

July 23, 2019

Mr. Cochrane Jamison
Elmington Capital Group
118 16th Ave South, Suite 200
Nashville, TN 37203

RE: Trip Generation Study Update Letter – 2019
Multi-Family Apartments
Sherrill Hill Development – Knoxville, Tennessee

Dear Mr. Jamison:

In accordance with your request we have conducted a review and evaluation of trip generation estimates for the above referenced project, which is to be located within the Sherrill Hill development in west Knoxville/Knox County. The current proposal is to construct a total of 192 multi-family apartment units on two parcels within this development. These units will replace 140,000 square feet of general office space that was originally proposed for these parcels.

The original traffic study for the Sherrill Hill development was prepared by Cannon & Cannon, Inc. in 2007. Trip generation projections from the original study are summarized in TABLE 1 and resulted in an estimated weekday trip generation of 19,979 daily trips. The 2007 trip generation estimates were based on Trip Generation, 7th Edition, published by the Institute of Transportation Engineers (ITE).

TABLE 1
Trip Generation Projections for Original Proposed Site Plan
(Data from 2007 Traffic Study – Table 2)

Land Use	ITE Land Use Code*	Size	Weekday Trips (trips/day)	AM Peak (trips/hour)	Midday Peak (trips/hour)	PM Peak (trips/hour)
Apartments	KNOX**	347 units	2,920	169	169	242
Senior Adult Housing - Attached	252	130 units	452	11	11	14
General Office	710	140,000 sf	1,730	246	246	236
Shopping Center	820	334,235 sf	14,878	323	1,388	1,388
Totals			19,979	749	1,814	1,880
*ITE rates used from <u>Trip Generation</u> , 7 th Edition						
**Rates from Knox County Local Apartment Trip Generation Study						

As noted above, the proposed update to the site development plan includes 192 multi-family apartments to be located on two currently vacant parcels located on each side of Moss Grove Blvd., just north of the roundabout and adjacent and south of the Academy Sports and Floor and Décor stores. These parcels were originally planned as general office use, with 140,000 square feet of space. The currently proposed site development plan is shown in FIGURE 1 and summarized as follows:

- Apartments (Existing) – Previously constructed with 336 units, 11 less than original site plan.
- Senior Adult Housing (Existing) – Previously constructed with 130 units, same as original site plan.
- Apartments (Proposed) – 192 units proposed, the subject of this update.
- General Office – 4,000 square feet, an existing historic house that has been converted to General Office use.
- Shopping Center – Includes 229,700 square feet existing and future, with 212,700 square feet previously constructed and an additional 17,000 square feet that is proposed for future in three separate buildings.

FIGURE 1
Currently Proposed Site Development Plan



Based on the updated site development plan, additional trip generation analyses were conducted in order to compare the current development plan with the original traffic impact study conducted in 2007. TABLE 2 contains trip generation estimates for the current development plan, including the proposed 192 apartment units.

TABLE 2
Trip Generation Projections for Currently Proposed Site Development Plan
(For Site Build-Out including Proposed Multi-Family Apartments)

Land Use	ITE Land Use Code*	Size	Weekday Trips (trips/day)	AM Peak (trips/hour)	Midday Peak (trips/hour)	PM Peak (trips/hour)
Apartments (existing)	KNOX**	336 units	2,837	164	164	235
Senior Adult Housing - Attached	252	130 units	497	26	43	33
Shopping Center	820	229,700 sf	10,592	216	690	1,006
General Office (Historic House)	710	4000 sf	47	30	10	5
Apartments*** (proposed)	KNOX**	192 units	1,715	98	98	139
Totals			15,688	534	1,005	1,418
*ITE rates used from <u>Trip Generation</u> , 10 th Edition						
**Rates from Knox County Local Apartment Trip Generation Study						
***New Proposed Apartments (Replaces 140,000 sf of General Office)						

Trip generation estimates presented in TABLE 2 utilized the 10th edition of the ITE Trip Generation Manual. This was considered appropriate as this is the latest version and therefore likely provides more accurate trip estimates than provided by earlier versions.

TABLE 3 shows the anticipated overall weekday, AM peak hour, midday peak hour, and PM peak hour trip generation estimates for the original site development plan and the current plan. As shown, the anticipated trips for the currently proposed development plan are significantly less than the trips anticipated with the original site development plan.

TABLE 3
Comparisons of Trip Generation Projections for Site Build-Out

Summary	Weekday Trips	AM Peak Hour	Midday Peak Hour	PM Peak Hour
Original Plan (Table 1)	19,979	749	1,814	1,880
Currently Proposed Plan (Table 2)	15,688	534	1,005	1,418
Difference	-4,291	-215	-809	-462
Percent Difference	-21.5%	-28.7%	-44.6%	-24.6%

In summary, development of the proposed 192 multi-family apartments, replacing the originally proposed 140,000 square feet of general office space, is anticipated to fit well within the trip generation assumptions used in the original site development plan and the originally approved traffic impact study. It remains reasonable to conclude that the recommendations of the original traffic study will continue to be valid, and that no additional traffic study for the site will be necessary.

Please let us know if you have questions or need additional information.

Sincerely,



Alan L. Childers, PE.
Director Emeritus

Attachments

C: Becky Bottoms, P.E., PTOE
CCI Project No: 01483-0000



Local Apartment Trip Generation Study

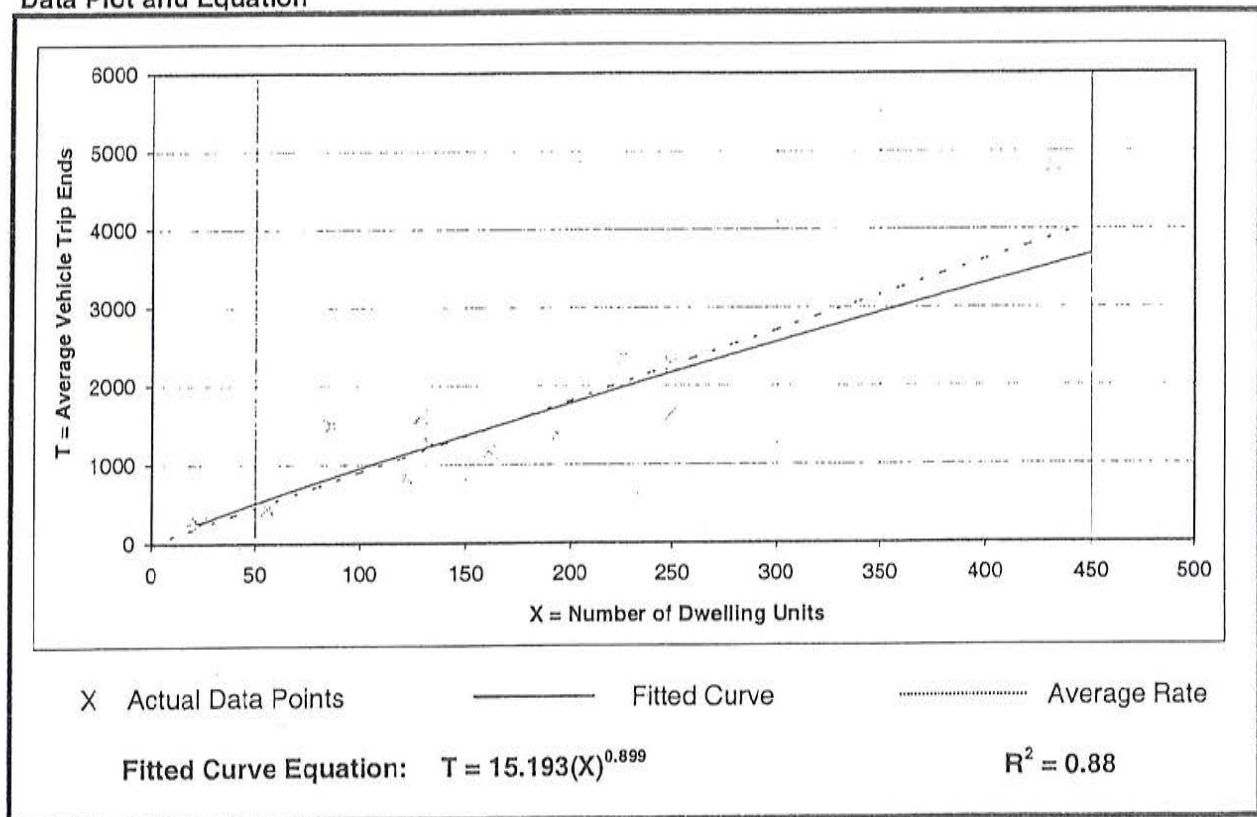
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Number of Studies: 13
Average Number of Dwelling Units: 193
Directional Distribution: 50% entering, 50% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
9.03	6.59 - 17.41	2.47

Data Plot and Equation



• Proposed - For $X = 192$, $T = 1715$
• Existing - For $X = 336$, $T = 2837$

Local Apartment Trip Generation Study

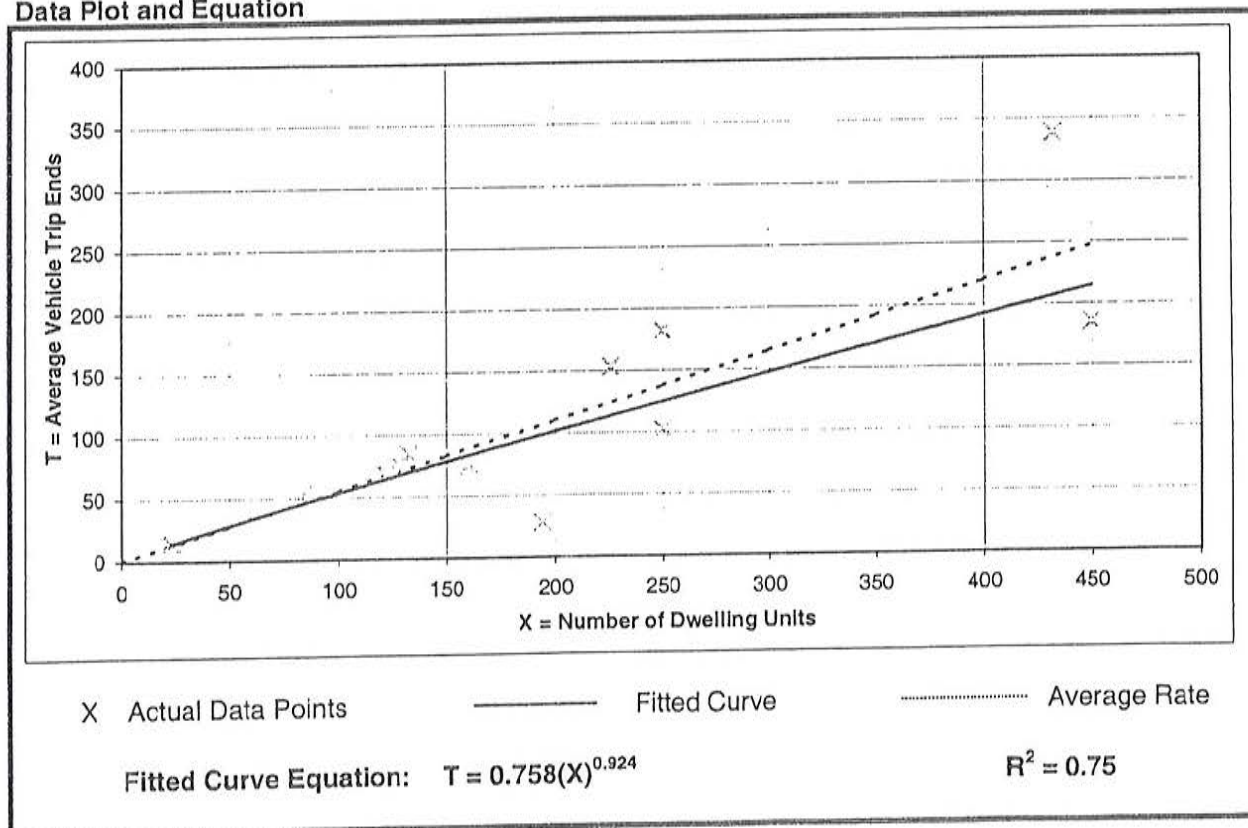
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 13
Average Number of Dwelling Units: 193
Directional Distribution: 22% entering, 78% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
0.55	0.14 - 0.78	0.18

Data Plot and Equation



• Proposed - For $X = 192$, $T = 98$

• Existing - For $X = 336$, $T = 164$

Local Apartment Trip Generation Study

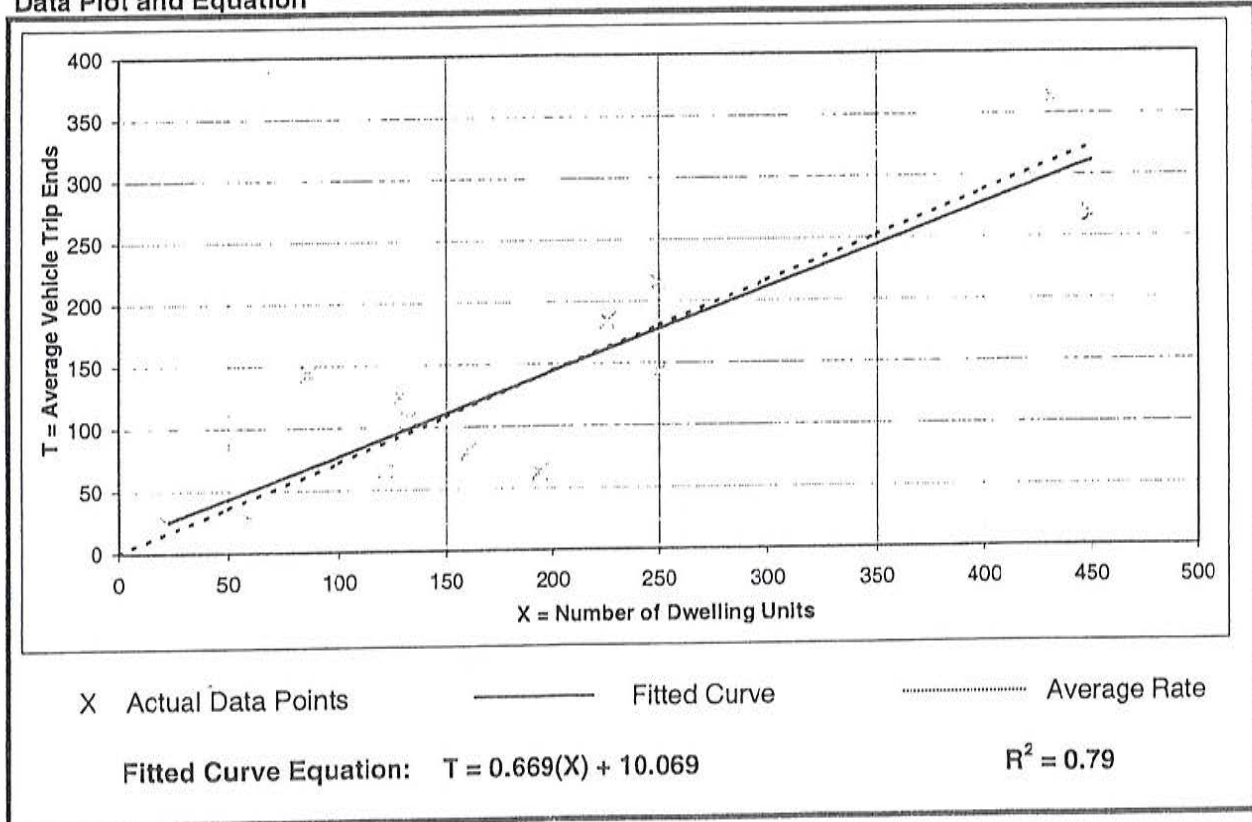
Average Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 13
Average Number of Dwelling Units: 193
Directional Distribution: 55% entering, 45% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
0.72	0.32 - 1.66	0.25

Data Plot and Equation



• Proposed - For $X = 192$, $T = 139$
• Existing - For $X = 336$, $T = 235$

Senior Adult Housing - Attached (252)

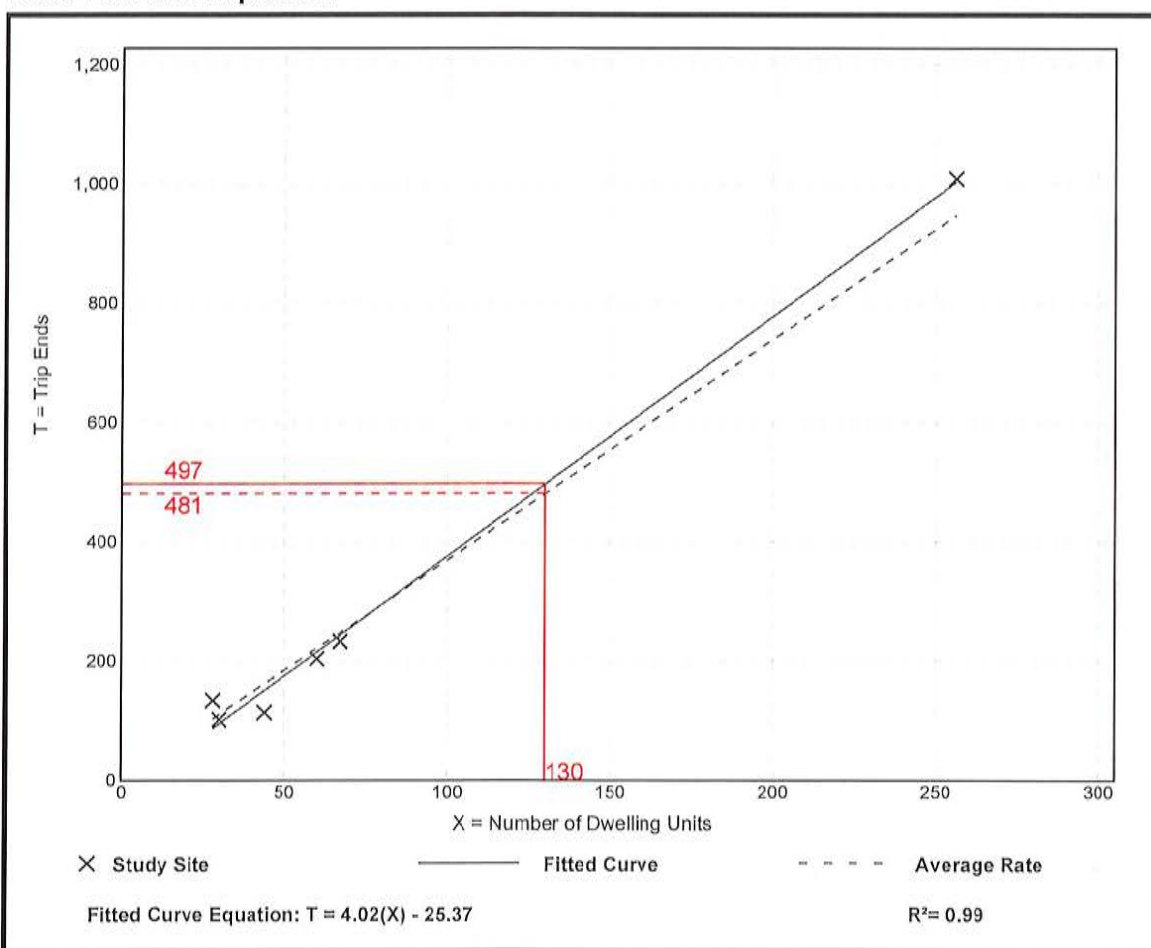
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 6
Avg. Num. of Dwelling Units: 81
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
3.70	2.59 - 4.79	0.53

Data Plot and Equation



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

Senior Adult Housing - Attached (252)

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: 11

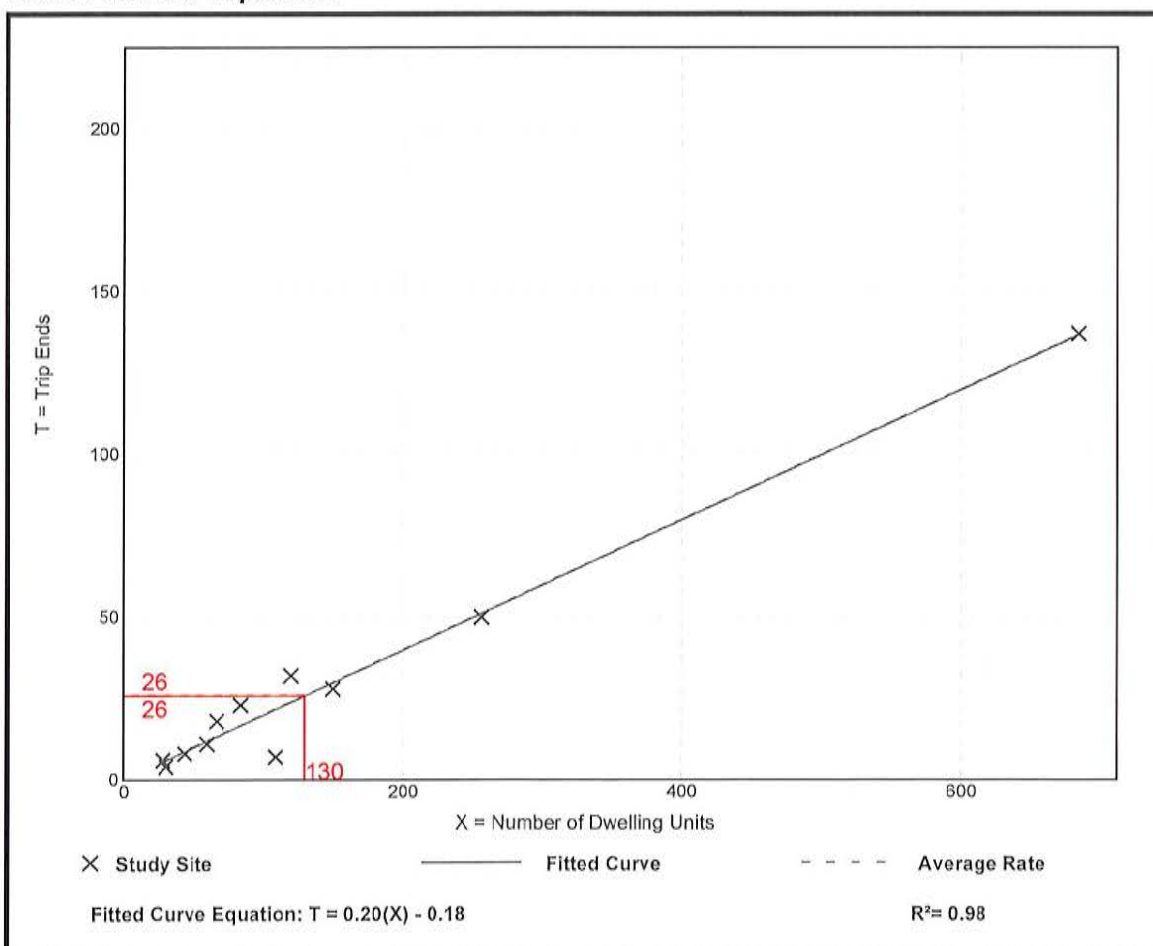
Avg. Num. of Dwelling Units: 148

Directional Distribution: 35% entering, 65% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.20	0.06 - 0.27	0.05

Data Plot and Equation



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Senior Adult Housing - Attached (252)

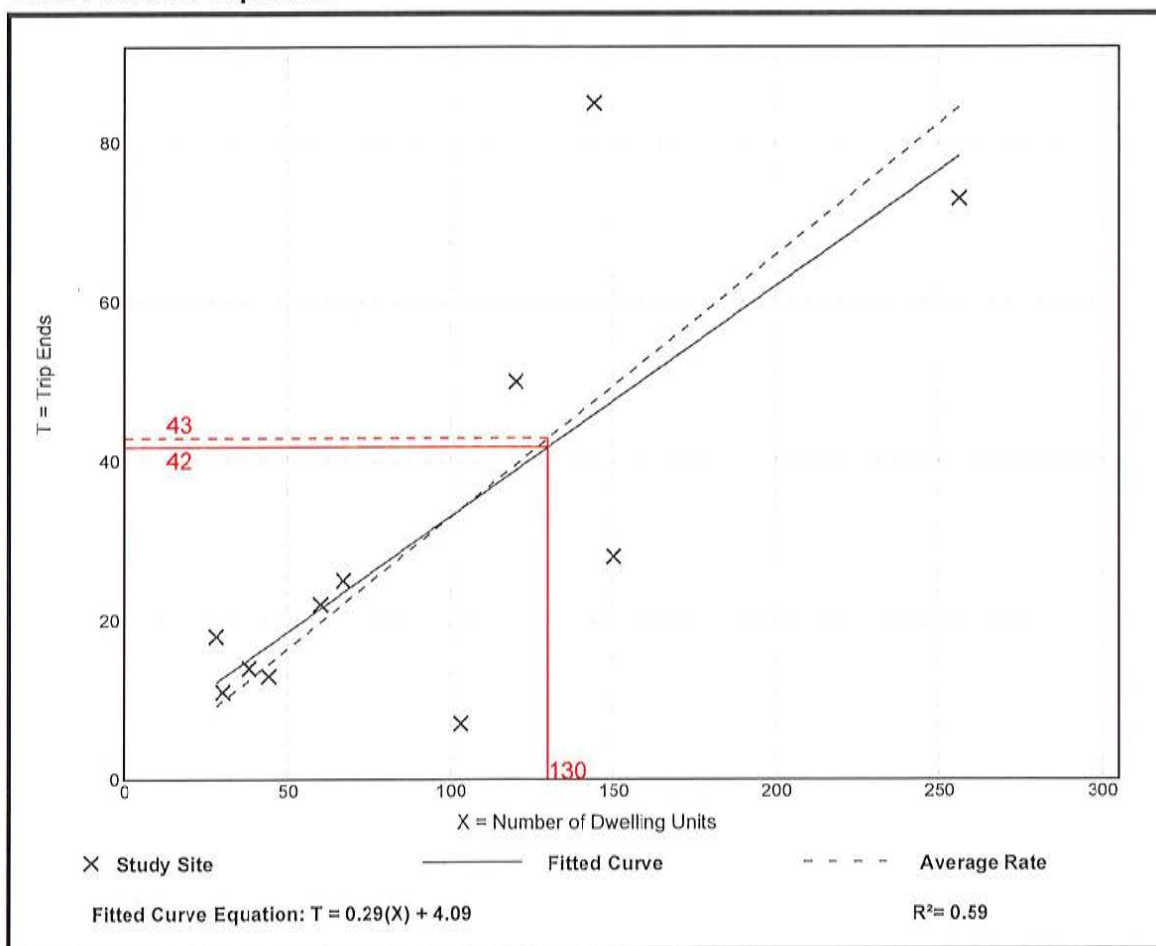
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 11
Avg. Num. of Dwelling Units: 95
Directional Distribution: 47% entering, 53% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.33	0.07 - 0.64	0.16

Data Plot and Equation



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Using Avg. Rate = $130 \times 0.33 = \underline{43}$
($R^2 < 0.75$)

Senior Adult Housing - Attached (252)

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: 11

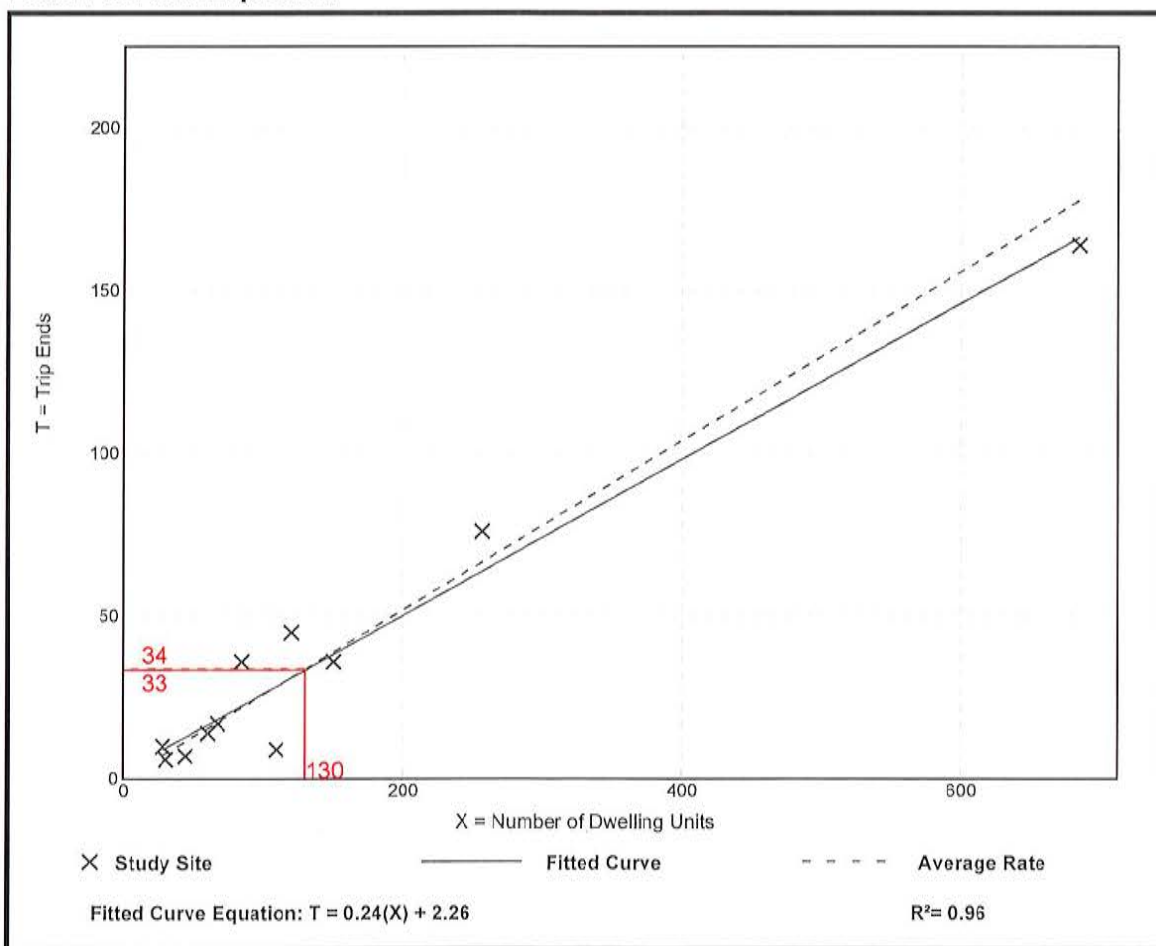
Avg. Num. of Dwelling Units: 148

Directional Distribution: 55% entering, 45% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.26	0.08 - 0.43	0.08

Data Plot and Equation



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Shopping Center (820)

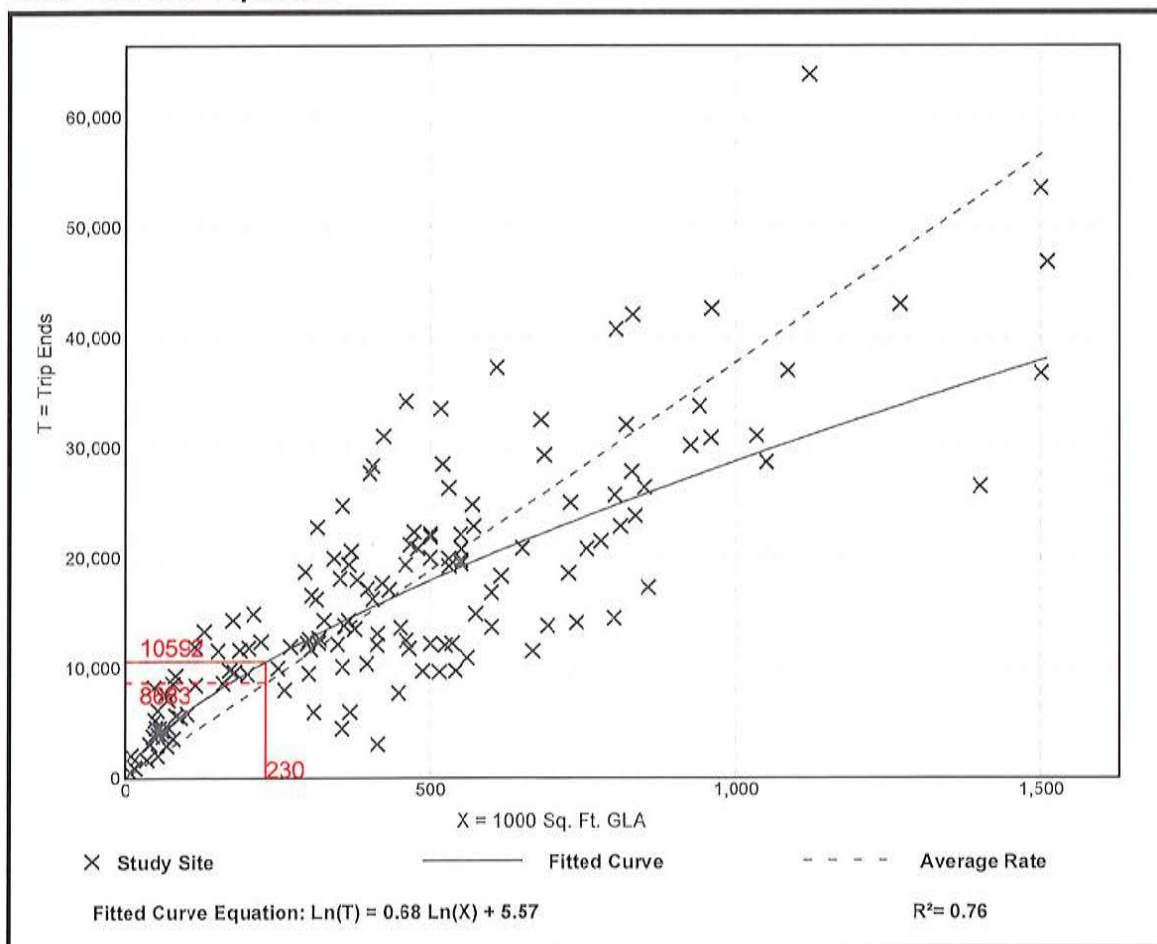
Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 147
Avg. 1000 Sq. Ft. GLA: 453
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
37.75	7.42 - 207.98	16.41

Data Plot and Equation



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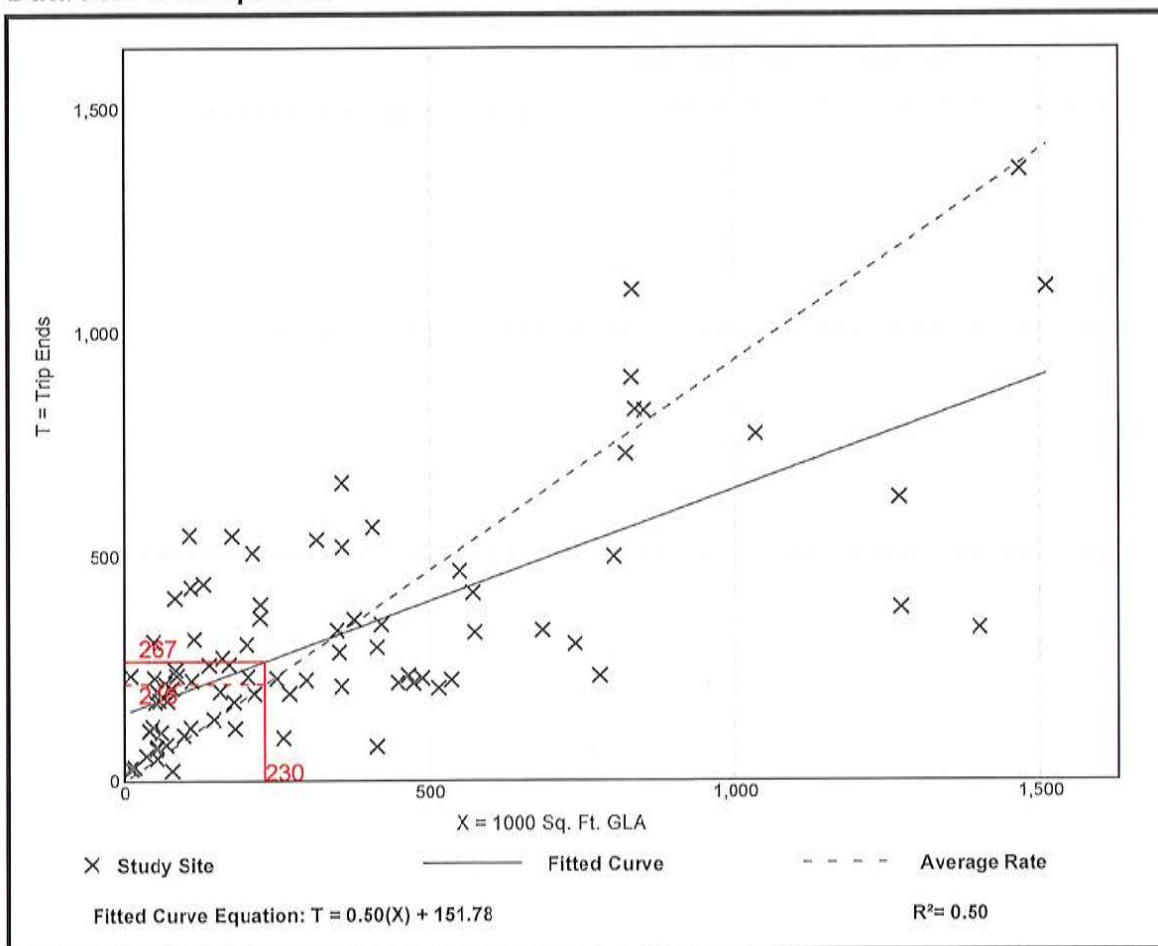
Shopping Center (820)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
 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: 84
 Avg. 1000 Sq. Ft. GLA: 351
 Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
0.94	0.18 - 23.74	0.87

Data Plot and Equation



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Using Avg. Rate = $230 \times 0.94 = \underline{216}$
 $(R^2 < 0.75)$

Shopping Center (820)

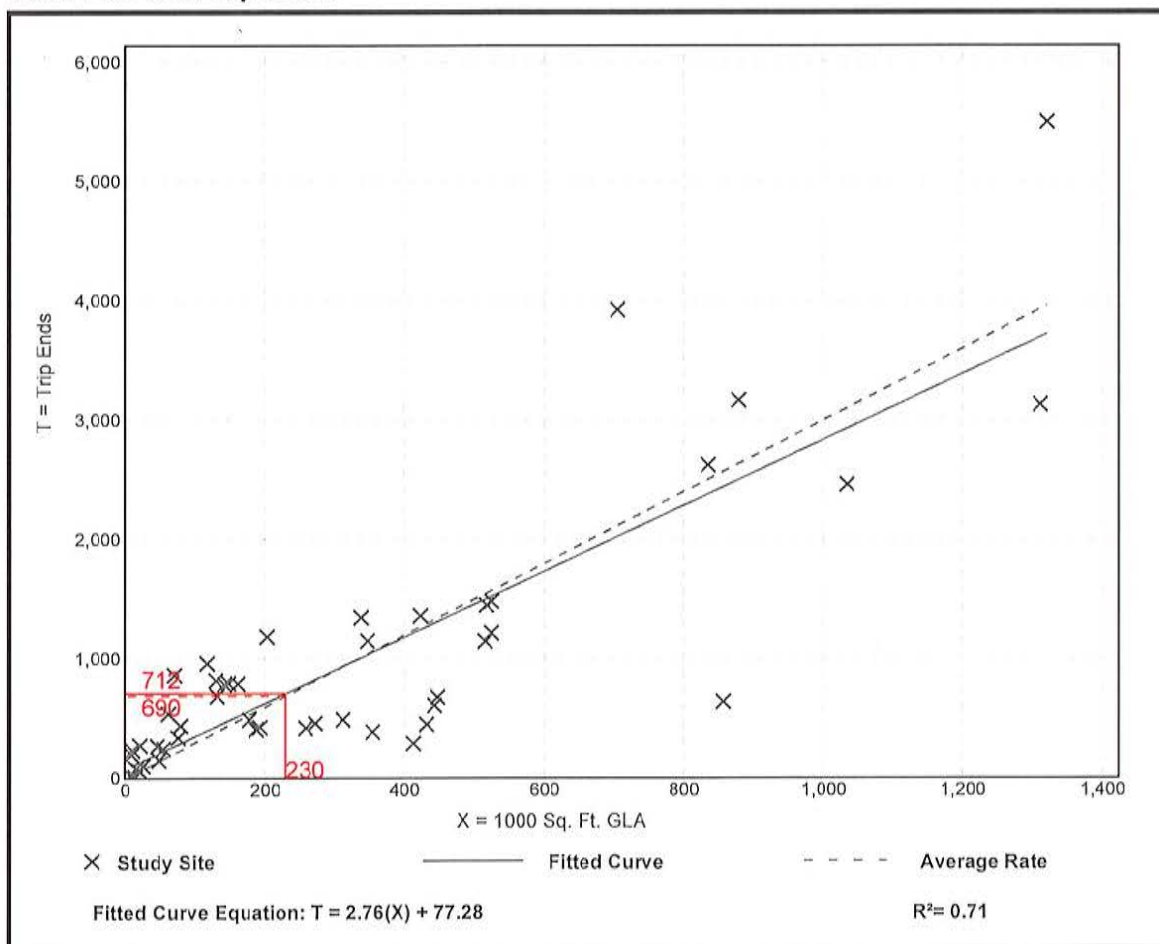
Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 47
Avg. 1000 Sq. Ft. GLA: 323
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.00	0.70 - 23.74	1.85

Data Plot and Equation



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Using Avg. Rate = $230 \times 3.00 = \underline{690}$
($R^2 < 0.75$)

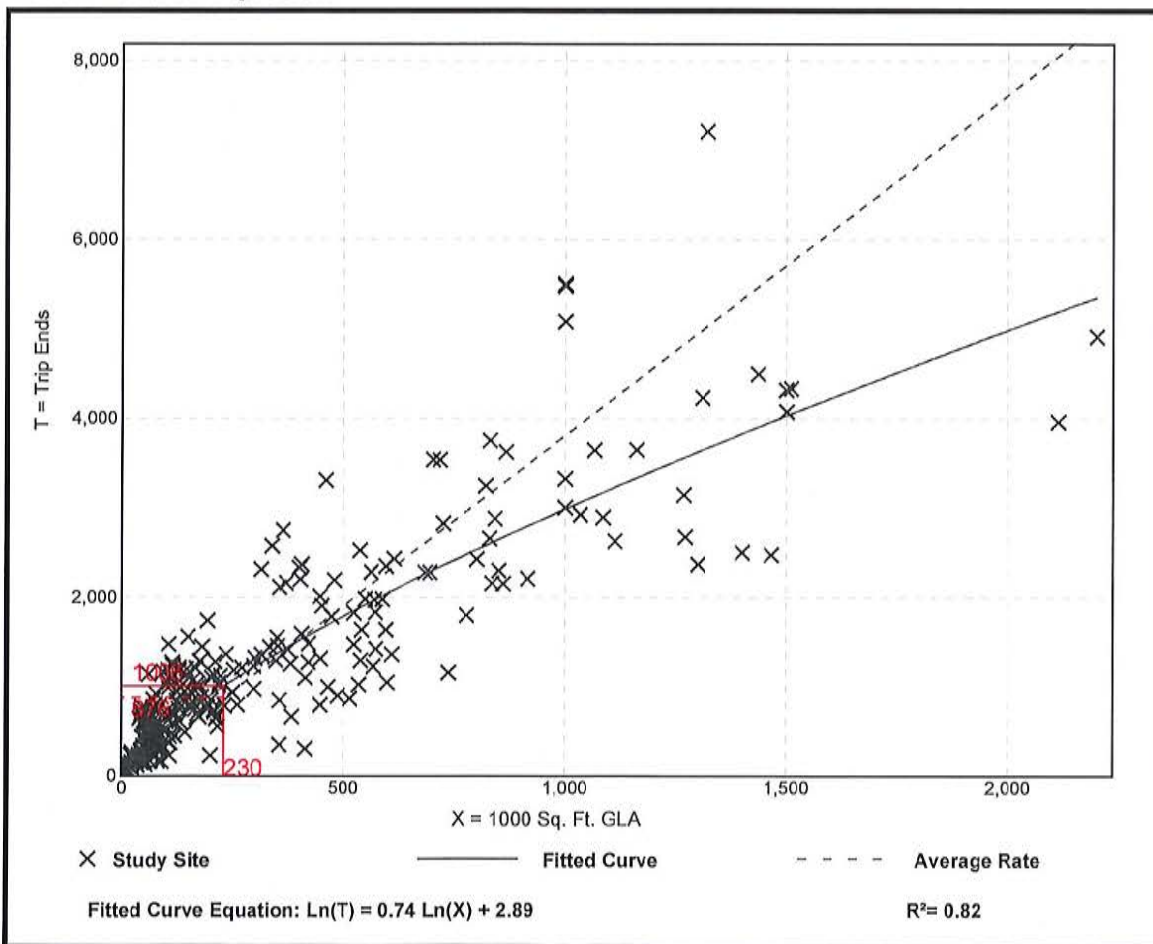
Shopping Center (820)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
 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: 261
 Avg. 1000 Sq. Ft. GLA: 327
 Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.81	0.74 - 18.69	2.04

Data Plot and Equation



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General Office Building (710)

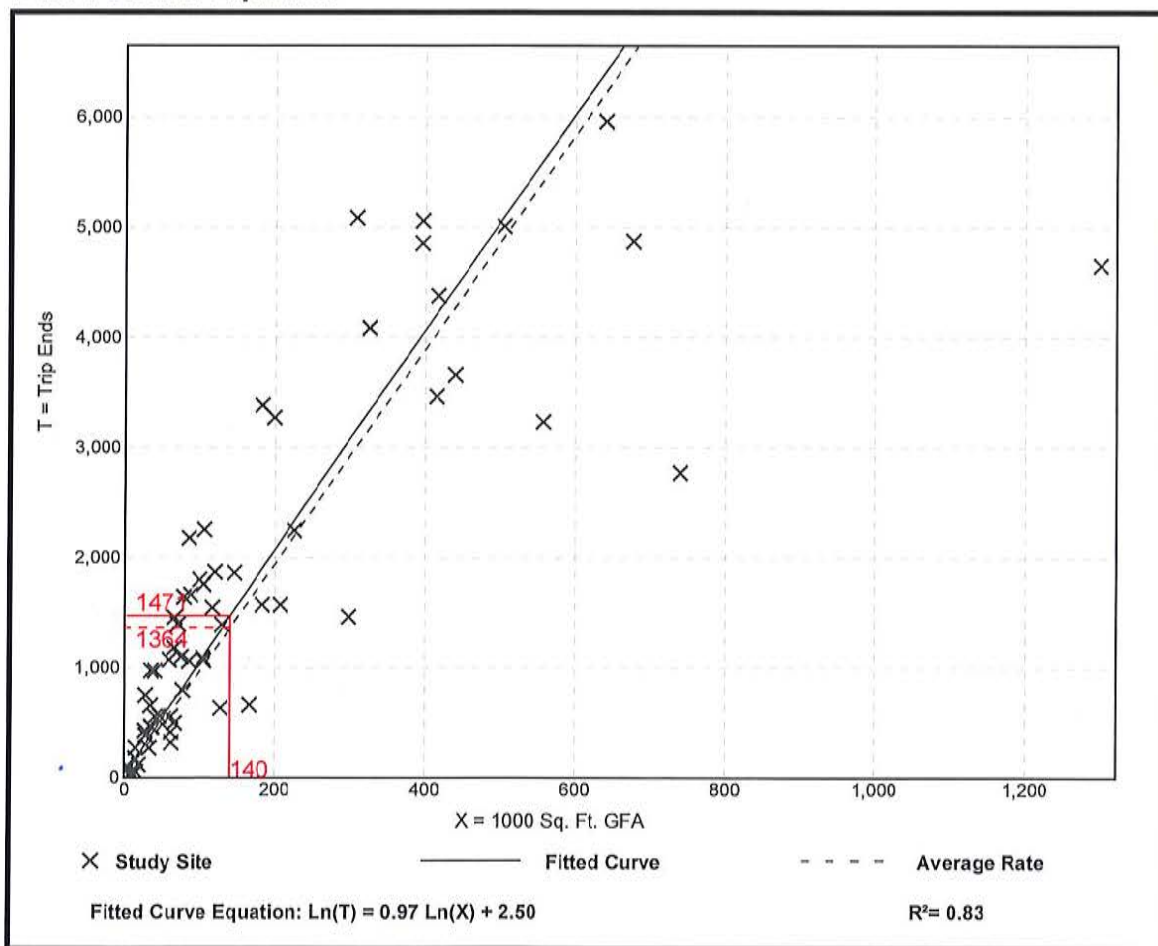
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

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



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- Being Replaced - For $X = 140,000$ sf, $T = 1471$
- Current Proposed - For $X = 4,000$ sf, $T = 47$
(Historic House)

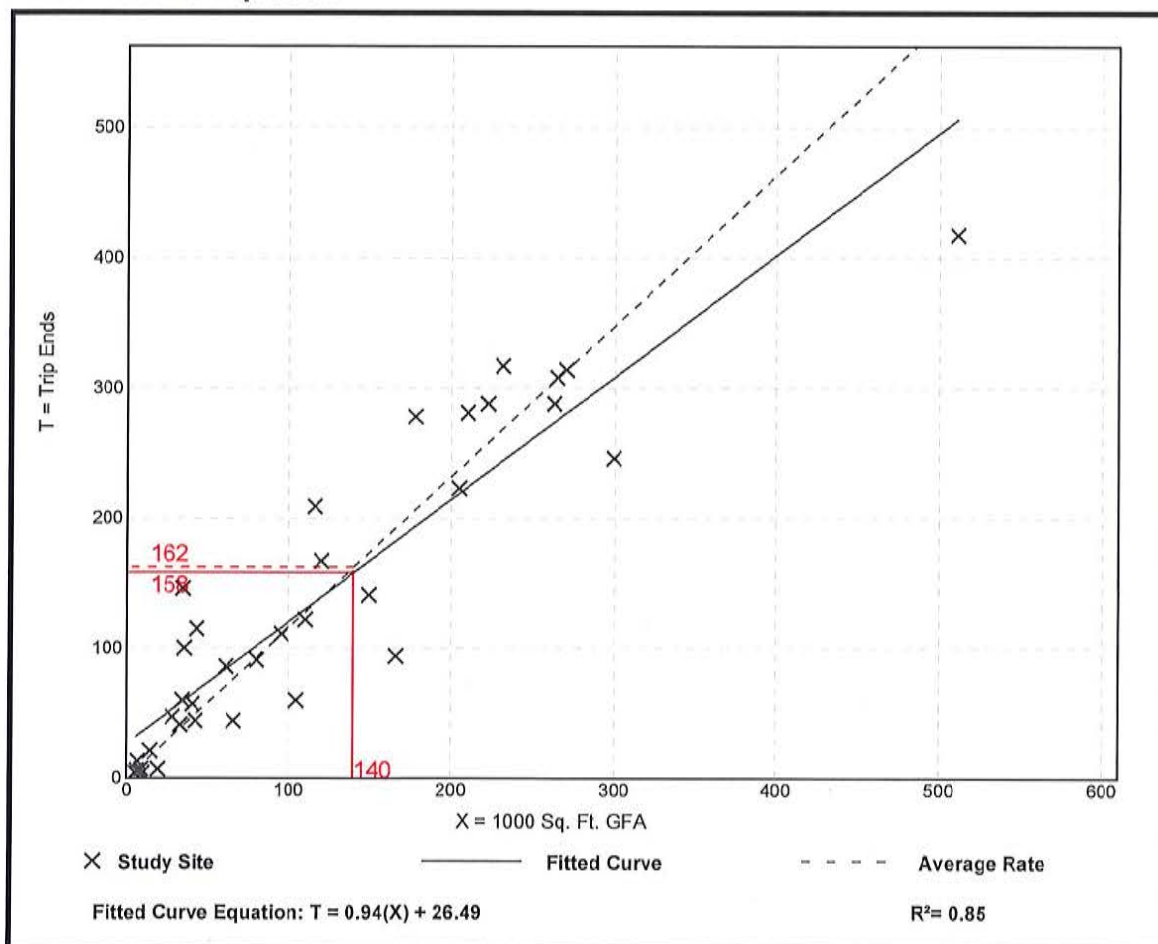
General Office Building (710)

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



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- Being Replaced - For $X = 140,000$ sf, $T = 158$
- Current Proposed - For $X = 4,000$ sf, $T = 30$
 (Historic House)

General Office Building (710)

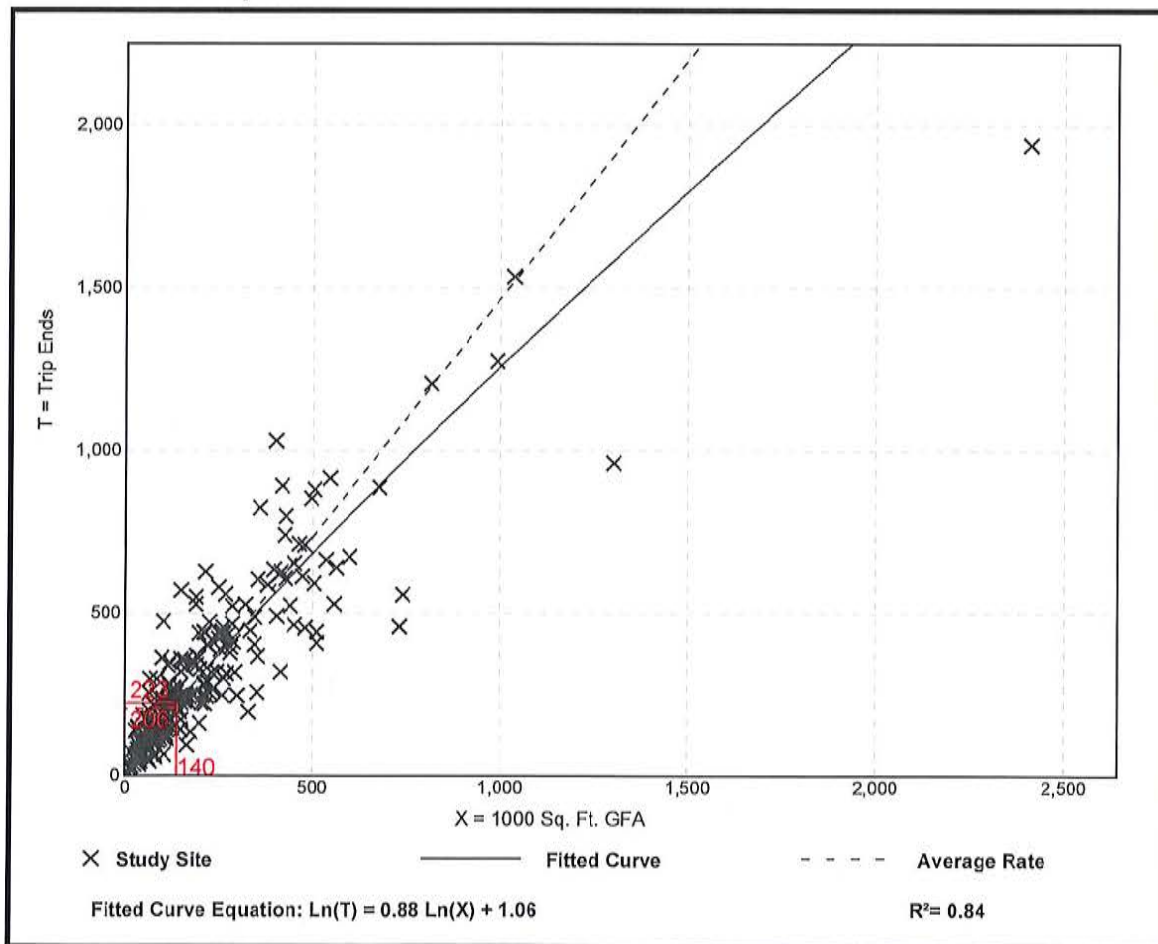
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 228
Avg. 1000 Sq. Ft. GFA: 209
Directional Distribution: 88% entering, 12% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.47	0.57 - 4.93	0.60

Data Plot and Equation



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- Being Replaced - For $X = 140,000 \text{ sf}$, $T = 223$
- Current Proposed - For $X = 4,000 \text{ sf}$, $T = 10$
(Historic House)

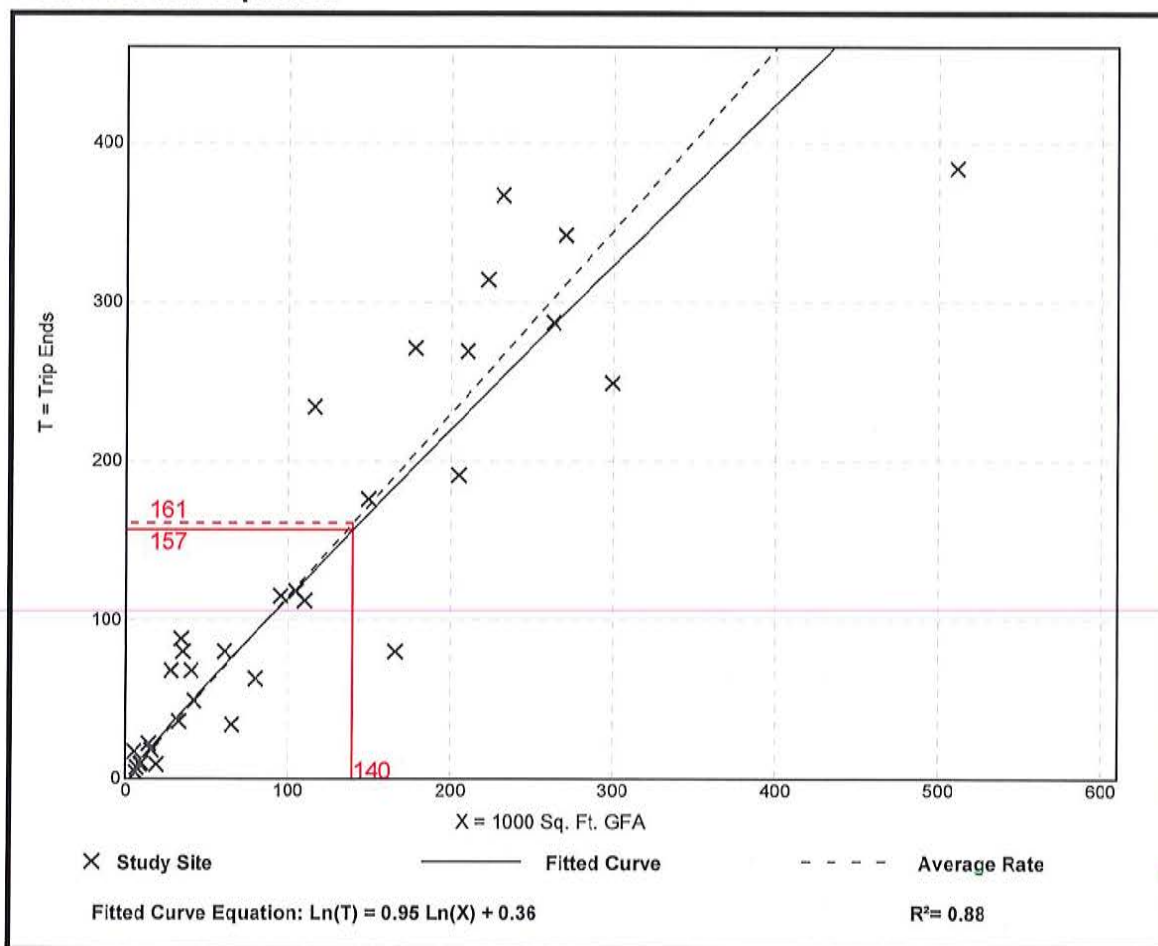
General Office Building (710)

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



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- Being Replaced - For $X = 140,000$, $T = 157$
- Current Proposed - For $X = 4,000$, $T = 5$
 (Historic House)