

# TECHNICAL MEMORANDUM

**To:** Mike Wolfe, PE  
Engineering Supervisor

**From:** Mac Hall, PE

**Re:** **Paradyme Gym and Barn Caves**  
**40 & 60 Retail Centre Boulevard**

**Date:** January 2024



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## Background:

The proposed development will consist of a 38,000 s.f. public gym and 97 Barndominiums on 17.91 acres located at 40 and 60 Retail Centre Boulevard in Lake Havasu City, AZ, will have a minor impact on the surrounding improved streets (See attached Exhibit 1). The Institute of Transportation Engineers (ITE) Trip Generation, 11<sup>th</sup> Edition, Health and Fitness code 492 and Multifamily Housing (Low-Rise) code 220, charts and formulas were utilized to determine the number of trips generated by the proposed land uses on an average weekday, AM Peak Hour, and PM Peak Hour. The peak hour trip rates used in this analysis are for the peak hours of the adjacent street traffic, typically between 7:00 – 9:00 a.m. and 4:00 – 6:00 p.m.

## Design Guidance:

The following section best describes the proposed land use in detail as defined in the ITE Trip Generation, 11<sup>th</sup> Edition.

Land Use Code: 220 – Multifamily Housing (Low-Rise)

This land use is described in Trip Generation, 11<sup>th</sup> Edition, in the following manner:

“Low-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have two or three floors (levels). Various configurations fit this description, including walkup apartment, mansion apartment, and stacked townhouse.

- A walkup apartment typically is two or three floors in height with dwelling units accessed by single or multiple entrances with stairways and hallways.
- A mansion apartment is a single structure that contains several apartments within what appears to be a single-family dwelling unit.
- A fourplex is a single two-story structure with two matching dwelling units on the ground and second floors. Access to the individual units is typically internal to the structure and provided through a central entry and stairway.

- A stacked townhouse is designed to match the external appearance of a townhouse. But, unlike a townhouse dwelling unit that only shares walls with an adjoining unit, the stacked townhouse units share both floors and walls. Access to the individual units is typically internal to the structure and provided through a central entry and stairway.

Multifamily housing (mid-rise) (Land Use 221), multifamily housing (high-rise) (Land Use 222), affordable housing (Land Use 223), and off-campus student apartment (low-rise) (Land Use 225) are related land uses.”

Land Use Code: 492 – Health/Fitness Club

This land use is described in Trip Generation, 11<sup>th</sup> Edition, in the following manner:

“A health/fitness club is a privately owned facility primarily focusing on individual fitness or training. It typically provides exercise classes, fitness equipment, a weight room, a spa, locker rooms, and a small restaurant or snack bar. This land use may also include ancillary facilities, such as a swimming pool, whirlpool, sauna, limited retail, tennis, pickle ball, racquetball, or handball courts. These facilities are membership clubs that may allow access to the general public for a fee. Racquet/tennis club (Land Use 491), athletic club (Land Use 493), and recreational community center (Land Use 495) are related uses.”

The independent variable used to predict the average daily trips for this development was the total number of food trucks. The only data for this use code is for the PM Peak Hour.

Trip Generation Rates (ITE 11<sup>th</sup> Addition)

Land Use	Independent Variable	Weekday			A.M. Peak Hour			P.M. Peak Hour		
		Enter	Exit	Multiplier	Enter	Exit	Multiplier	Enter	Exit	Multiplier
Health/Fitness Club (492)	1,000 Sq. Ft. GFA				46%	54%	1.40	52%	48%	3.92
Multifamily Housing (220)	Dwelling Units	50%	50%	6.74	24%	76%	0.47	62%	38%	0.57

Site Trip Generation (ITE 11<sup>th</sup> Addition))

Land Use	Independent Variable	Weekday			A.M. Peak Hour			P.M. Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Health/Fitness Club (492)	38				24	29	53	77	72	149
Multifamily Housing (220)	97	349	348	697	15	47	62	47	29	76
Total					39	76	115	124	101	225

As anticipated, the number of Maximum Potential Trip Generations rates for the type of development was low, which will have a minor impact on the surrounding improved streets. See Appendix A for trip calculations.



CONSTRUCTION NOTES

GENERAL NOTES

1. CONTACT ARIZONA ONE CALL AT (800) STAKE-IT OR 811 PRIOR TO START OF ANY EXCAVATION FOR LOCATIONS OF BURIED UTILITIES. THE LOCATIONS OF ANY AND ALL UNDERGROUND UTILITIES SHOWN ARE BASED UPON ABOVE-GROUND EVIDENCE (INCLUDING, BUT NOT LIMITED TO: MANHOLES, INLETS, ASPHALT PATCHES, AND MARKS MADE ON THE GROUND BY OTHERS) AND ARE SPECULATIVE IN NATURE. THERE MAY BE UNDERGROUND UTILITIES THAT ARE NOT SHOWN, OR SHOWN INCORRECTLY IF NO ABOVE-GROUND EVIDENCE OR ABOVE-GROUND EVIDENCE WAS NOT OBSERVED. FURTHERMORE, THE UTILITIES MAY NOT BE THAT EXACTLY LOCATED OR MARKED ON THE PLANS. THE CONTRACTOR SHALL VERIFY THE LOCATIONS AND ELEVATIONS OF ALL UNDERGROUND UTILITIES AND TOPOGRAPHIC FEATURES PRIOR TO THE START OF CONSTRUCTION. ANY AND ALL DAMAGES THAT MAY OCCUR FROM THE CONTRACTOR'S FAILURE TO IDENTIFY OR VERIFY LOCATIONS AND ELEVATIONS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY IF ANY DISCREPANCIES OR VARIANCES TO THE PLANS ARE FOUND.

AM TRAFFIC MOVEMENTS:

PM TRAFFIC MOVEMENTS:

050

0 50

Scale in Feet

Contact Arizona 811 at least two full working days before you begin excavation

ARIZONA811

Call 811 or click Arizona811.com

REVISIONS:

TRAFFIC EXHIBIT

PROJECT:

DESIGNER: MFH

DRAWN BY: MAR

PRELIMINARY  
NOT FOR  
CONSTRUCTION  
OR  
RECORDING

PROJECT NO.  
2025-006

SHEET NO.  
EX-1  
01 of 01



## **Appendix A**

### **Trip Generation Calculations**

# Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

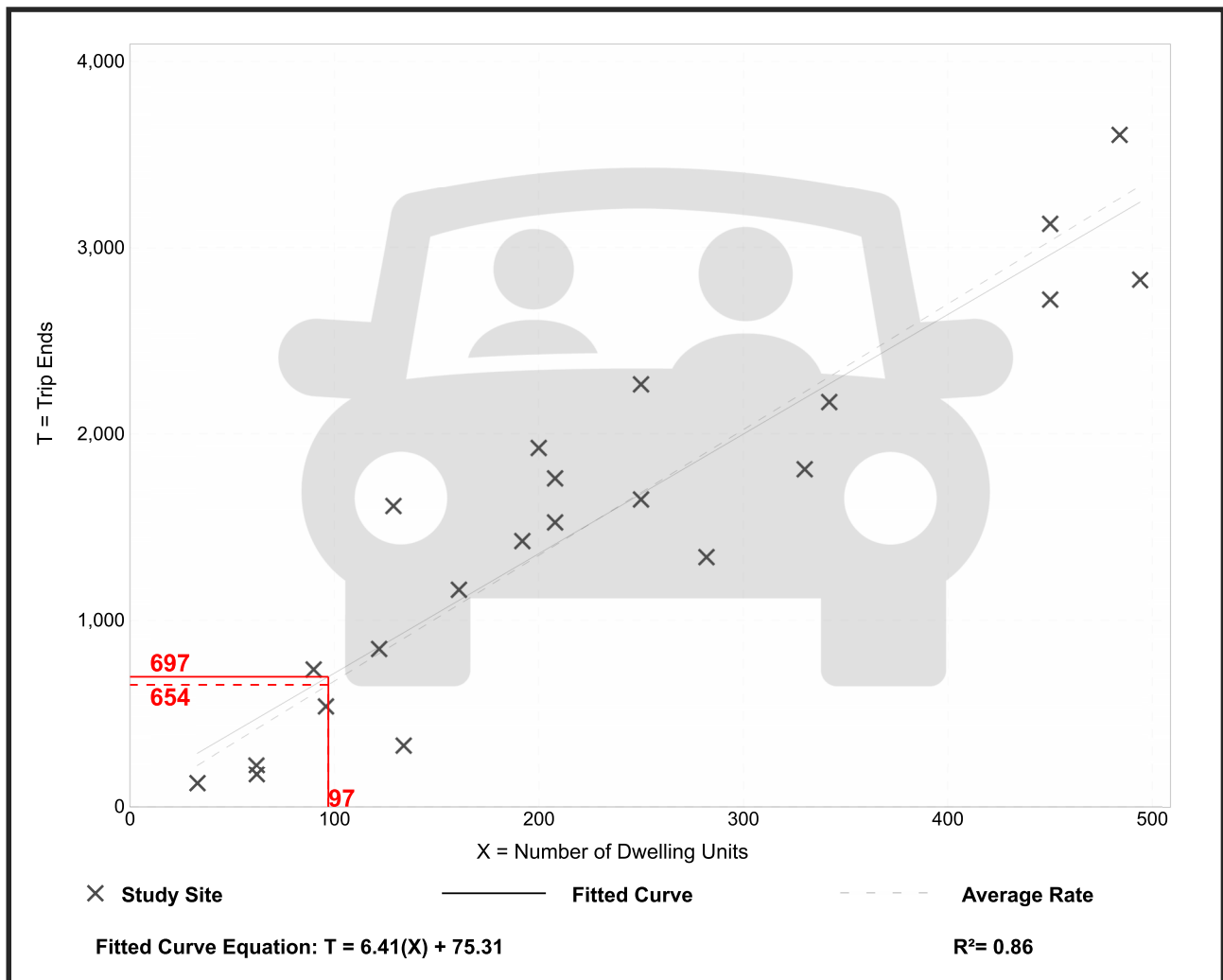
Vehicle Trip Ends vs: Dwelling Units  
On a: Weekday

Setting/Location: General Urban/Suburban  
Number of Studies: 22  
Avg. Num. of Dwelling Units: 229  
Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
6.74	2.46 - 12.50	1.79

## Data Plot and Equation



# Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

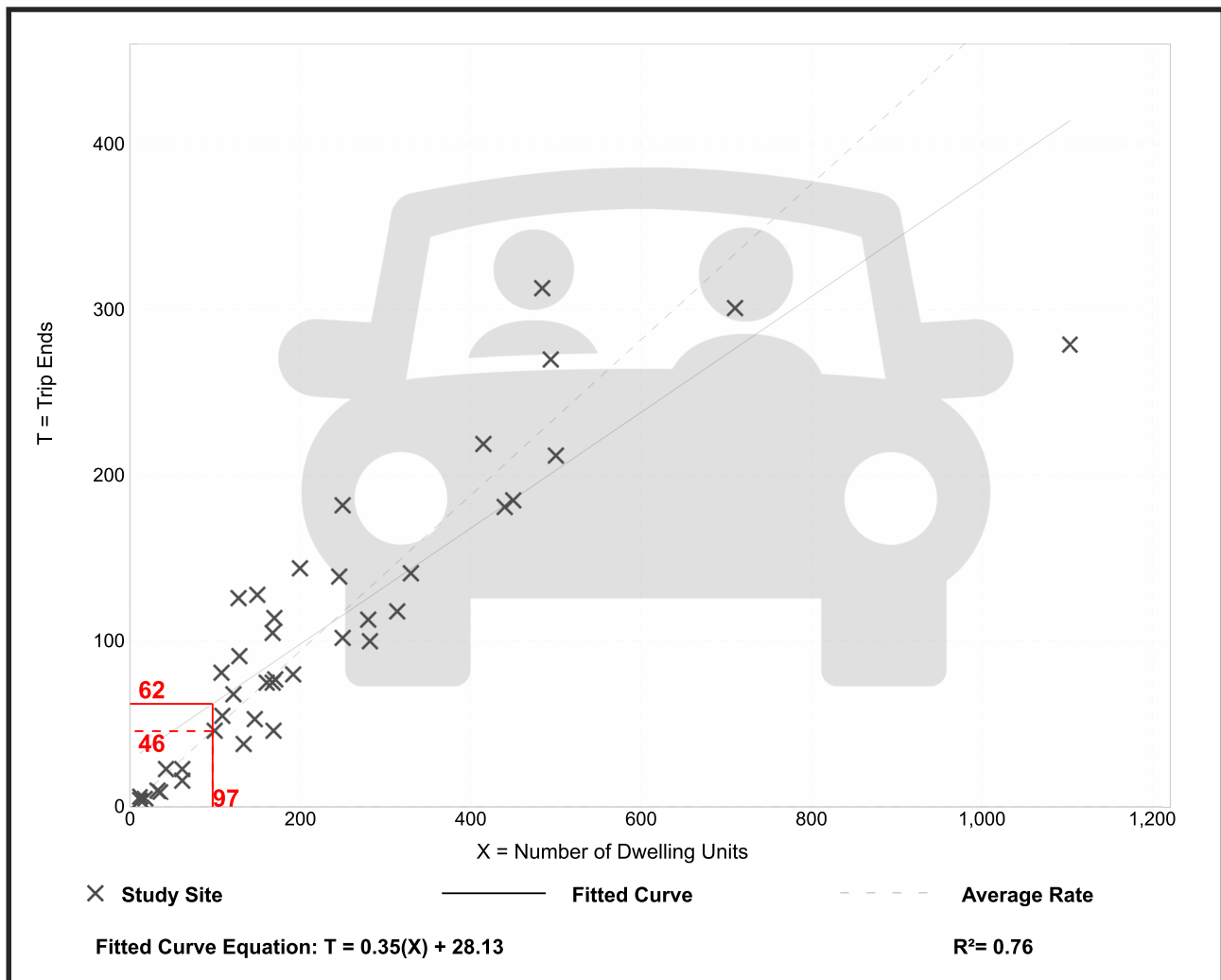
Vehicle Trip Ends vs: Dwelling Units  
On a: Weekday,  
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban  
Number of Studies: 40  
Avg. Num. of Dwelling Units: 234  
Directional Distribution: 24% entering, 76% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.47	0.25 - 0.98	0.16

## Data Plot and Equation



# Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

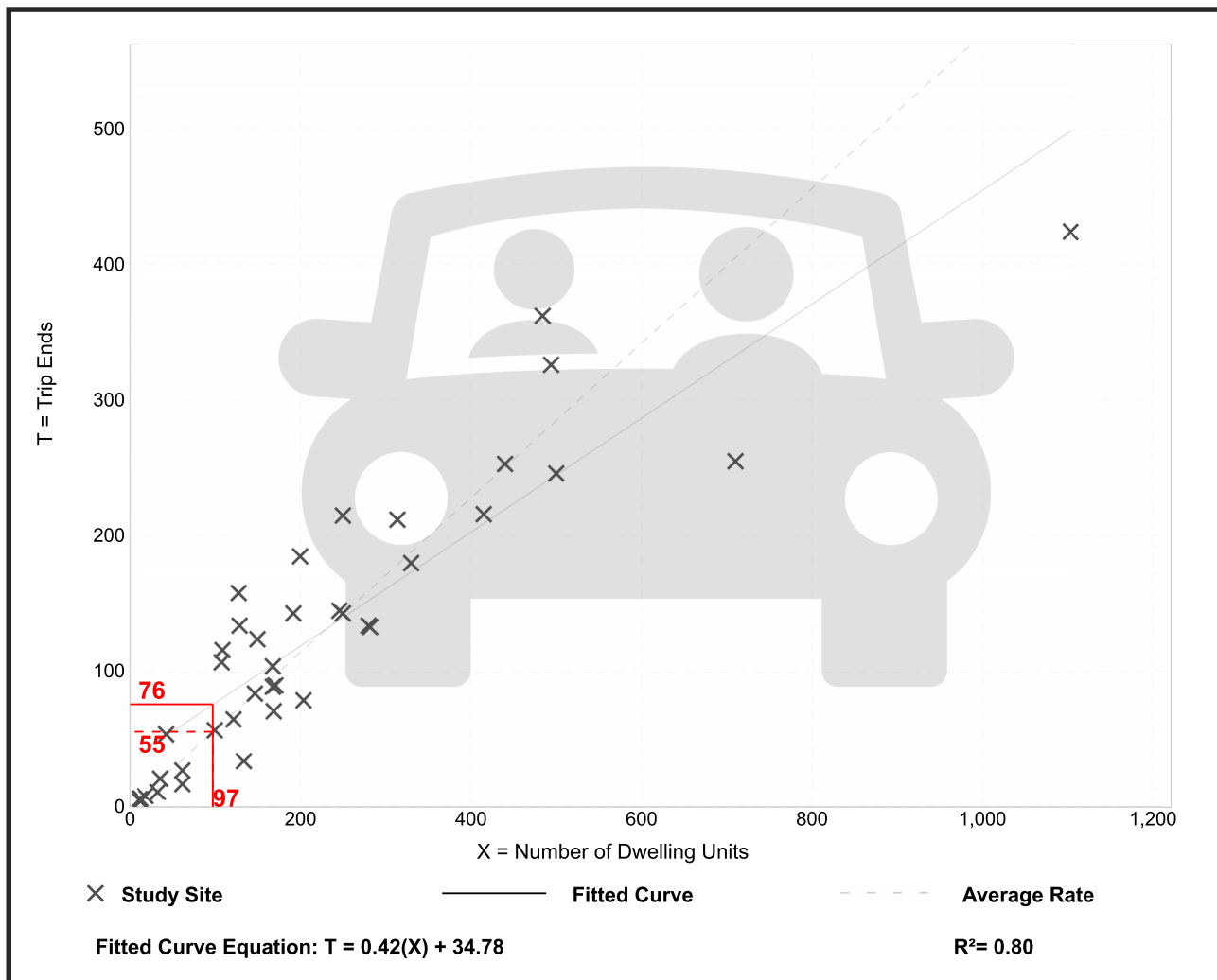
Vehicle Trip Ends vs: Dwelling Units  
On a: Weekday,  
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban  
Number of Studies: 38  
Avg. Num. of Dwelling Units: 231  
Directional Distribution: 62% entering, 38% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.57	0.25 - 1.26	0.20

## Data Plot and Equation





# Health/Fitness Club (492)

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

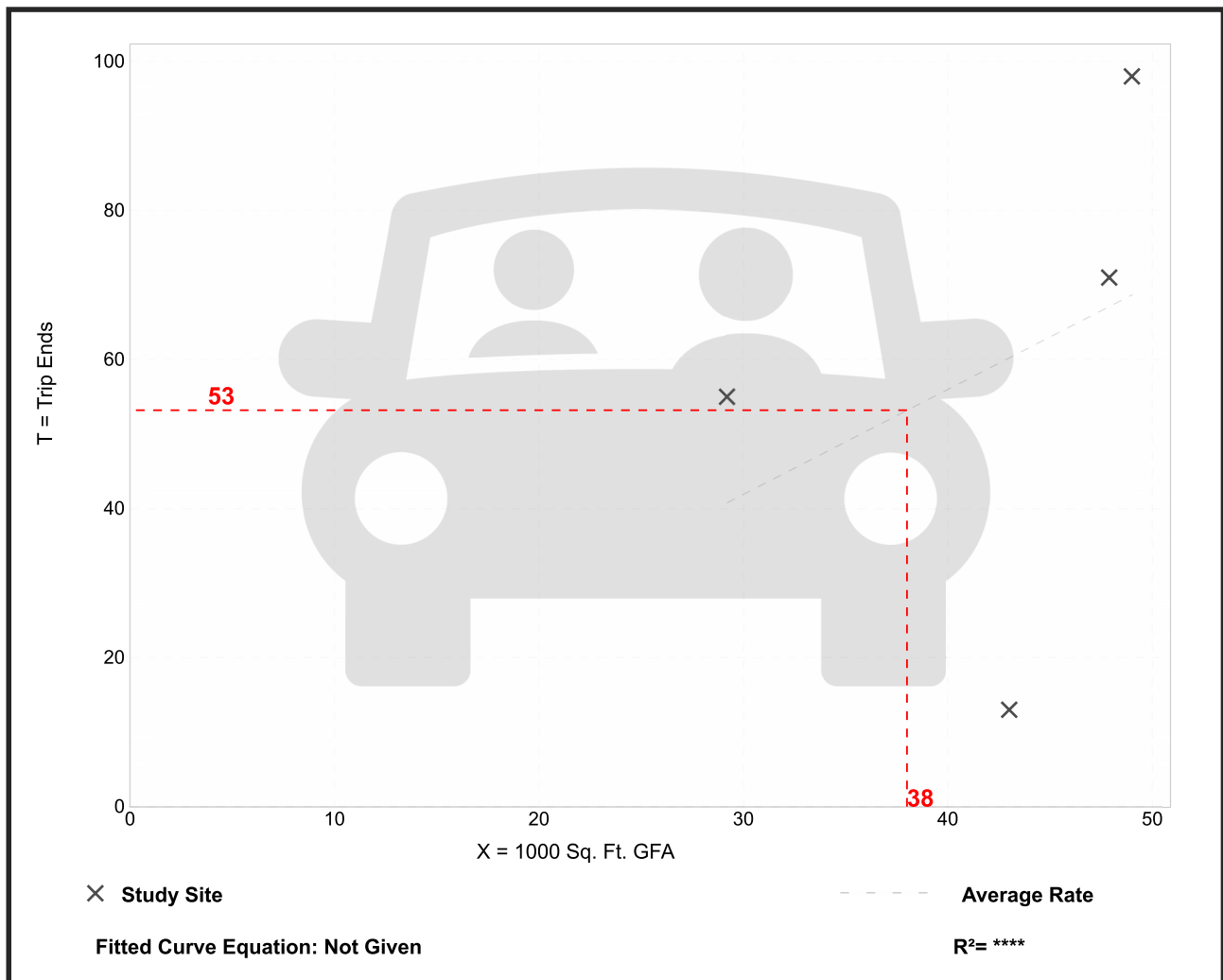
Setting/Location: General Urban/Suburban  
Number of Studies: 4  
Avg. 1000 Sq. Ft. GFA: 42  
Directional Distribution: 46% entering, 54% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.40	0.30 - 2.00	0.78

## Data Plot and Equation

*Caution – Small Sample Size*



# Health/Fitness Club (492)

Vehicle 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: 40  
Directional Distribution: 52% entering, 48% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.92	3.08 - 4.30	0.59

## Data Plot and Equation

*Caution – Small Sample Size*

