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Ref: 8410

September 19, 2019

Mr. Matthew Dacey  
Champion Builders, Inc.  
P.O. Box 1414  
Duxbury, MA 02331-1414

Re: Trip-Generation Calculations  
Proposed Office Building – 345 Oak Street  
Pembroke, Massachusetts

Dear Matt:

Vanasse & Associates, Inc. (VAI) has prepared trip-generation calculations in support of the proposed office building that is to be located at 345 Oak Street in Pembroke, Massachusetts (hereafter referred to as the “Project”). This information has been prepared in response to a request from the Town of Pembroke’s independent review consultant.

In order to determine the traffic characteristics of the Project, trip-generation methodologies established by the Institute of Transportation Engineers (ITE)<sup>1</sup> were used. The ITE provides trip-generation information for various types of land uses developed as a result of scientific studies that have been conducted over the past 50 plus years, the most recent update of which was published in 2017. This data includes trip estimates for a land use that is similar to the Project (general office building). ITE Land Use Code (LUC) 710, *General Office Building*, was used to develop the traffic characteristics of the Project, the results of which are summarized in Table 1.

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<sup>1</sup>*Trip Generation*, 10<sup>th</sup> Edition; Institute of Transportation Engineers; Washington, DC; 2017.

**Table 1**  
**TRIP GENERATION SUMMARY**

Time Period/Direction	Vehicle Trips
	Proposed Office Building (4,800 sf) <sup>a</sup>
<i>Average Weekday Daily:</i>	
Entering	28
<u>Exiting</u>	<u>28</u>
Total	56
<i>Weekday Morning Peak Hour:</i>	
Entering	5
<u>Exiting</u>	<u>1</u>
Total	6
<i>Weekday Evening Peak Hour:</i>	
Entering	1
<u>Exiting</u>	<u>5</u>
Total	6

<sup>a</sup>Based on ITE LUC 710, *General Office Building*.

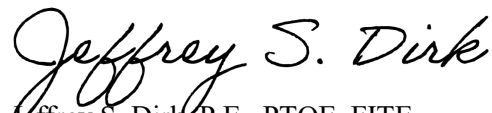
As can be seen in Table 1, the Project is expected to generate approximately 56 vehicle trips on an average weekday (two-way, 24-hour volume, or 28 vehicles entering and 28 exiting), with 6 vehicle trips (5 vehicles entering and 1 exiting) expected during the weekday morning peak-hour and 6 vehicle trips (1 vehicles entering and 5 exiting) expected during the weekday evening peak-hour.

***The predicted traffic volume increases that are expected to be associated with the Project are relatively minor (approximately one (1) additional vehicle every 10 minutes during the peak hours) and would not be expected to result in a material increase in motorist delays or vehicle queuing over existing conditions.***

If you should have any questions regarding our assessment of the traffic characteristics of the Project, please feel free to contact me.

Sincerely,

VANASSE & ASSOCIATES, INC.



Jeffrey S. Dirk, P.E., PTOE, FITE  
Partner

*Professional Engineer in CT, MA, ME, NH, RI and VA*

JSD/jsd

# General Office Building (710)

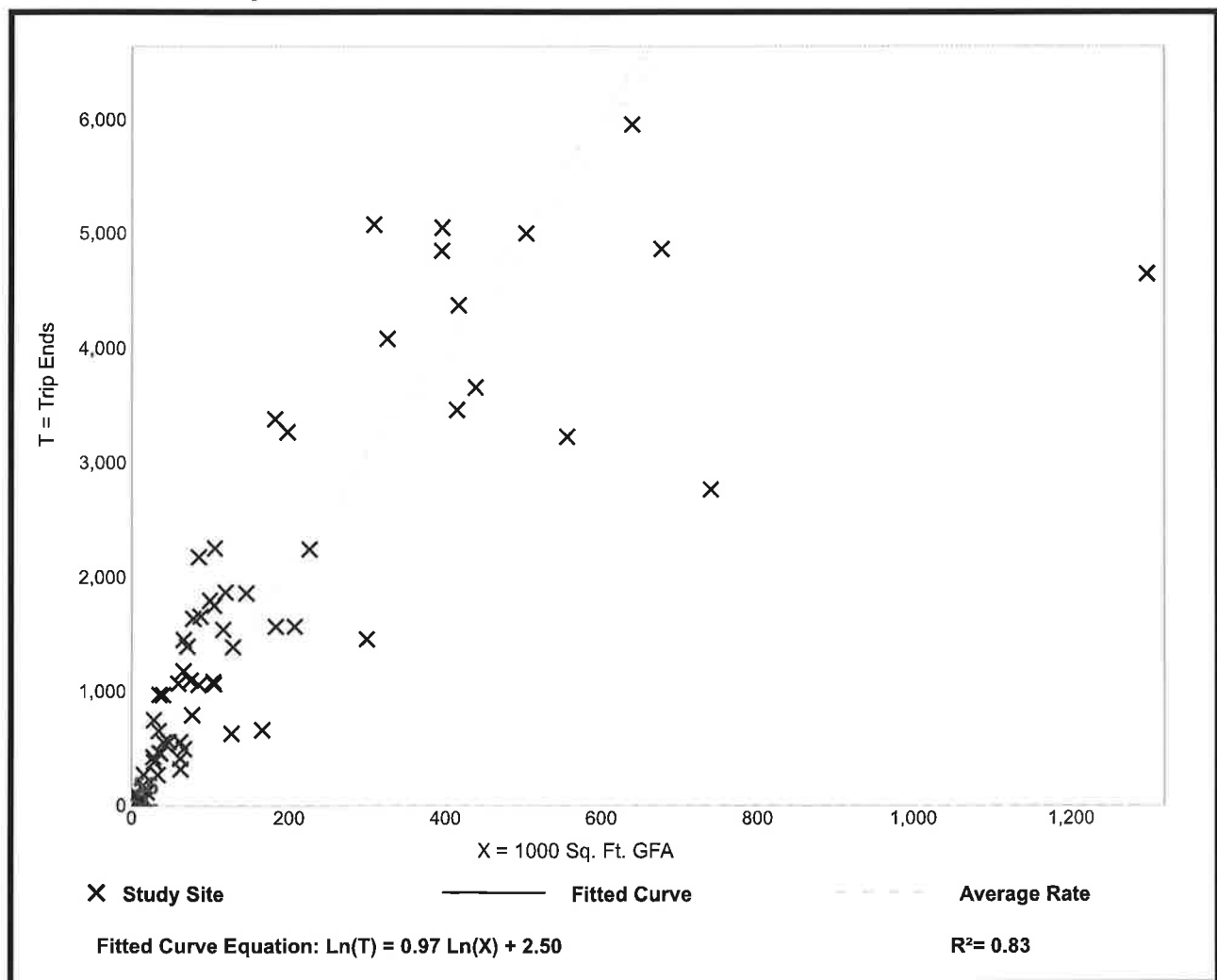
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA  
On a: Weekday

Setting/Location: General Urban/Suburban  
Number of Studies: 66  
Avg. 1000 Sq. Ft. GFA: 171  
Directional Distribution: 50% entering, 50% exiting

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

Average Rate	Range of Rates	Standard Deviation
9.74	2.71 - 27.56	5.15

## Data Plot and Equation



Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

$$\ln(T) = 0.97 \ln(4.8) + 2.50 \approx 56 \text{ VEHICLE TRIPS}$$

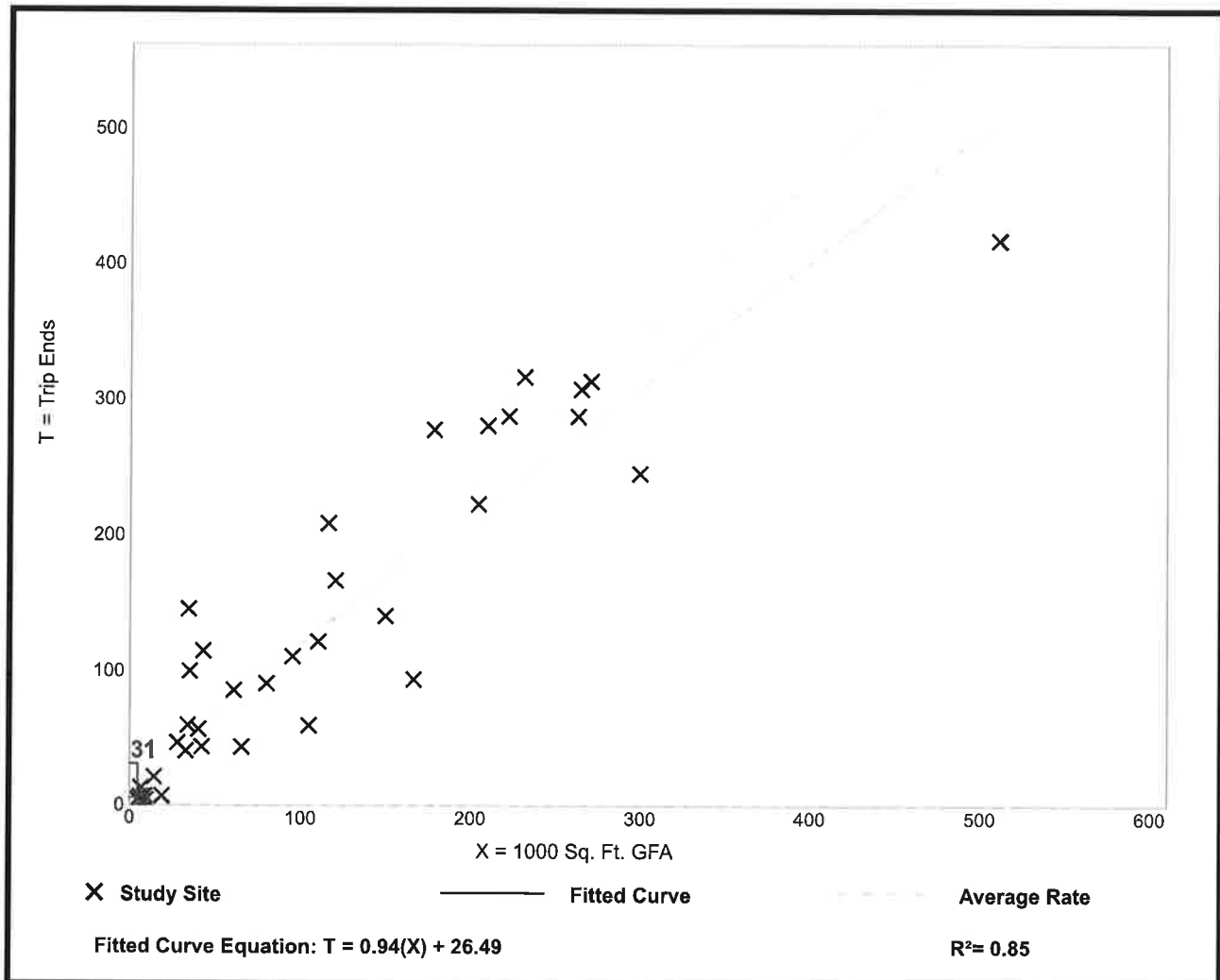
# General Office Building (710)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA  
 On a: Weekday,  
 Peak Hour of Adjacent Street Traffic,  
 One Hour Between 7 and 9 a.m.  
 Setting/Location: General Urban/Suburban  
 Number of Studies: 35  
 Avg. 1000 Sq. Ft. GFA: 117  
 Directional Distribution: 86% entering, 14% exiting

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

Average Rate	Range of Rates	Standard Deviation
1.16	0.37 - 4.23	0.47

## Data Plot and Equation



$$T = 1.16 \times 4.8 = 6 \text{ vehicle trips}$$

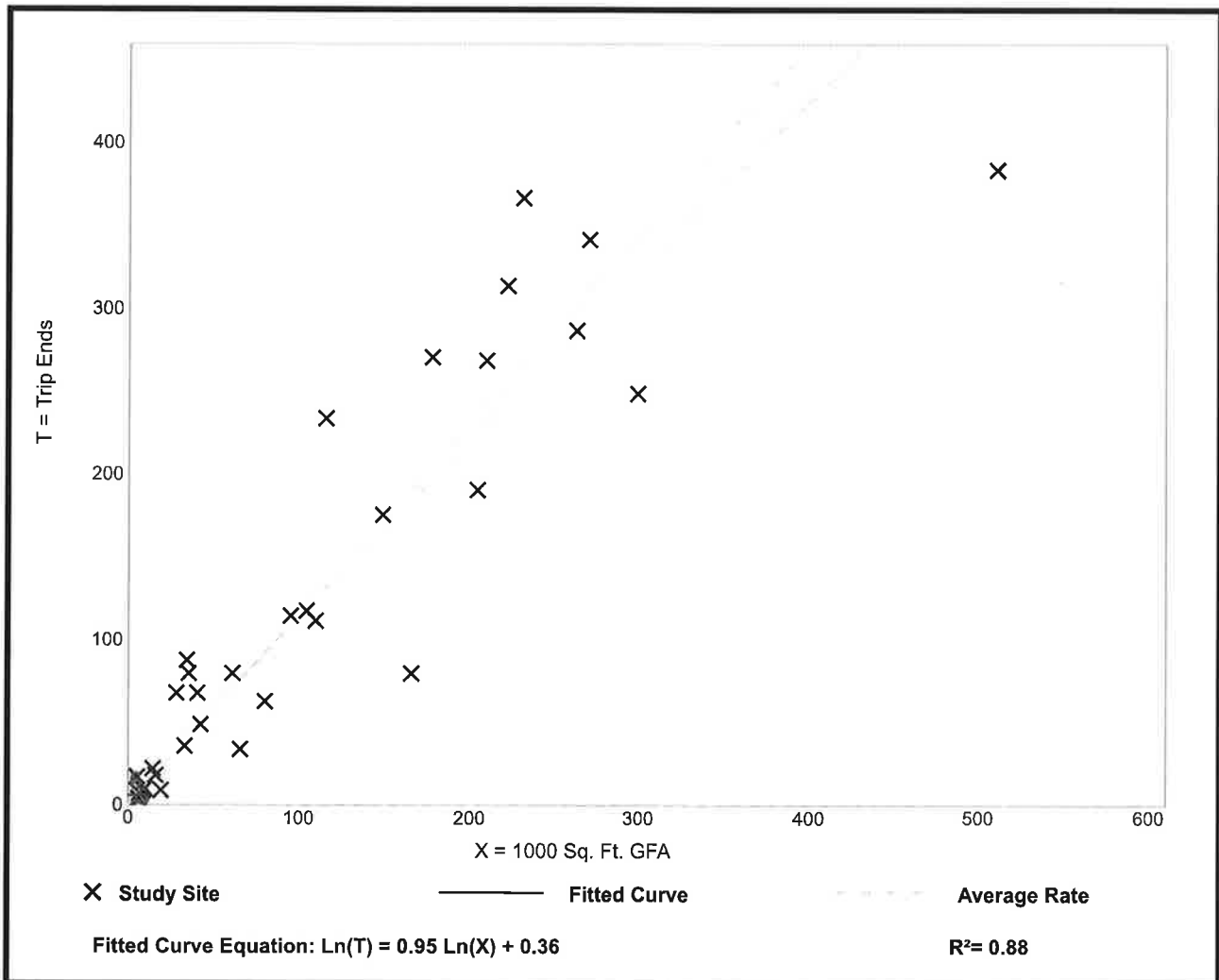
# General Office Building (710)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA  
 On a: Weekday,  
 Peak Hour of Adjacent Street Traffic,  
 One Hour Between 4 and 6 p.m.  
 Setting/Location: General Urban/Suburban  
 Number of Studies: 32  
 Avg. 1000 Sq. Ft. GFA: 114  
 Directional Distribution: 16% entering, 84% exiting

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

Average Rate	Range of Rates	Standard Deviation
1.15	0.47 - 3.23	0.42

## Data Plot and Equation



Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

$$\ln(T) = 0.95 \ln(4.8) + 0.36 = 6 \text{ VEHICLE TRIPS}$$