

To: Sandra Bonito, Director of Design and Development, MG2 Group
Date: December 8, 2022
From: Stephen Siragusa, M.S.
Proj. No. 89997.00
Re: 35 Portland Street Trip Generation Memorandum

BSC Group (BSC) has prepared this Trip Generation Memorandum to provide MG2 Group, the Client, with information pertaining to the trip generation for proposed development at 35 Portland Street (“Project”). The subsequent sections detail the proposed development and is submitted to the City for their review and approval.

Project Description and Overview

Project Location and Description

The site is located at 35 Portland Street, at the corner of Portland Street and Myrtle Street. The site is approximately 0.50 miles southwest of the Worcester stop on the Framingham/Worcester line on the Commuter Rail. Additionally, the WRTA Central Hub is located within an approximate 10-minute walk of the Project site.

The Project will consist of office space for artist studios and residential units on six (6) floors with on-site vehicle and bicycle parking. The site will replace a parking area, which currently has approximately 50 marked parking spaces.

Project Programming

The proposed Project will replace the existing parking area and will consist of the following land uses that will be considered for trip generation calculations:

- First Floor: two (2) office spaces for artist studios (one approximately 1,057 square feet and one approximately 1,238 square feet),
- Second through Sixth Floor: 108 residential dwelling units

Additionally, there will be ancillary uses within the building, including a gym/yoga studio and a dog washing area, which will be used mostly by residents of the building. These uses were not separated out for trip generation calculations. Table 1 summarizes the proposed project programming.

Table 1 Project Programming Summary

	Proposed Site
Land Uses	Two (2) office spaces for artist studios; 108 residential dwelling units; gym/yoga studio; dog washing station
Gross Square Feet	104,211
On-Site Bicycle Parking	Long-term bicycle parking room on the first floor accessed via a door along Portland Street and from internal doors.
Loading and Service	Loading will mainly take place on-site for residents moving in and out
Parking Accommodations	62 vehicle spaces on-site accessed via a curb cut along Portland Street

Location of Site Access

Primary vehicle access will be from Portland Street via a curb cut to the parking area. There are currently two (2) curb cuts to access the existing parking area, one of which will be closed as part of the development. Primary pedestrian access will be provided at entrances along Portland Street, with secondary access from the parking garage and along the side and rear of the building.

Vehicle Trip Generation

This section qualitatively describes the existing trip generation and quantitatively describes the proposed trip generation.

Existing Trip Generation

The existing parking area is currently generating trips both to and from the lot during both the Weekday AM and Weekday PM peak hours. However, to provide a conservative estimate of the number of trips that will be generated by the proposed site, existing trip generation numbers were not calculated and deducted from the proposed trip generation.

Proposed Vehicle Trip Generation

To estimate the number of vehicle-trips generated by the Project for the office and residential uses of the site, data published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual, 11th Edition (2021)* were used. ITE provides data to estimate the total number of unadjusted vehicle-trips associated with any given development. Two (2) separate land use codes were used for this Project, including:

- LUC 221 – Multifamily Housing (Mid-Rise) – used for the residential dwelling units
- LUC 712 – Small Office Building – used for the office spaces for artist studios

Land Use Code 712 was chosen for the proposed artist studios because the description reads that “a small office building is the same as a general office building...but with less than or equal to 10,000 square feet of gross floor area. The building typically houses a single tenant.” Given this description, BSC felt this LUC is most suitable for the proposed space.

The proposed Project is located in an area that may serve non-vehicular modes of transportation, including pedestrian and bicycle facilities and proximity to bus routes and a commuter rail station. Commuting data was gathered from residents from Census Tract 7317, in which the site is located, from the 2016 to 2020 American Community Survey 5-Year Estimates. The collected data shows that approximately 64% of residents drive to work, 12.5% of residents commute via public transportation, 18.5% commute via walking, and 5% commute via other modes (e.g. telecommuting).

As shown in **Table 2**, the two land uses are expected to generate approximately 26 vehicle-trips during the Weekday AM peak hour, 24 vehicle-trips during the Weekday PM peak hour, and 494 vehicle-trips during a typical Weekday. Full trip generation calculations are provided in the Appendix.

Table 2 Trip Generation Summary

	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekday Daily
Estimated Proposed Residential Trips (Unadjusted) ^a	35	31	748
Estimated Proposed Residential Vehicle-Trips (Adjusted) ^b	22	19	460
Estimated Proposed Office Vehicle-Trips ^c	4	5	34
Estimate Total Proposed Vehicle-Trips	26	24	494

^a Number of trips calculated using ITE trip generation average rates/fitted curve equations for LUC 221

^b Number of trips calculated utilizing ITE average rates/fitted curve equations adjusted utilizing Census Tract data

^c Number of trips calculated using ITE trip generation average rates/fitted curve equations for LUC 712 and assuming no reduction for non-vehicular trips

Conclusion

This Trip Generation Memorandum has been prepared to discuss the proposed trip generation of the development at 35 Portland Street in Worcester, Massachusetts. The proposed development will replace the existing parking area with one (1) building that will have multiple land uses, including approximately 2,300 square feet of artist studio and 108 residential dwelling units. There will be 62 on-site vehicle parking spaces and on-site bicycle parking on the first floor.

Based on the proposed trip generation, the new development is expected to generate approximately **26 vehicle-trips during the Weekday AM peak hour, 24 vehicle-trips during the Weekday PM peak hour, and 494 vehicle-trips during a typical Weekday.** This equates to approximately one (1) vehicle-trips every two (2) minutes during both the Weekday AM and Weekday PM peak hours. Additionally, these calculated trips do not discount for any vehicle-trips to the existing parking area.

Based on the results of the Trip Generation Memorandum, BSC does not believe the site will have an impact on the surrounding traffic network.

APPENDIX

Appendix A: Proposed Trip Generation Calculations

Land Use: 221

Multifamily Housing (Mid-Rise)

Description

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

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

Land Use Subcategory

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

Additional Data

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

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

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

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

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

Source Numbers

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

Multifamily Housing (Mid-Rise) Close to Rail Transit (221)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 2

Avg. Num. of Dwelling Units: 393

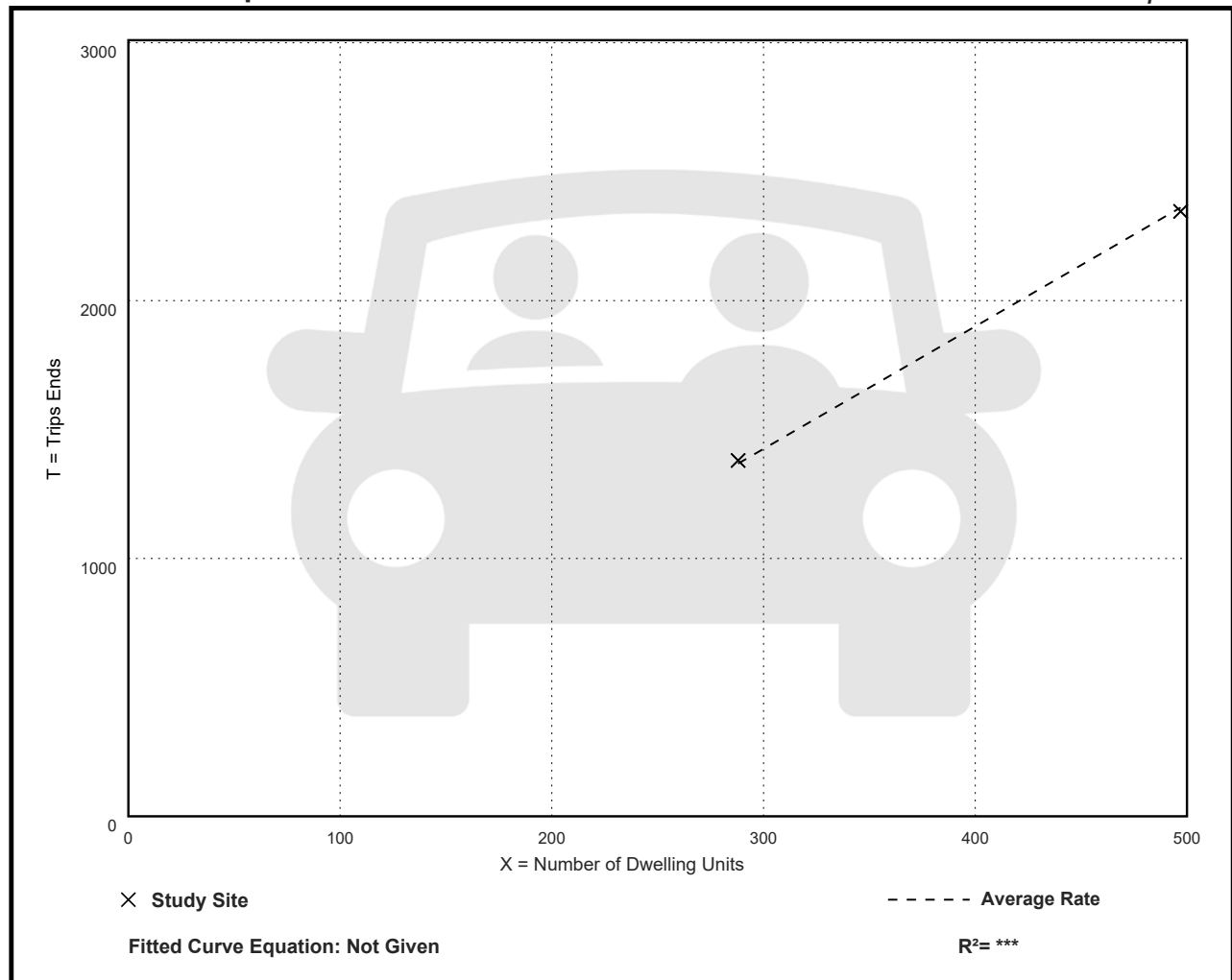
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
4.75	4.72 - 4.79	***

Data Plot and Equation

Caution – Small Sample Size



Multifamily Housing (Mid-Rise) Close to Rail Transit (221)

Vehicle Trip Ends vs: Dwelling Units

On a: **Weekday,**

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 7

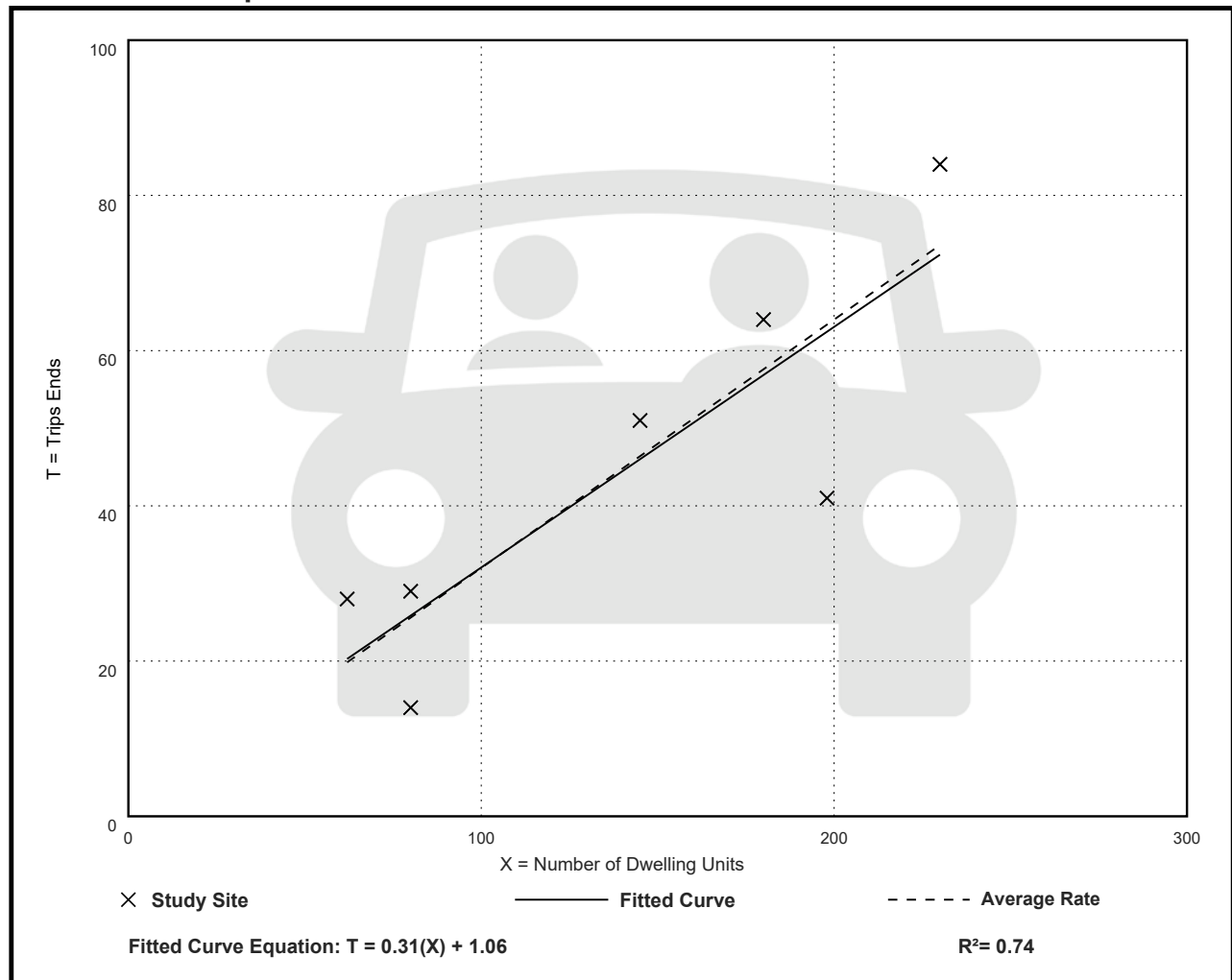
Avg. Num. of Dwelling Units: 139

Directional Distribution: 56% entering, 44% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.32	0.18 - 0.45	0.09

Data Plot and Equation



Multifamily Housing (Mid-Rise) Close to Rail Transit (221)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 7

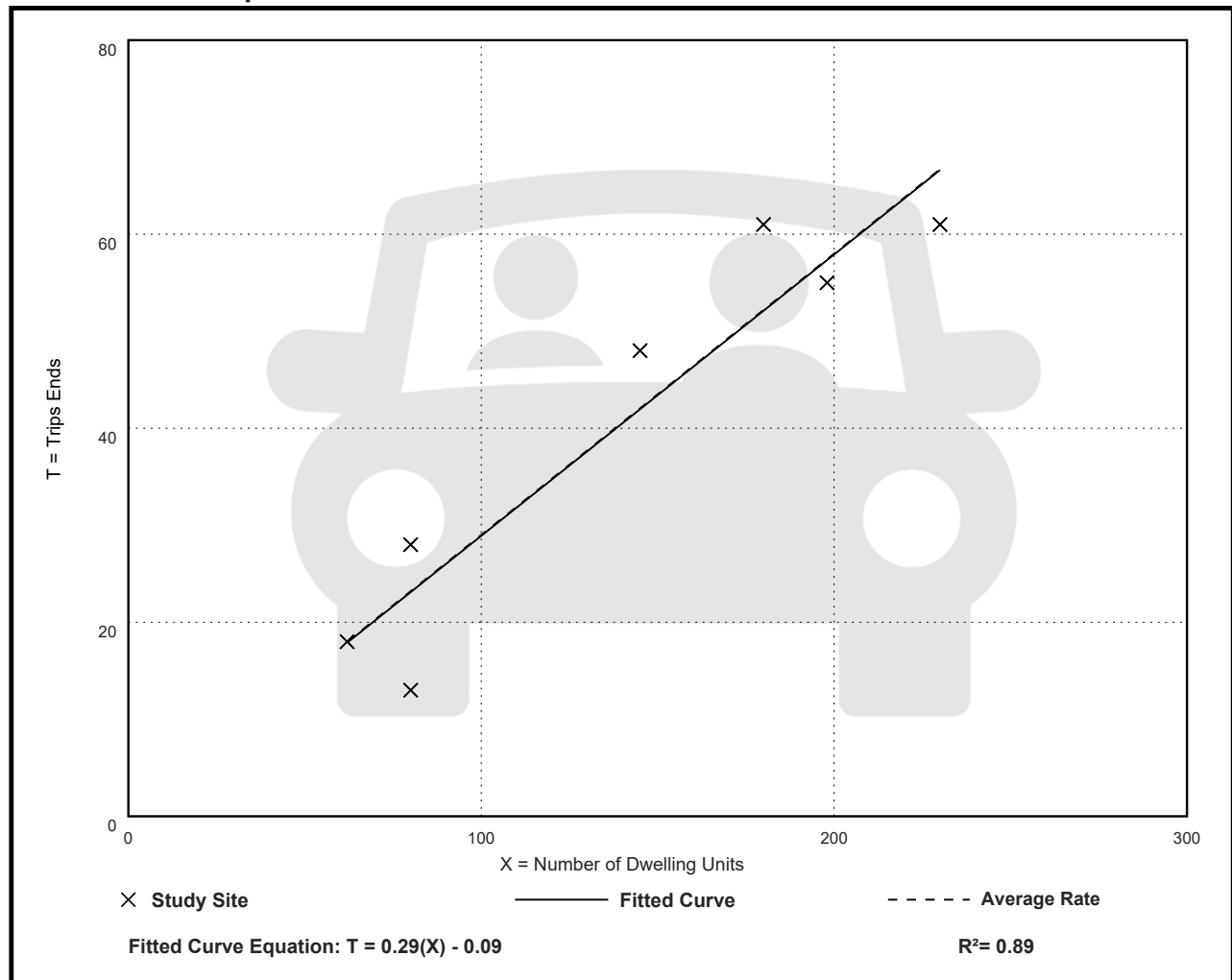
Avg. Num. of Dwelling Units: 139

Directional Distribution: 43% entering, 57% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.29	0.16 - 0.35	0.05

Data Plot and Equation



Land Use: 712

Small Office Building

Description

A small office building is the same as a general office building (Land Use 710) but with less than or equal to 10,000 square feet of gross floor area. The building typically houses a single tenant. It is a location where affairs of a business, commercial or industrial organization, or professional person or firm are conducted. General office building (Land Use 710) is a related use.

Additional Data

Attorney office, mortgage company, financial advisor, insurance agency, home health care provider, and real estate company are examples of tenants included in the small office building database. The diversity of employer types results in a wide range in employee density in the database. Densities range from a high of 1,300 to a low of 240 square feet per employee with an overall average of nearly 600 square feet per employee (a value much larger than the average observed in a general office building study sites).

In addition to the significant difference in employee density, small office buildings tend to be dominated by a single tenant (or very few) that are more service-oriented than a typical general office building. The result is more frequent and regular visitors and higher trip generation rates.

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

The sites were surveyed in the 1980s and the 2010s in Alberta (CAN), California, Texas, and Wisconsin.

Source Numbers

418, 890, 891, 959, 976

Small Office Building (712)

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

Setting/Location: General Urban/Suburban

Number of Studies: 21

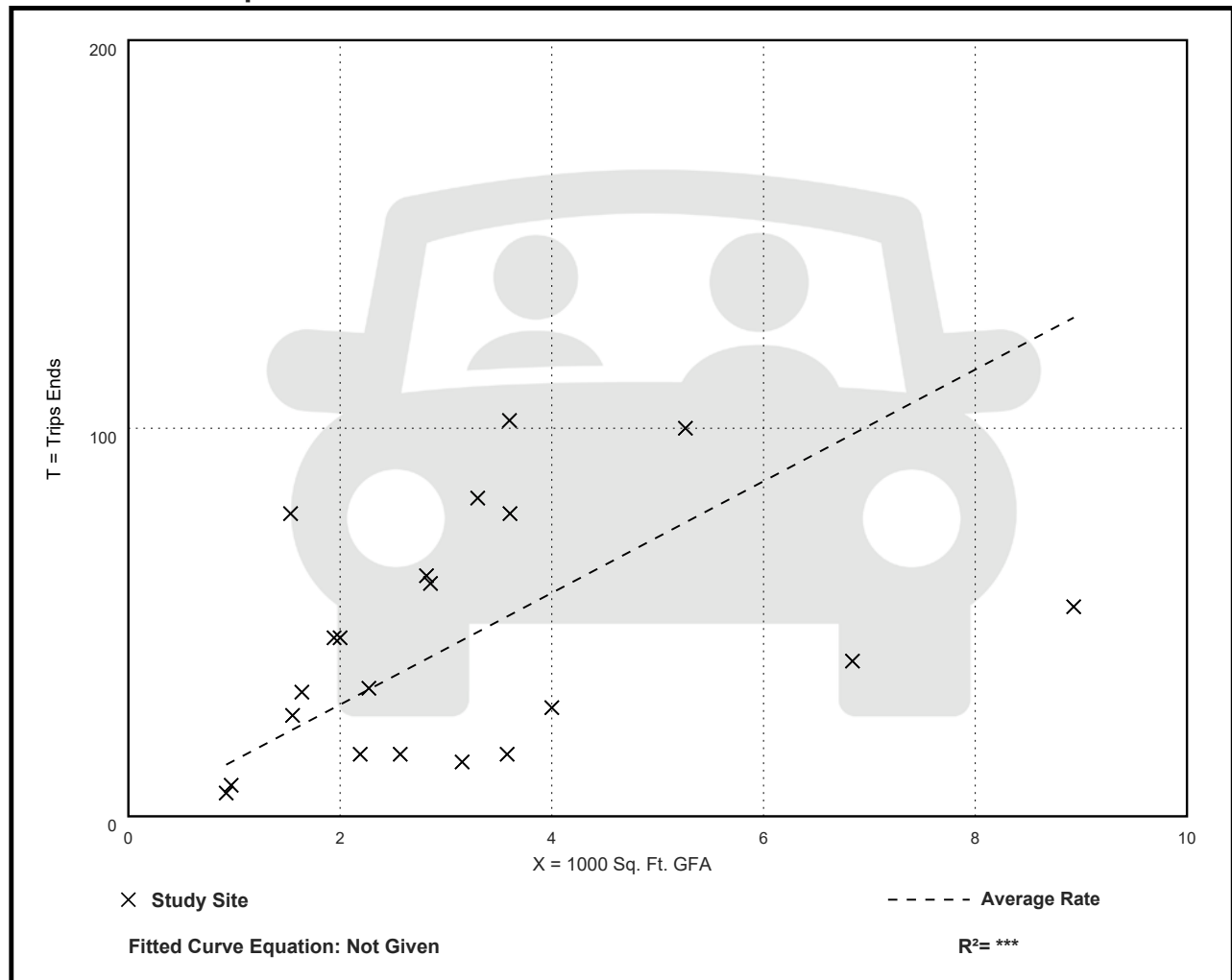
Avg. 1000 Sq. Ft. GFA: 3

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
14.39	4.44 - 50.91	10.16

Data Plot and Equation



Small Office Building (712)

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: 21

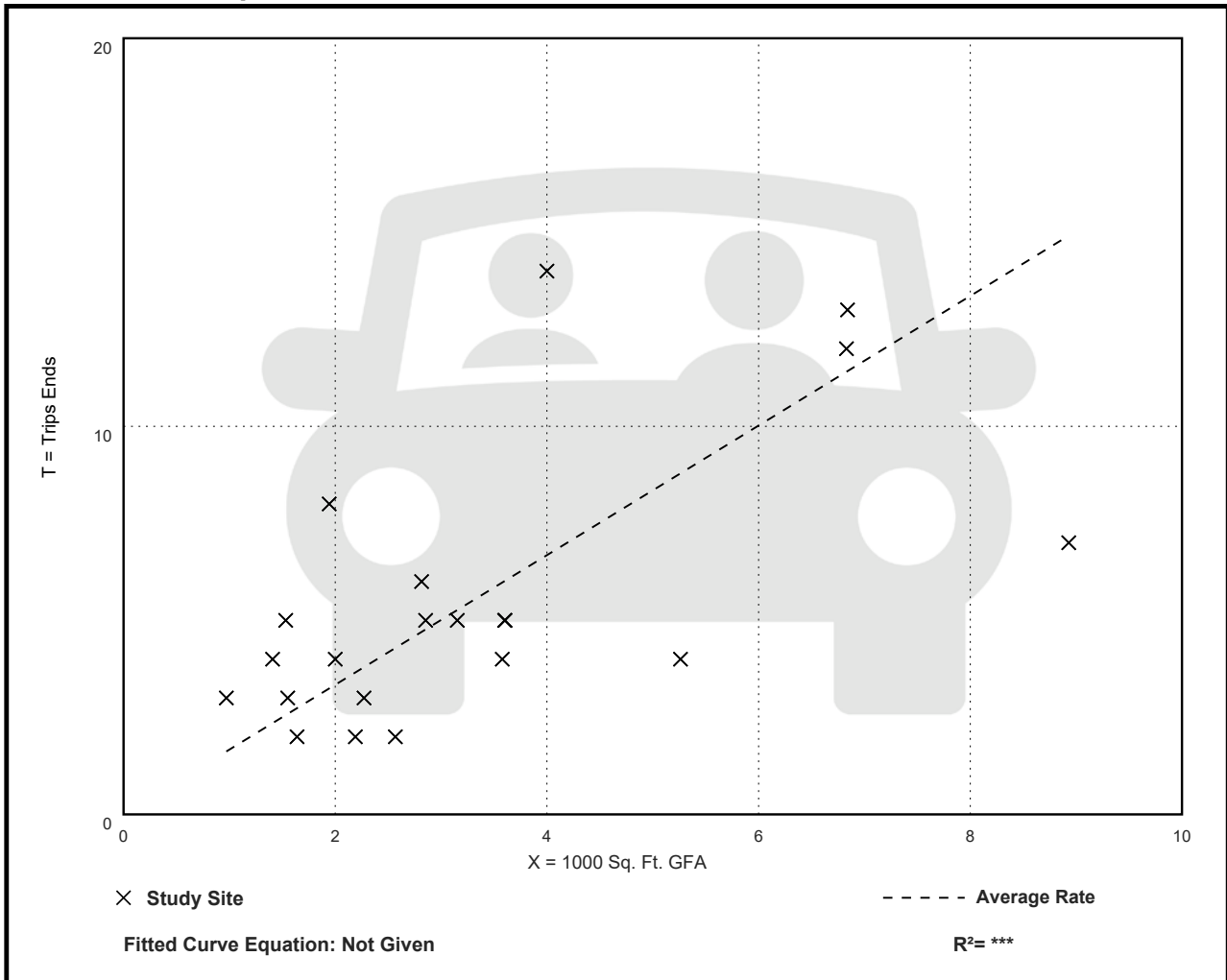
Avg. 1000 Sq. Ft. GFA: 3

Directional Distribution: 82% entering, 18% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.67	0.76 - 4.12	0.88

Data Plot and Equation



Small Office Building (712)

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: 21

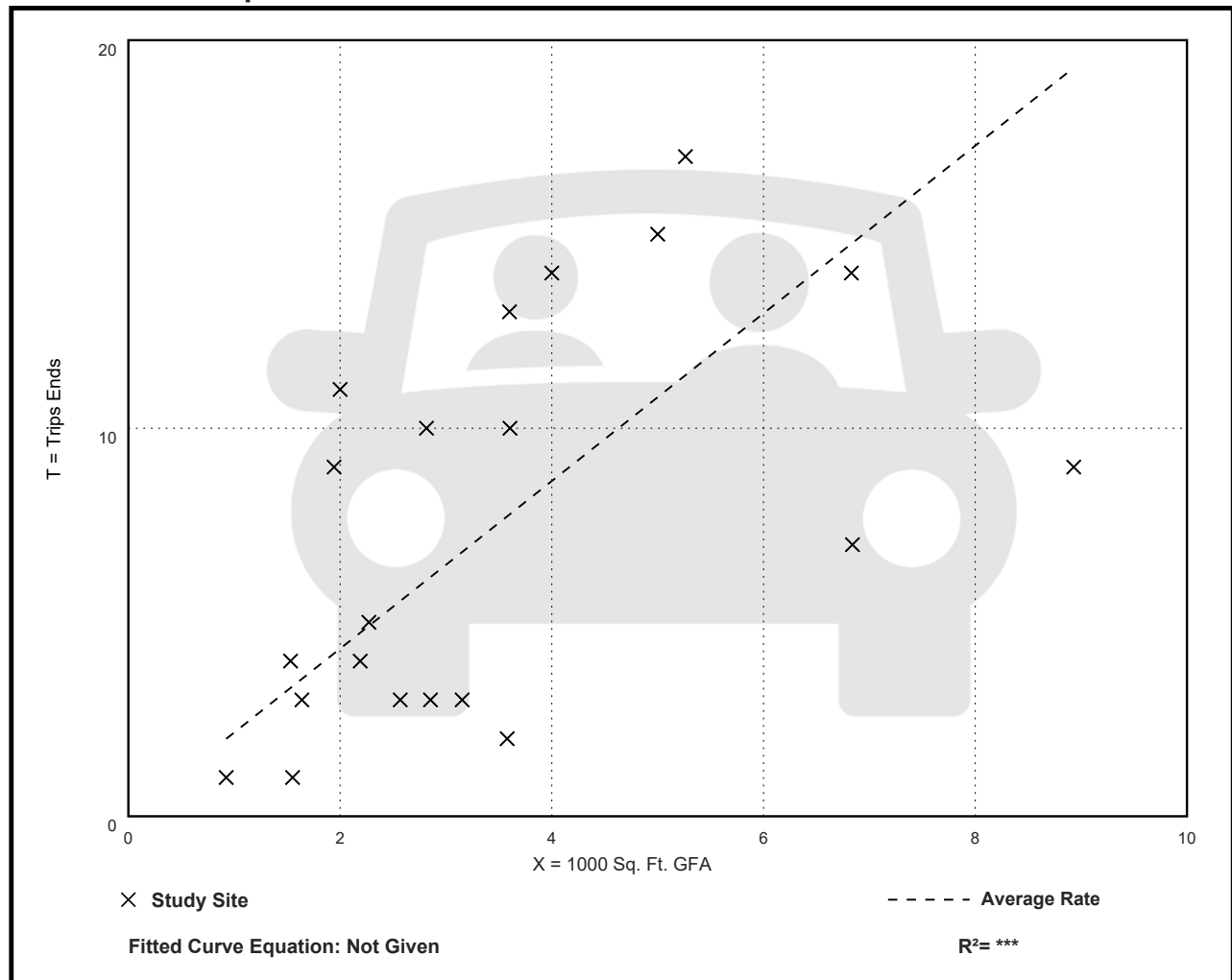
Avg. 1000 Sq. Ft. GFA: 3

Directional Distribution: 34% entering, 66% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.16	0.56 - 5.50	1.26

Data Plot and Equation



Proposed										
Residential Dwelling Units										
	Total Vehicles	Pass-By Percentage	Adjusted Total Vehicles	Vehicle Occupancy Rate	Total Person Trips	Auto (person trips)	Auto (vehicle trips)	Transit	Bike	Walk
Weekday Daily	748	0.0%	748	1.1	822	524	460	103	0	152
	374	0.0%	374	1.1	411	262	230			
	374	0.0%	374	1.1	411	262	230			
Weekday AM Peak Hour	35	0.0%	35	1.1	39	25	22	5	0	7
	20	0.0%	20	1.1	22	14	12			
	15	0.0%	15	1.1	17	11	10			
Weekday PM Peak Hour	31	0.0%	31	1.1	34	22	19	4	0	6
	14	0.0%	14	1.1	15	9	8			
	17	0.0%	17	1.1	19	13	11			
Office Spaces for Artist Studios										
Weekday Daily	34	0.0%	34	1.0	34	34	34	4	0	6
	17	0.0%	17	1.0	17	17	17			
	17	0.0%	17	1.0	17	17	17			
Weekday AM Peak Hour	4	0.0%	4	1.0	4	4	4	1	0	1
	3	0.0%	3	1.0	3	3	3			
	1	0.0%	1	1.0	1	1	1			
Weekday PM Peak Hour	5	0.0%	5	1.0	5	5	5	1	0	1
	2	0.0%	2	1.0	2	2	2			
	3	0.0%	3	1.0	3	3	3			
Total										
Weekday Daily	782				856	558	494	107	0	158
	391				428	279	247			
	391				428	279	247			
Weekday AM Peak Hour	39				43	29	26	5	0	8
	23				25	17	15			
	16				18	12	11			
Weekday PM Peak Hour	36				39	27	24	5	0	7
	16				16	11	10			
	20				23	16	14			

Mode Share Summary				
Auto	Transit	Bike	Walk	WFH
64%	13%	0%	19%	5%