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June 27, 2019

Ms. Alicia McAuley
Sr. Project Coordinator
MBI Companies Inc.
299 N. Weisgarber Road
Knoxville, TN 37919

RE: Trip Generation Study Update Letter - 2019
Knoxville TVA Employees Credit Union – 7-G-19-UR
Northshore Town Center – Knoxville, Tennessee

Dear Ms. McAuley:

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 Northshore Town Center development in southwest Knoxville/Knox County. The current proposal is to construct a Knoxville TVA Employees Credit Union branch facility on this site. This is consistent with the land use proposed in both the original development traffic impact study (2011) and the most recently approved update (2018), both of which assumed a drive-in bank. The only difference is that the current proposal includes a 5,500 square foot building, as opposed to the 4,500 square foot building assumed by both the 2011 study and the 2018 update.

The original traffic impact study (2011) was based on trip generation estimates taken from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 8th Edition. The study update (2018), however, was based on the 9th Edition of this manual. The most current version of this document is the 10th Edition. For purposes of comparison, TABLE 1 below summarizes trip generation estimates for the project site looking at both 4,500 and 5,500 square foot buildings, utilizing the trip generation rates from both the most recently approved study update (2018 with 9th Edition rates) and the current edition of the Manual (10th Edition rates).

TABLE 1
Trip Generation Comparisons for Project Site (Drive-In Bank)
(ITE Trip Generation Manual 9th Edition vs. 10th Edition)

ITE Trip Generation Manual Edition	Weekday Total Trips By Building Size (4,500 sf / 5,500 sf)	AM Peak Hour Total Trips By Building Size (4,500 sf / 5,500 sf)	PM Peak Hour Total Trips By Building Size (4,500 sf / 5,500 sf)
9th Edition	667 / 815	54 / 66	110 / 134
10th Edition	450 / 573	43 / 52	92 / 112

As indicated in TABLE 1, the 10th Edition trip generation rates result in significantly lower trip estimates than the 9th Edition rates. This results primarily from the collection of data from additional bank locations. However, the differences in trip estimates between the two different building sizes are on the same order of magnitude between the two Editions. Therefore, for purposes of better comparison with the 2018 study update, which utilized the 9th Edition rates, these rates will also be utilized as the basis for this 2019 update.

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In order to better understand the broader impact of the proposed increase in building size of the proposed credit union branch facility, TABLE 2 below summarizes the trip generation estimates for the complete Northshore Town Center development, utilizing the ITE Trip Generation Manual 9th Edition rates. The left half of the table contains the trip estimates from the 2018 study update, which has been approved, and the right half contains the estimates that would result from the 2019 proposed change in building size.

TABLE 2
Trip Generation Comparisons for Complete Development
(Most Recent Approved Study Update-2018 vs. Currently Proposed Study Update-2019)

Development Zone	2018 Update Weekday Trips	2018 Update AM Peak Hour Trips	2018 Update PM Peak Hour Trips	2019 Update Weekday Trips	2019 Update AM Peak Hour Trips	2019 Update PM Peak Hour Trips
Zone A Trips	1,493	124	174	1,641	136	198
Zone B Trips	2,477	227	163	2,477	227	163
Zone C Trips	7,983	294	793	7,983	294	793
Zone D Trips	6,862	206	619	6,862	206	619
Zone E Trips	3,995	252	351	3,995	252	351
Total Trips	22,810	1,104	2,101	22,958	1,116	2,125
Increase from 2018 to 2019	-	-	-	148 (+0.65%)	12 (+1.1%)	24 (+1.1%)

As shown in TABLE 2, the anticipated increase in trips due to the proposed increase in building size amounts to only a little over one percent during both the AM and PM peak traffic hours. Given the location of the site, the additional traffic will mostly be seen along Town Center Boulevard. A table is attached which is the summary of capacity and level of service table from the 2018 study update. As can be seen from this table for 2020 projected traffic, the Town Center Boulevard intersections are all expected to operate at level of service "A" or "B" under full project buildout conditions, except for the Northshore Drive intersection, where level of service "D" is anticipated during the PM peak hour. Even here, the anticipated volume to capacity ratio (V/C) is 0.68. Thus it appears that the small increase in trips anticipated from the larger credit union facility will have little or no impact on intersection operations.

As indicated previously, the 2018 traffic study update, which has been approved, utilized the trip generation rates from the ITE Trip Generation Manual, 9th Edition. TABLE 3 shows how the resulting estimated trips for a 4,500 square foot building compare to the currently proposed 5,500 square foot building, if current 10th Edition rates were applied. As can be seen, the most critical AM and PM peak hour volumes show virtually no change. Thus, the change in trip rates from the 9th to 10th editions of the ITE Trip Generation Manual appears to essentially fully compensate for the proposed increase in building size.

TABLE 3
Trip Generation Comparisons for Project Site (Drive-In Bank)
(Most Recent Approved Study Update-2018 vs. Currently Proposed Study Update-2019)

ITE Trip Generation Manual Edition	Weekday Total Trips	AM Peak Hour Total Trips	PM Peak Hour Total Trips
2018 Study Update w/9th Edition Rates (4,500 sf building)	667	54	110
2019 Study Update w/10th Edition Rates (5,500 sf building)	573	52	112

In summary, development of the proposed 5,500 square foot Knoxville TVA Employees Credit Union branch facility within the Northshore Town Center development is anticipated to fit within the trip generation assumptions that were used with the currently approved traffic impact study update (2018). Thus it remains reasonable to conclude that the recommendations of this traffic study update will continue to be valid, and that no additional traffic study for the project site will be necessary.

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

Sincerely,

Alan L. Childers

Alan Childers, P.E.

cc: Becky Bottoms
CCI Project No.: 00590-0011

Attachments

Table from
2018 Study Update

TABLE 5
SUMMARY OF CAPACITY AND LEVEL OF SERVICE

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	2018 EXISTING TRAFFIC V/C	2018 EXISTING TRAFFIC DELAY	2018 EXISTING TRAFFIC LOS	2020 BACKGROUND TRAFFIC V/C	2020 BACKGROUND TRAFFIC DELAY	2020 BACKGROUND TRAFFIC LOS	2020 PROJECTED TRAFFIC V/C	2020 PROJECTED TRAFFIC DELAY	2020 PROJECTED TRAFFIC LOS
Northshore Dr.	SIGNAL	AM	0.22	10.1	B	0.38	14.8	B	0.38	14.9	B
at Town Center Blvd.		PM	0.44	17.5	B	0.66	39.2	D	0.68	46.0	D
Town Center Blvd.	STOP	AM	0.01 / 0.01	8.8 / 10.0	A / A	0.07 / 0.15	9.9 / 15.6	A / C	0.07 / 0.15	9.9 / 16.1	A / C
at S. Shopping Ctr. Access	EB/WB	PM	0.10 / 0.02	10.3 / 15.1	B / C	0.39 / 0.79	15.7 / 113.8	C / F	0.39 / 0.82	16.1 / 124.9	C / F
Town Center Blvd.	SIGNAL	AM	0.11	4.5	A	0.19	9.8	A	0.20	9.7	A
at N. Shopping Ctr. Access		PM	0.33	11.4	B	0.53	15.1	B	0.55	15.1	B
Town Center Blvd.	ROUNDABOUT	AM	---	4.5	A	---	5.0	A	---	5.1	A
at Boardwalk Blvd.		PM	---	4.6	A	---	7.4	A	---	9.1	A
Northshore Dr.	SIGNAL	AM	0.72	23.9	C	0.81	70.0	E	0.82	69.7	E
at Thunderhead Rd.		PM	0.53	14.2	B	0.73	62.8	E	0.73	62.7	E
Mitigation	*SIGNAL*	*AM*				*0.83*	*23.4*	*C*	*0.84*	*23.6*	*C*
Optimize Splits		*PM*				*0.73*	*21.5*	*C*	*0.74*	*22.0*	*C*
Mitigation	*SIGNAL*	*AM*							*0.65*	*20.2*	*C*
SB Double Left-Turn		*PM*							*0.61*	*17.2*	*B*
Mitigation	*SIGNAL*	*AM*							*0.77*	*20.4*	*C*
4-Lane Northshore		*PM*							*0.55*	*15.8*	*B*
Mitigation	*SIGNAL*	*AM*							*0.77*	*20.4*	*C*
2011 Study Recommended Improvement		*PM*							*0.40*	*14.3*	*B*
Thunderhead Rd.	STOP	AM	0.22 / 0.55	73.8 / 22.7	F / C	1.21 / 0.76	409.8 / 38.3	F / E	1.39 / 0.77	485.4 / 39.9	F / E
at Boardwalk Blvd.	WBL/WBR	PM	0.13 / 0.05	10.0 / 8.7	A / A	0.38 / 0.21	18.6 / 10.7	C / B	0.41 / 0.22	19.3 / 10.7	C / B
Boardwalk Blvd.	STOP	AM				0.03 / 0.04	10.4 / 11.2	B / B	0.03 / 0.06	10.6 / 11.6	B / B
at Site Access	NB/SB	PM				0.09 / 0.20	11.3 / 13.9	B / B	0.09 / 0.28	11.6 / 15.1	B / C

Note: Average vehicle delay estimated in seconds. STOP control analyses presented by minor approach.

Table from 2018 Study Update

proposed medical land use will generate additional daily trips but is not significant relative to the buildout of Northshore Town Center.

5488 sf

TABLE 1 NORTHSHORE TOWN CENTER TRIP GENERATION FOR BUILDOUT

ZONE	LAND USE	L.U.C	SIZE	DAILY TRAFFIC	AM PEAK ENTER	AM PEAK EXIT	AM PEAK TOTAL	PM PEAK ENTER	PM PEAK EXIT	PM PEAK TOTAL
	DISCOUNT STORE (1)	*815*	*135,320*			*EXISTING TRAFFIC*				
	H.T. RESTAURANT	932	6,500	826	39	32	70	38	26	64
	DRIVE-IN BANK	912	4,500	667	31	23	54	55	55	110
A	SUB-TOTAL		146,320	1,493	70	55	124	93	81	174
	Internal Trips	*10%*		*149*	*7*	*6*	*12*	*9*	*8*	*17*
	Pass-By Trips	*20%*		*299*	*14*	*11*	*25*	*19*	*16*	*35*
	Primary Trips			*1,045*	*49*	*39*	*87*	*65*	*57*	*122*
	SUPERMARKET (1)	*850*	*54,000*			*EXISTING TRAFFIC*				
	SPECIAL RETAIL (1)	*814*	*25,900*			*EXISTING TRAFFIC*				
	FASTFOOD RESTAURANT (2)	*934*	*4,992*	*2,477*	*116*	*111*	*227*	*85*	*78*	*163*
	DRIVE-IN BANK	*912*	*4,500*			*EXISTING TRAFFIC*				
B	SUB-TOTAL		89,392	2,477	116	111	227	85	78	163
	Internal Trips	*10%*		*248*	*12*	*11*	*23*	*9*	*8*	*16*
	Pass-By Trips	*20%*		*495*	*23*	*22*	*45*	*17*	*16*	*33*
	Primary Trips			*1,734*	*81*	*78*	*159*	*60*	*55*	*114*
	OFFICE BLDG.(1)	*710*	*57,500*			*EXISTING TRAFFIC*				
	SHOPPING CENTER	820	87,000	6,203	89	54	143	262	284	546
	H.T. RESTAURANT	932	14,000	1,780	83	68	151	83	55	138
	MULTIPLEX THEATER	445	8		-	-	-	49	60	109
C	SUB-TOTAL		158,500	7,983	172	122	294	394	399	793
	Internal Trips	*10%*		*798*	*17*	*12*	*29*	*39*	*40*	*79*
	Pass-By Trips	*25%*		*1,996*	*43*	*31*	*74*	*99*	*100*	*198*
	Primary Trips			*5,189*	*112*	*79*	*191*	*256*	*259*	*516*
	KNOX CO MULTI-FAMILY	225	24	265	3	11	14	14	12	26
	SHOPPING CENTER	820	79,100	5,831	84	51	135	246	266	512
	MEDICAL OFFICE (2)	*720*	*24,000*	*766*	*45*	*12*	*57*	*23*	*58*	*81*
D	SUB-TOTAL		103,100	6,862	132	74	206	283	336	619
	Internal Trips	*10%*		*686*	*13*	*7*	*21*	*28*	*34*	*62*
	Pass-By Trips	*30%*		*2,058*	*40*	*22*	*62*	*85*	*101*	*186*
	Primary Trips			*4,117*	*79*	*44*	*124*	*170*	*201*	*371*
	SINGLE FAMILY	210	120	1,242	23	70	94	78	46	124
	KNOX CO MULTI-FAMILY	225	325	2,753	35	124	159	125	102	227
	SUB-TOTAL		445	3,995	58	194	252	203	148	351
E	Internal Trips			-	-	-	-	-	-	-
	Pass-By Trips			-	-	-	-	-	-	-
	Primary Trips			3,995	58	194	252	203	148	351
	TOTAL TRIP GENERATION			22,810	549	556	1,104	1,059	1,042	2,101
	TOTAL PRIMARY TRIP GENERATION			**16,080**	**380**	**434**	**813**	**754**	**720**	**1,474**

REFERENCE: Trip Generation, 9th Edition, published by the Institute of Transportation Engineers.

NOTES:

(1) Developed land use reflected in current traffic.

(2) Revised Land Use from the March 2011 Northshore Town Center traffic study.

Drive-in Bank
(912)

9th Edition

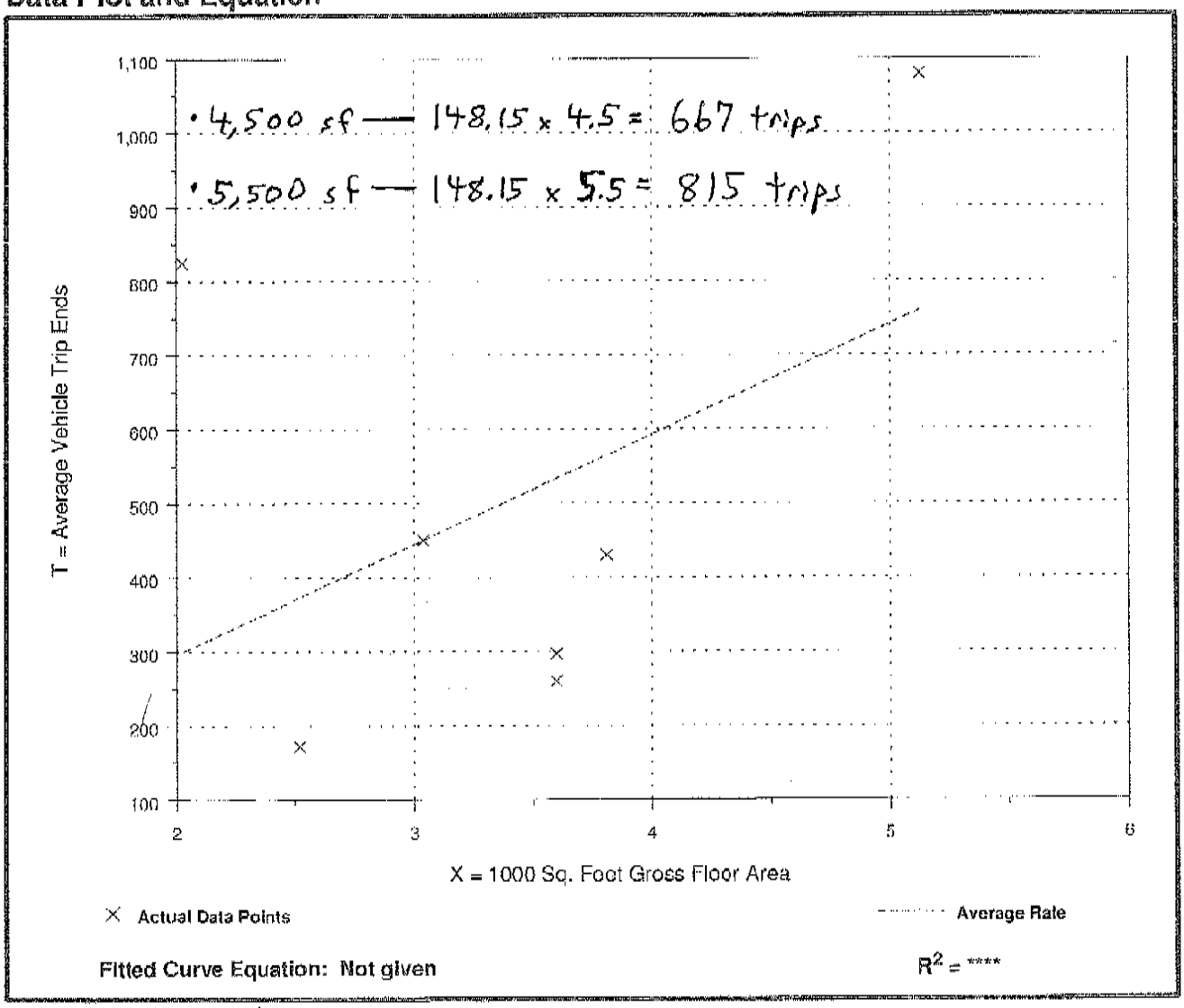
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday

Number of Studies: 7
Average 1000 Sq. Feet GFA: 3
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
148.15	68.23 - 407.21	97.36

Data Plot and Equation



Drive-in Bank
(912)

9th Edition

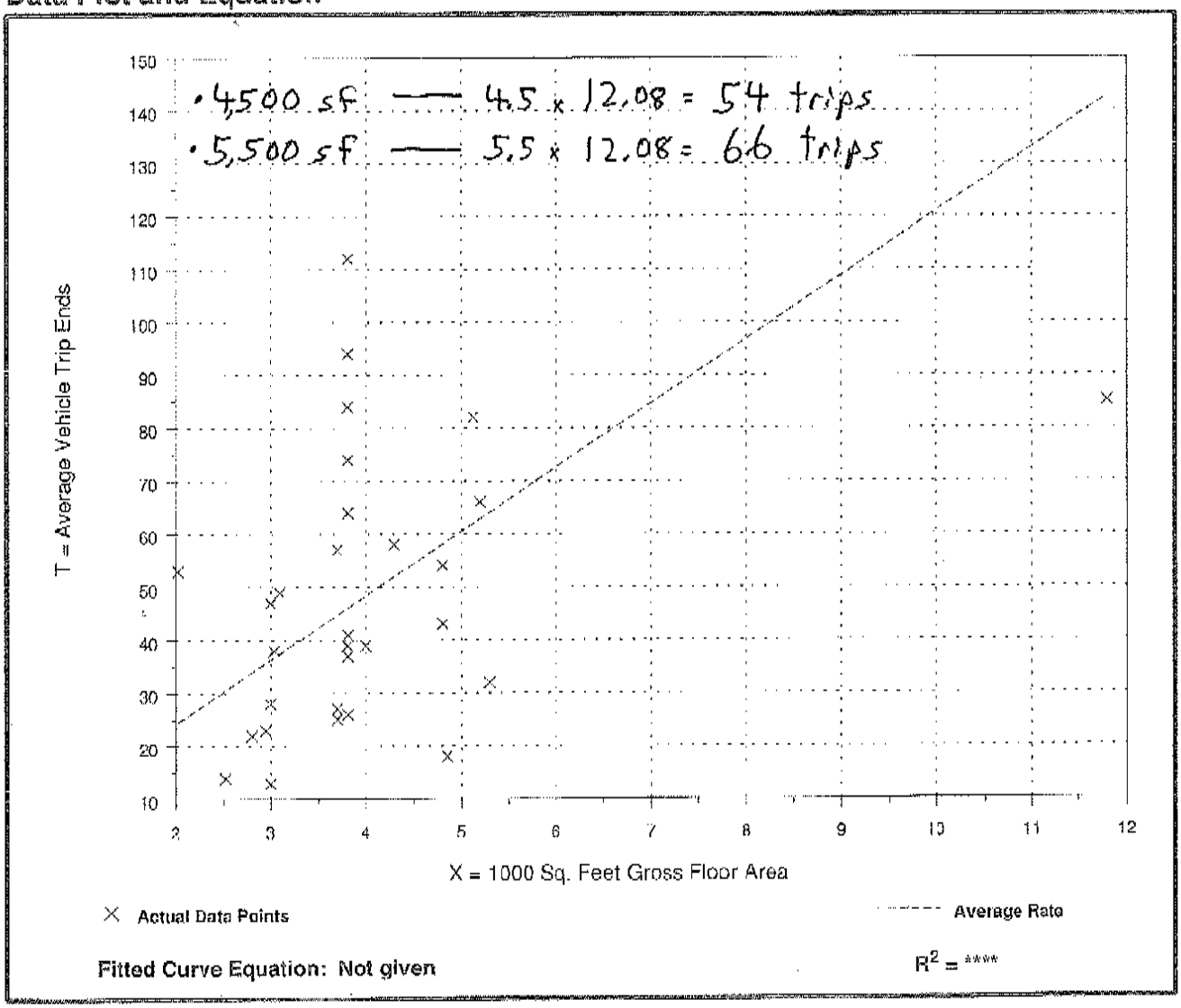
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 31
Average 1000 Sq. Feet GFA: 4
Directional Distribution: 57% entering, 43% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
12.08	3.71 - 29.40	6.88

Data Plot and Equation



Fitted Curve Equation: Not given

R^2 = ****

Drive-in Bank
(912)

9th Edition

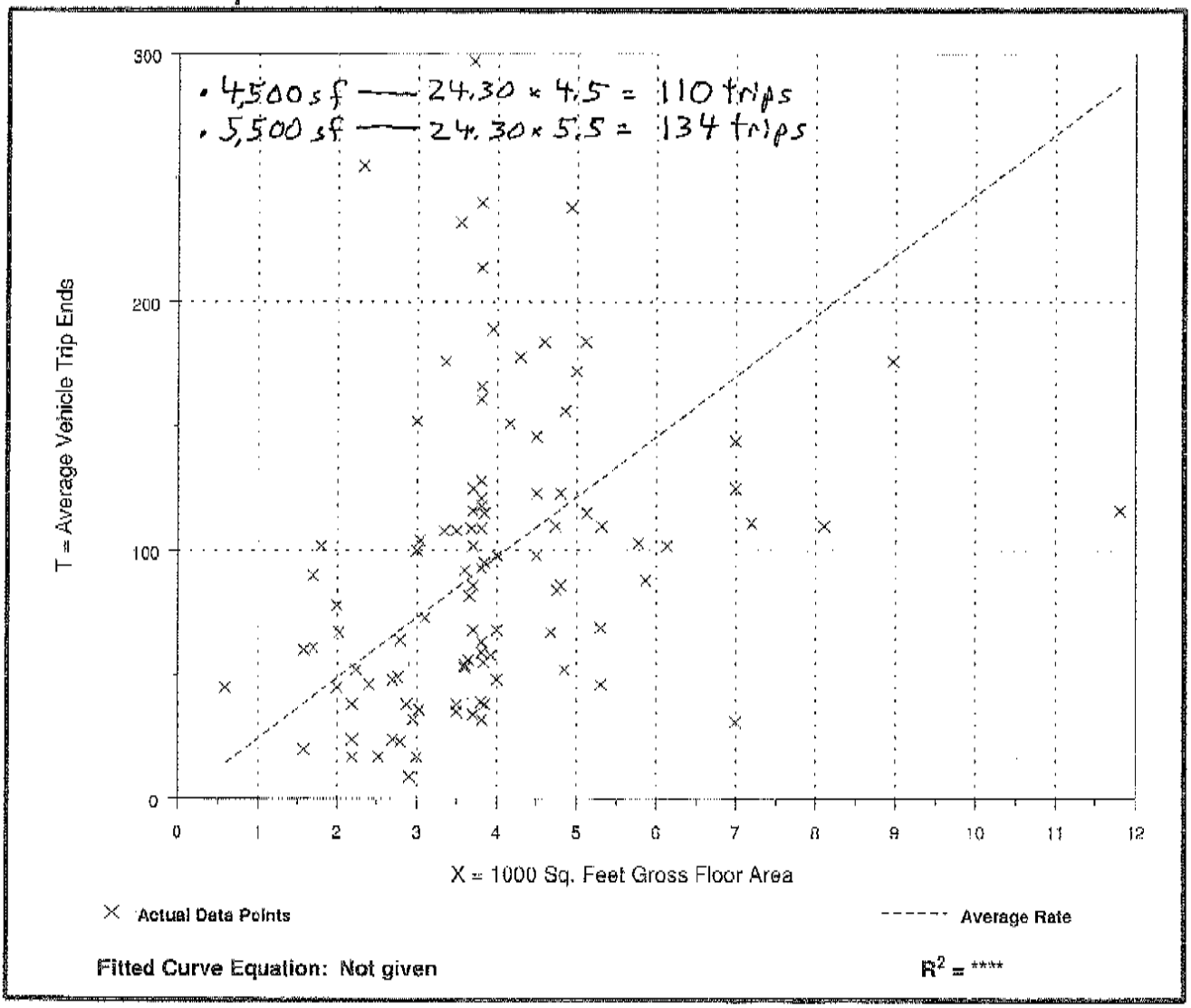
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 102
Average 1000 Sq. Feet GFA: 4
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
24.30	3.09 - 109.68	16.24

Data Plot and Equation



Fitted Curve Equation: Not given

R^2 = ****

Drive-in Bank
(912)

10th Edition
4,500 sf building

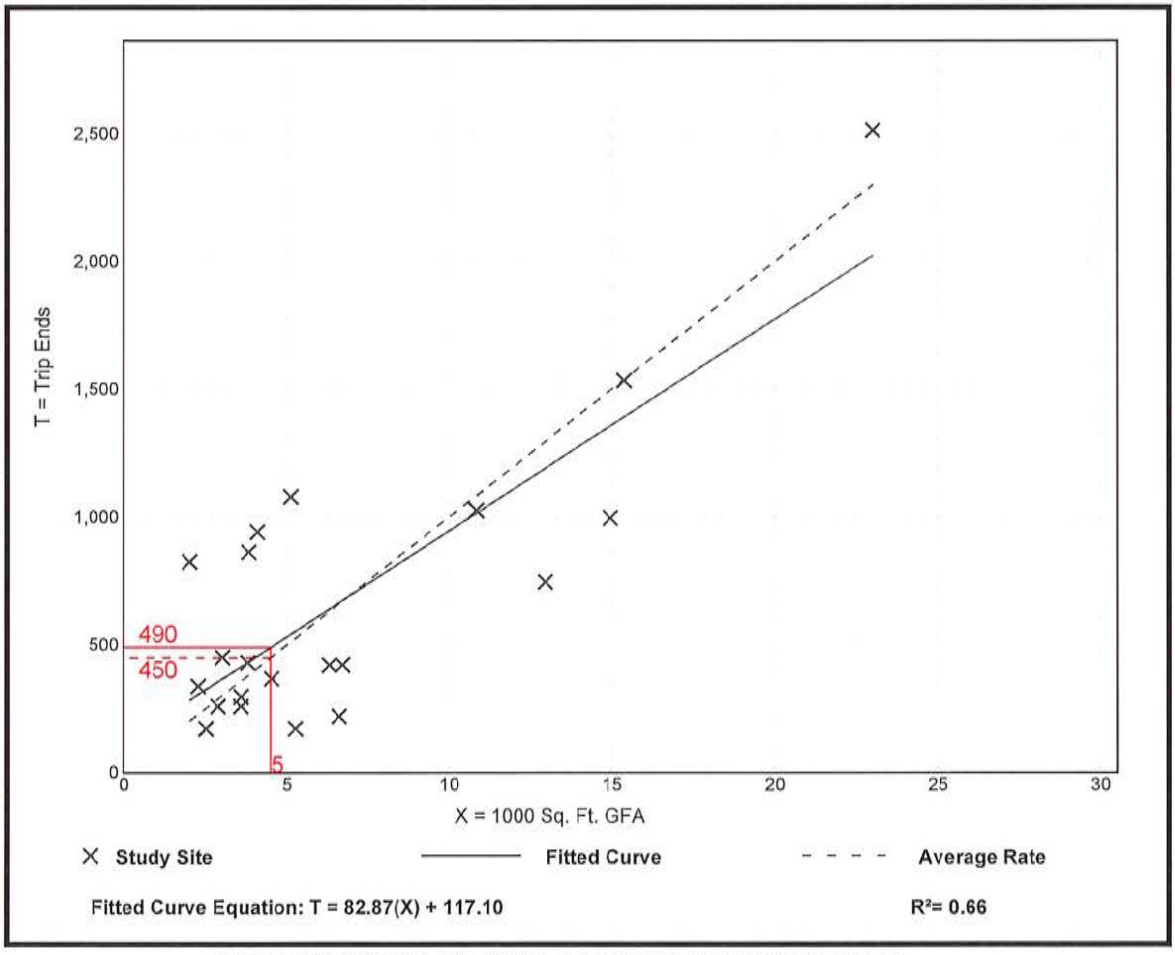
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 21
Avg. 1000 Sq. Ft. GFA: 7
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
100.03	32.67 - 408.42	61.61

Data Plot and Equation



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Drive-in Bank
(912)

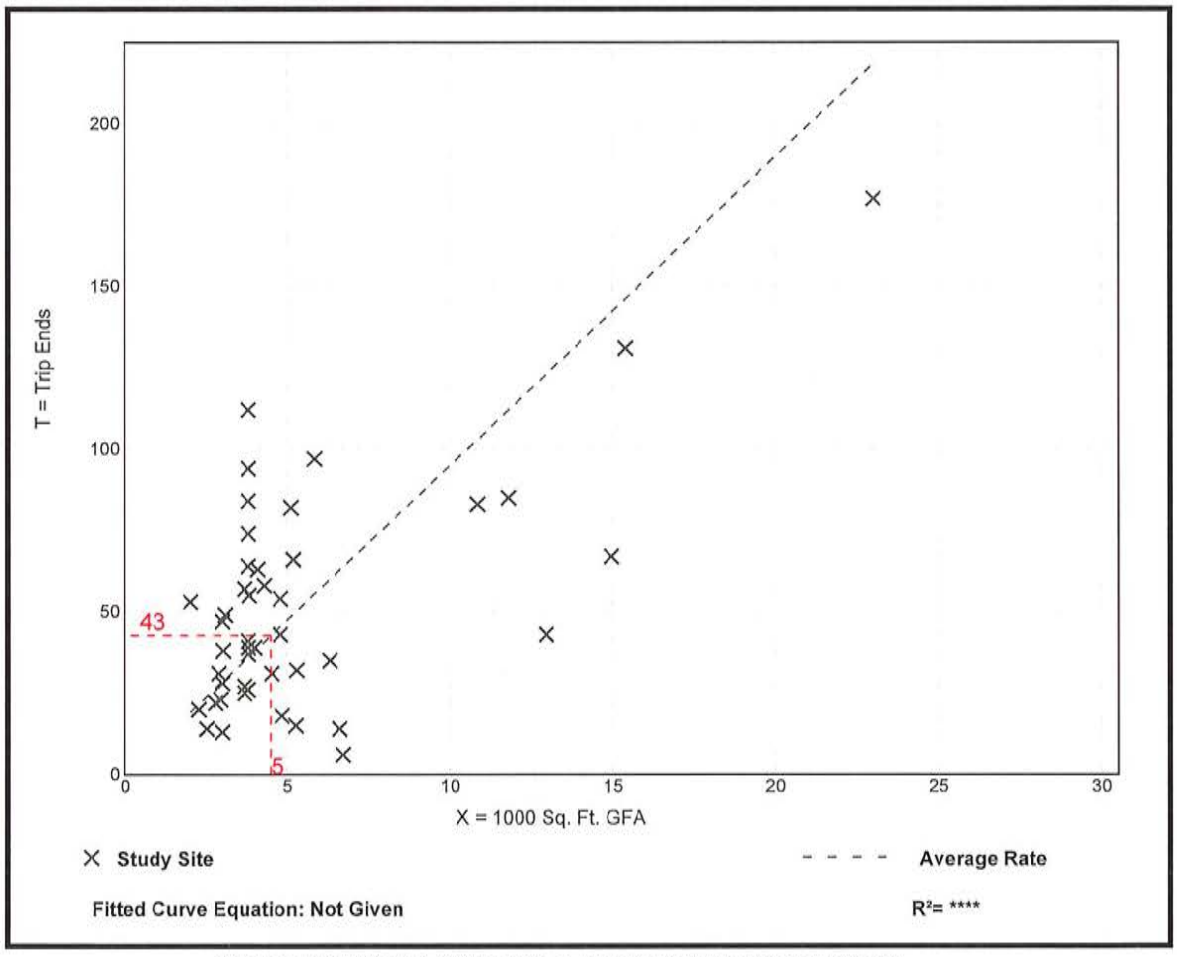
10th Edition
4,500 sf building

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: 46
Avg. 1000 Sq. Ft. GFA: 5
Directional Distribution: 58% entering, 42% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.50	0.89 - 29.47	5.85

Data Plot and Equation



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Drive-in Bank
(912)

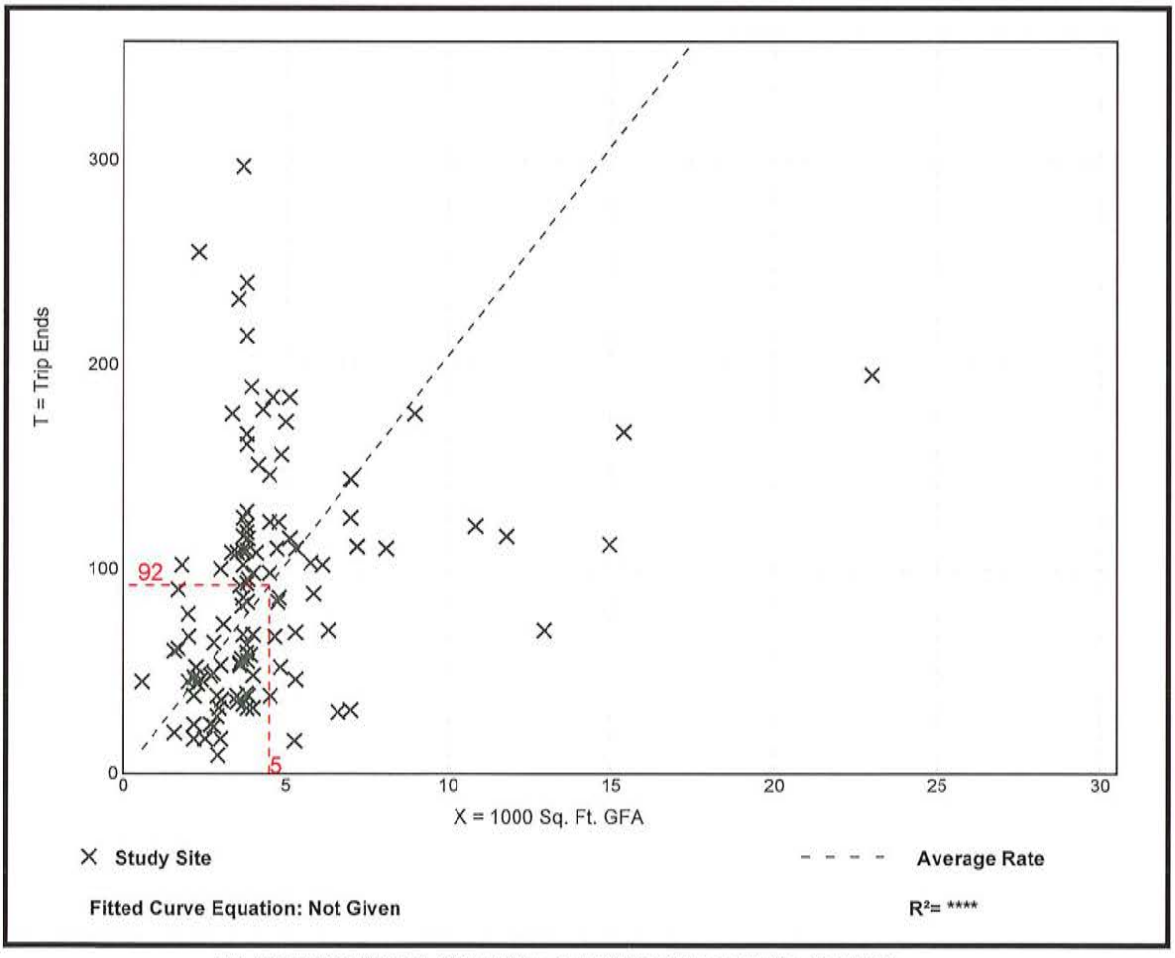
10th Edition
4,500 sf building

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: 115
Avg. 1000 Sq. Ft. GFA: 4
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
20.45	3.04 - 109.91	15.01

Data Plot and Equation



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Drive-in Bank
(912)

10th Edition
5,500 sf building

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

Setting/Location: General Urban/Suburban
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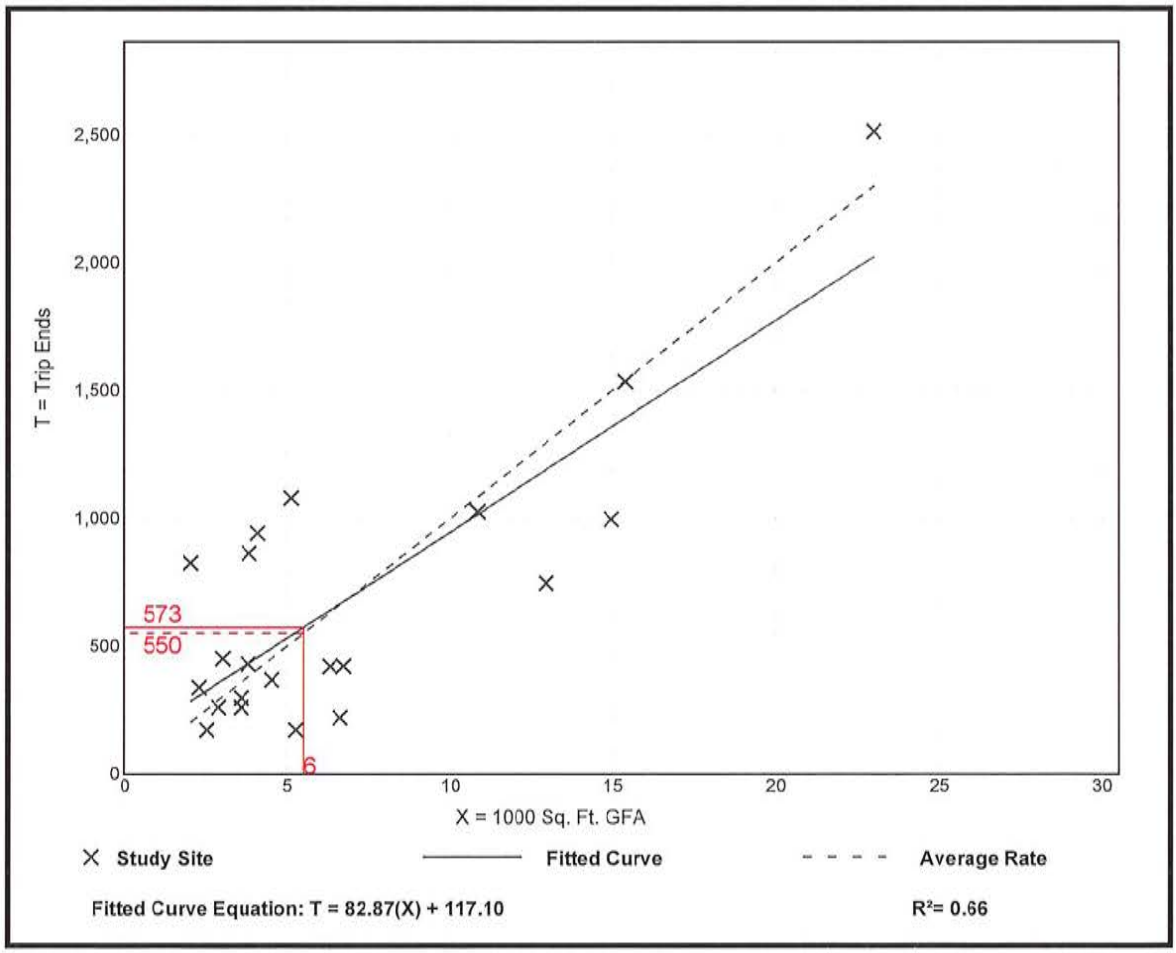

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Drive-in Bank
(912)

10th Edition
5,500 sf building

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Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
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Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
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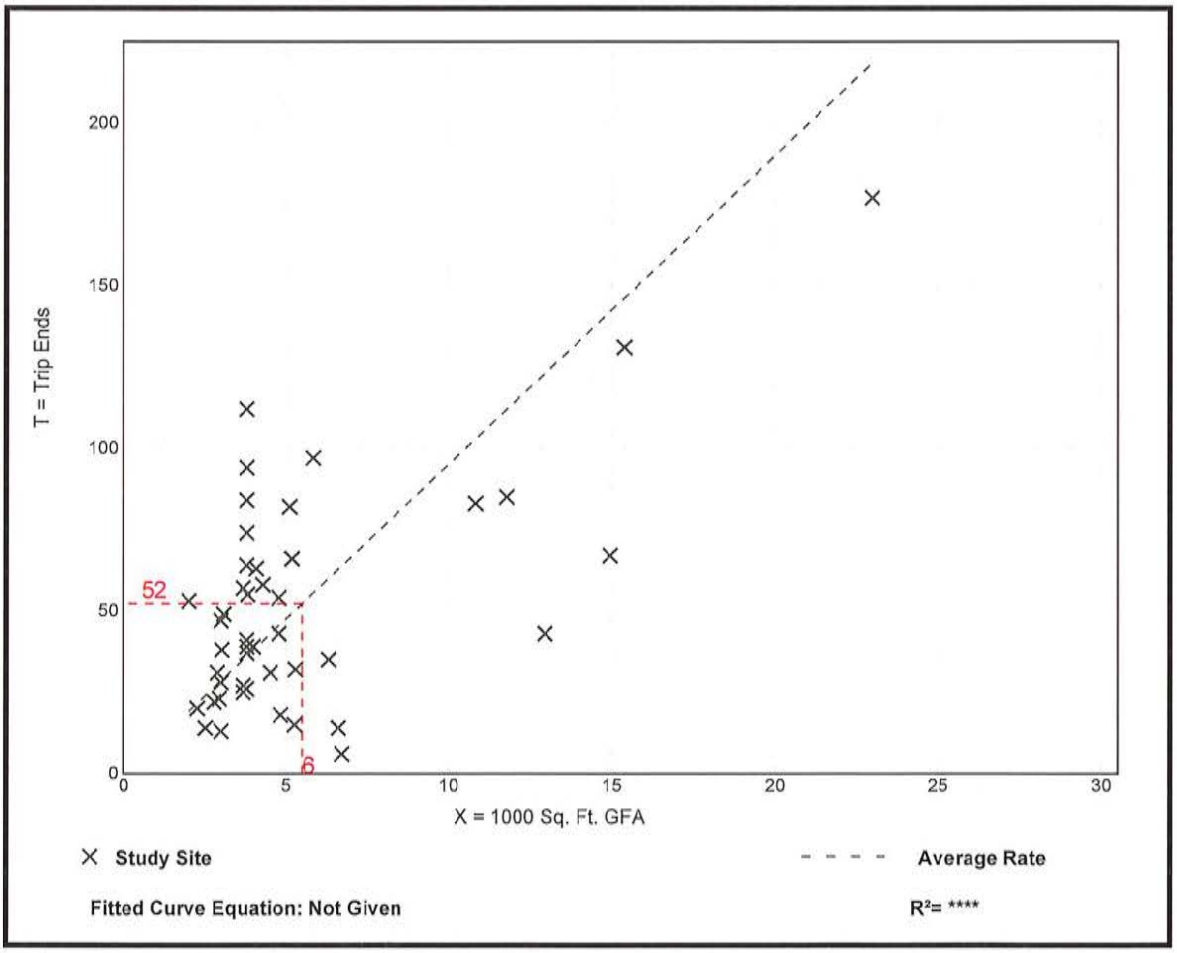
Data Plot and Equation



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Drive-in Bank
(912)

10th Edition
5,500 sf building

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: 115
Avg. 1000 Sq. Ft. GFA: 4
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
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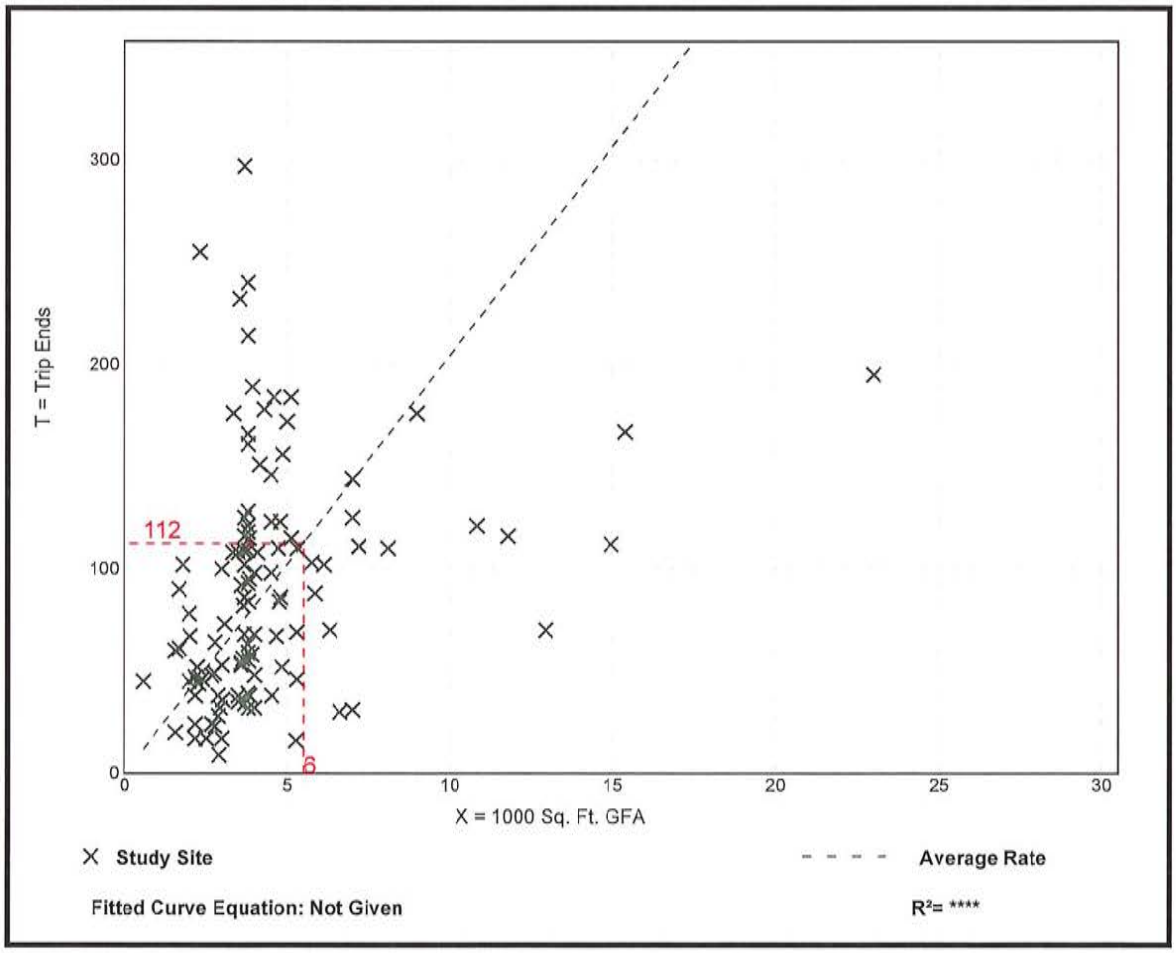
Data Plot and Equation



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