Vanasse & Associates, Inc.
Transportation Engineers & Planners

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Fax 978-688-6508

Ref: 7413

May 29, 2019

Ms. Rachna D. Balakrishna
Mason & Murphy, Inc.
1299 Beacon Street
Brookline, MA 02446

Re: Trip Generation Update
Brookline, Massachusetts

Dear Rachna:

Vanasse & Associates, Inc. (VAI) is pleased to provide the updated the Trip Generation estimate based upon the revised development program of 65 residential units and 6,667 sf of retail space. The updated estimates were compared to the prior estimate dated February 15, 2019. The February 15, 2019 estimates are presented in Table 1, the updated May 29, 2019 estimates are presented in Table 2 and a comparison is presented in Table 3.

Table 1
TRIP-GENERATION SUMMARY (UPDATE) (2/15/19)

			Retail/Restaurant		
	Residential Trips[a]	Residential Transit Reduction[b]	5,000 sf	Transit Reduction[d]	**Total New Trips**
Weekday Morning Peak Hour:					
Entering	5	-4	7	-3	**5**
Exiting	10	-6	5	-2	**7**
Total	15	-10	12[c]	-5[d]	**12**
Weekday Evening Peak Hour:					
Entering	11	-7	26	-8	**22**
Exiting	9	-6	13	-7	**9**
Total	20	-13	39[e]	-15[f]	**31**
Saturday Midday Peak Hour:					
Entering	15	-10	32	-11	**26**
Exiting	9	-6	22	-10	**15**
Total	24	-16	54[e]	-21[f]	**41**

Source: *Institute of Transportation Engineers – Trip Generation 10th Edition.*
[a]Based on ITE trip generation rates for LUC 252 applied to 74 apartments.
[b]Based on 65% percent transit usage for residential use.
[c]Based on ITE LUC 820 applied to 6,667 sf retail space – selected points.
[d]Based on 38% percent transit usage for retail use.
[e]Based on ITE trip generation rates for LUC 931 applied to 5,000 sf quality restaurant space.
[f]Based on 38% percent transit usage for restaurant use.

Table 2
TRIP-GENERATION SUMMARY (UPDATE) (5/29/19)

	Residential Trips[a]	Residential Transit Reduction[b]	Retail 6,667 sf	Retail Transit Reduction[d]	**Total New Trips**
Weekday Morning Peak Hour:					
Entering	5	-3	10	-4	**8**
Exiting	8	-5	6	-2	**7**
Total	13	-8	16[c]	-6[d]	**15**
Weekday Evening Peak Hour:					
Entering	10	-7	23	-8	**18**
Exiting	8	-5	25	-10	**18**
Total	18	-12	48[e]	-18[d]	**36**
Saturday Midday Peak Hour:					
Entering	13	-9	34	-13	**25**
Exiting	8	-5	31	-12	**22**
Total	21	-14	65[c]	-25[d]	**47**

Source: *Institute of Transportation Engineers – Trip Generation 10th Edition.*
[a]Based on ITE trip generation rates for LUC 252 applied to 65 apartments.
[b]Based on 65% percent transit usage for residential use.
[c]Based on ITE LUC 820 applied to 6,667 sf retail space – selected points.
[d]Based on 38% percent transit usage for retail use.

Table 3
TRIP-GENERATION COMPARISON

	Trip Generation 2/15/19	Trip Generation 5/29/19	**Increase**
Weekday Morning Peak Hour:			
Entering	5	8	**3**
Exiting	7	7	**0**
Total	12	15	**3**
Weekday Evening Peak Hour:			
Entering	22	18	**-4**
Exiting	9	18	**9**
Total	31	36	**5**
Saturday Midday Peak Hour:			
Entering	26	25	**-1**
Exiting	15	22	**7**
Total	41	47	**6**

As shown in Table 3, the revised development program will add between 3 and 6 peak hour trips and will not change any of the study conclusions or recommendations.

Sincerely,

VANASSE & ASSOCIATES, INC.

F. Giles Ham, P.E.
Managing Partner

FGH/mef

Attachments

APPENDIX

TRIP GENERATION DOCUMENTATION

TRIP GENERATION DOCUMENTATION

Institute of Transportation Engineers (ITE)
Trip Generation, 10 th Edition
Land Use Code (LUC) 252 - Senior Adult Housing - Attached

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X): 65

AVERAGE WEEKDAY DAILY

T = 4.02 * (X) - 25.37
T = 4.02 * 65 - 25.37
T = 235.93
T = 236 vehicle trips
with 50% (118 vph) entering and 50% (118 vph) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.20 * (X) - 0.18
T = 0.20 * 65 - 0.18
T = 12.82
T = 13 vehicle trips
with 35% (5 vph) entering and 65% (8 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.24 * (X) + 2.26
T = 0.24 * 65 + 2.26
T = 17.86
T = 18 vehicle trips
with 55% (10 vph) entering and 45% (8 vph) exiting.

SATURDAY DAILY

T = 3.97 * (X) - 60.09
T = 3.97 * 65 - 60.09
T = 197.96
T = 198 vehicle trips
with 50% (99 vph) entering and 50% (99 vph) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

T = 0.35 * (X) -1.67
T = 0.35 * 65 -1.67
T = 21.08
T = 21 vehicle trips
with 62% (13 vph) entering and 38% (8 vph) exiting.

AM Reference

Graph Look Up

DATA SOURCE:
ITE-TGM 10th Edition

SEARCH BY LAND USE CODE:
820

LAND USE CATEGORY:
(800-899) Retail

LAND USE:
820 - Shopping Center

INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GLA

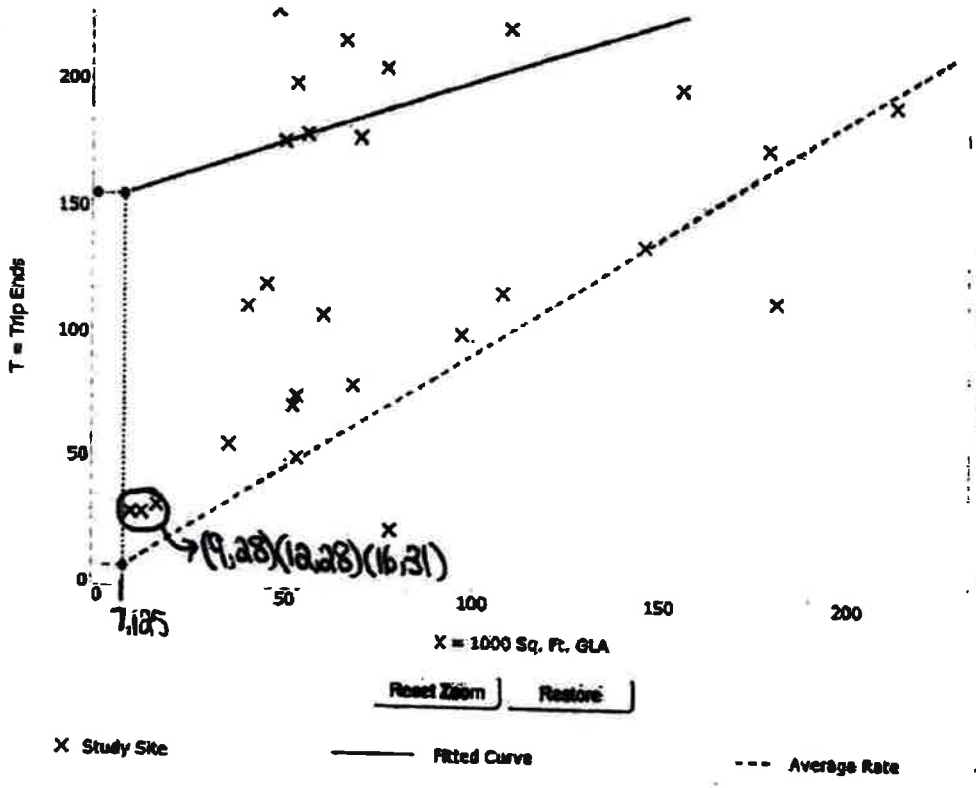
TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

SETTING/LOCATION:
General Urban/Suburban

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
7.19 Calculate

Data Plot and Equation



DATA STATISTICS

1000 Sq. Ft. GLA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
84

Avg. 1000 Sq. Ft. GLA:
351

Average Rate:
0.94

Range of Rates:
0.18 - 23.74

Standard Deviation:
0.87

Fitted Curve Equation:
T = 0.50(X) + 151.78

R^2:
0.50

Directional Distribution:
62% entering, 38% exiting

Calculated Trip Ends:
Average Rate: 7 (Total); 4 (Entry); 3 (Exit)
Fitted Curve: 155 (Total); 96 (Entry); 59 (Exit)

Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

3.11 233 1.93

Avc = 2.46
rate

~~X 5~~ = ~~12~~

6.667 = 16

Graph Look Up

PM Reference

DATA SOURCE: ITE-TGM 10th Edition

SEARCH BY LAND USE CODE: 820

LAND USE CATEGORY: (800-899) Retail

LAND USE: 820 - Shopping Center

INDEPENDENT VARIABLE (IV): 1000 Sq. Ft. GLA

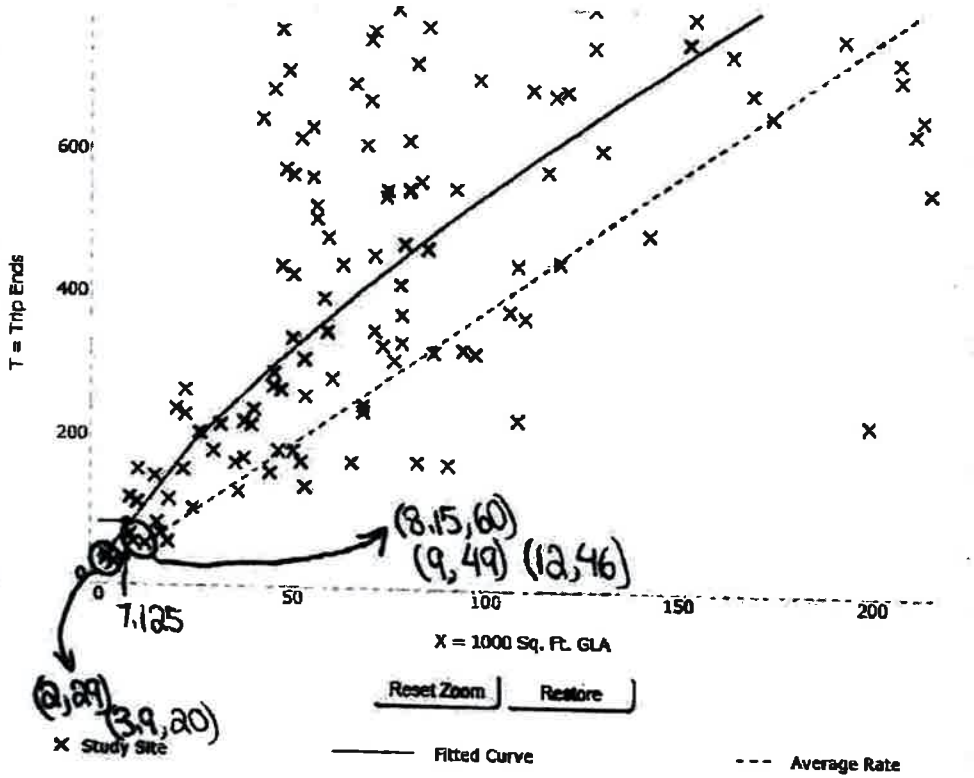
TIME PERIOD: Weekday, Peak Hour of Adjacent Street Traffic

SETTING/LOCATION: General Urban/Suburban

TRIP TYPE: Vehicle

ENTER IV VALUE TO CALCULATE TRIPS: 7.13 Calculate

Data Plot and Equation



DATA STATISTICS

1000 Sq. Ft. GLA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
261

Avg. 1000 Sq. Ft. GLA:
327

Average Rate:
3.81

Range of Rates:
0.74 - 18.69

Standard Deviation:
2.04

Fitted Curve Equation:
Ln(T) = 0.74 Ln(X) + 2.89

R^2:
0.82

Directional Distribution:
48% entering, 52% exiting

Calculated Trip Ends:
Average Rate: 27 (Total), 13 (Entry), 14 (Exit)
Fitted Curve: 77 (Total), 37 (Entry), 40 (Exit)

Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

14 5
5.12

7 36
5.44
3.83

AVE - 7.25 × 5 = 36
rate
×6.667 = 48

Saturday Reference

Graph Look Up

DATA SOURCE:
ITE-TGM 10th Edition

SEARCH BY LAND USE CODE:
820

LAND USE CATEGORY:
(800-899) Retail

LAND USE:
820 - Shopping Center

INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GLA

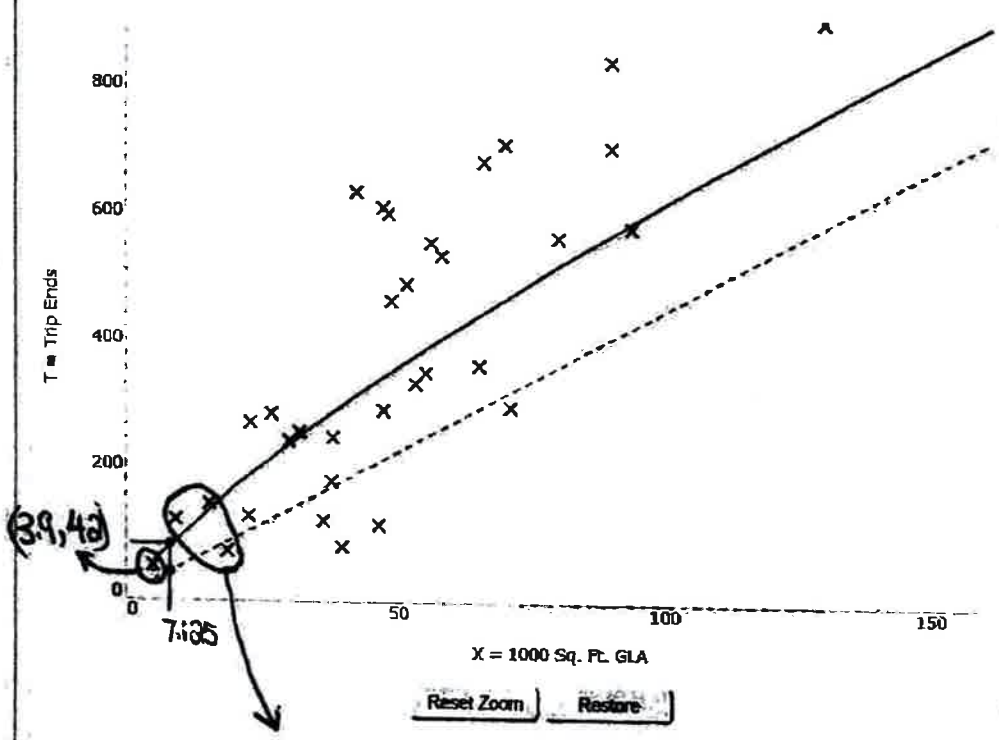
TIME PERIOD:
Saturday, Peak Hour of Generator

SETTING/LOCATION:
General Urban/Suburban

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
7.13 Calculate

Data Plot and Equation



× Study Site ——— Fitted Curve - - - Average Rate

Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Independent Variable:
1000 Sq. Ft. GLA

Time Period:
Saturday
Peak Hour of Generator

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
119

Avg. 1000 Sq. Ft. GLA:
416

Average Rate:
4.50

Range of Rates:
1.42 - 15.10

Standard Deviation:
1.88

Fitted Curve Equation:
Ln(T) = 0.79 Ln(X) + 2.79

R^2:
0.87

Directional Distribution:
52% entering, 48% exiting

Calculated Trip Ends:
Average Rate: 32 (Total); 17 (Entry); 15 (Exit)
Fitted Curve: 77 (Total); 40 (Entry); 37 (Exit)

10.76 10.07
14.23 3.66

Ave. rate 9.68 × ~~5~~ = ~~48~~
6667 = 65