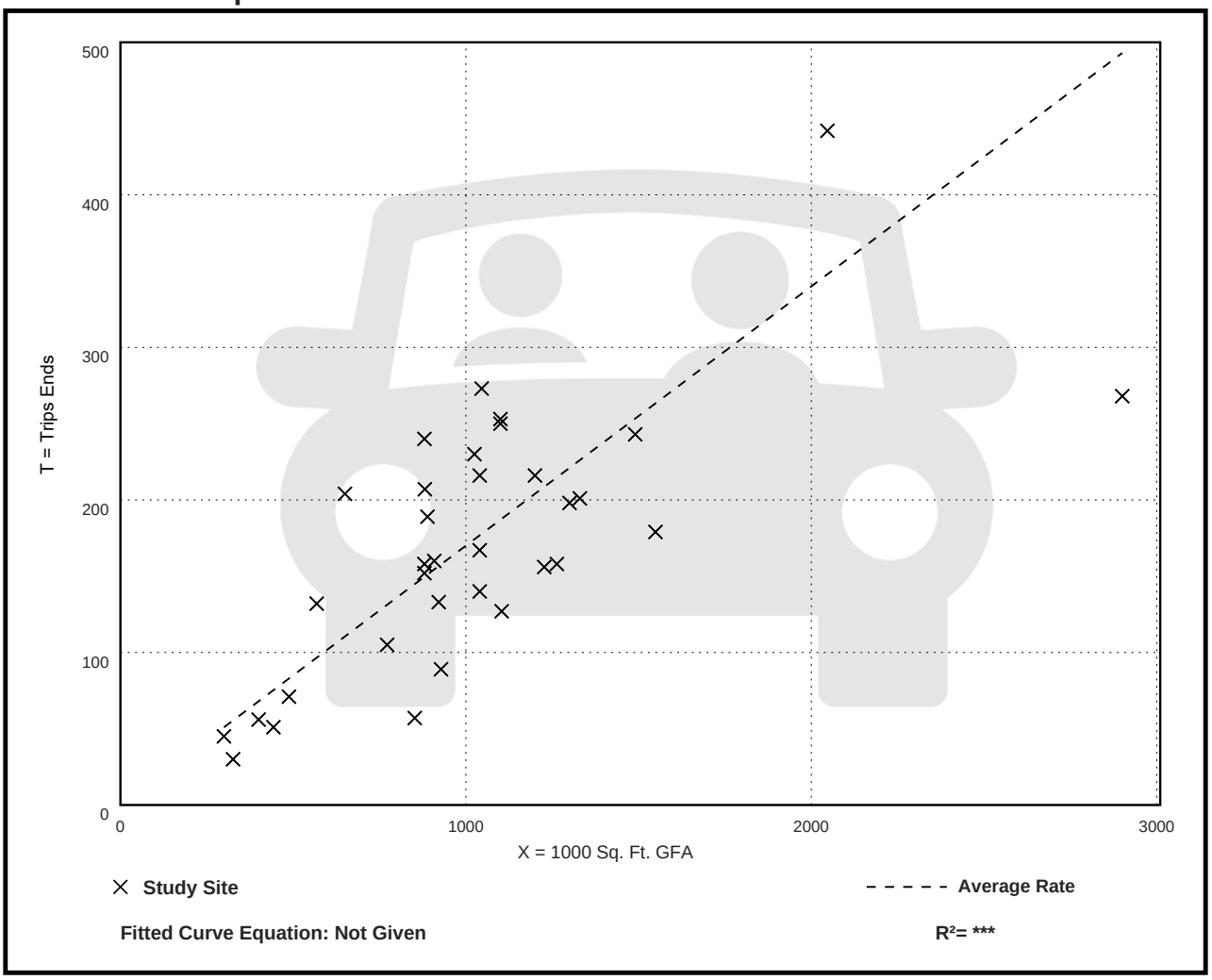
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 34
Avg. 1000 Sq. Ft. GFA: 1023
Directional Distribution: 34% entering, 66% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.17	0.07 - 0.31	0.06

Data Plot and Equation



High-Cube Transload and Short-Term Storage Warehouse (154)

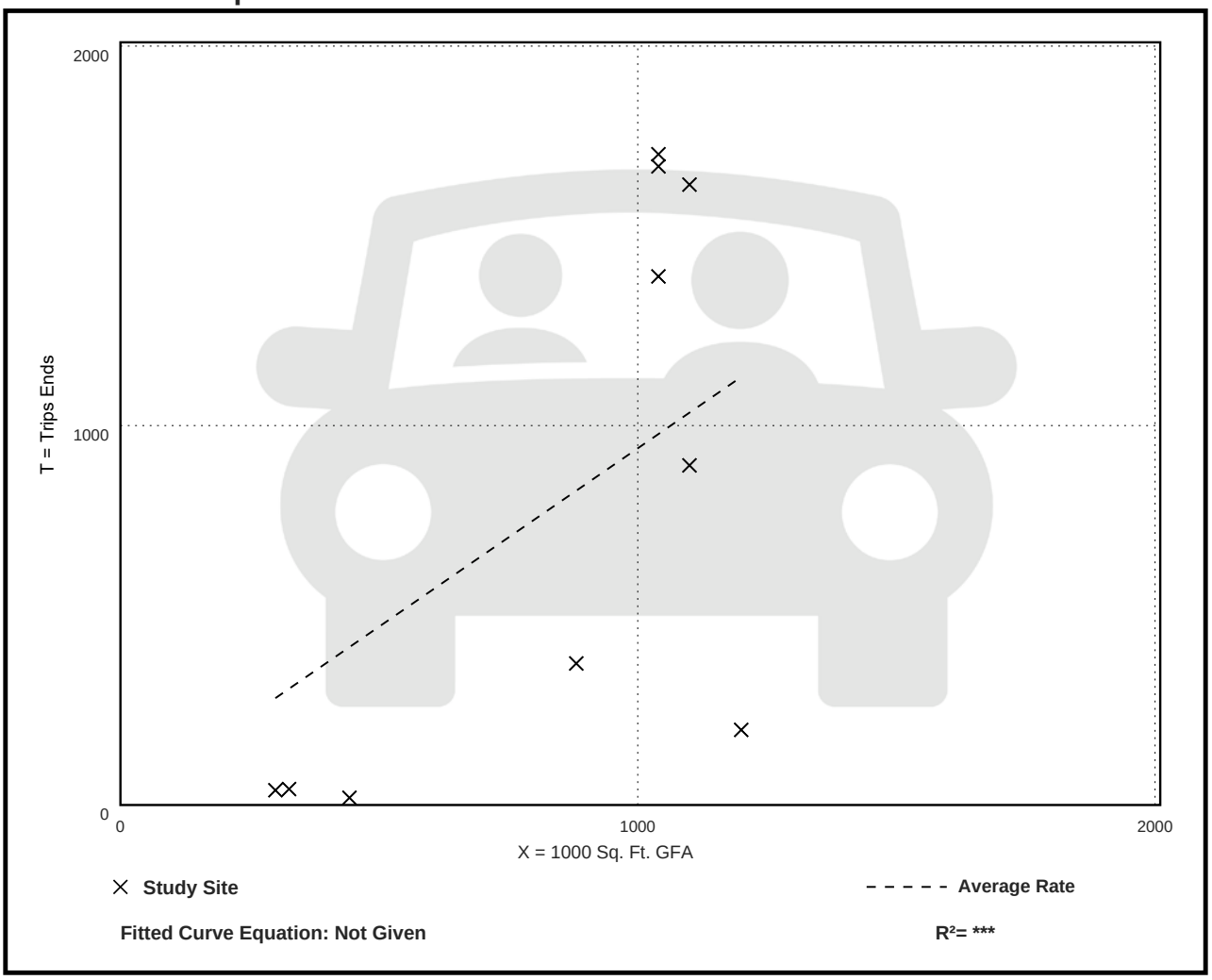
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday

Setting/Location: General Urban/Suburban
Number of Studies: 10
Avg. 1000 Sq. Ft. GFA: 847
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.94	0.04 - 1.65	0.65

Data Plot and Equation



High-Cube Transload and Short-Term Storage Warehouse (154)

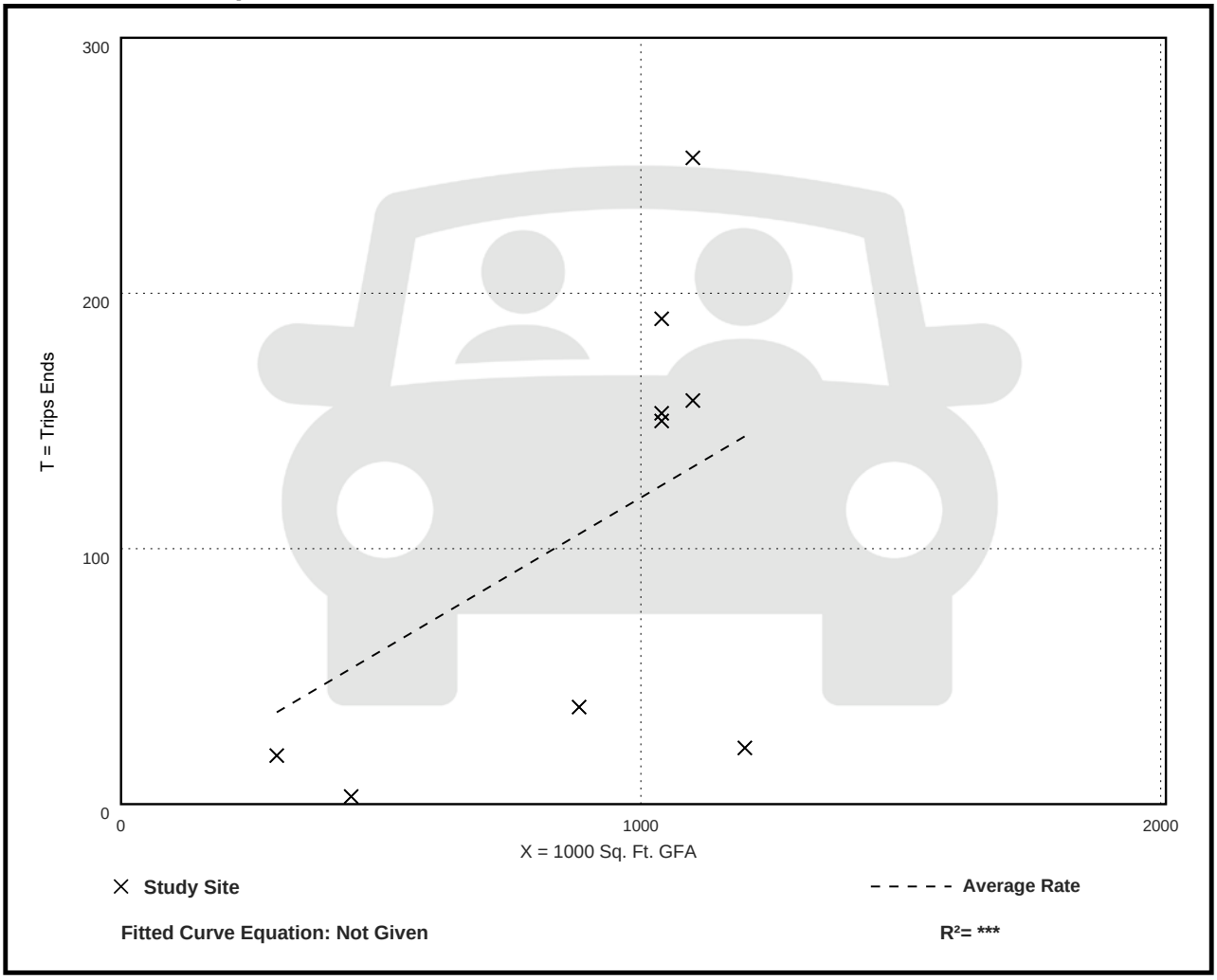
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 9
Avg. 1000 Sq. Ft. GFA: 905
Directional Distribution: Not Available

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.12	0.01 - 0.23	0.08

Data Plot and Equation



High-Cube Transload and Short-Term Storage Warehouse (154)

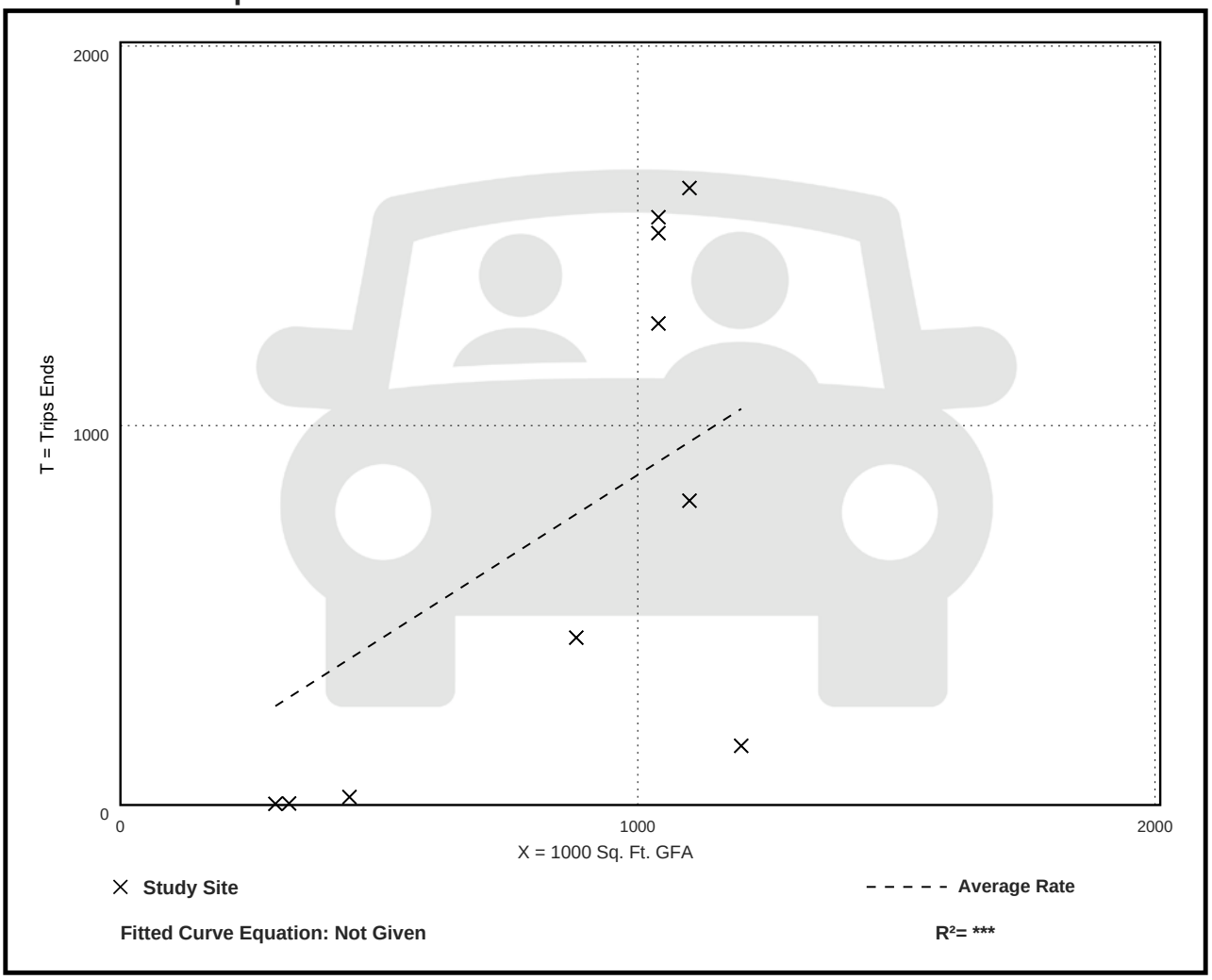
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Sunday

Setting/Location: General Urban/Suburban
Number of Studies: 10
Avg. 1000 Sq. Ft. GFA: 847
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.87	0.01 - 1.49	0.61

Data Plot and Equation



High-Cube Transload and Short-Term Storage Warehouse (154)

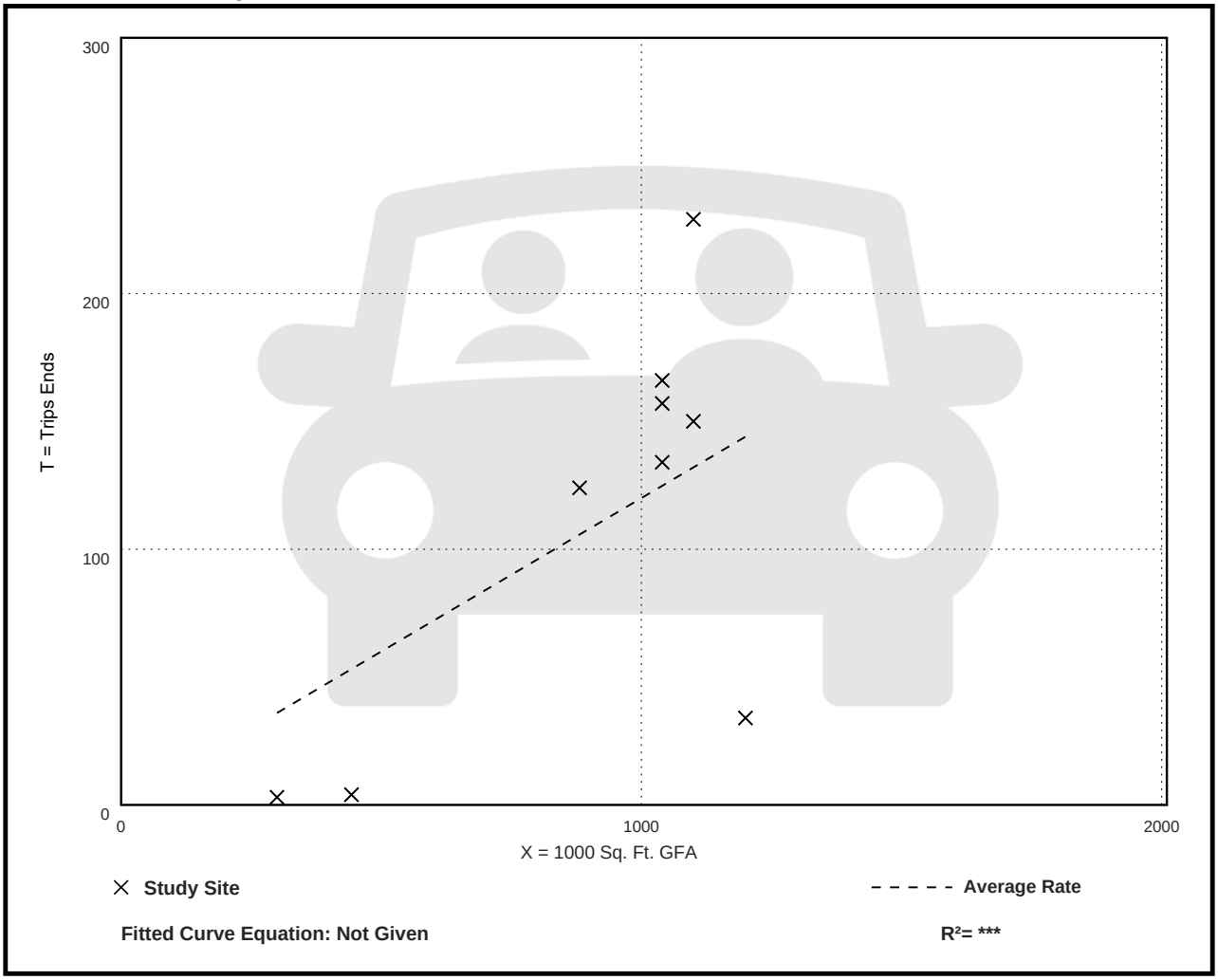
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Sunday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 9
Avg. 1000 Sq. Ft. GFA: 905
Directional Distribution: Not Available

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.12	0.01 - 0.21	0.07

Data Plot and Equation



High-Cube Transload and Short-Term Storage Warehouse (154)

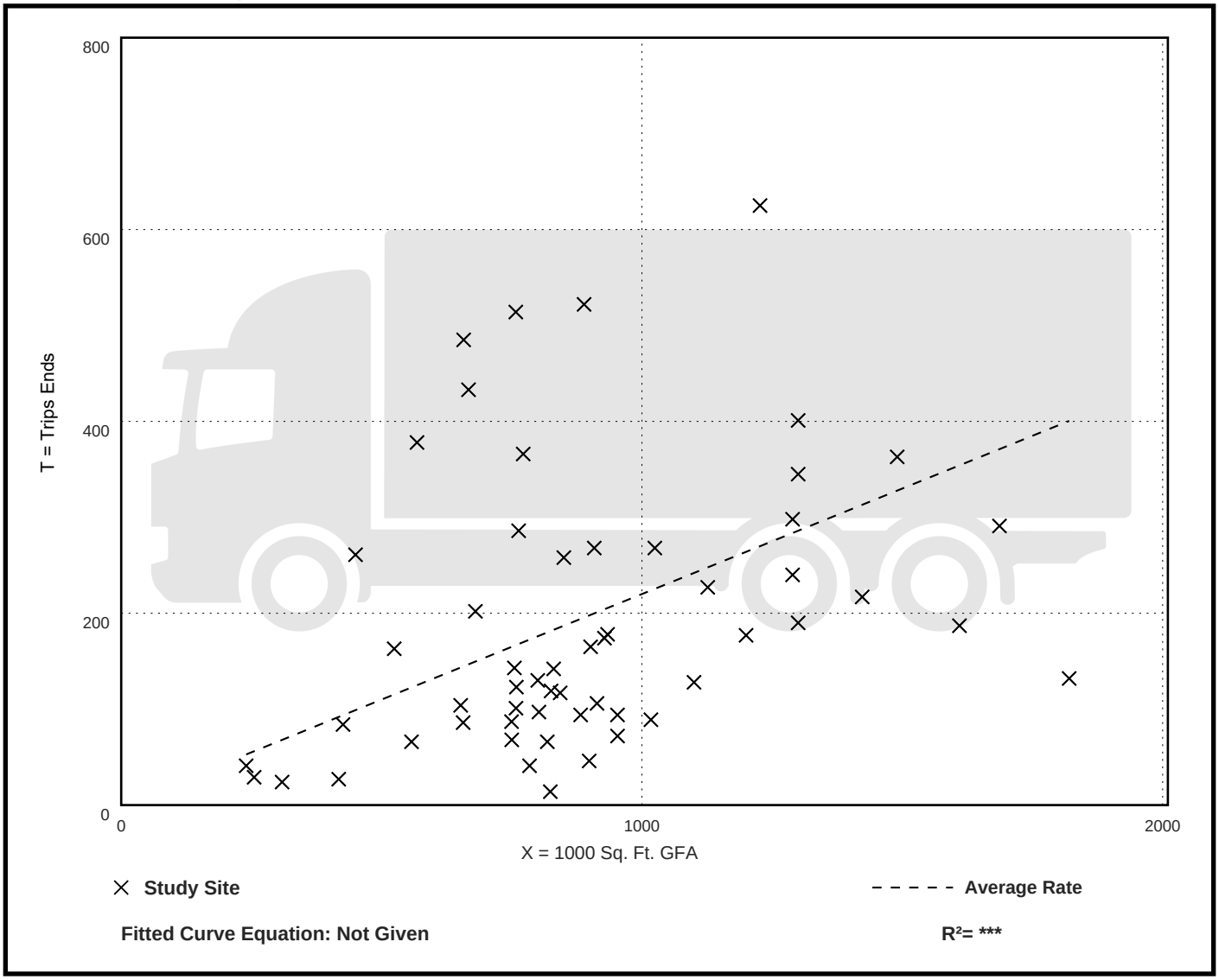
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 57
Avg. 1000 Sq. Ft. GFA: 892
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.22	0.02 - 0.74	0.16

Data Plot and Equation



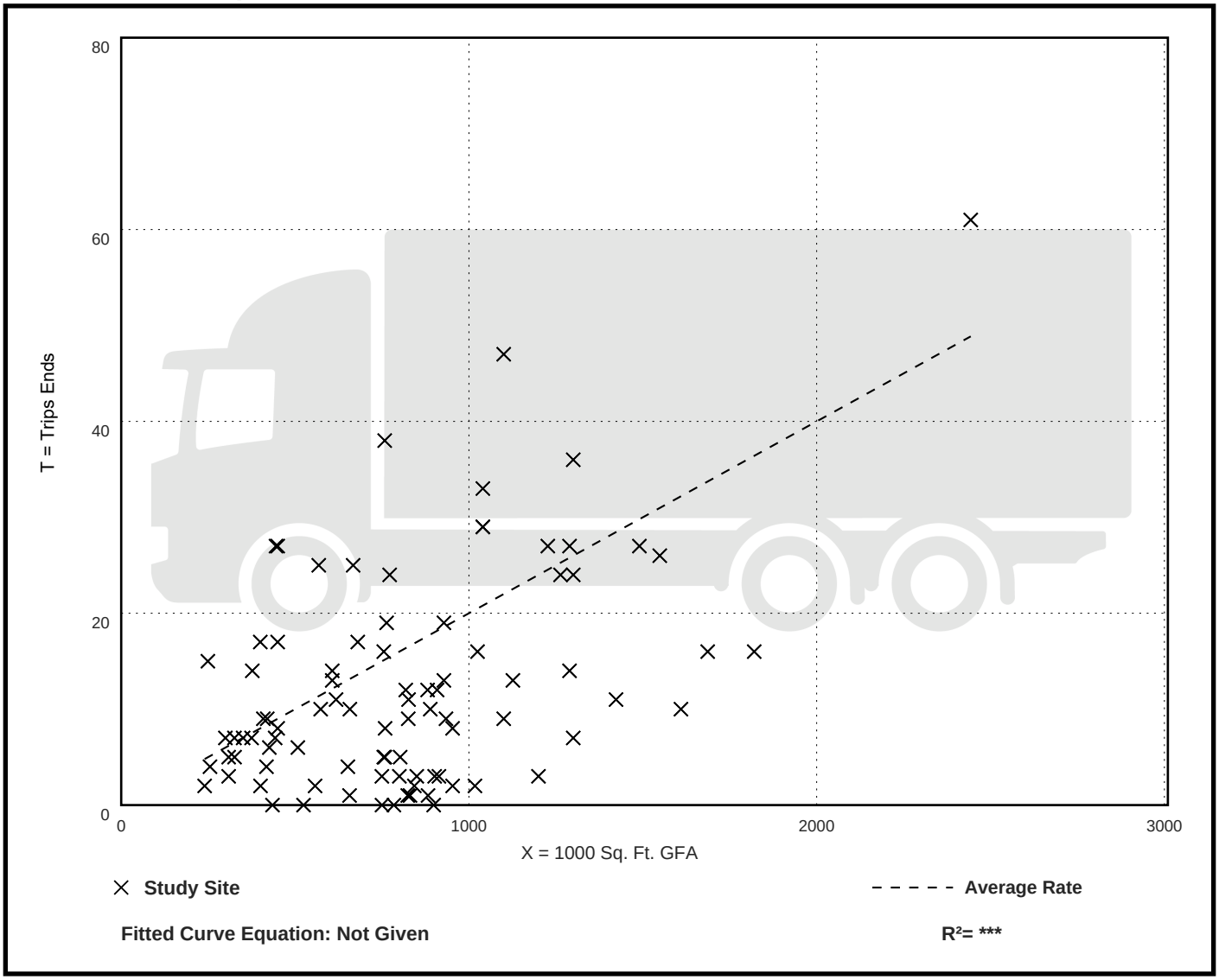
High-Cube Transload and Short-Term Storage Warehouse (154)

Truck 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: 90
Avg. 1000 Sq. Ft. GFA: 812
Directional Distribution: 49% entering, 51% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 0.06	0.01

Data Plot and Equation



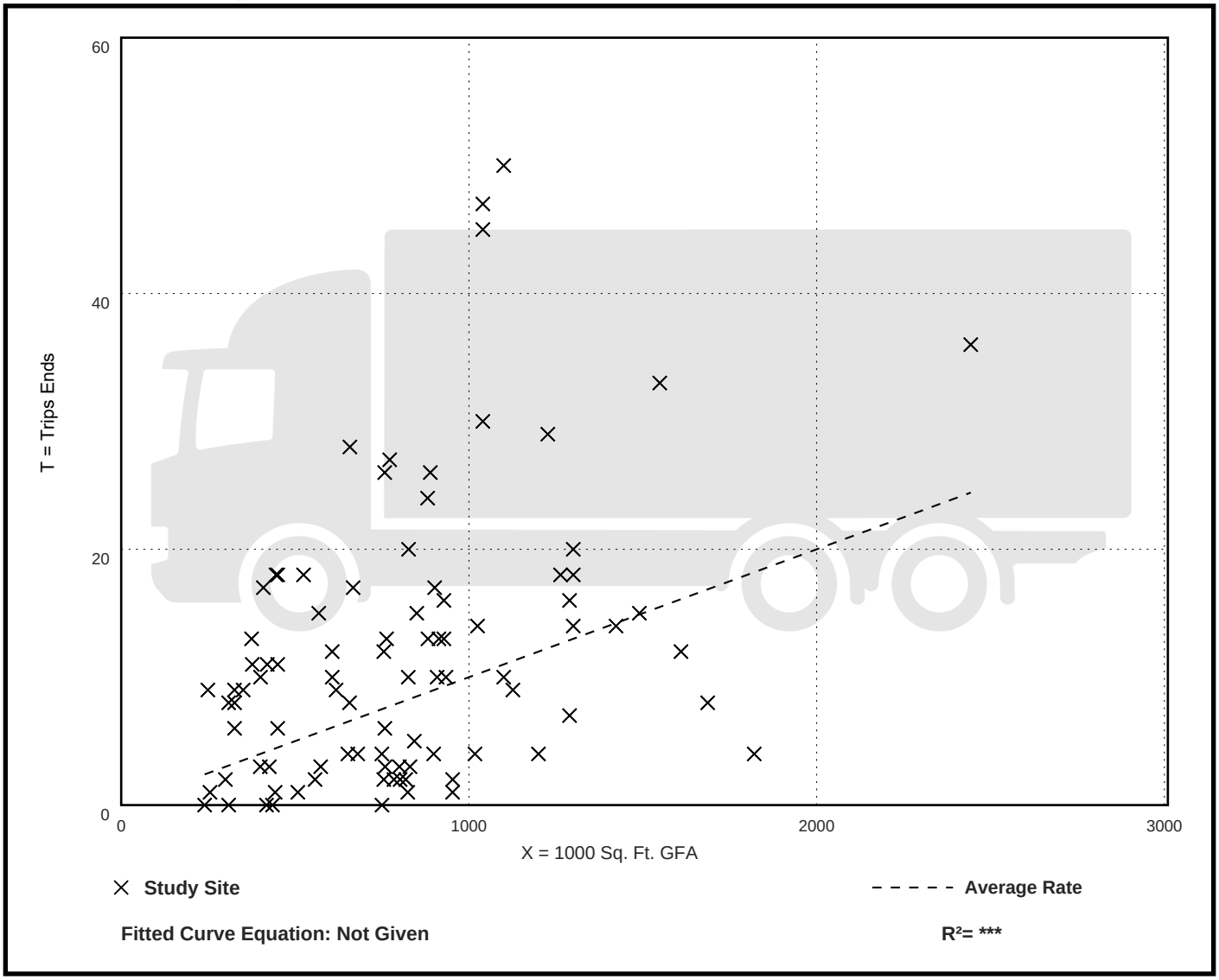
High-Cube Transload and Short-Term Storage Warehouse (154)

Truck 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: 91
Avg. 1000 Sq. Ft. GFA: 807
Directional Distribution: 47% entering, 53% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.01	0.00 - 0.05	0.01

Data Plot and Equation



High-Cube Transload and Short-Term Storage Warehouse (154)

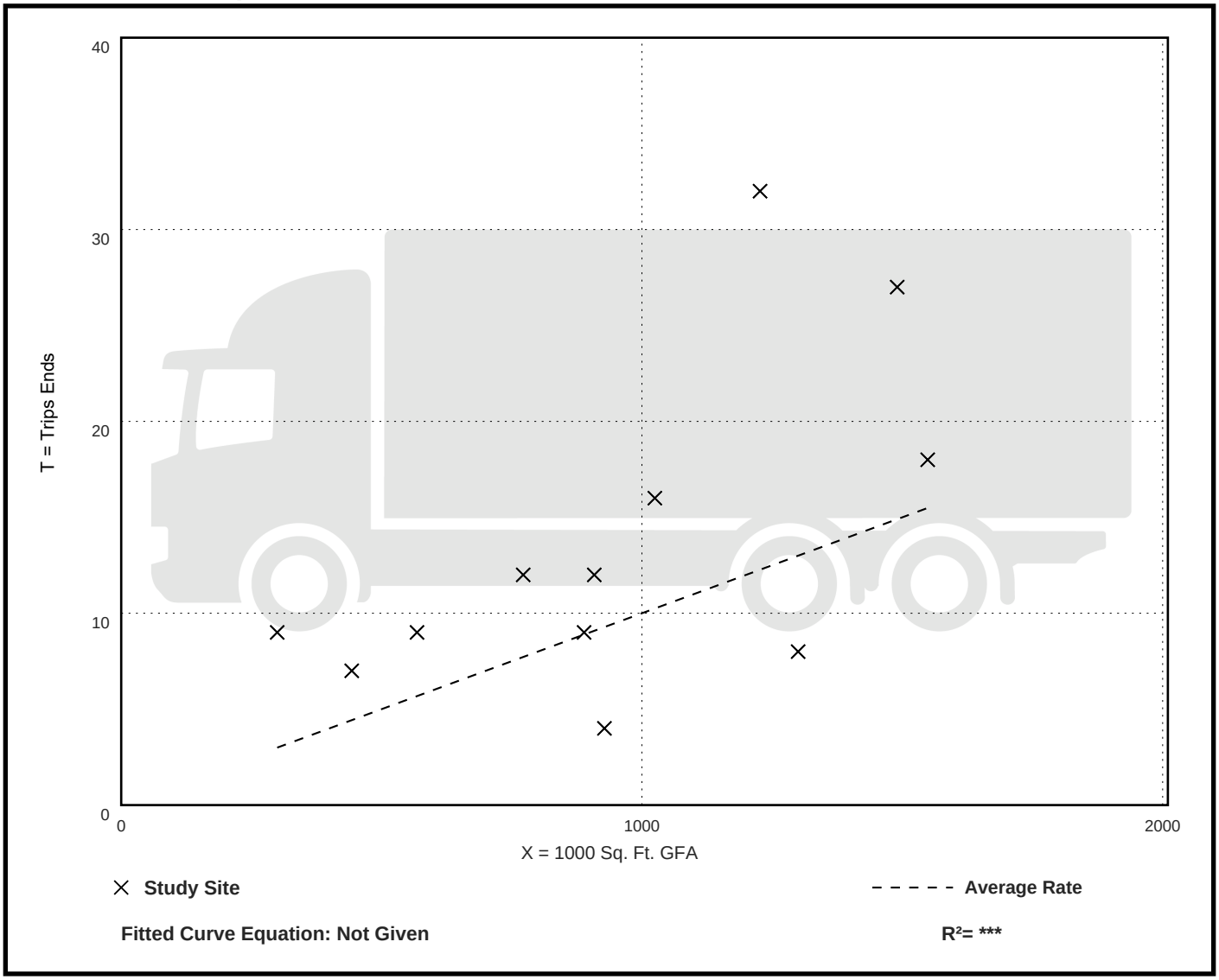
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 12
Avg. 1000 Sq. Ft. GFA: 950
Directional Distribution: 56% entering, 44% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.01	0.00 - 0.03	0.01

Data Plot and Equation



High-Cube Transload and Short-Term Storage Warehouse (154)

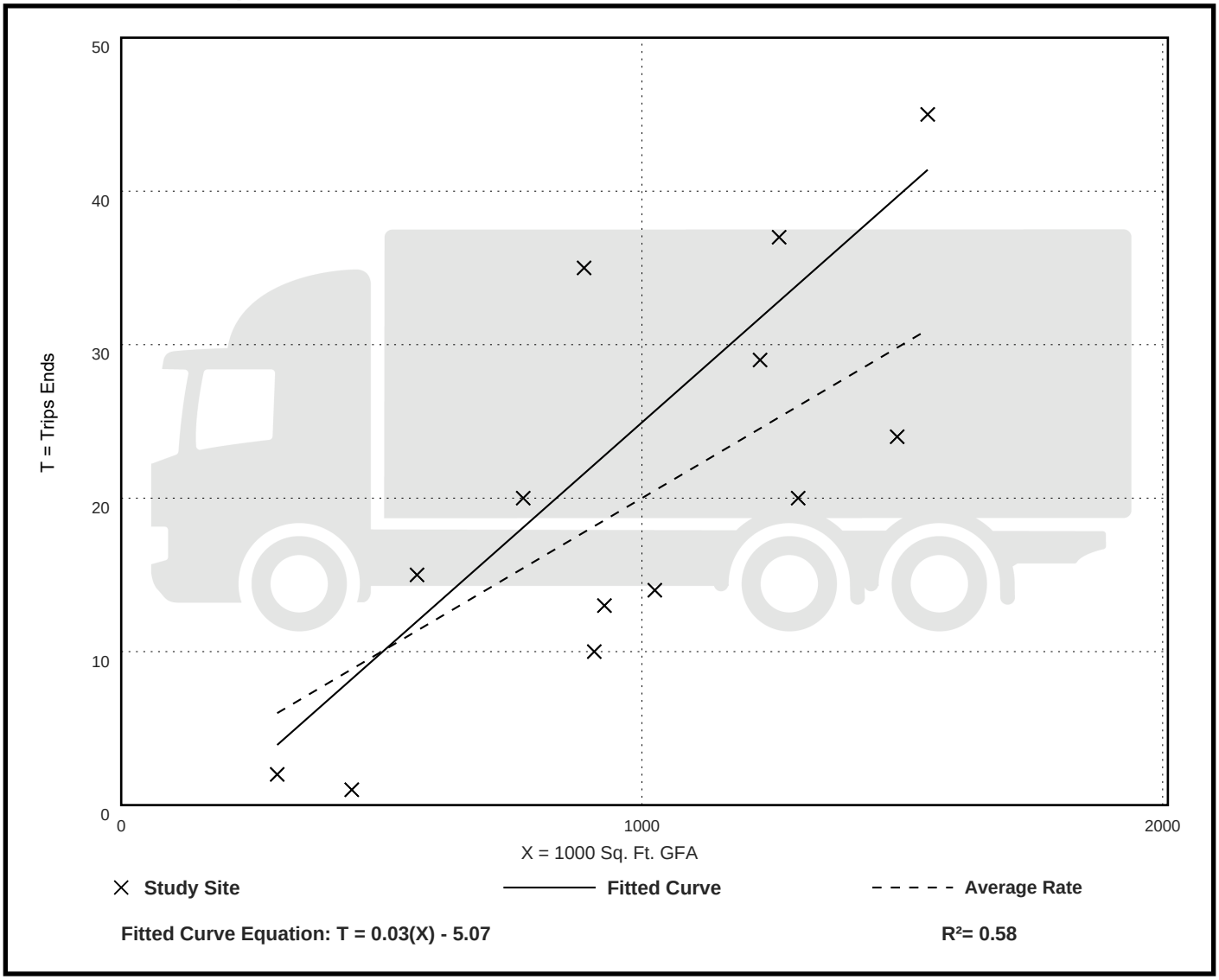
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 13
Avg. 1000 Sq. Ft. GFA: 974
Directional Distribution: 55% entering, 45% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 0.04	0.01

Data Plot and Equation



Fitted Curve Equation: T = 0.03(X) - 5.07

R^2= 0.58

Land Use: 155
High-Cube Fulfillment Center Warehouse

Description

A high-cube warehouse (HCW) is a building that typically has at least 200,000 gross square feet of floor area, has a ceiling height of 24 feet or more, and is used primarily for the storage and/or consolidation of manufactured goods (and to a lesser extent, raw materials) prior to their distribution to retail locations or other warehouses. A typical HCW has a high level of on-site automation and logistics management. The automation and logistics enable highly-efficient processing of goods through the HCW. A high-cube warehouse can be free-standing or located in an industrial park.

Warehousing (Land Use 150), high-cube transload and short-term storage warehouse (Land Use 154), high-cube parcel hub warehouse (Land Use 156), and high-cube cold storage warehouse (Land Use 157) are related land uses.

Land Use Subcategory

Each fulfillment center in the ITE database has been categorized as either a sort or non-sort facility. A sort facility is a fulfillment center that ships out smaller items, requiring extensive sorting, typically by manual means. A non-sort facility is a fulfillment center that ships large box items that are processed primarily with automation rather than through manual means. Separate sets of data plots are presented for the sort and non-sort fulfillment centers. Some limited assembly and repackaging may occur within the facility.

Additional Data

A high-cube warehouse may contain a mezzanine. In a HCW setting, a mezzanine is a free-standing, semi-permanent structure that is commonly supported by structural steel columns and that is lined with racks or shelves. The gross floor area (GFA) values for the study sites in the database for this land use do NOT include the floor area of the mezzanine. The GFA values represent only the permanent ground-floor square footage.

The amount of office/employee welfare space that is provided within a HCW can be highly variable but is typically an insignificant portion of the overall building square footage. Within the trip generation database, common values are between 3,000 and 5,000 square feet for a Cold Storage HCW and between 5,000 and 10,000 square feet for Transload, Fulfillment Center, and Parcel Hub HCW (all of which are less than one percent of total GFA for a site). Therefore, for the trip generation data plots, any office space that is part of the normal operation of the warehouse is included in the total GFA.

The High-Cube Warehouse/Distribution Center-related land uses underwent specialized consideration through a commissioned study titled “High-Cube Warehouse Vehicle Trip Generation Analysis,” published in October 2016. The results of this study are posted on the ITE website at http://library.ite.org/pub/a3e6679a-e3a8-bf38-7f29-2961becdd498.

The sites were surveyed in the 2000s and the 2010s in California, New Jersey, and Texas.

Source Numbers

752, 941, 1001, 1002, 1011

High-Cube Fulfillment Center Warehouse - Non-Sort (155)

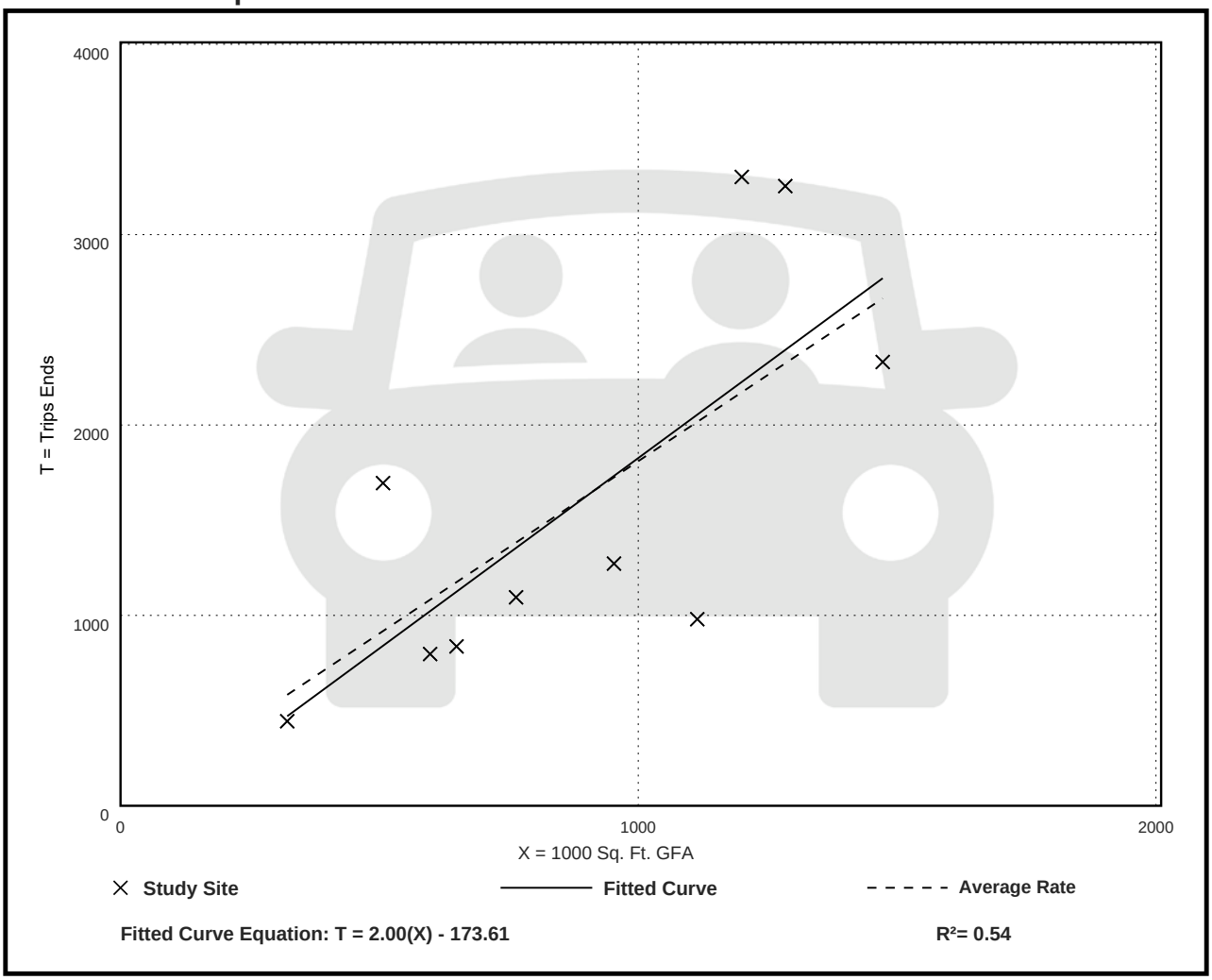
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 10
Avg. 1000 Sq. Ft. GFA: 886
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.81	0.88 - 3.34	0.76

Data Plot and Equation



Fitted Curve Equation: T = 2.00(X) - 173.61

R^2= 0.54

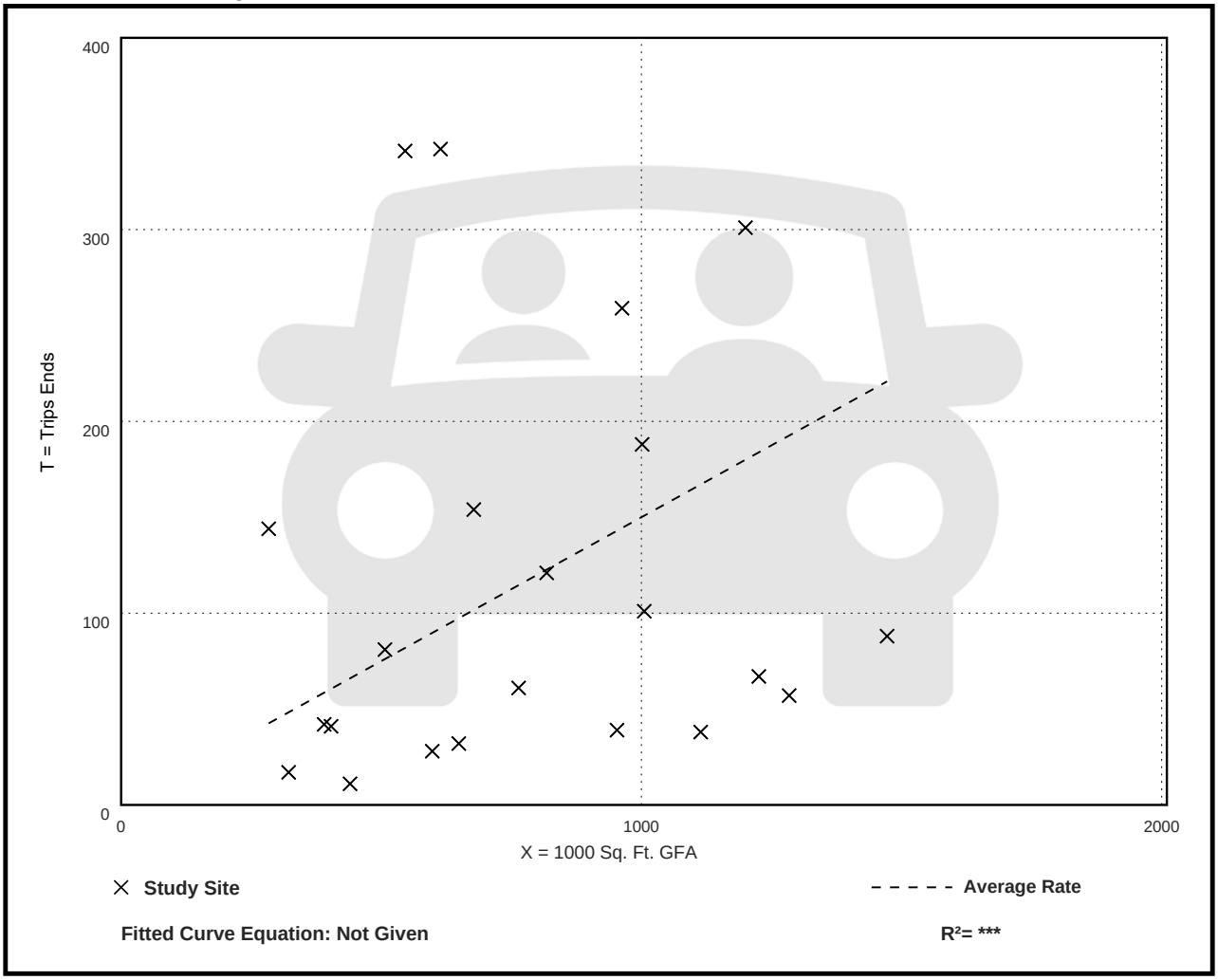
High-Cube Fulfillment Center Warehouse - Non-Sort (155)

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: 22
Avg. 1000 Sq. Ft. GFA: 783
Directional Distribution: 81% entering, 19% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.15	0.03 - 0.62	0.15

Data Plot and Equation



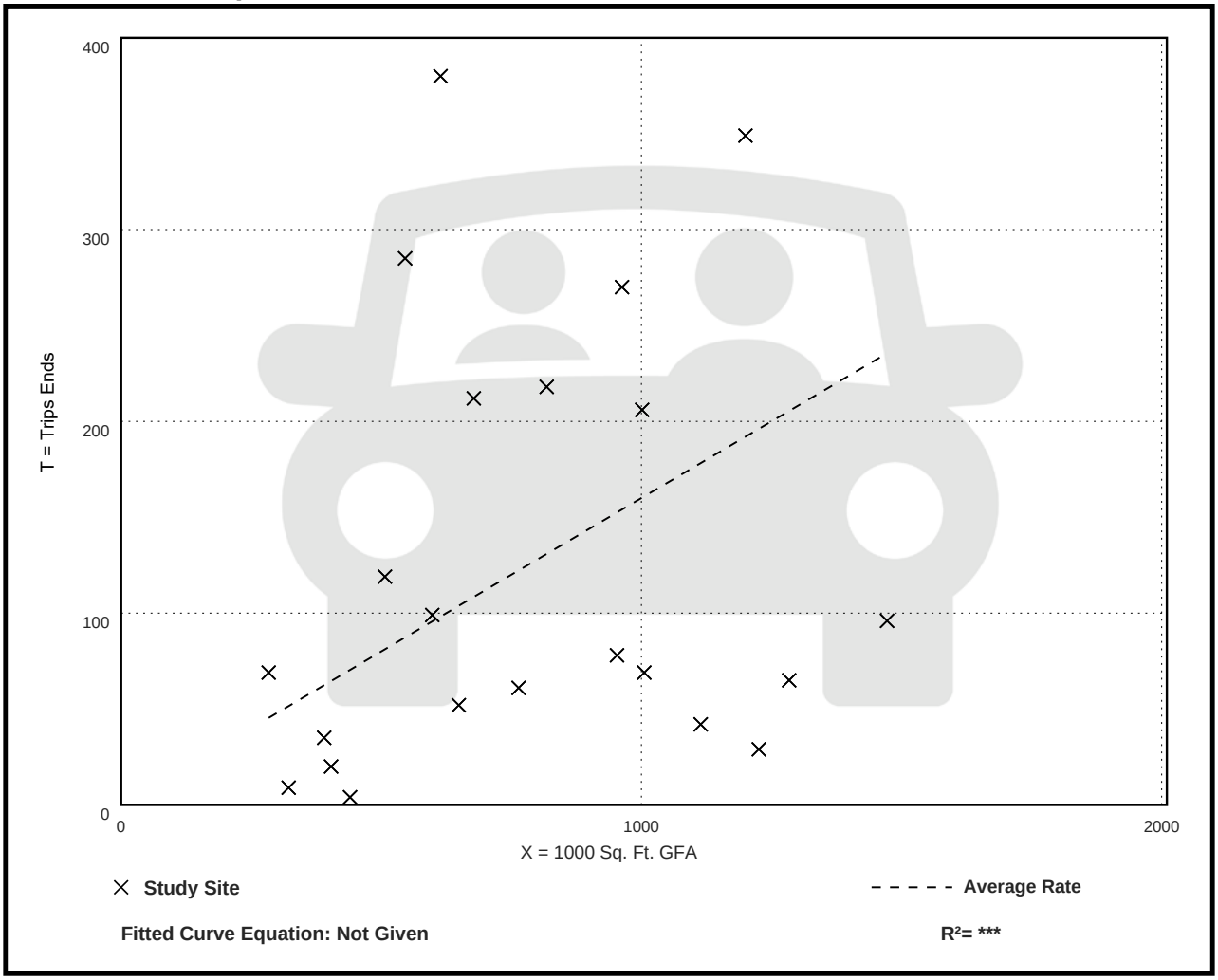
High-Cube Fulfillment Center Warehouse - Non-Sort (155)

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: 22
Avg. 1000 Sq. Ft. GFA: 783
Directional Distribution: 39% entering, 61% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.16	0.01 - 0.62	0.15

Data Plot and Equation



High-Cube Fulfillment Center Warehouse - Non-Sort (155)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
AM Peak Hour of Generator

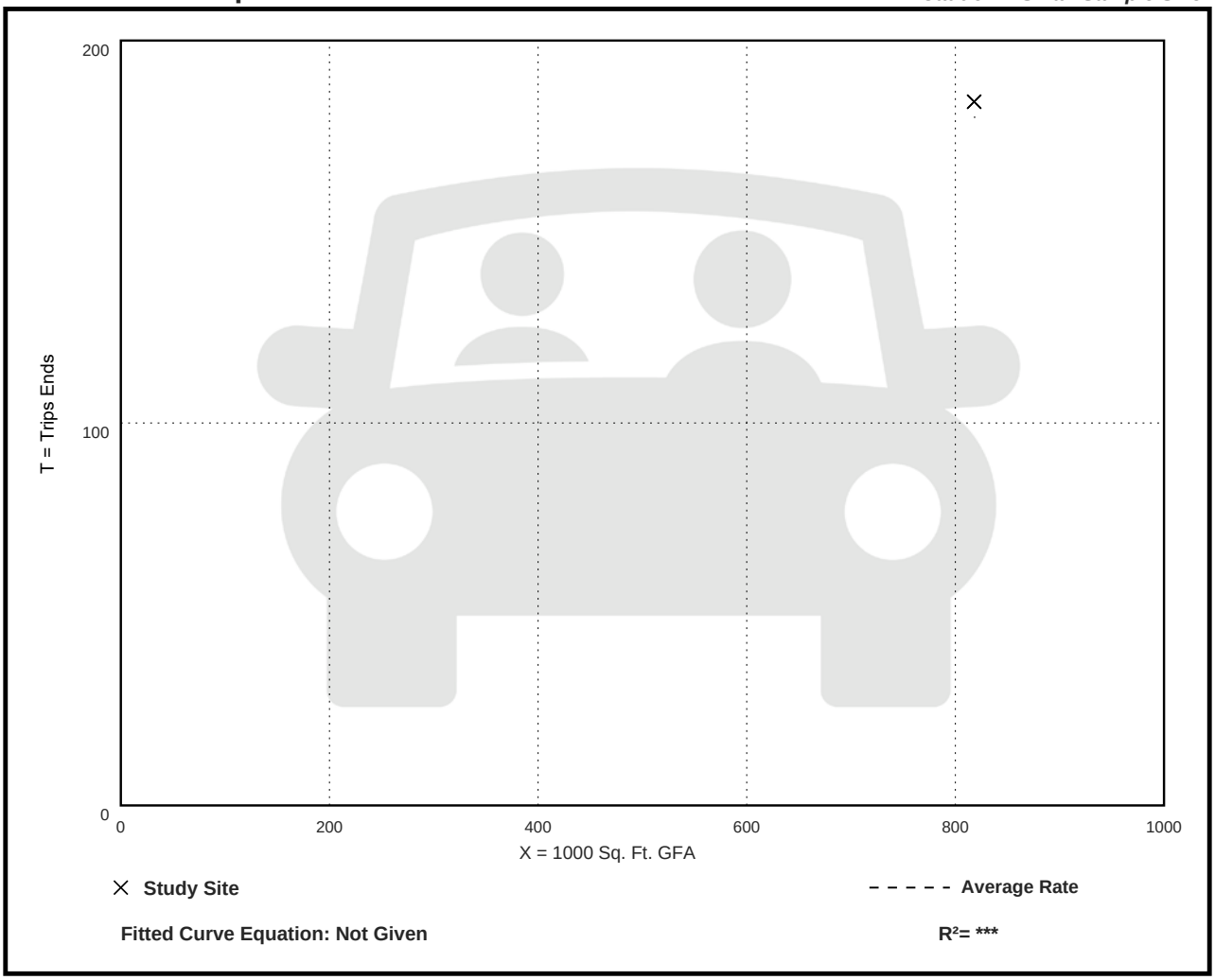
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. 1000 Sq. Ft. GFA: 818
Directional Distribution: Not Available

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.22	0.22 - 0.22	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

High-Cube Fulfillment Center Warehouse - Non-Sort (155)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

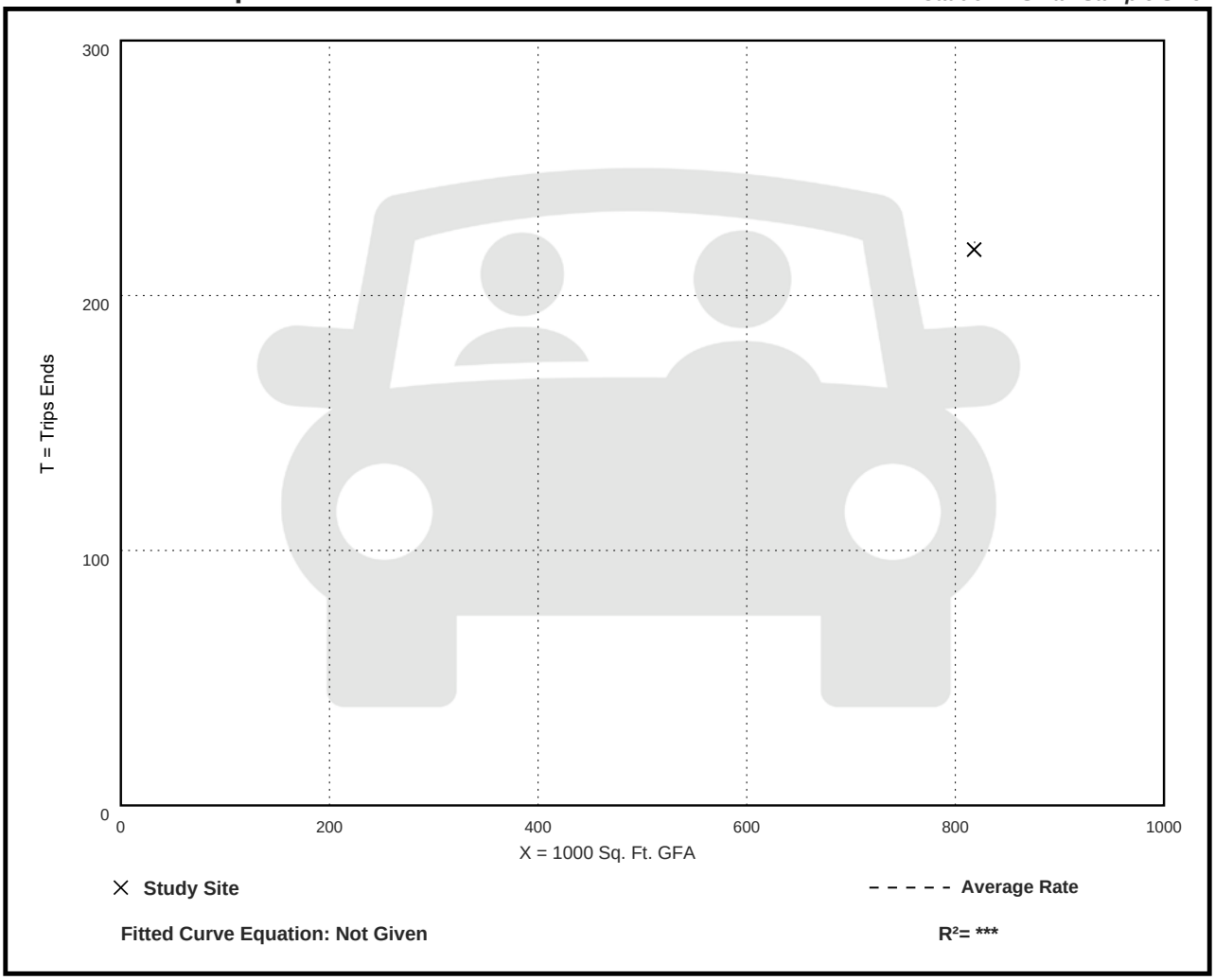
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. 1000 Sq. Ft. GFA: 818
Directional Distribution: Not Available

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.27	0.27 - 0.27	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

High-Cube Fulfillment Center Warehouse - Non-Sort (155)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday, Peak Hour of Generator

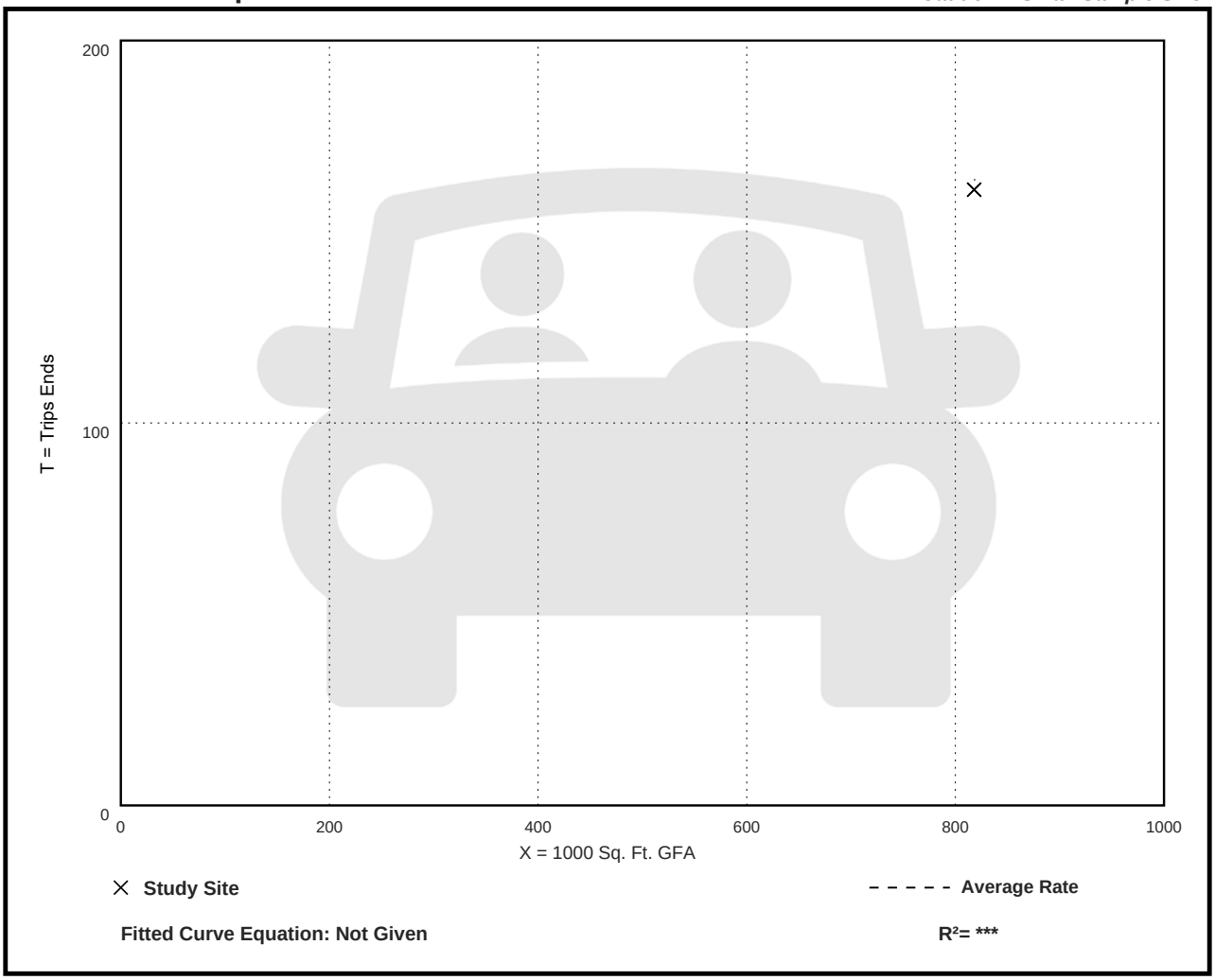
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. 1000 Sq. Ft. GFA: 818
Directional Distribution: Not Available

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.20	0.20 - 0.20	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

High-Cube Fulfillment Center Warehouse - Non-Sort (155)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Sunday, Peak Hour of Generator

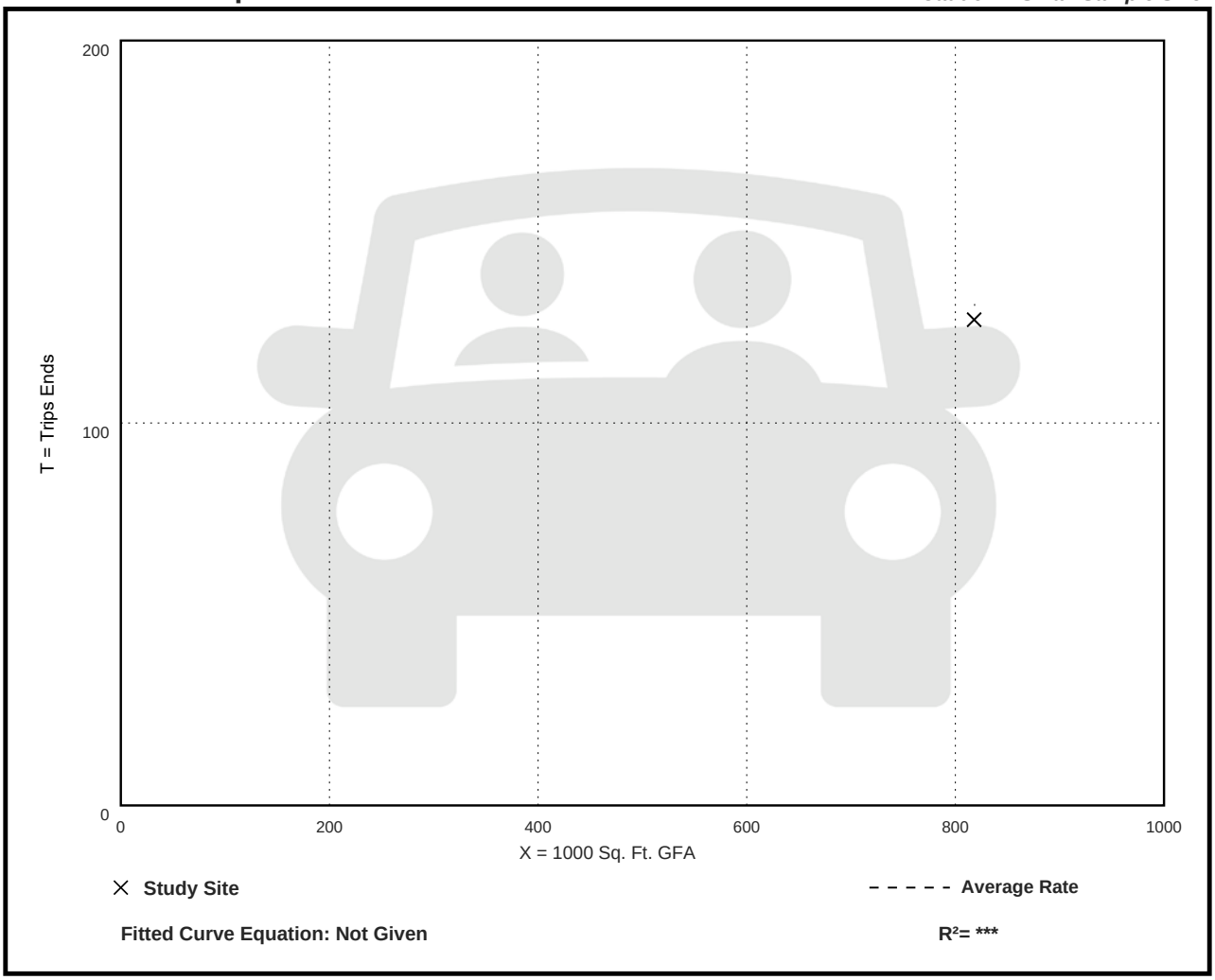
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. 1000 Sq. Ft. GFA: 818
Directional Distribution: Not Available

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.16	0.16 - 0.16	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

High-Cube Fulfillment Center Warehouse - Non-Sort (155)

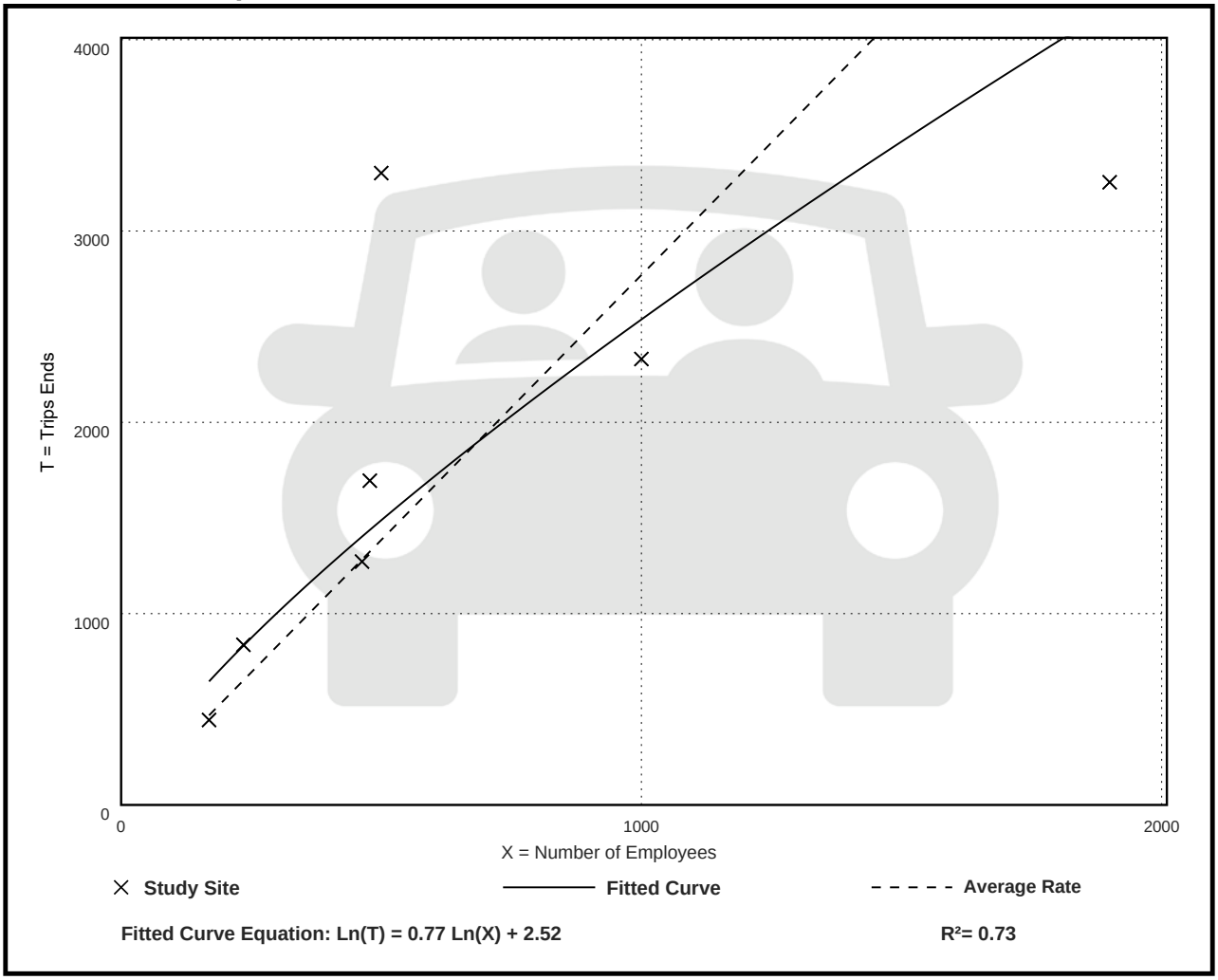
Vehicle Trip Ends vs: Employees
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 7
Avg. Num. of Employees: 678
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
2.77	1.71 - 6.61	1.58

Data Plot and Equation



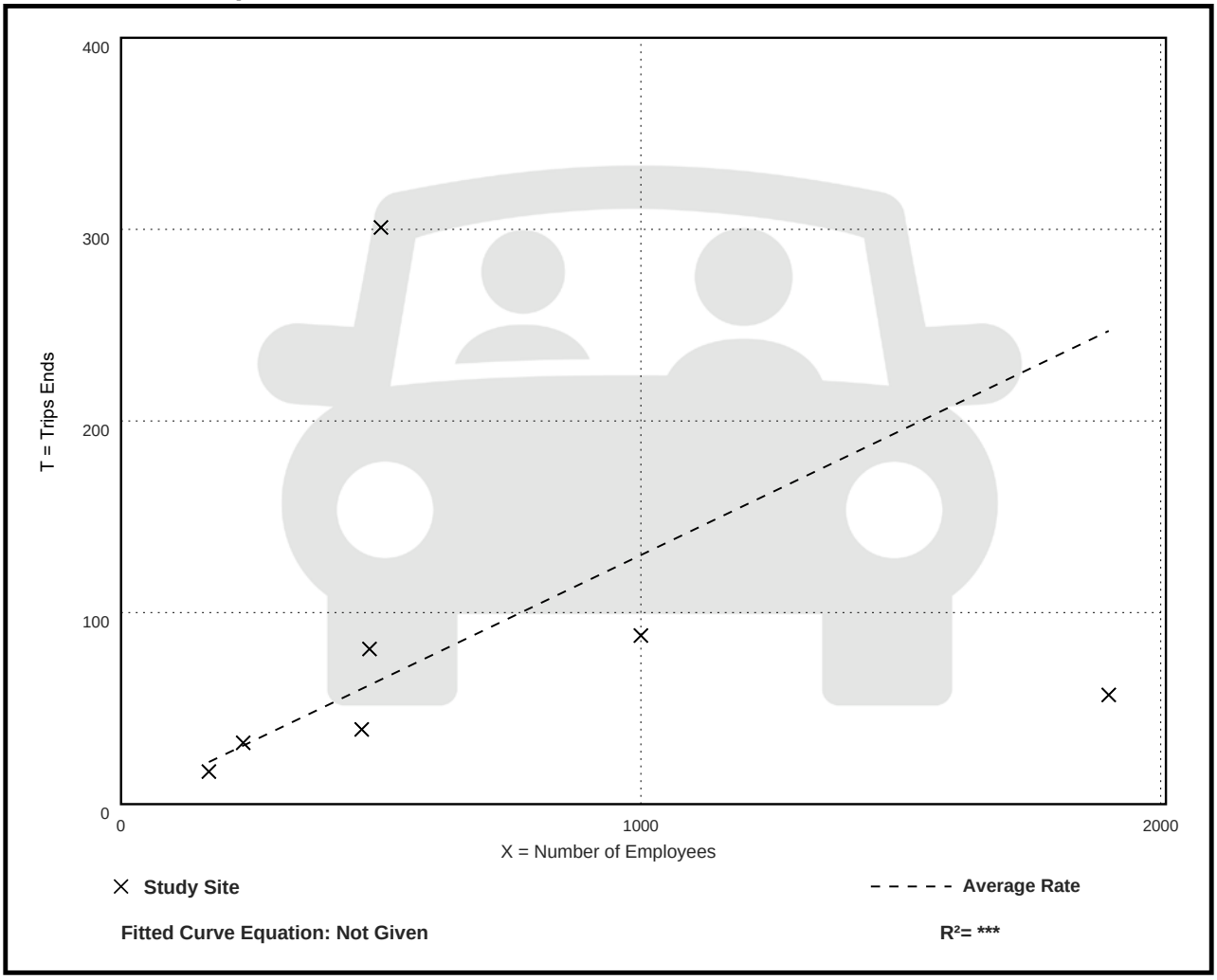
High-Cube Fulfillment Center Warehouse - Non-Sort (155)

Vehicle Trip Ends vs: Employees
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: 7
Avg. Num. of Employees: 678
Directional Distribution: 81% entering, 19% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.13	0.03 - 0.60	0.18

Data Plot and Equation



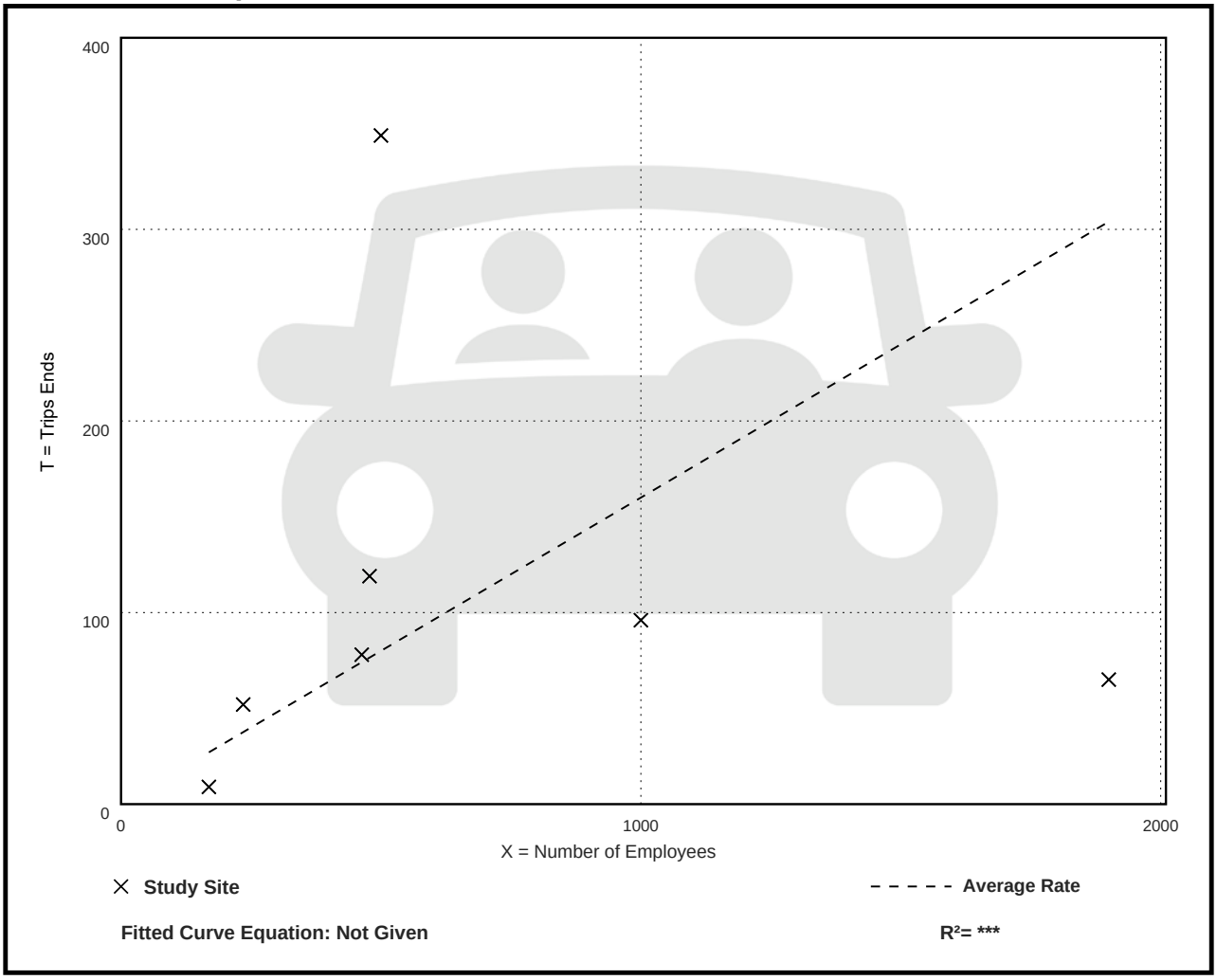
High-Cube Fulfillment Center Warehouse - Non-Sort (155)

Vehicle Trip Ends vs: Employees
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: 7
Avg. Num. of Employees: 678
Directional Distribution: 39% entering, 61% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.16	0.03 - 0.70	0.21

Data Plot and Equation



High-Cube Fulfillment Center Warehouse - Sort (155)

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

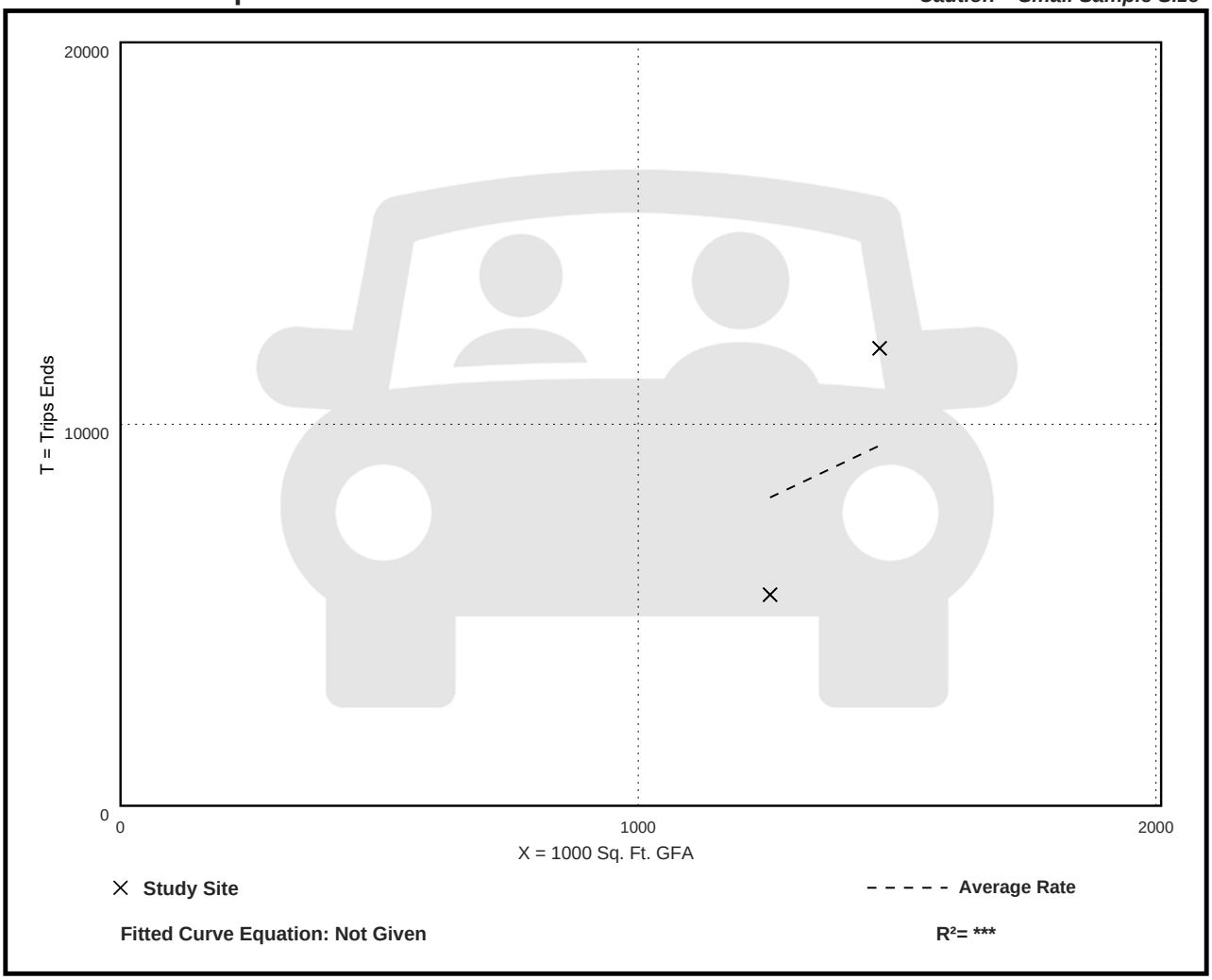
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 1360
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
6.44	4.41 - 8.18	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= ***

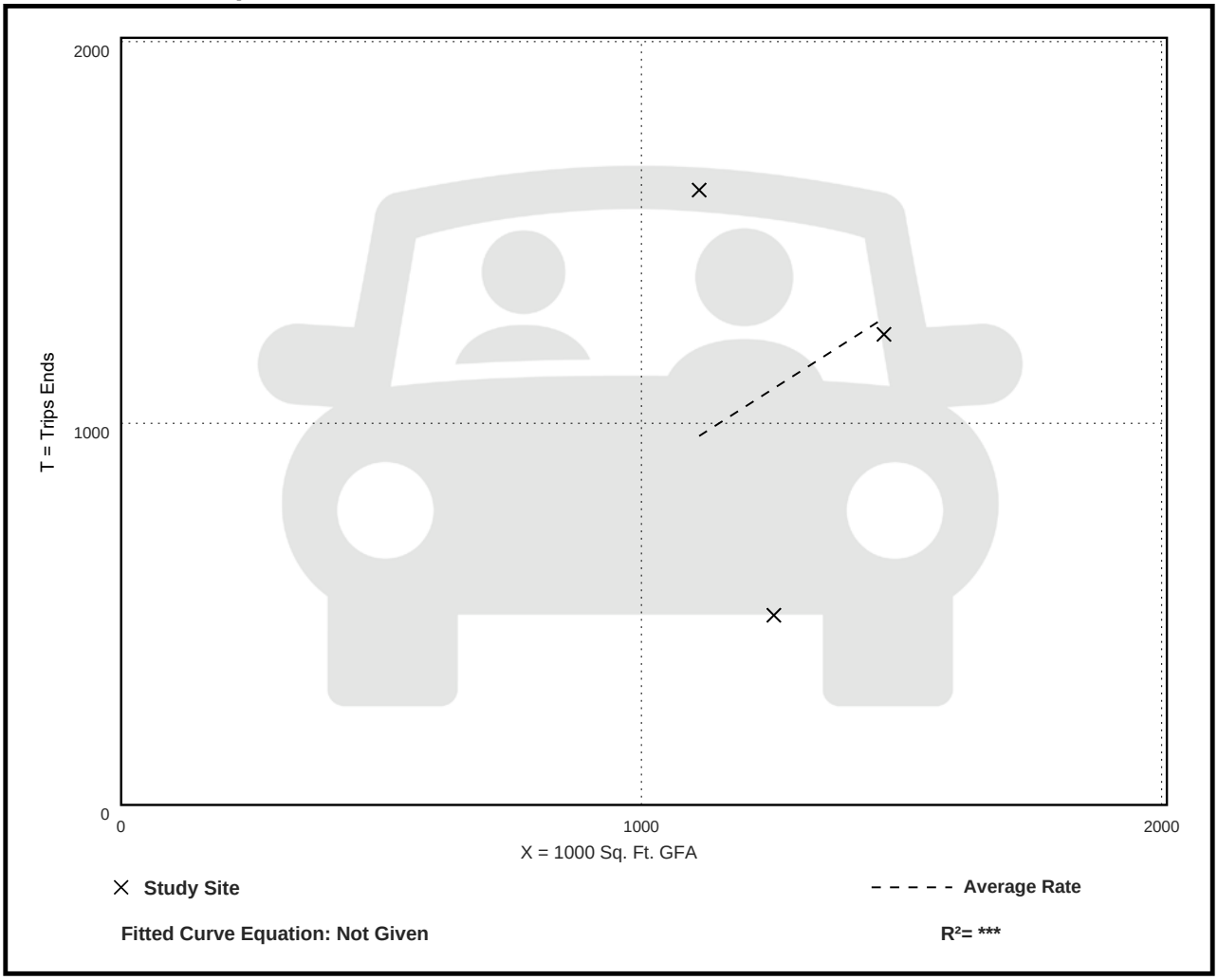
High-Cube Fulfillment Center Warehouse - Sort (155)

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: 3
Avg. 1000 Sq. Ft. GFA: 1277
Directional Distribution: 81% entering, 19% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.87	0.40 - 1.45	0.51

Data Plot and Equation



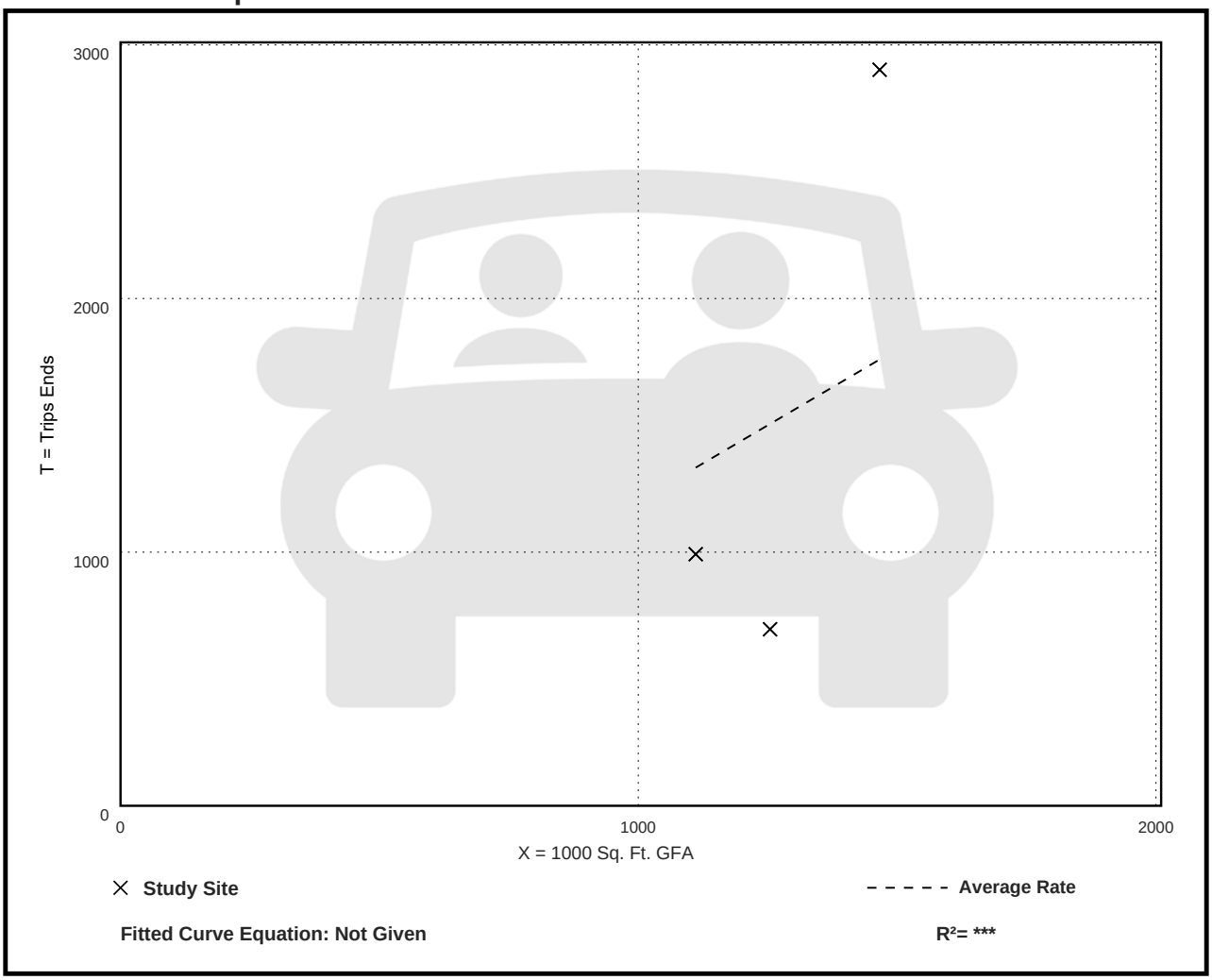
High-Cube Fulfillment Center Warehouse - Sort (155)

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: 3
Avg. 1000 Sq. Ft. GFA: 1277
Directional Distribution: 39% entering, 61% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.20	0.55 - 1.98	0.77

Data Plot and Equation



High-Cube Fulfillment Center Warehouse - Sort (155)

Vehicle Trip Ends vs: Employees
On a: Weekday

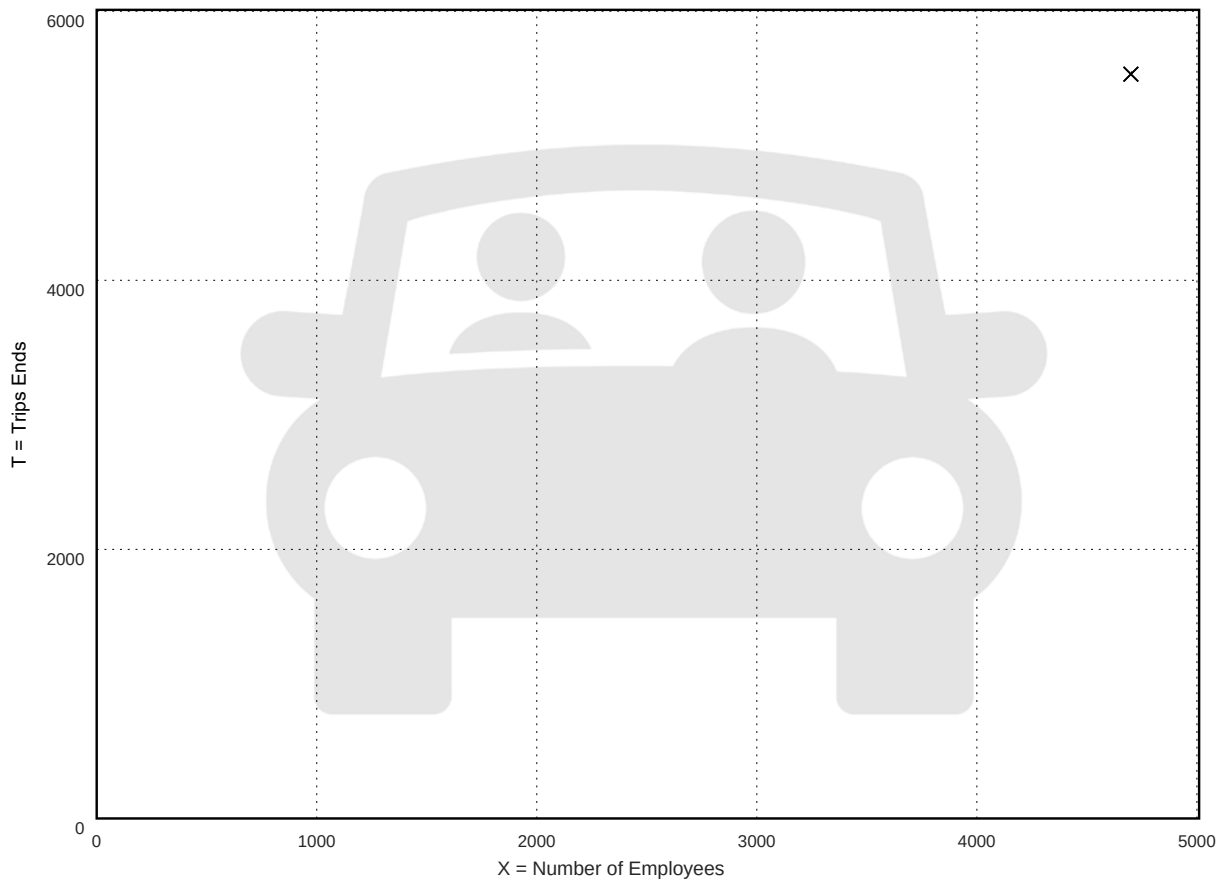
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Employees: 4700
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
1.18	1.18 - 1.18	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

High-Cube Fulfillment Center Warehouse - Sort (155)

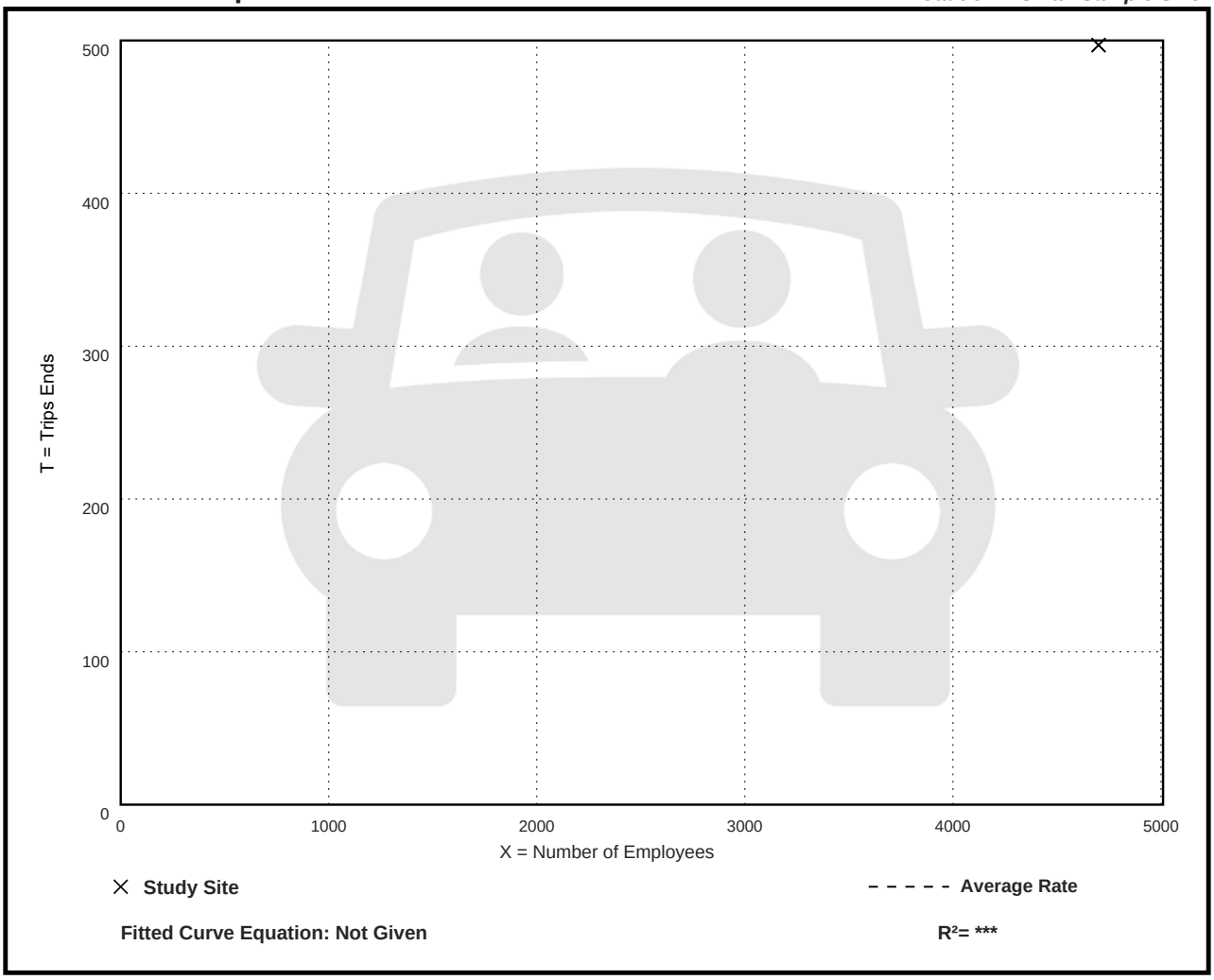
Vehicle Trip Ends vs: Employees
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Employees: 4700
Directional Distribution: 81% entering, 19% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.11	0.11 - 0.11	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

High-Cube Fulfillment Center Warehouse - Sort (155)

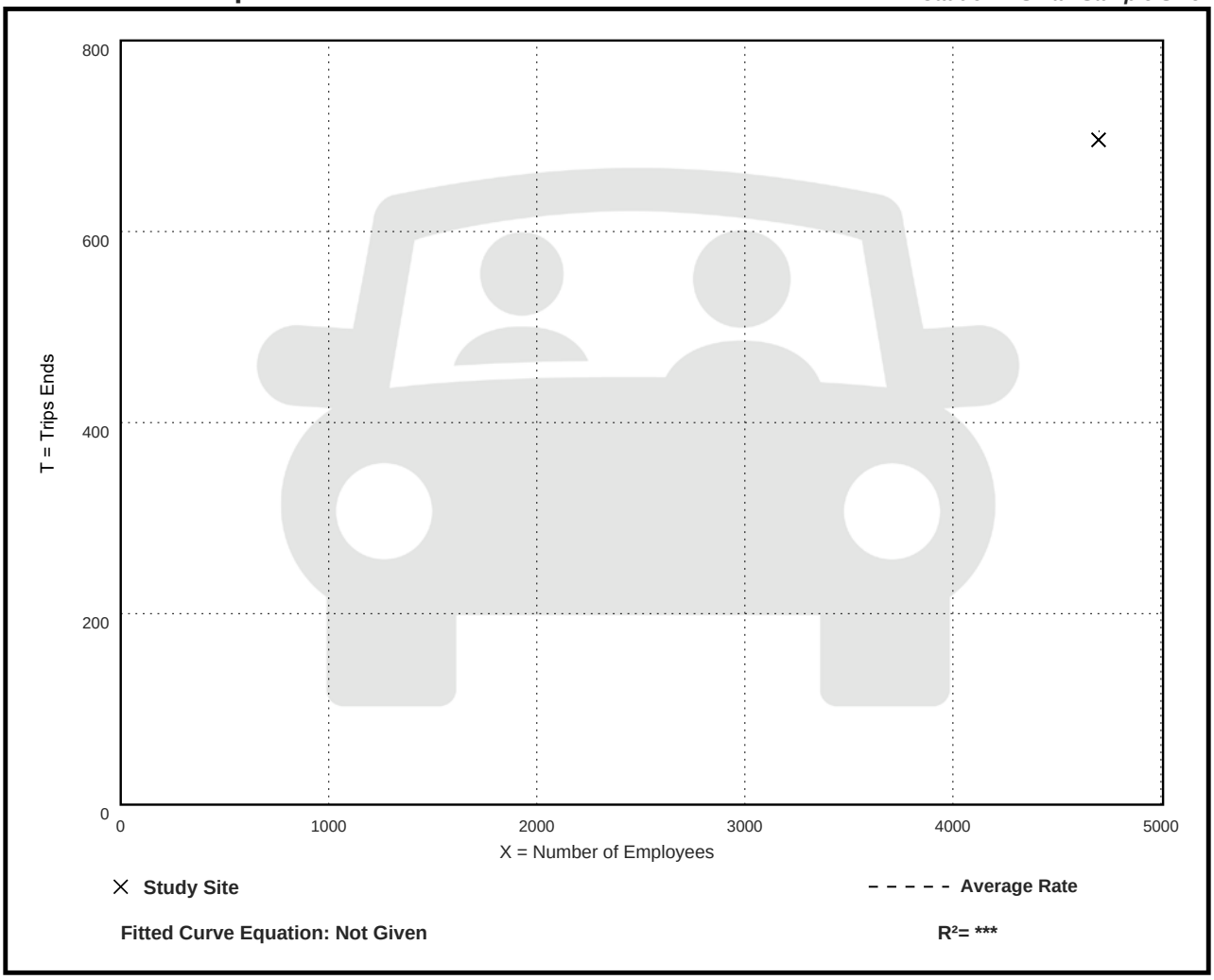
Vehicle Trip Ends vs: Employees
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Employees: 4700
Directional Distribution: 39% entering, 61% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.15	0.15 - 0.15	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

High-Cube Fulfillment Center Warehouse - Non-Sort (155)

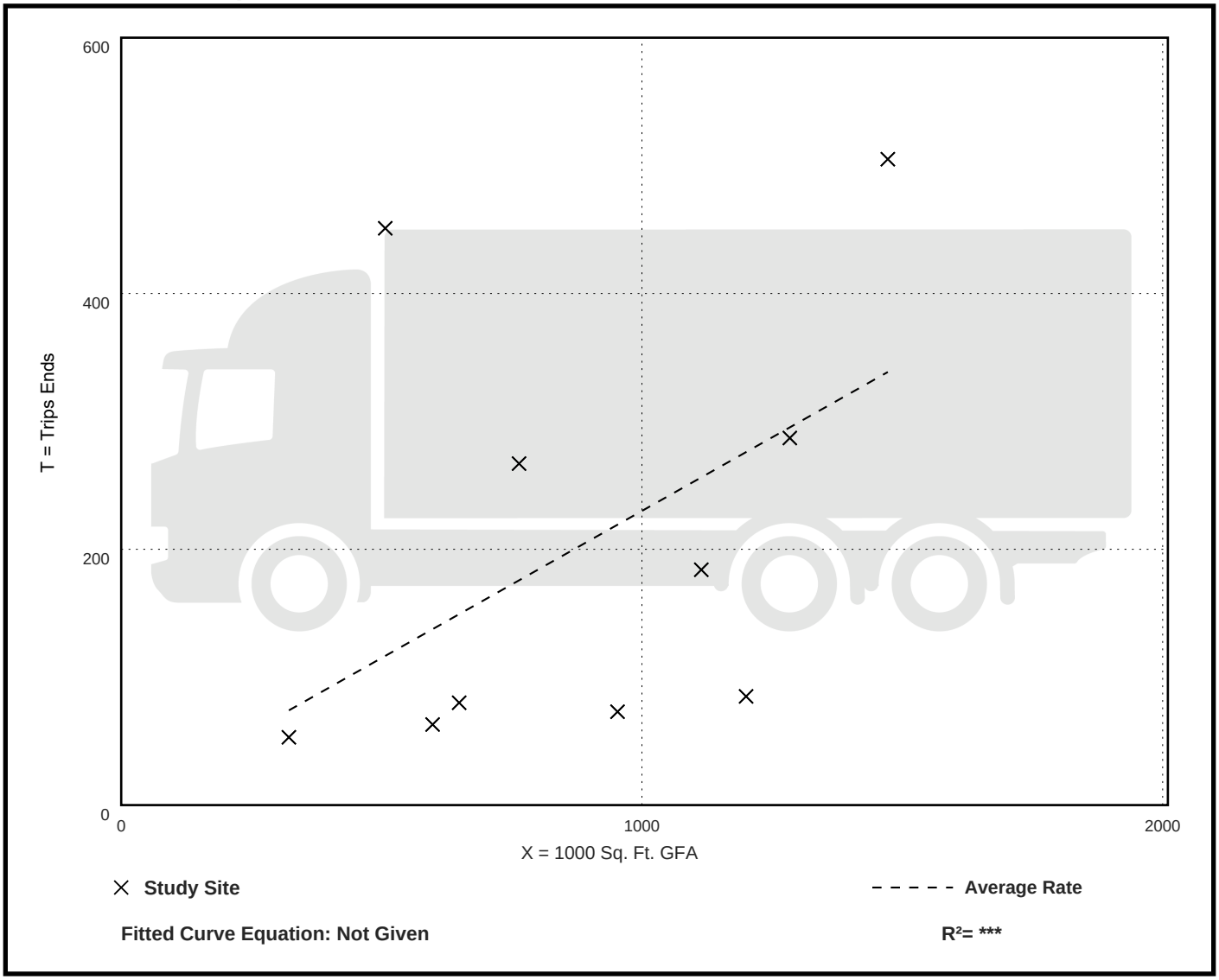
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 10
Avg. 1000 Sq. Ft. GFA: 886
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.23	0.07 - 0.89	0.20

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

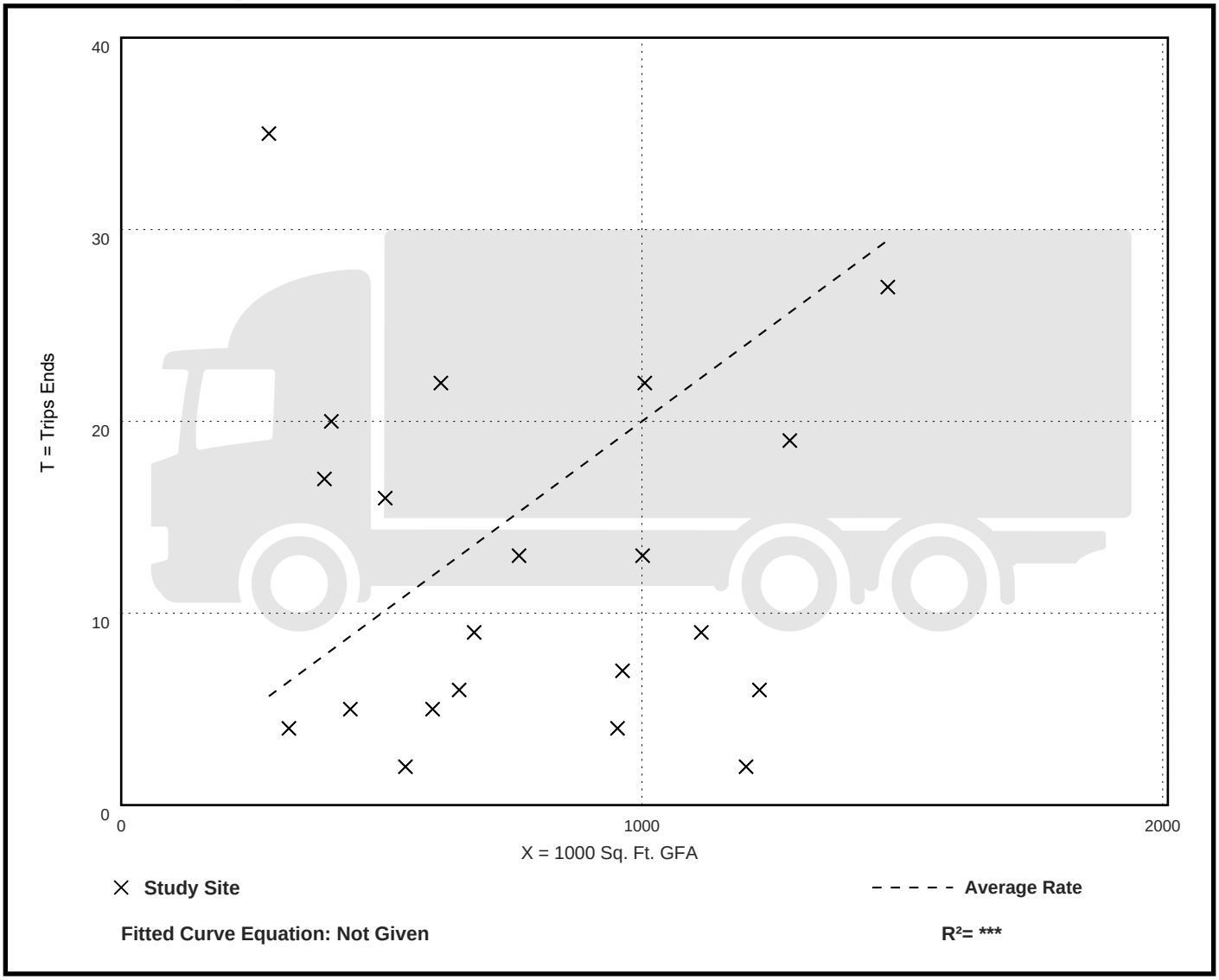
High-Cube Fulfillment Center Warehouse - Non-Sort (155)

Truck 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: 21
Avg. 1000 Sq. Ft. GFA: 782
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 0.12	0.02

Data Plot and Equation



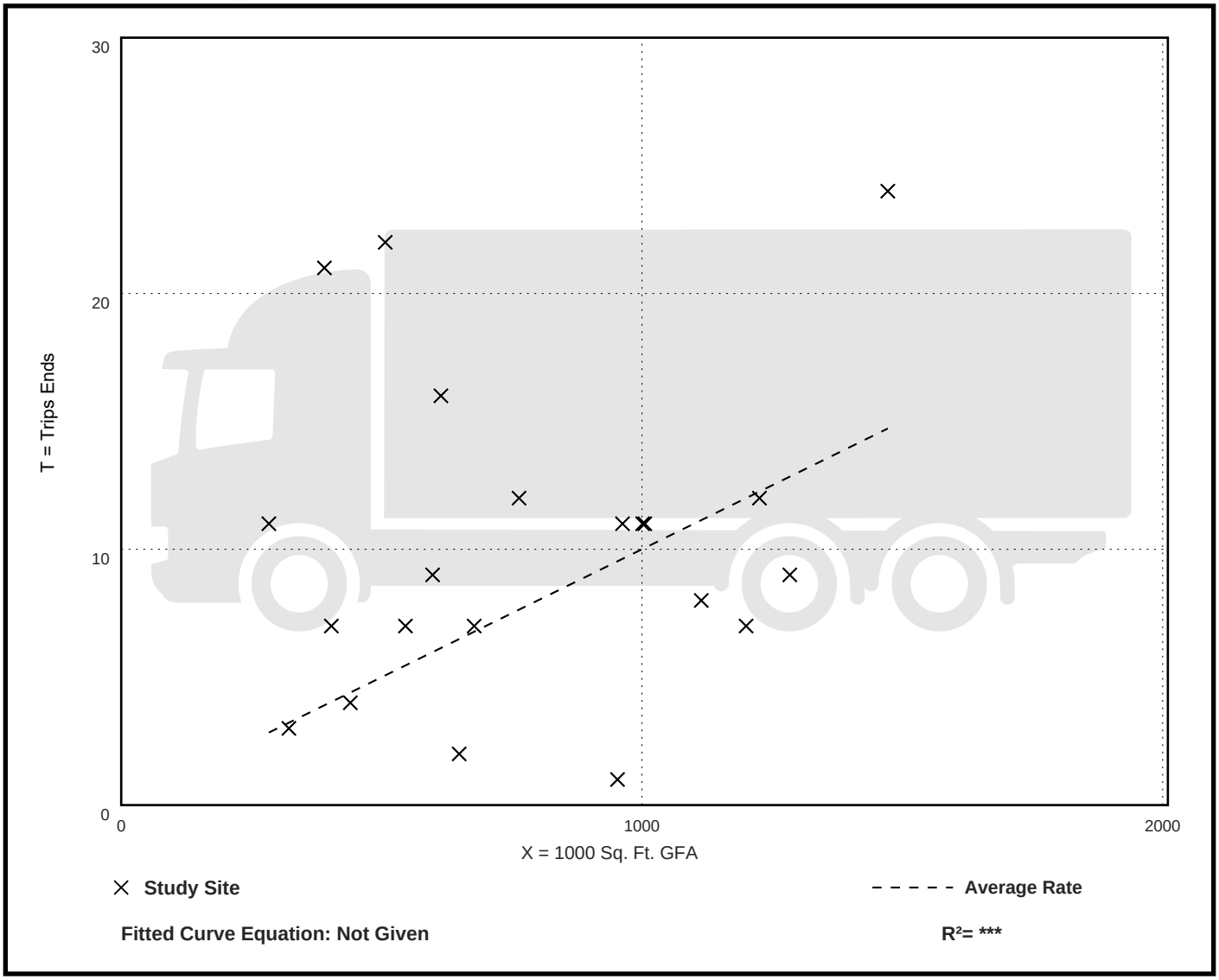
High-Cube Fulfillment Center Warehouse - Non-Sort (155)

Truck 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: 21
Avg. 1000 Sq. Ft. GFA: 782
Directional Distribution: 46% entering, 54% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.01	0.00 - 0.05	0.01

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

High-Cube Fulfillment Center Warehouse - Non-Sort (155)

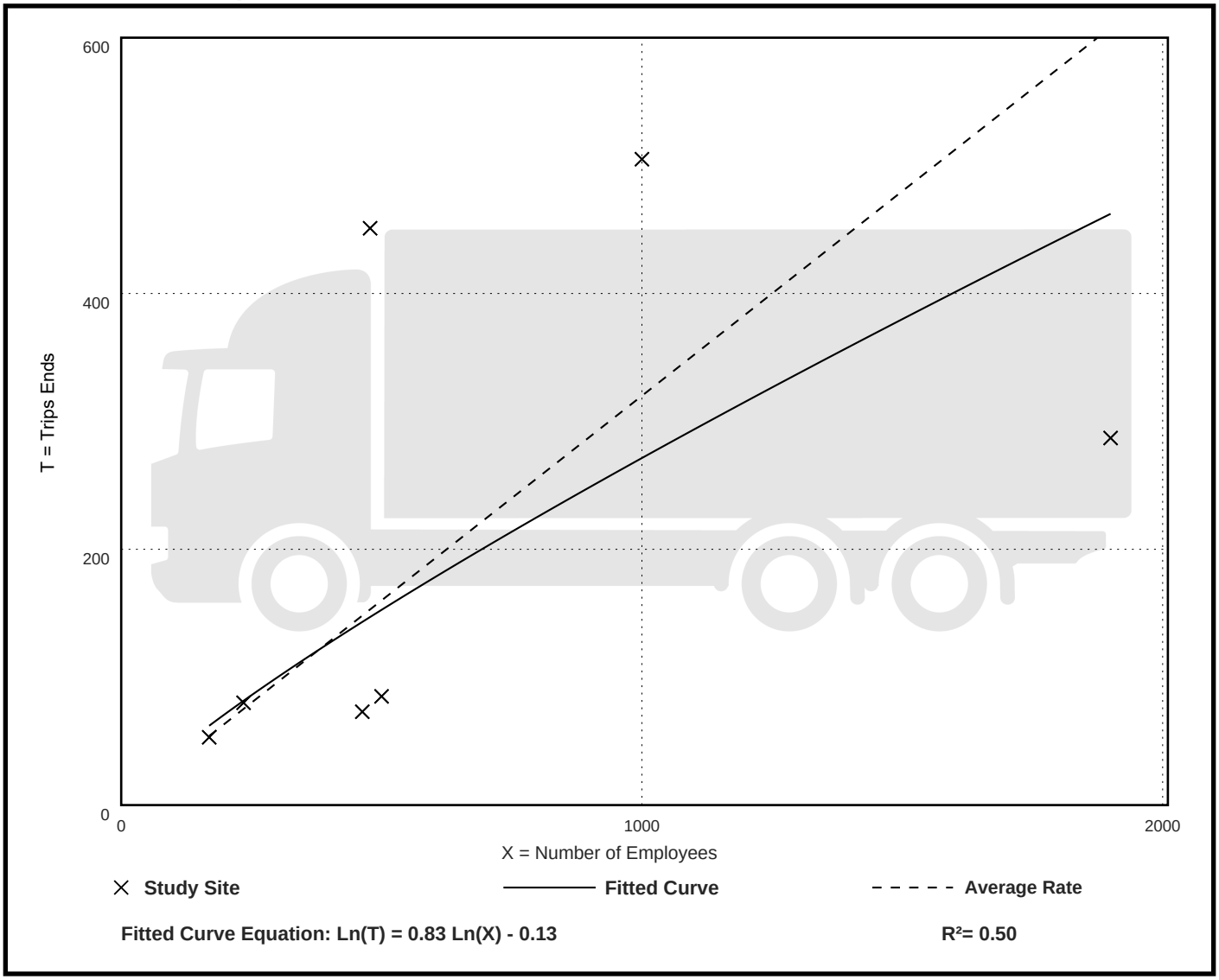
Truck Trip Ends vs: Employees
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 7
Avg. Num. of Employees: 678
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.32	0.15 - 0.94	0.27

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.83 Ln(X) - 0.13

R^2= 0.50

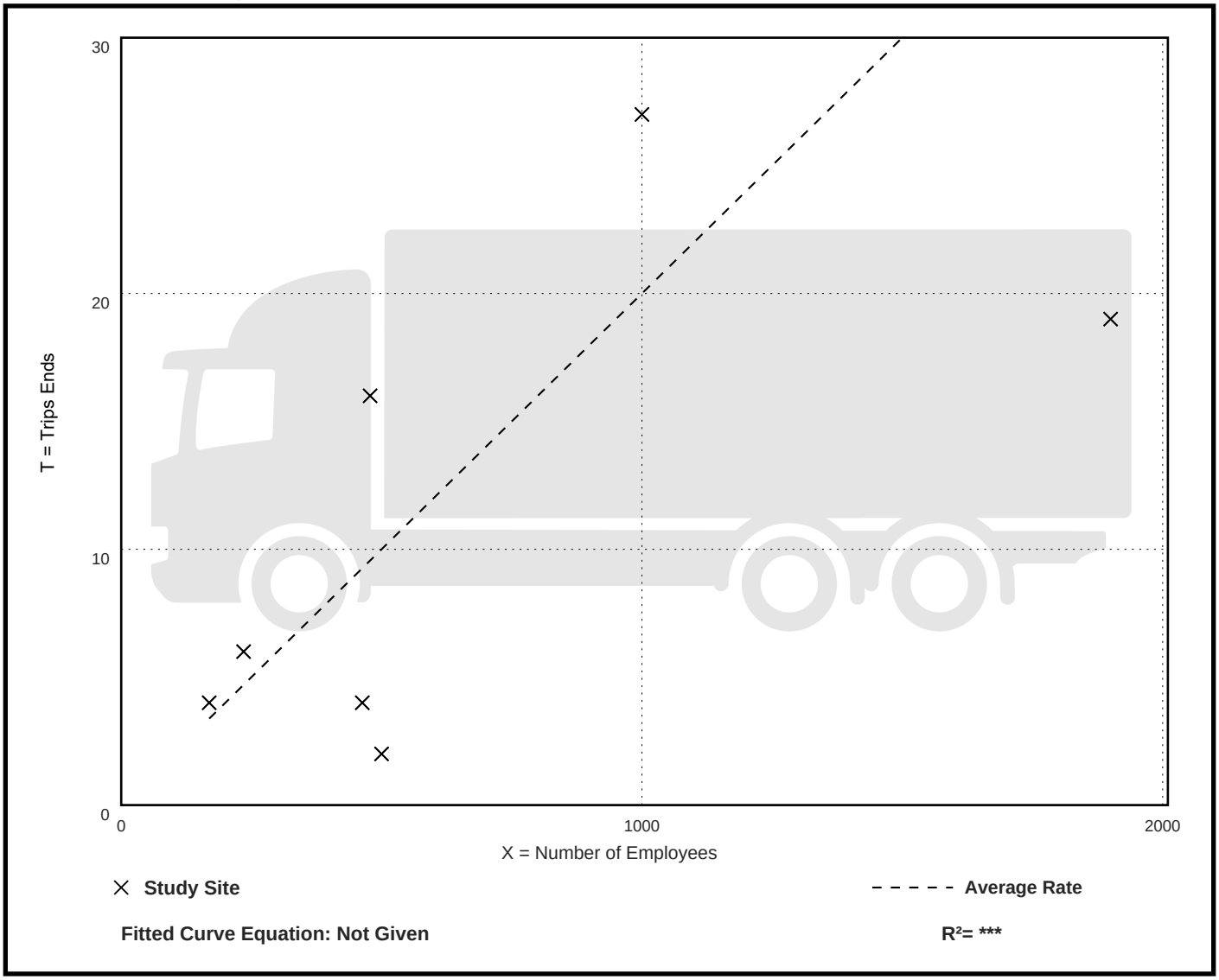
High-Cube Fulfillment Center Warehouse - Non-Sort (155)

Truck Trip Ends vs: Employees
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: 7
Avg. Num. of Employees: 678
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 0.03	0.01

Data Plot and Equation



High-Cube Fulfillment Center Warehouse - Non-Sort (155)

Truck Trip Ends vs: Employees
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: 7
Avg. Num. of Employees: 678
Directional Distribution: 46% entering, 54% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.01	0.00 - 0.05	0.01

Data Plot and Equation

High-Cube Fulfillment Center Warehouse - Sort (155)

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

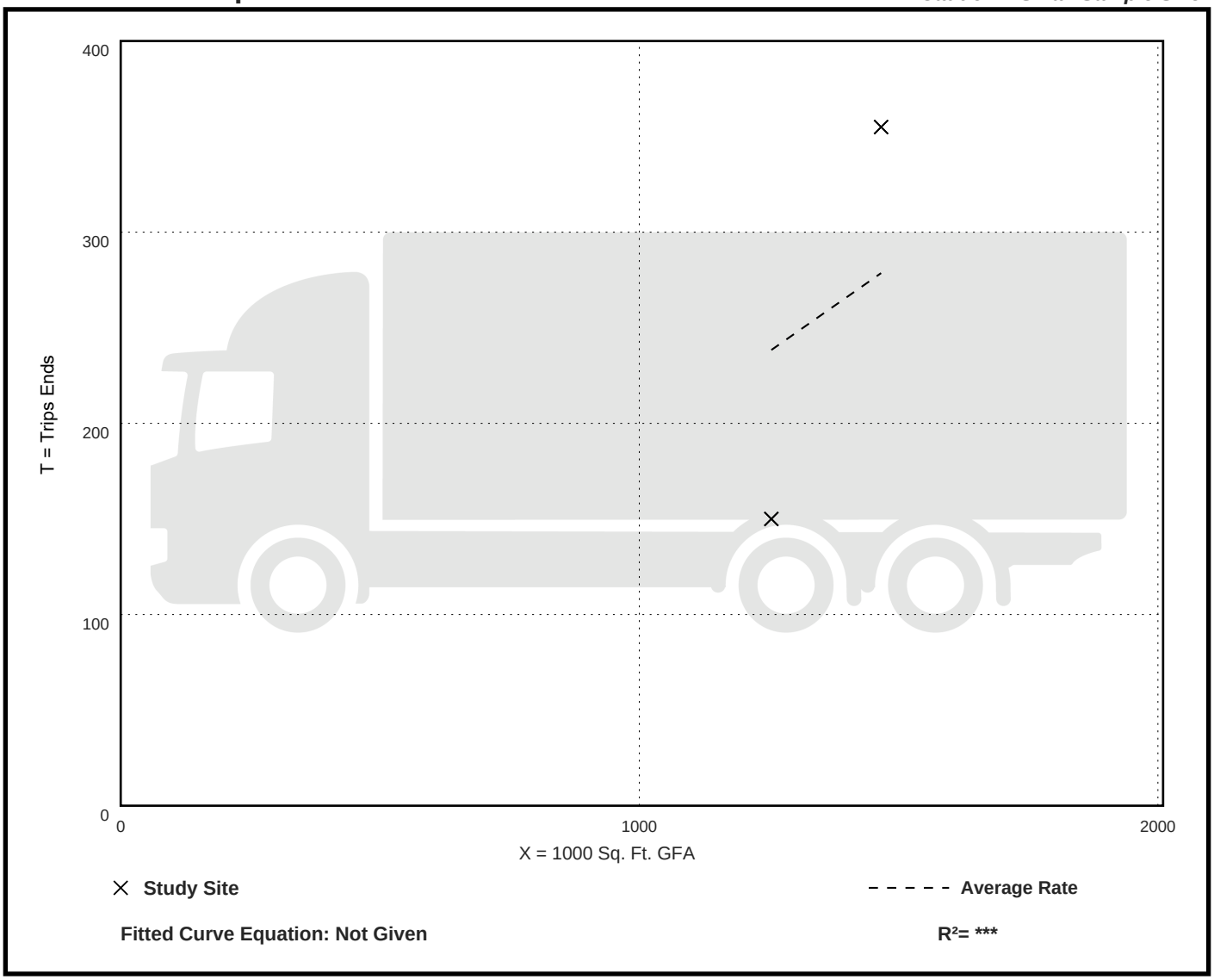
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 1360
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.19	0.12 - 0.24	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

High-Cube Fulfillment Center Warehouse - Sort (155)

Truck 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: 3
Avg. 1000 Sq. Ft. GFA: 1277
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.02	0.01 - 0.04	0.02

Data Plot and Equation

Fitted Curve Equation: Not Given

R^2= *

High-Cube Fulfillment Center Warehouse - Sort (155)

Truck 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: 3
Avg. 1000 Sq. Ft. GFA: 1277
Directional Distribution: 46% entering, 54% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 0.05	0.02

Data Plot and Equation

Fitted Curve Equation: Not Given

R^2= *

High-Cube Fulfillment Center Warehouse - Sort (155)

Truck Trip Ends vs: Employees
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Employees: 4700
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.03	0.03 - 0.03	***

Data Plot and Equation

Caution – Small Sample Size

Fitted Curve Equation: Not Given

R^2= *

High-Cube Fulfillment Center Warehouse - Sort (155)

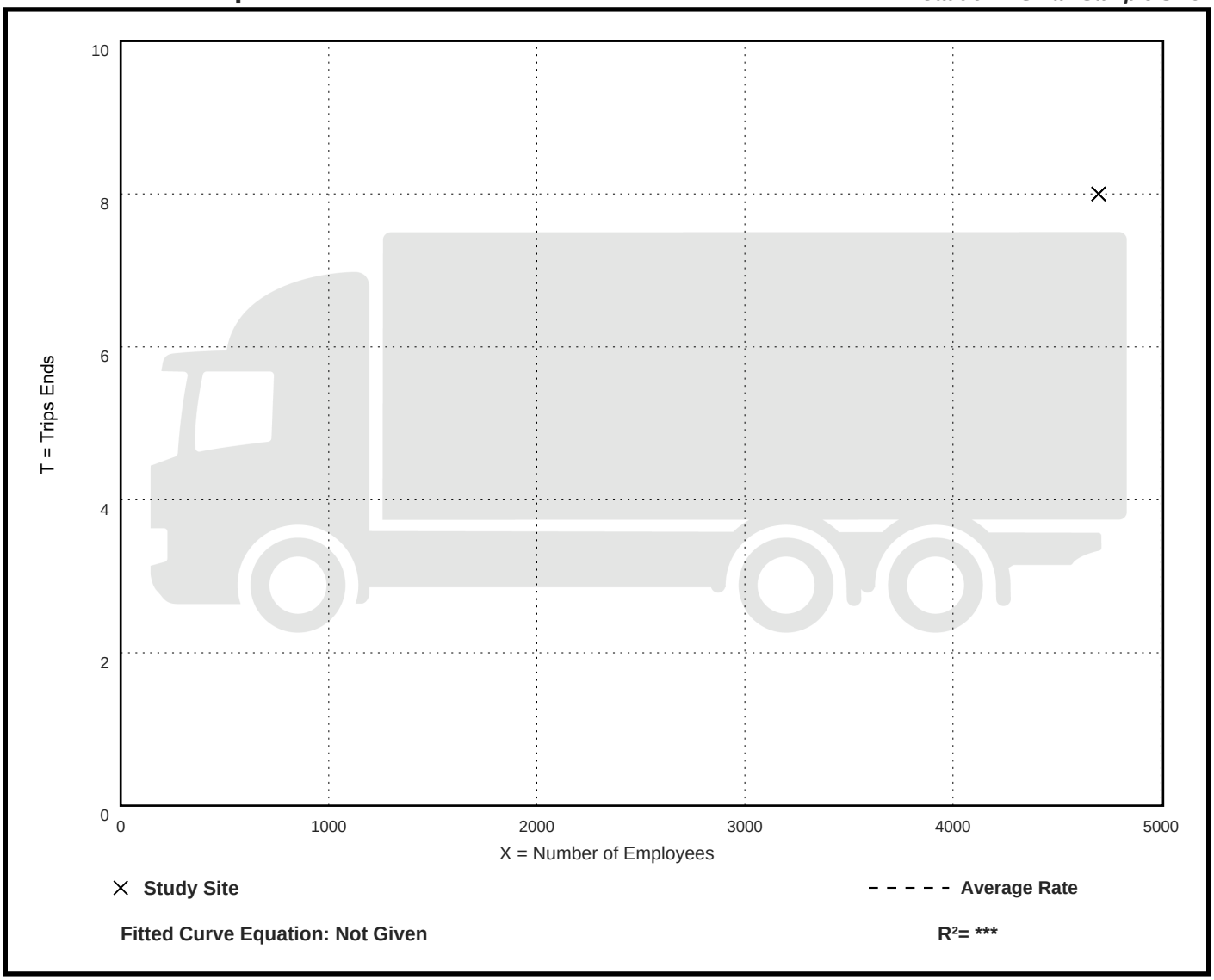
Truck Trip Ends vs: Employees
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Employees: 4700
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.00	0.00 - 0.00	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

High-Cube Fulfillment Center Warehouse - Sort (155)

Truck Trip Ends vs: Employees
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: 1
Avg. Num. of Employees: 4700
Directional Distribution: 46% entering, 54% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.00	0.00 - 0.00	***

Data Plot and Equation

Caution – Small Sample Size

Fitted Curve Equation: Not Given

R^2= *

Land Use: 156
High-Cube Parcel Hub Warehouse

Description

A high-cube warehouse (HCW) is a building that typically has at least 200,000 gross square feet of floor area, has a ceiling height of 24 feet or more, and is used primarily for the storage and/or consolidation of manufactured goods (and to a lesser extent, raw materials) prior to their distribution to retail locations or other warehouses. A typical HCW has a high level of on-site automation and logistics management. The automation and logistics enable highly-efficient processing of goods through the HCW. A high-cube warehouse can be free-standing or located in an industrial park.

A high-cube parcel hub warehouses typically serves as a regional and local freight-forwarder facility for time sensitive shipments via airfreight and ground carriers. A site can also include truck maintenance, wash, or fueling facilities. Some limited assembly and repackaging may occur within the facility.

A high-cube warehouse may contain a mezzanine. In a HCW setting, a mezzanine is a free-standing, semi-permanent structure that is commonly supported by structural steel columns and that is lined with racks or shelves. The gross floor area (GFA) values for the study sites in the database for this land use do NOT include the floor area of the mezzanine. The GFA values represent only the permanent ground-floor square footage.

The amount of office/employee welfare space that is provided within a HCW can be highly variable but is typically an insignificant portion of the overall building square footage. Within the trip generation database, common values are between 3,000 and 5,000 square feet for a Cold Storage HCW and between 5,000 and 10,000 square feet for Transload, Fulfillment Center, and Parcel Hub HCW (all of which are less than one percent of total GFA for a site). Therefore, for the trip generation data plots, any office space that is part of the normal operation of the warehouse is included in the total GFA.

Warehousing (Land Use 150), high-cube transload and short-term storage warehouse (Land Use 154), high-cube fulfillment center warehouse (Land Use 155), and high-cube cold storage warehouse (Land Use 157) are related land uses.

Additional Data

The High-Cube Warehouse/Distribution Center-related land uses underwent specialized consideration through a commissioned study titled “High-Cube Warehouse Vehicle Trip Generation Analysis,” published in October 2016. The results of this study are posted on the ITE website at http://library.ite.org/pub/a3e6679a-e3a8-bf38-7f29-2961becdd498.

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 2010s in California, Connecticut, and Minnesota.

Source Numbers

869, 892, 941, 1001, 1011

High-Cube Parcel Hub Warehouse
(156)

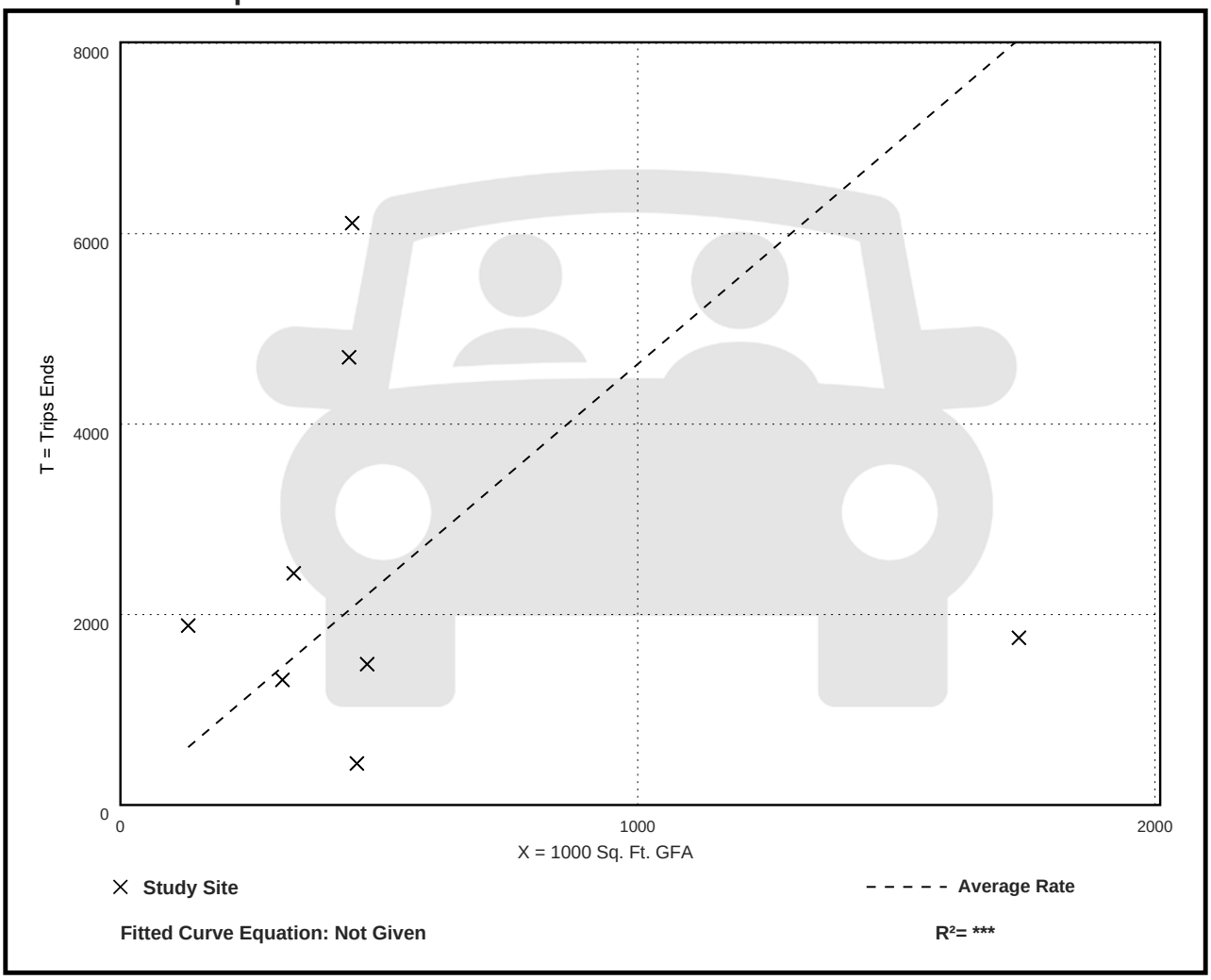
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 8
Avg. 1000 Sq. Ft. GFA: 543
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
4.63	0.95 - 14.38	5.06

Data Plot and Equation



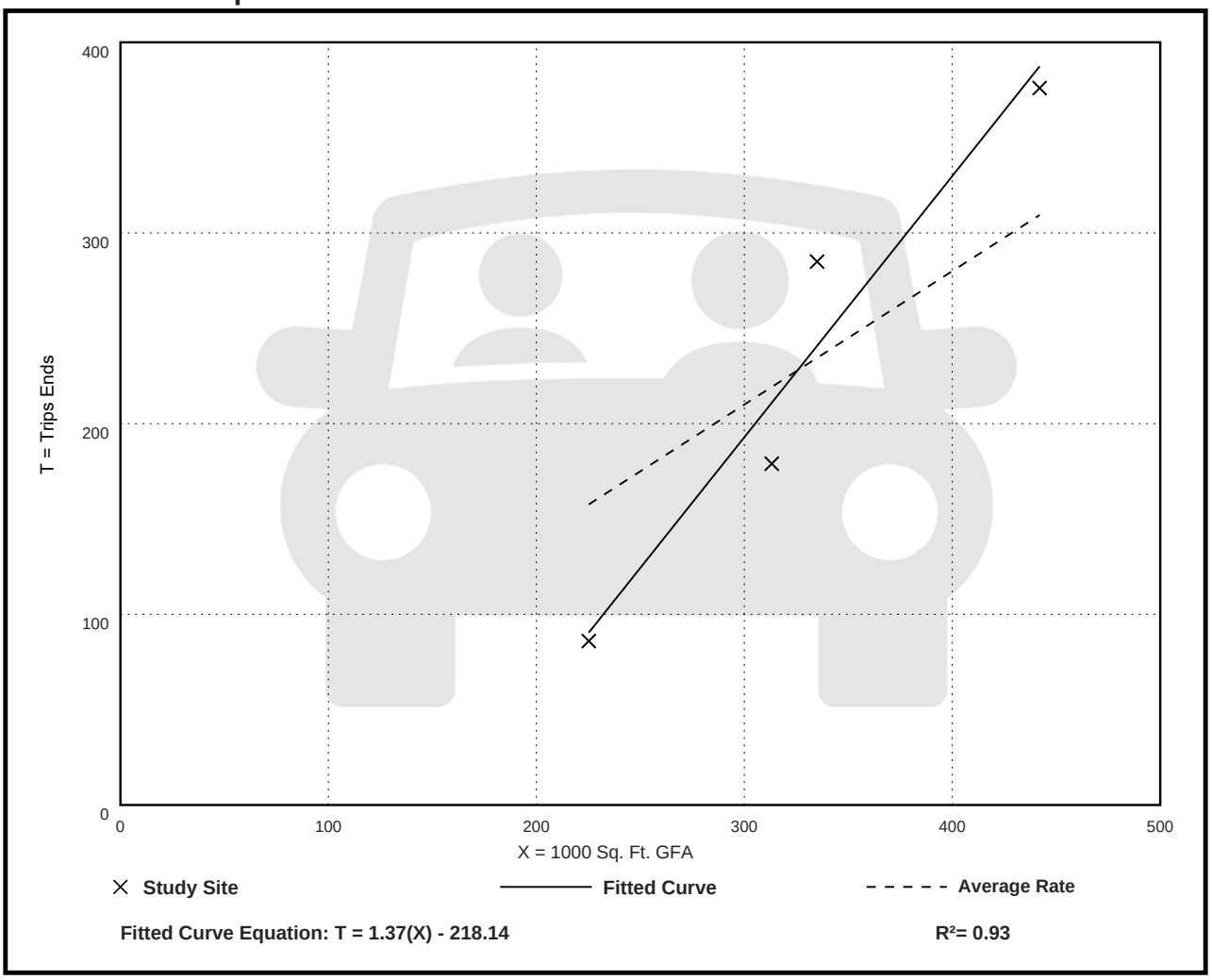
High-Cube Parcel Hub Warehouse
(156)

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: 4
Avg. 1000 Sq. Ft. GFA: 329
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.70	0.38 - 0.85	0.21

Data Plot and Equation



Fitted Curve Equation: T = 1.37(X) - 218.14

R^2= 0.93

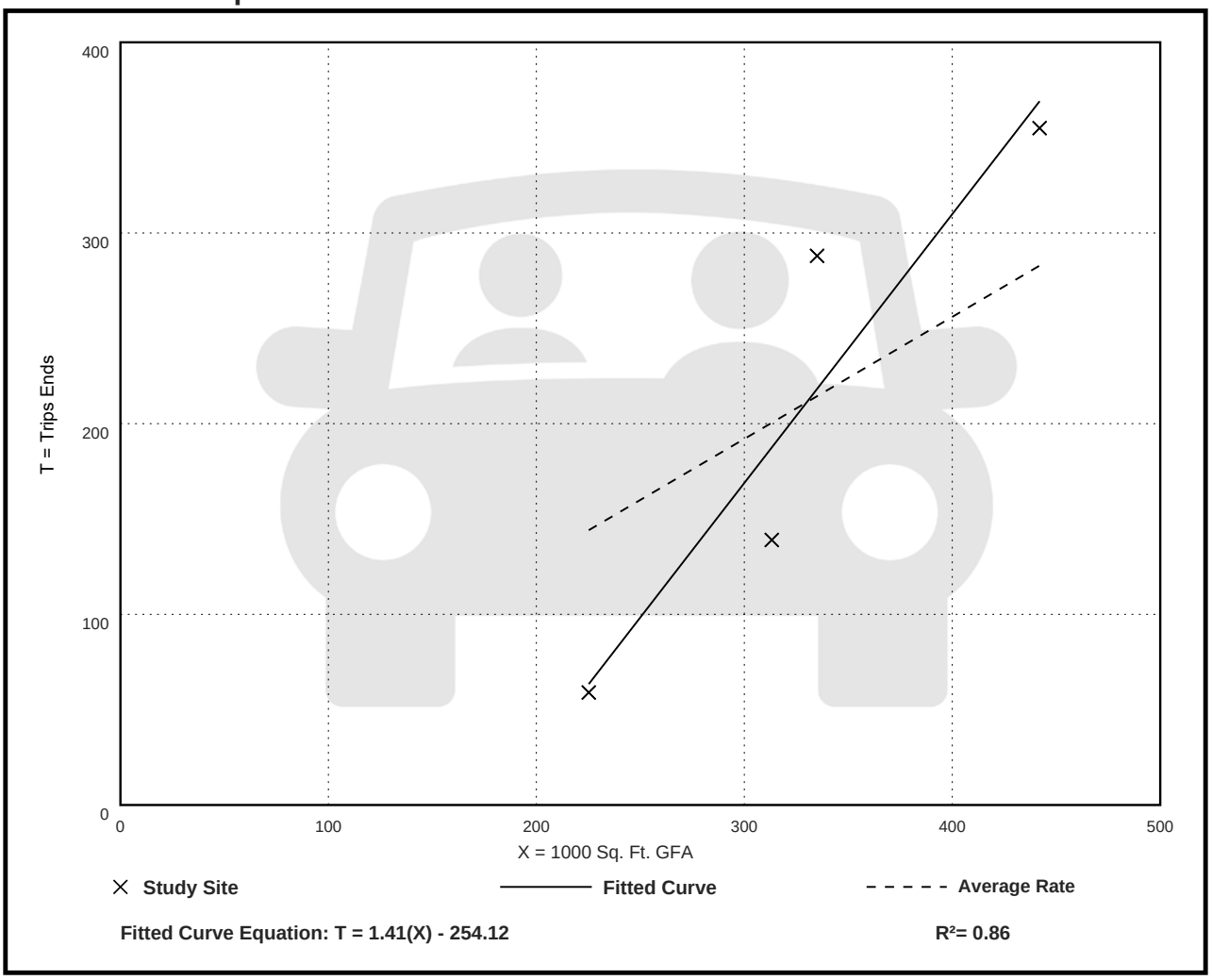
High-Cube Parcel Hub Warehouse
(156)

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: 4
Avg. 1000 Sq. Ft. GFA: 329
Directional Distribution: 68% entering, 32% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.64	0.26 - 0.86	0.27

Data Plot and Equation



Fitted Curve Equation: T = 1.41(X) - 254.12

R^2= 0.86

High-Cube Parcel Hub Warehouse
(156)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
AM Peak Hour of Generator

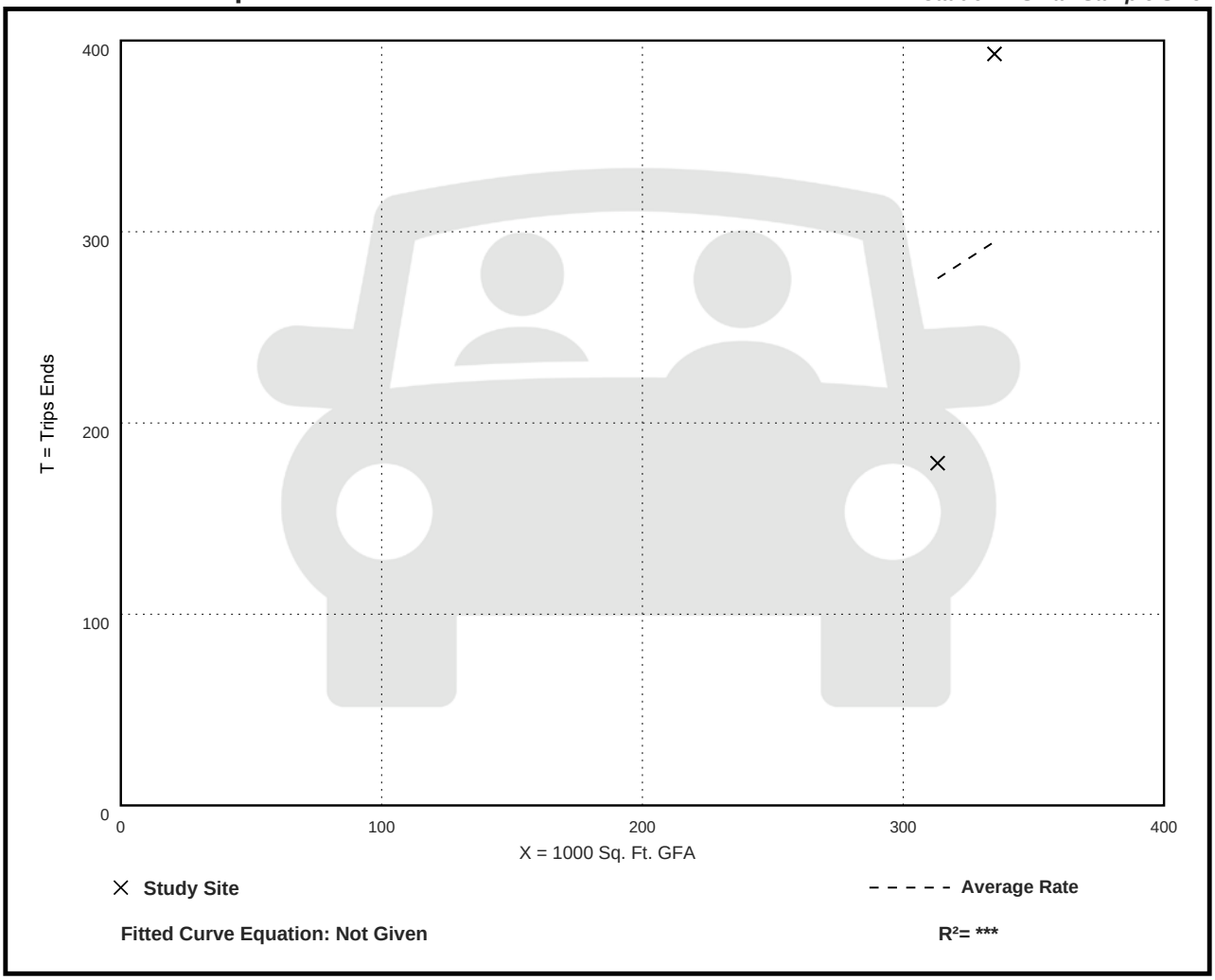
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 324
Directional Distribution: 34% entering, 66% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.88	0.57 - 1.17	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

High-Cube Parcel Hub Warehouse
(156)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

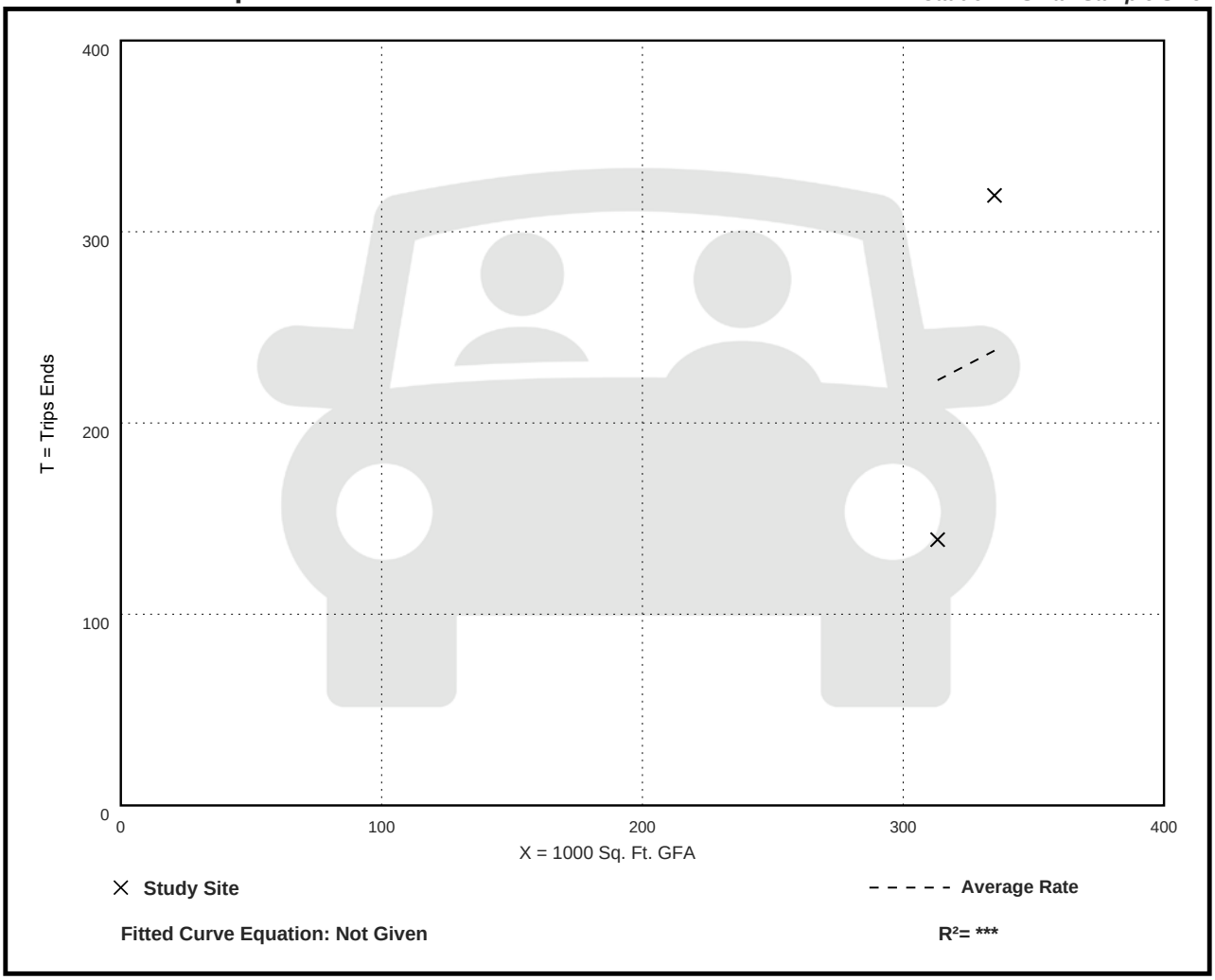
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 324
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.71	0.44 - 0.95	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

High-Cube Parcel Hub Warehouse
(156)

Vehicle Trip Ends vs: Employees
On a: Weekday

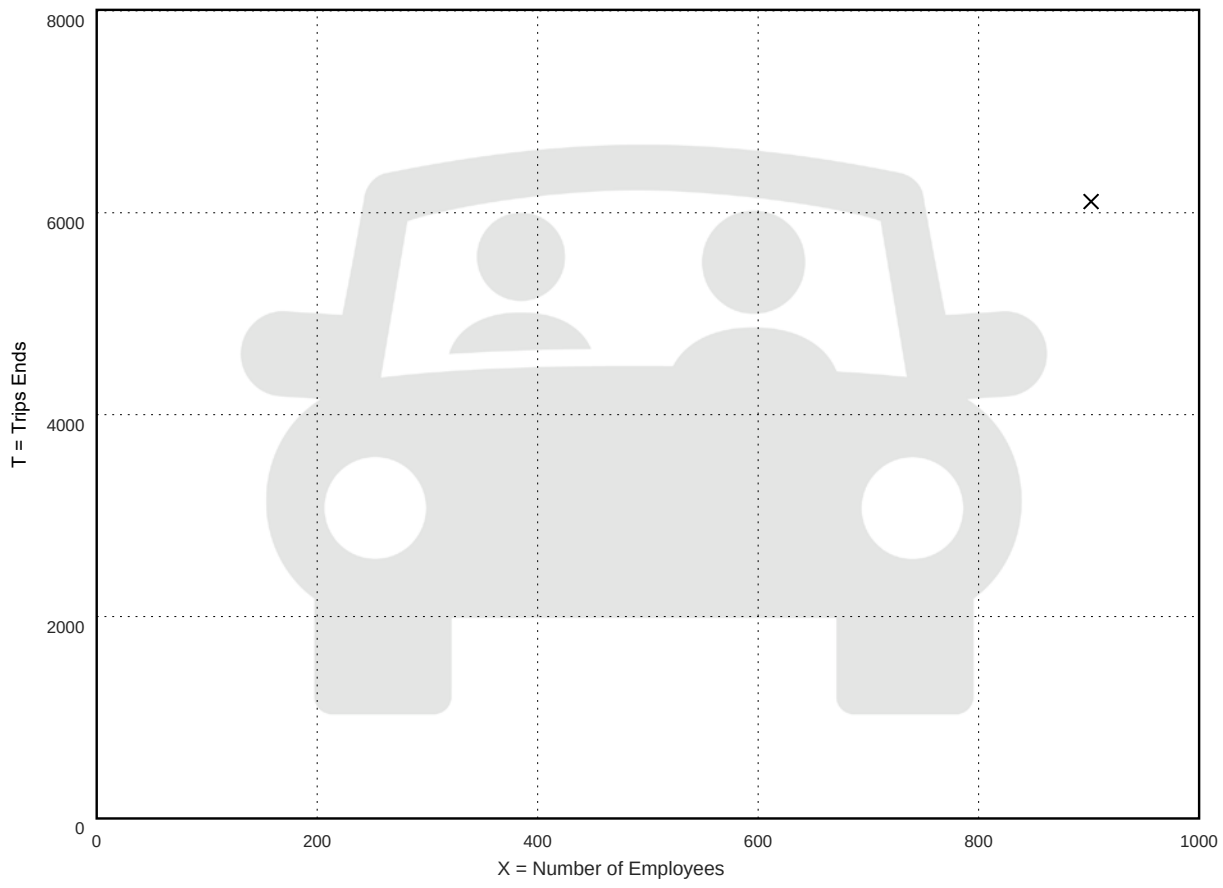
Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Employees: 902
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
6.77	6.77 - 6.77	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

High-Cube Parcel Hub Warehouse (156)

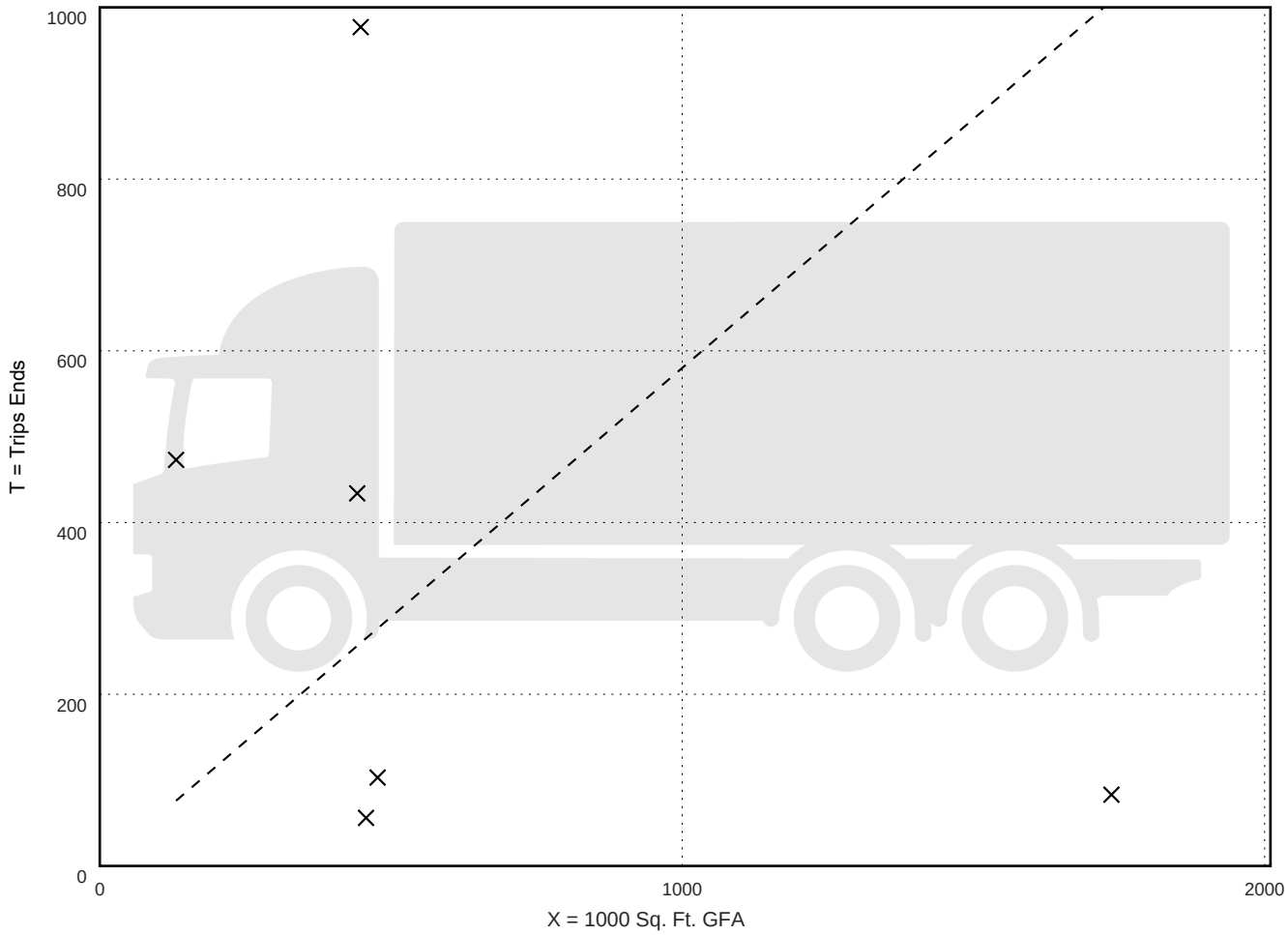
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 6
Avg. 1000 Sq. Ft. GFA: 615
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.58	0.05 - 3.61	1.00

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

High-Cube Parcel Hub Warehouse (156)

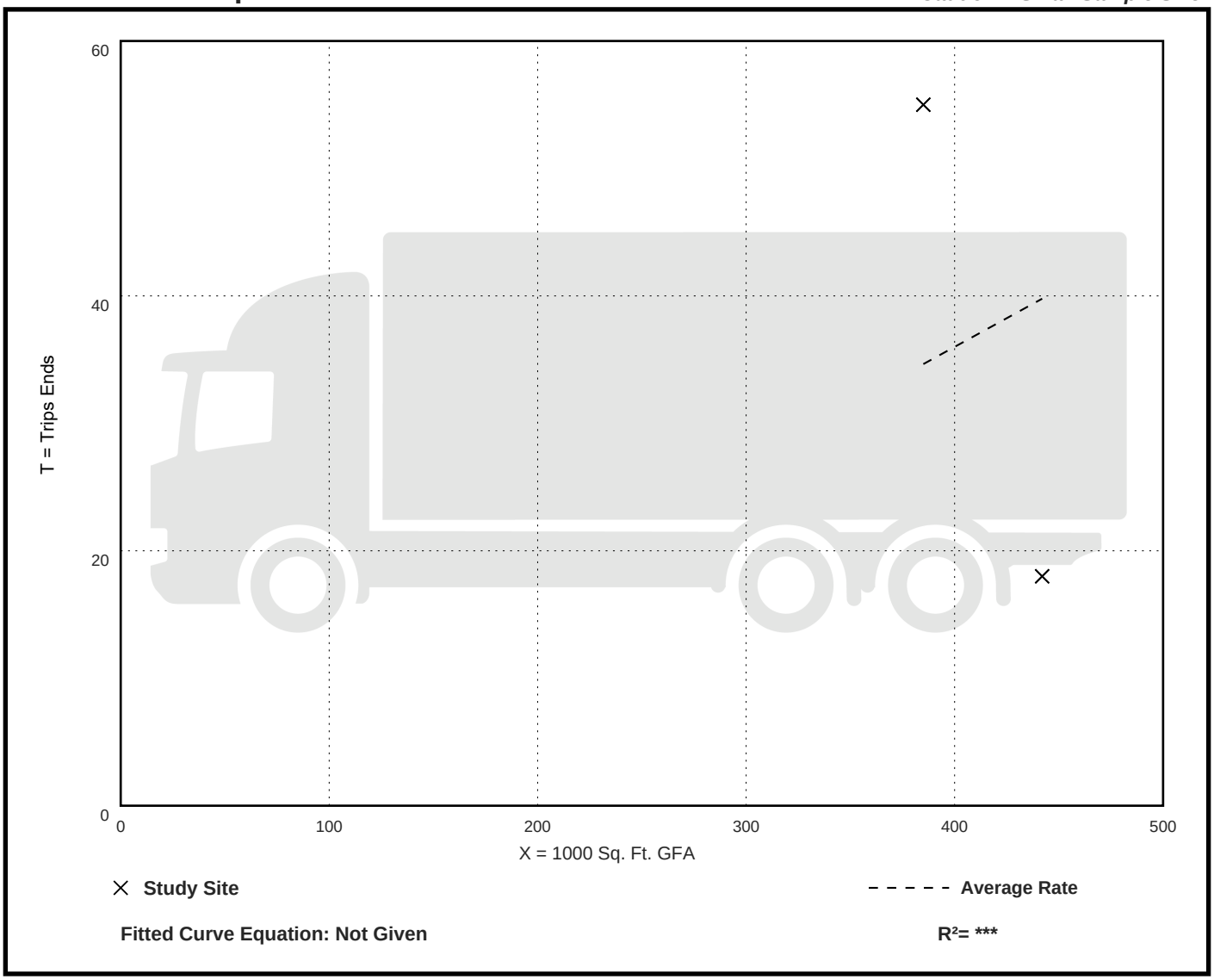
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 414
Directional Distribution: Not Available

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.09	0.04 - 0.14	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

High-Cube Parcel Hub Warehouse (156)

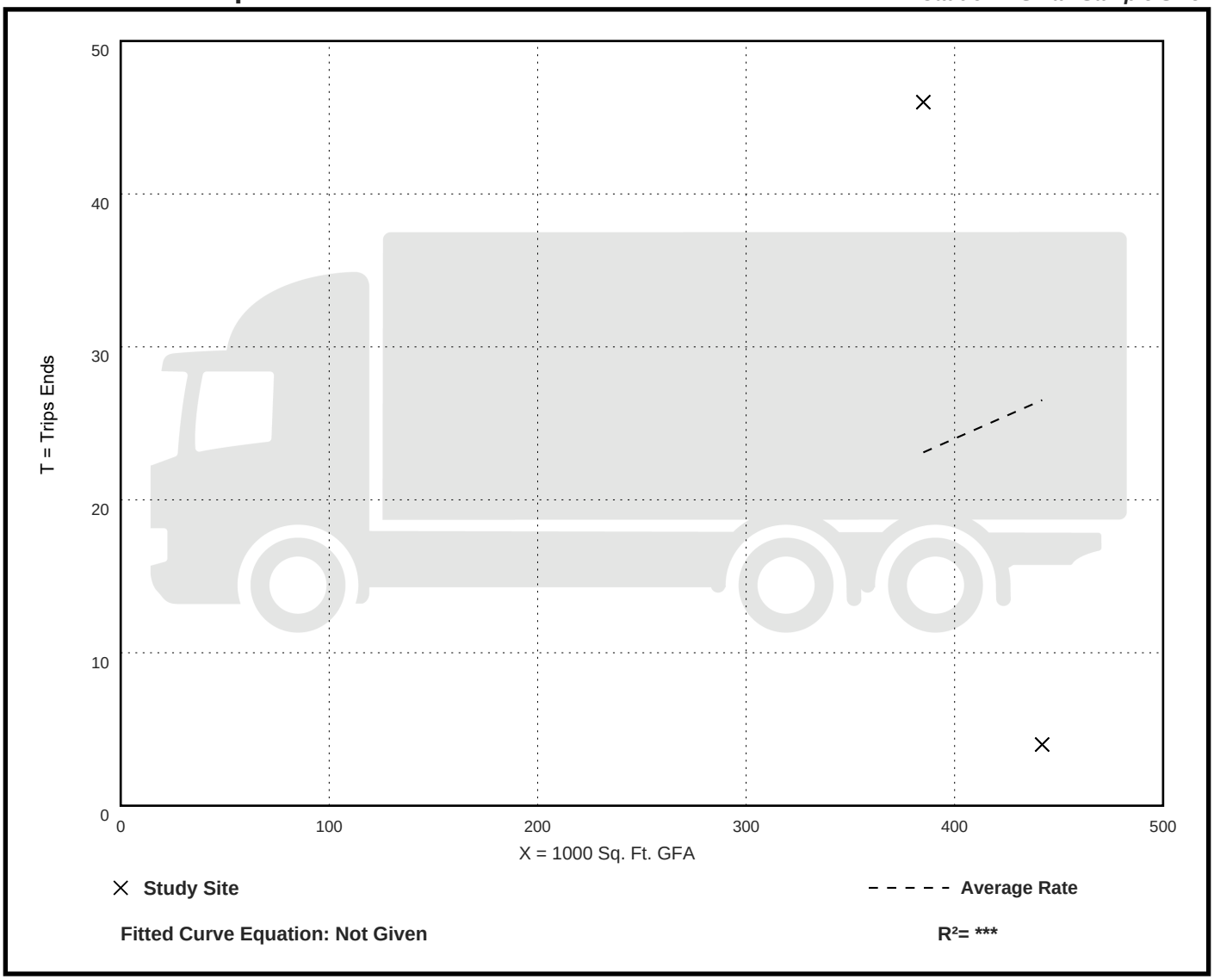
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 414
Directional Distribution: Not Available

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.06	0.01 - 0.12	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

High-Cube Parcel Hub Warehouse (156)

Truck Trip Ends vs: Employees
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 1
Avg. Num. of Employees: 902
Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
1.08	1.08 - 1.08	***

Data Plot and Equation

Caution – Small Sample Size

Fitted Curve Equation: Not Given

R^2= *

Land Use: 157
High-Cube Cold Storage Warehouse

Description

A high-cube warehouse (HCW) is a building that typically has at least 200,000 gross square feet of floor area, has a ceiling height of 24 feet or more, and is used primarily for the storage and/or consolidation of manufactured goods (and to a lesser extent, raw materials) prior to their distribution to retail locations or other warehouses. A typical HCW has a high level of on-site automation and logistics management. The automation and logistics enable highly-efficient processing of goods through the HCW. A high-cube warehouse can be free-standing or located in an industrial park.

A high-cube cold store warehouse has substantial temperature-controlled environments for frozen food and other perishable products.

A high-cube warehouse may contain a mezzanine. In a HCW setting, a mezzanine is a free-standing, semi-permanent structure that is commonly supported by structural steel columns and that is lined with racks or shelves. The gross floor area (GFA) values for the study sites in the database for this land use do NOT include the floor area of the mezzanine. The GFA values represent only the permanent ground-floor square footage.

The amount of office/employee welfare space that is provided within a HCW can be highly variable but is typically an insignificant portion of the overall building square footage. Within the trip generation database, common values are between 3,000 and 5,000 square feet for a Cold Storage HCW and between 5,000 and 10,000 square feet for Transload, Fulfillment Center, and Parcel Hub HCW (all of which are less than one percent of total GFA for a site). Therefore, for the trip generation data plots, any office space that is part of the normal operation of the warehouse is included in the total GFA.

Warehousing (Land Use 150), high-cube transload and short-term storage warehouse (Land Use 154), high-cube fulfillment center warehouse (Land Use 155), and high-cube parcel hub warehouse (Land Use 156) are related land uses.

Additional Data

The High-Cube Warehouse/Distribution Center-related land uses underwent specialized consideration through a commissioned study titled “High-Cube Warehouse Vehicle Trip Generation Analysis,” published in October 2016. The results of this study are posted on the ITE website at http://library.ite.org/pub/a3e6679a-e3a8-bf38-7f29-2961becdd498.

The sites were surveyed in the 2000s and the 2010s in California.

Source Numbers

619, 941, 942, 943

High-Cube Cold Storage Warehouse
(157)

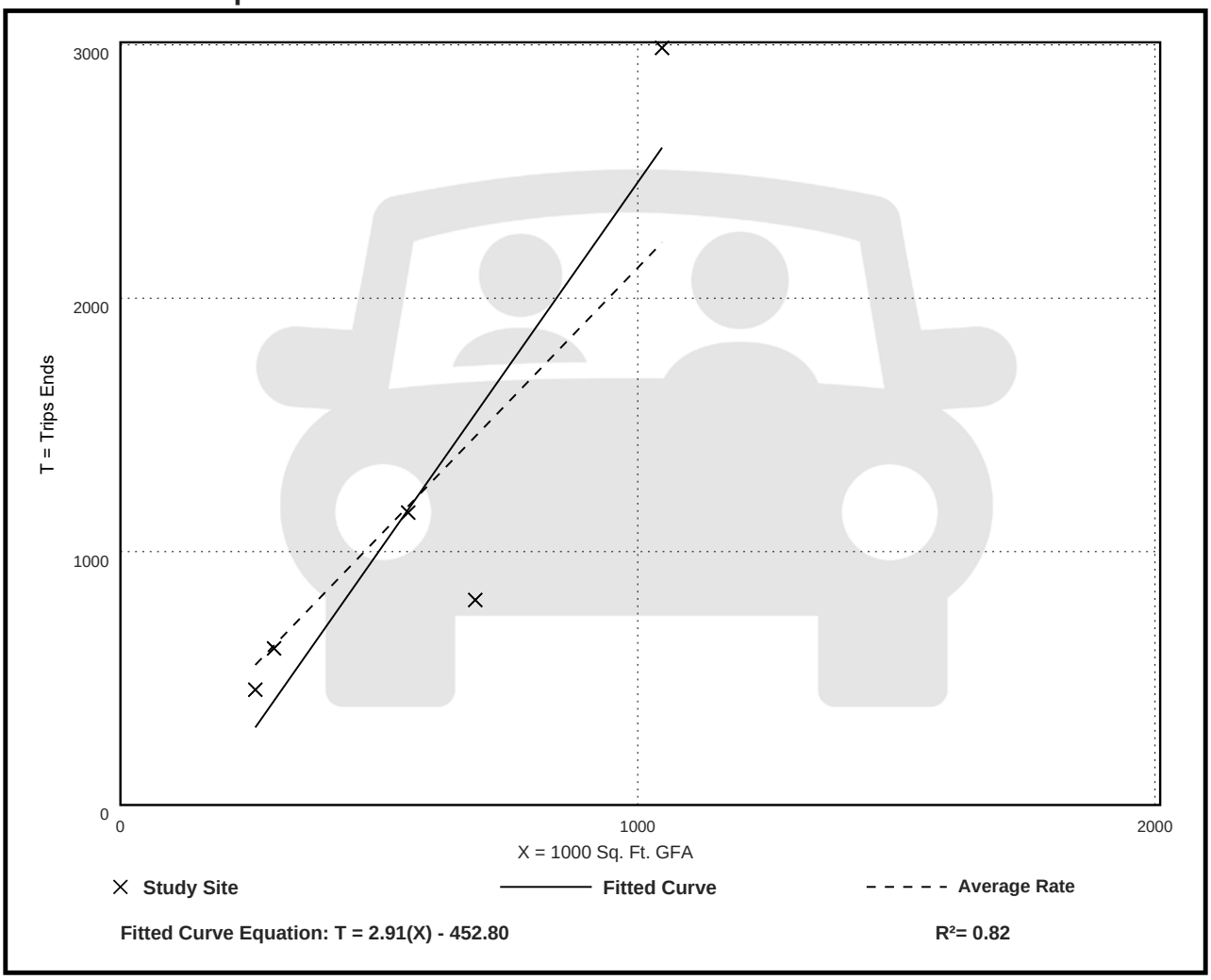
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 5
Avg. 1000 Sq. Ft. GFA: 569
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.12	1.18 - 2.85	0.73

Data Plot and Equation



Fitted Curve Equation: T = 2.91(X) - 452.80

R^2= 0.82

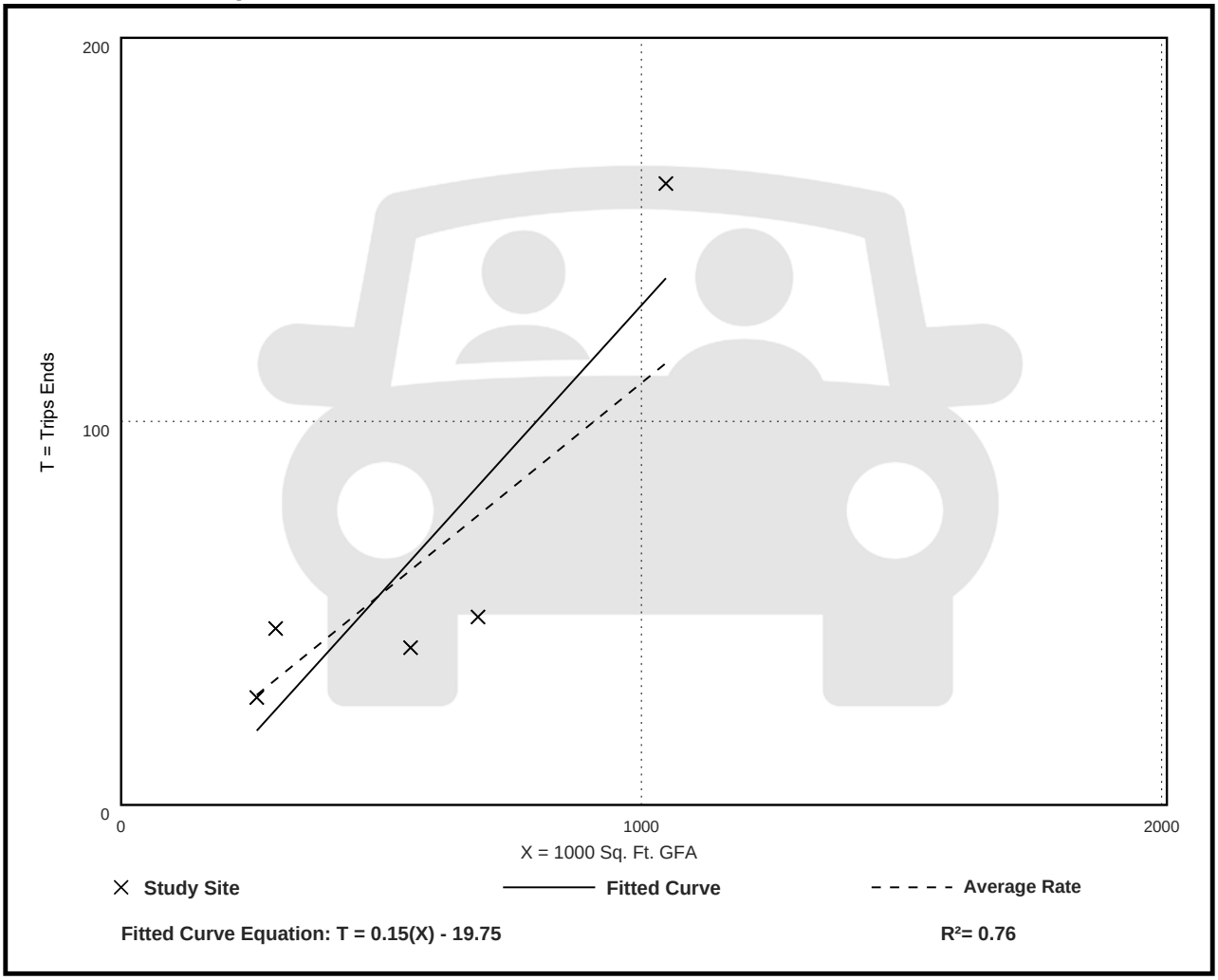
High-Cube Cold Storage Warehouse
(157)

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: 5
Avg. 1000 Sq. Ft. GFA: 569
Directional Distribution: Not Available

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.11	0.07 - 0.15	0.04

Data Plot and Equation



Fitted Curve Equation: T = 0.15(X) - 19.75

R^2= 0.76

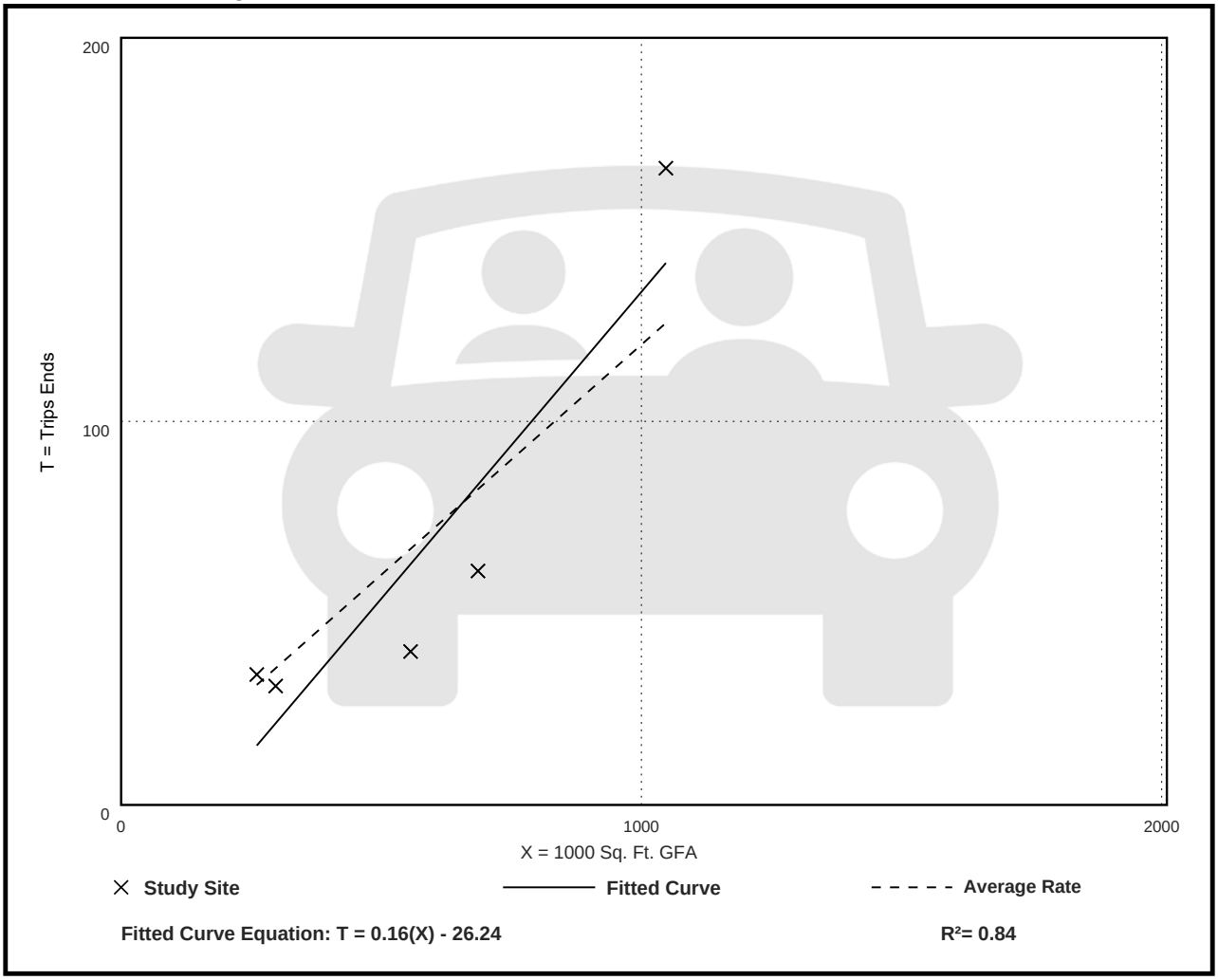
High-Cube Cold Storage Warehouse
(157)

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: 5
Avg. 1000 Sq. Ft. GFA: 569
Directional Distribution: Not Available

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.12	0.07 - 0.16	0.04

Data Plot and Equation



Fitted Curve Equation: T = 0.16(X) - 26.24

R^2= 0.84

High-Cube Cold Storage Warehouse (157)

Truck Trip Ends vs: 1000 Sq. Ft. GFA

On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 4

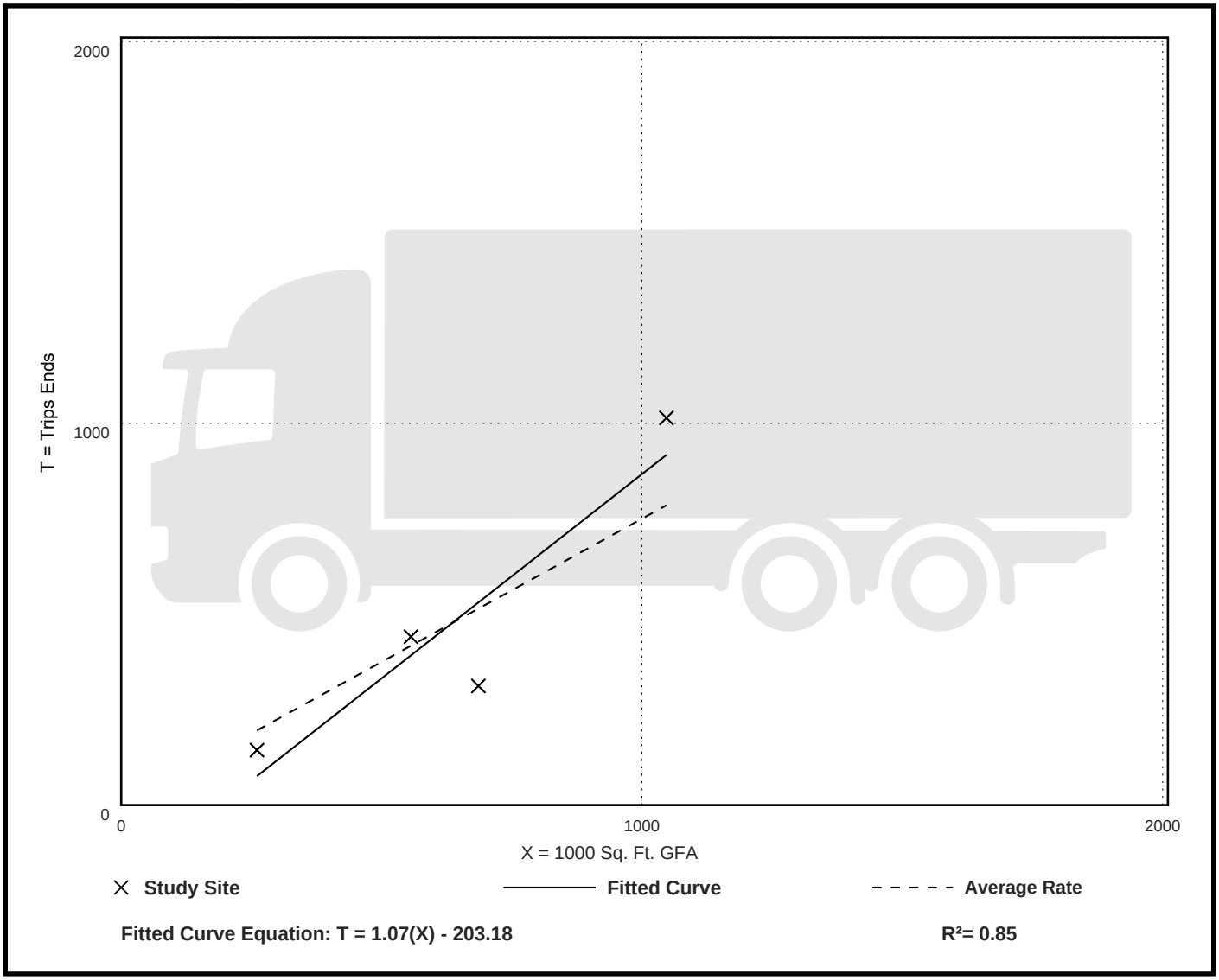
Avg. 1000 Sq. Ft. GFA: 638

Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.75	0.45 - 0.97	0.25

Data Plot and Equation



Fitted Curve Equation: T = 1.07(X) - 203.18

R^2= 0.85

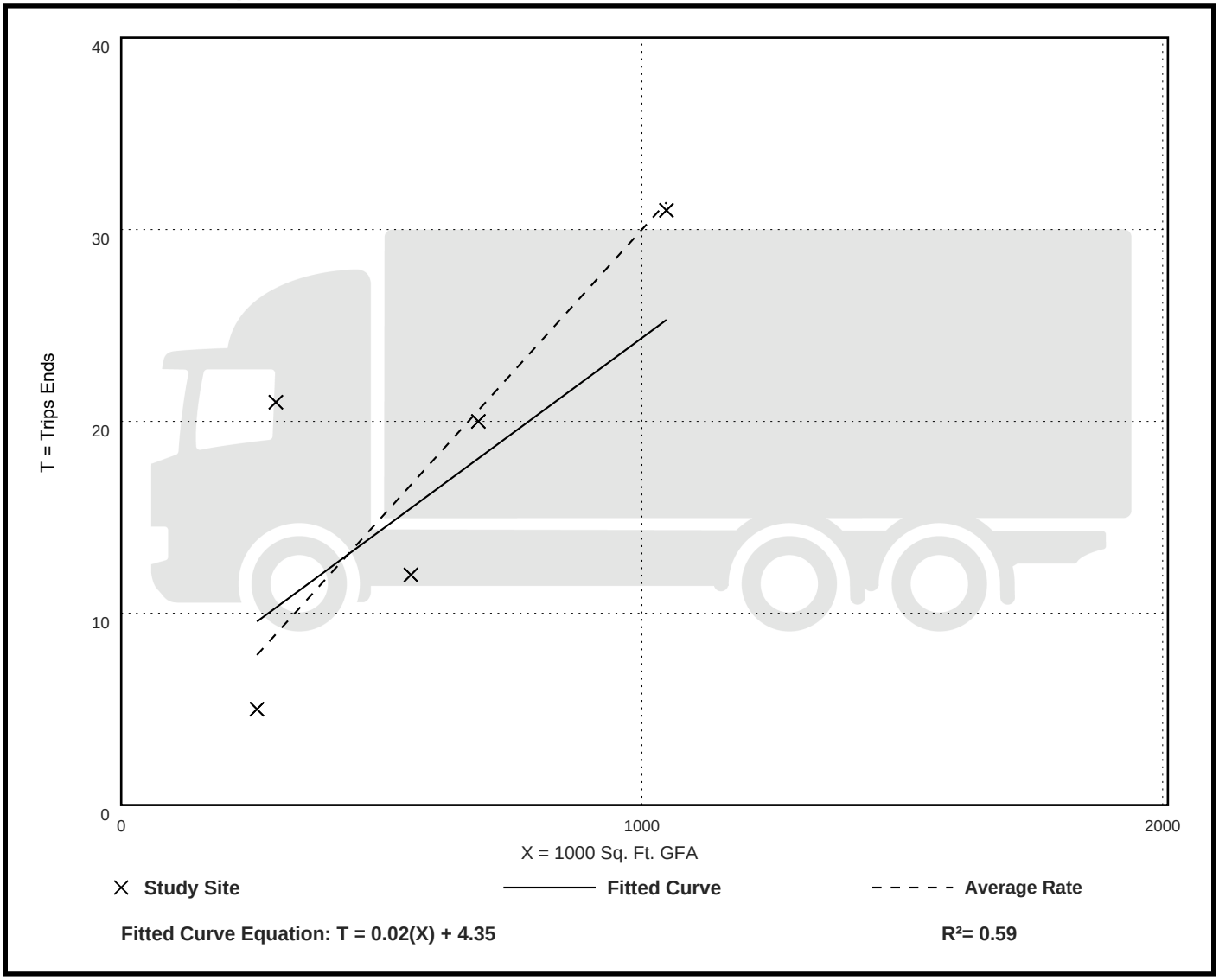
High-Cube Cold Storage Warehouse (157)

Truck 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: 5
Avg. 1000 Sq. Ft. GFA: 569
Directional Distribution: 33% entering, 67% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.03	0.02 - 0.07	0.02

Data Plot and Equation



Fitted Curve Equation: T = 0.02(X) + 4.35

R^2= 0.59

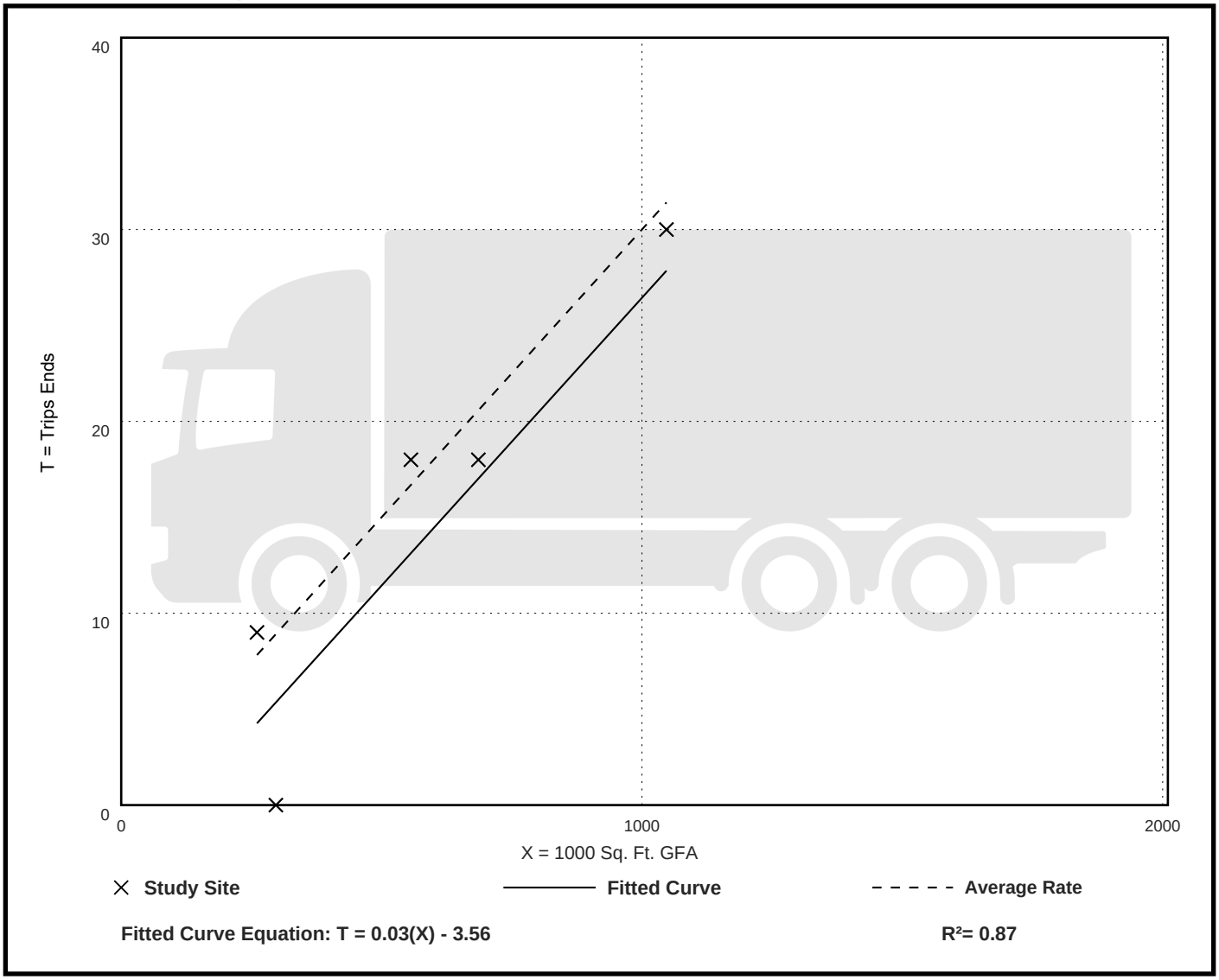
High-Cube Cold Storage Warehouse (157)

Truck 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: 5
Avg. 1000 Sq. Ft. GFA: 569
Directional Distribution: Not Available

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.03	0.00 - 0.03	0.01

Data Plot and Equation



Fitted Curve Equation: T = 0.03(X) - 3.56

R^2= 0.87

Land Use: 160
Data Center

Description

A data center is a free-standing warehouse type of facility that is primarily used for off-site storage of computer systems and associated components including applications and secure data. Some data centers may include maintenance areas and a small office. Data centers may be occupied by single or multiple tenants. Data centers typically have a small number of employees and visitors.

Additional Data

For the two data sites with time-of-day data, the AM and PM peak hours for the sites were between 6:30 and 7:30 a.m. and 3:00 and 4:00 p.m., respectively.

The sites were surveyed in the 2010s in Illinois and Virginia.

Caution should be used when applying trip generation rates for data centers, as the database contains a small number of sites with limited data on the number of tenants and employees. To assist in the future analysis of this land use, it is important that this information be reported.

Source Numbers

660, 958

Data Center
(160)

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

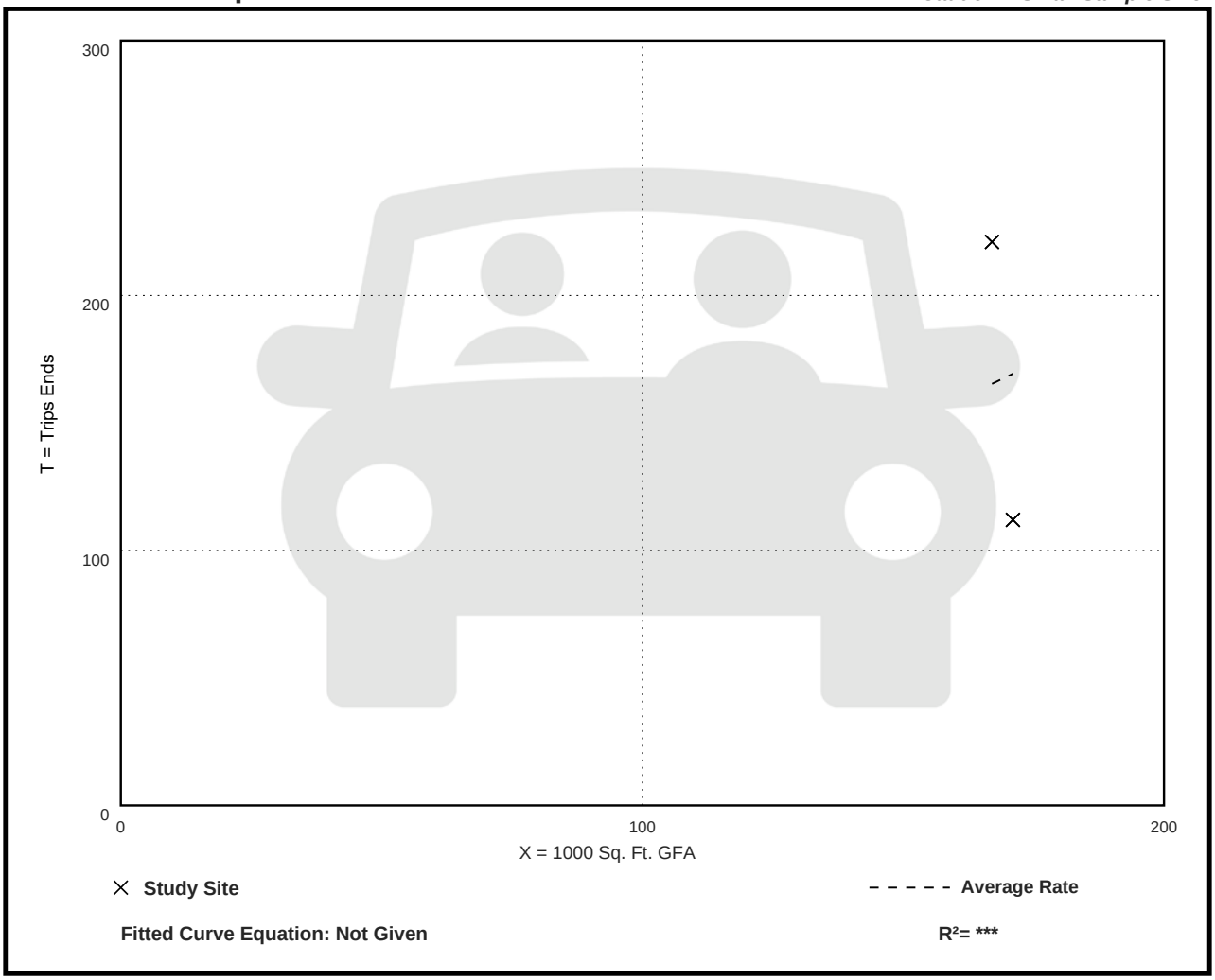
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 169
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.99	0.65 - 1.32	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

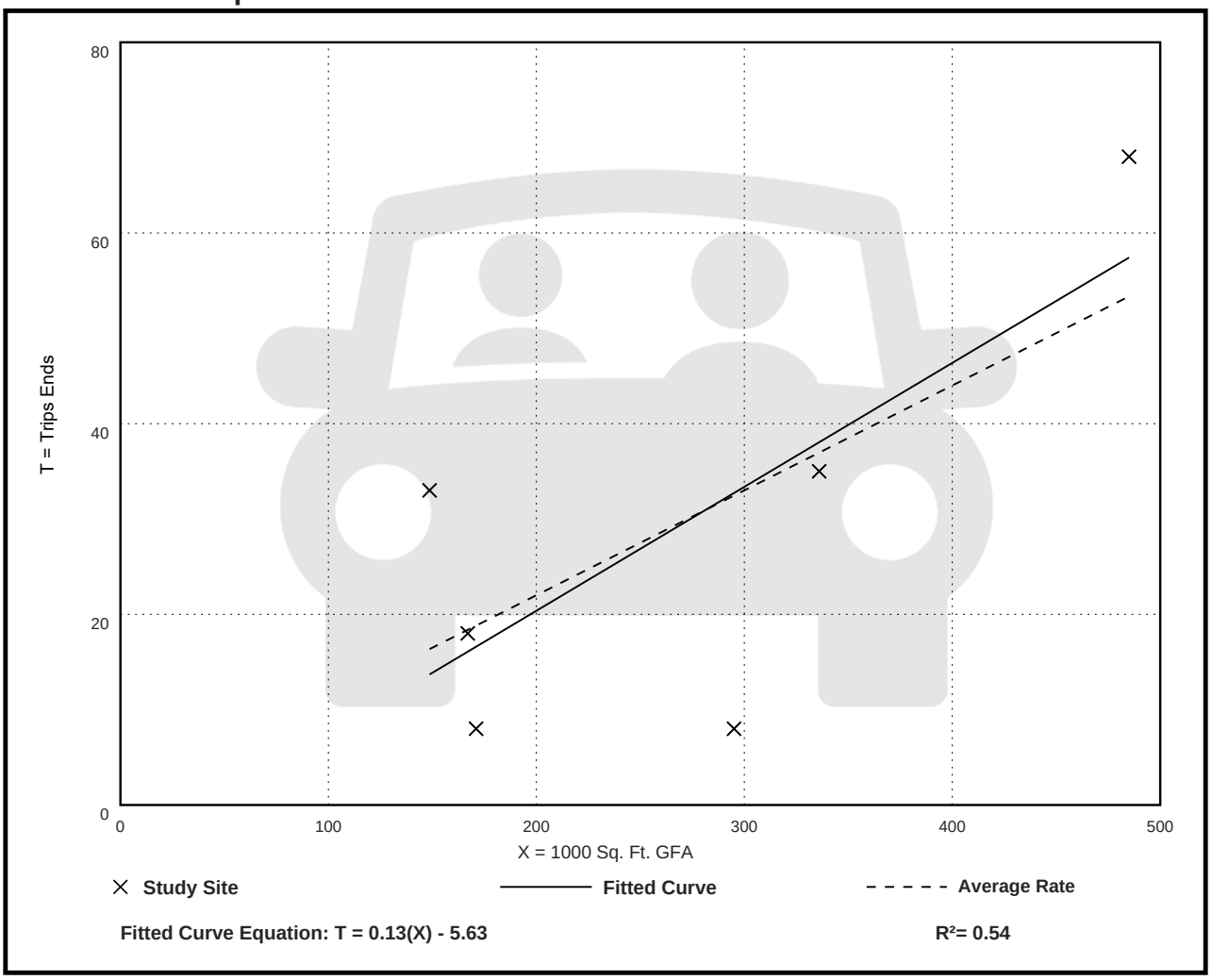
Data Center
(160)

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: 6
Avg. 1000 Sq. Ft. GFA: 267
Directional Distribution: 55% entering, 45% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.11	0.03 - 0.22	0.06

Data Plot and Equation



Fitted Curve Equation: T = 0.13(X) - 5.63

R^2= 0.54

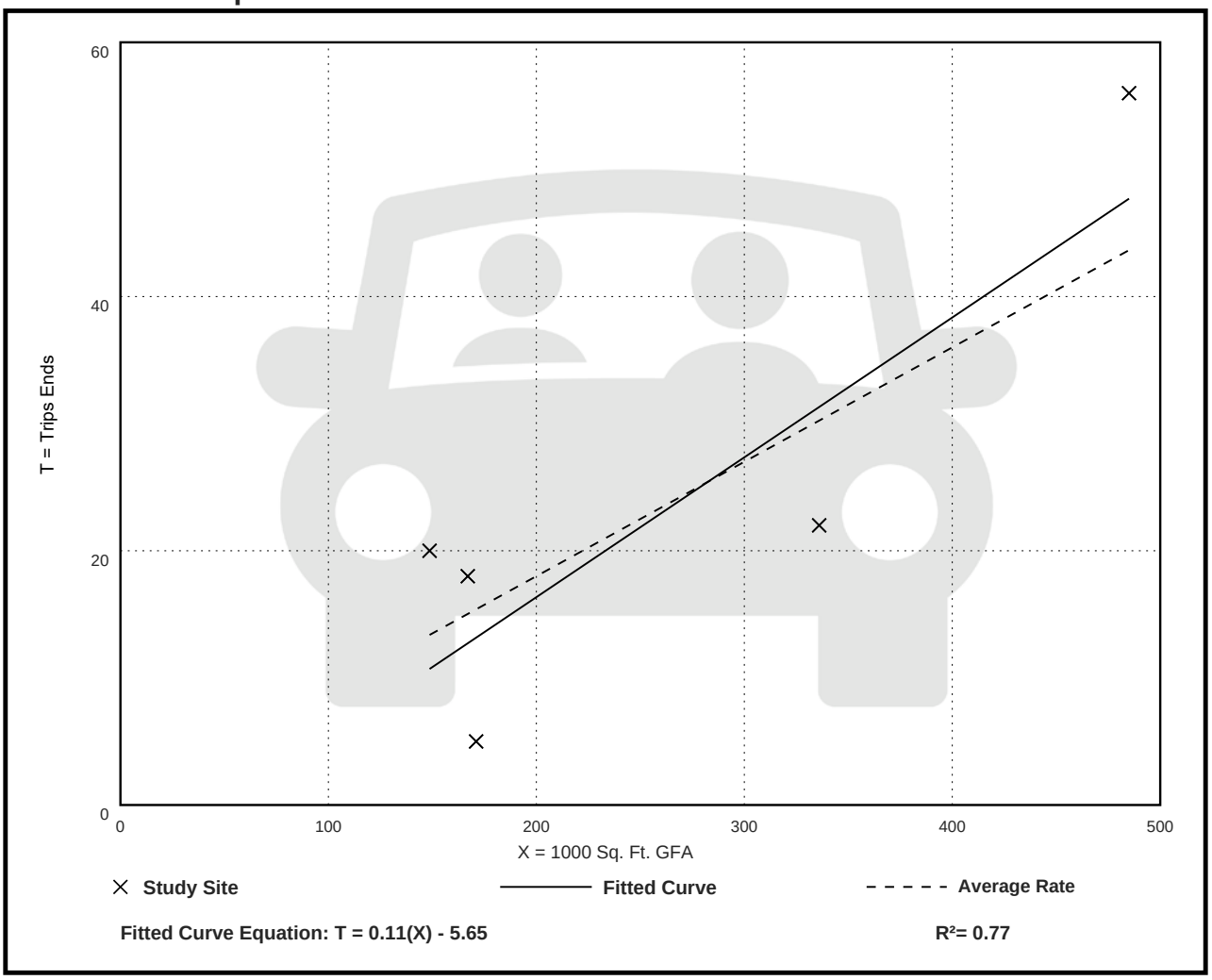
Data Center
(160)

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: 5
Avg. 1000 Sq. Ft. GFA: 262
Directional Distribution: 30% entering, 70% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.09	0.03 - 0.13	0.04

Data Plot and Equation



Fitted Curve Equation: T = 0.11(X) - 5.65

R^2= 0.77

Data Center
(160)

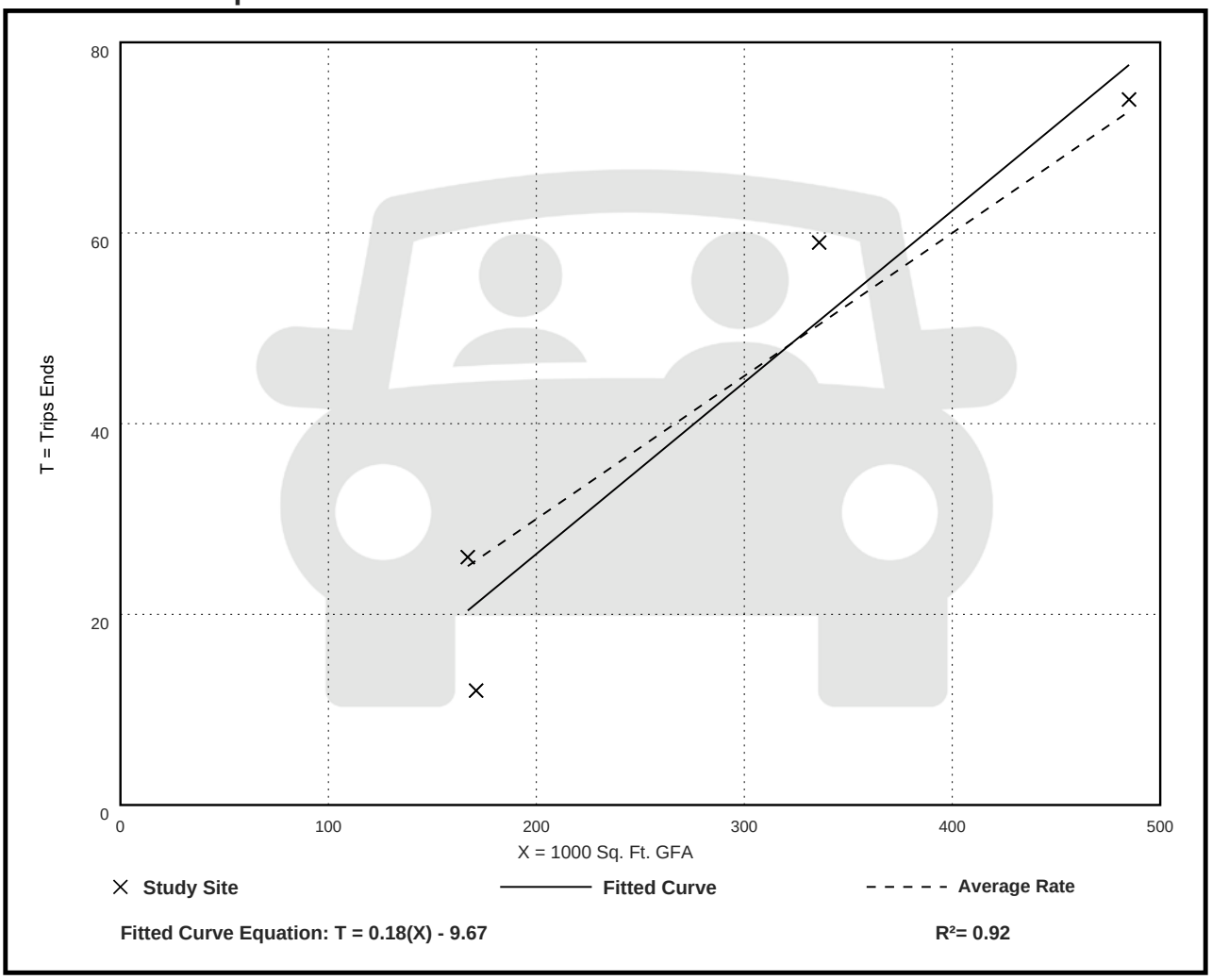
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 4
Avg. 1000 Sq. Ft. GFA: 290
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.15	0.07 - 0.18	0.04

Data Plot and Equation



Fitted Curve Equation: T = 0.18(X) - 9.67

R^2= 0.92

Data Center
(160)

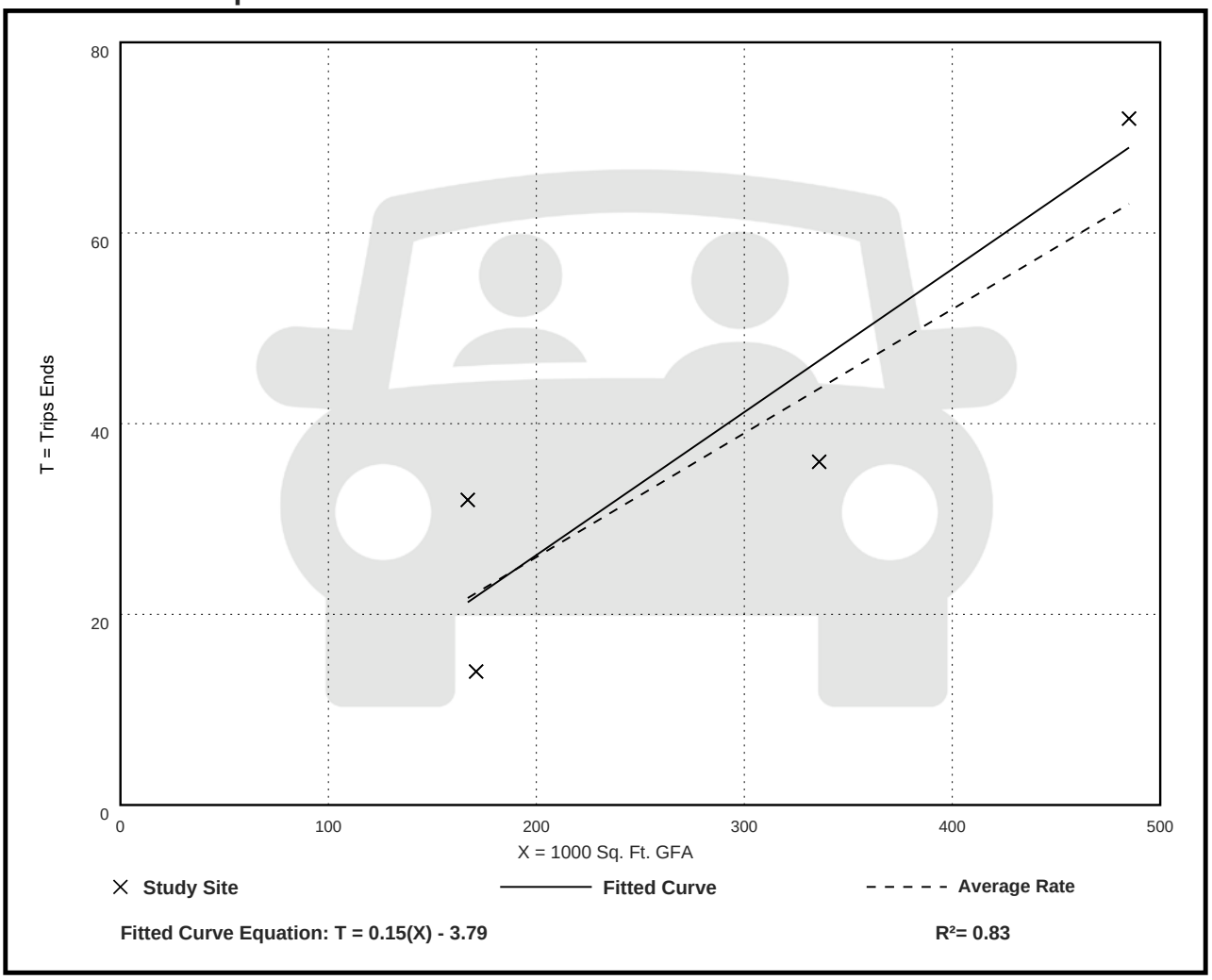
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 4
Avg. 1000 Sq. Ft. GFA: 290
Directional Distribution: 42% entering, 58% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.13	0.08 - 0.19	0.04

Data Plot and Equation



Fitted Curve Equation: T = 0.15(X) - 3.79

R^2= 0.83