Memorandum

To: Zachary Hallock
Transportation Planner
Town of Carrboro

Date: October 5, 2020

Project #: 39219.00

From: Andrew Topp, PE, PTOE

Re: 201 N. Greensboro Street Trip Generation Analysis
Carrboro NC

VHB Engineering NC, P.C. was retained by Beacon Properties Group to assist in addressing the town's comments regarding a proposed mixed-use development in Carrboro, NC. The site is located at the northeast corner of the N. Greensboro Street (SR 1772) and W. Weaver Street intersection. The development will consist of a three-story building with one floor of mixed restaurant and retail space totaling 5,395 square feet, and two floors of office space totaling 10,790 square feet. The proposed site will have one driveway accessing Center Street and one driveway accessing W. Weaver Street. The responses to the town comments are listed below.

Comment #5

> *As allowed in LUO section 15-292 Flexibility in Administration Required, applicant is requesting a parking space reduction. As such, a parking reduction justification letter should be added with the following information: what is being done to enhance multimodal (bike/ped/transit) accessibility to the site, what is being done within the site to encourage employees/patrons to use multimodal transportation, how/if the different proposed uses have different parking demand peaks.*

The proposed site's mix of uses and location, in downtown Carrboro, with significant alternatives provided in terms of parking and modes of transportation, led to the decision to request a parking space reduction. The proposed development is located within walking and biking distance of many residential areas, as well as public parking lots, which fosters a greater amount of pedestrian traffic to the site. The site will also encourage walking by enhancing an existing sidewalk on W. Weaver Street and N. Greensboro Street, widening it from 5 feet to 8 feet in front of the proposed building. In addition, the wheelchair curb ramp at the N. Greensboro Street at W. Weaver Street intersection will be improved, bringing it up to ADA standards. The inadequate sidewalk crossing the N. Greensboro Street driveway will be improved when the driveway is closed, by adding a new curb, eight-foot sidewalk and two adjacent tree grates which should improve aesthetics, shade and help calm traffic along Greensboro Street.

Additionally, there are a number of public transit stops along the roadways adjacent to and near the proposed site. This includes the Chapel Hill Transit CW Route which travels along the site's W. Weaver Street frontage, stopping at the Weaver Street Market and Carrboro Century Center one block east of the site. The site will also add several bike racks, providing space above and beyond the Town requirement. These factors contribute to an overall reduction in the required parking provided by the site itself.

Based on a review of the hourly parking occupancy distribution percentages listed in the Institute of Traffic Engineers Parking Generation Manual, 5th Edition, the occupancy percentages vary between the office and retail/restaurant uses. As shown in Table 1 below, the maximum office parking occurs mid-morning, the retail peaks at 1PM, and the restaurant peaks in the evening once the office spaces are mostly open. Detailed summaries are also contained at the end of this memorandum.

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Table 1: ITE Parking Distribution

Hour Beginning	710 Office % Occupied	820 Retail % Occupied	932 Restaurant % Occupied
12am-4am	-	-	-
5am	-	-	-
6am	-	-	-
7am	13%	-	-
8am	48%	15%	-
9am	88%	32%	-
10am	100%	54%	26%
11am	100%	71%	43%
12pm	85%	99%	95%
1pm	84%	100%	95%
2pm	93%	90%	49%
3pm	94%	83%	39%
4pm	85%	81%	37%
5pm	58%	84%	62%
6pm	20%	86%	99%
7pm	11%	80%	100%
8pm	-	63%	83%
9pm	-	42%	51%
10pm	-	15%	28%
11pm	-	-	-

Comment #6

The bike parking provided does not meet the minimum requirement as calculated by use (LUO Section 15-291(h)): Use 2.1: minimum 5 spaces, use 3.1: minimum 5 spaces, use 8.1: minimum 5 spaces, there is no minimum for use 5.0. The total required bicycle parking is 15 spaces and only 14 are provided.

As detailed on the cover of the site plan, one bicycle space is required for the retail use, three spaces are required for the office use and three spaces are required for the restaurant use. To help encourage bicycling, fourteen spaces are provided on site, doubling the required number.

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Comment #8

What assessment has been done of the driveway access onto W Weaver Street? Left turns out of this site could conflict with left turns out of the public parking driveway on the south side of W Weaver St, posing a safety hazard. Consider restricting left turns out of the driveway, or potentially restricting left turns entirely by making the driveway a right-in/right-out access with left turns occurring to/from Center Street.

Preliminary analysis of the site shows that concerns at this point should be minimal due to several factors including good sight distance at the site driveways (10 ft x 70 ft sight triangles illustrated on latest plan), the presence of a nearby signal to provide adequate gaps in traffic flow, and there being multiple access points for each site to provide alternative entrances/exits in the event of heavier congestion. Lefts in can store briefly in the existing left-turn lane and lefts out would stack within their own driveway, which would not obstruct mainline vehicles along W. Weaver Street. Lefts out should not experience high delay exiting during most times during the week, however if a left-turn was difficult during a peak hour when a stopped queue was present along W. Weaver Street, they would likely use the Center Street driveway as an alternative.

A westbound left-turning movement into the driveway to the south across W. Weaver Street is likely very rare. Drivers originating from the north on N. Greensboro Street would likely stay on N. Greensboro Street to take a right-turn into the site at the southern end of the parking lot, which would be simpler, faster, and reduce the chance of getting blocked by a stopped queue at the signal. Similarly, vehicles heading west on W. Weaver Street or Main Street would likely choose the southern driveway for the same reasons. Drivers turning left out of that parking lot would similarly not be common, due to it being so close to the signal. Many drivers ultimately heading west or northwest, could opt for a series of right-turns to access Main Street which heads west, intersecting W. Weaver Street just west of the site or could avoid the left out onto W. Weaver Street and head north on N. Greensboro Street instead, which accesses destinations to the northwest. Right-turns into and out of the parking lot across the street would be more common than lefts and would have the right of way over any turns out of the new development. Site adjustments have been made to ensure clear sight triangles at the W. Weaver Street driveway, which improve driver visibility to all vehicles, which should also help reduce conflict potential.

Comment #9

A question had been posed if a Traffic Impact Analysis (TIA) would be required of this development. The Town of Carrboro does not require a TIA, rather that is usually the condition of an NCDOT driveway permit. Instead we request the completion of a Traffic Impact Study (TIS) to include the following information:

9a: An assessment of trip generation from the site using ITE rates (no distribution or capacity analysis as would be associated with a TIA, just total new trips);

Tables 2, 3, 4, 5 and 6 summarize the projected vehicular trips generated by the site using the most appropriate rates and equations contained in the *ITE Trip Generation Manual, 10th Edition*. Since the site has relatively low square footages per use, the average rates provided by the manual were used rather than the equations, which have y-intercept values

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more appropriate for larger sites. In addition, the peaks across all uses reflect the peaks during the adjacent street traffic peak (7-9 AM and 4-6 PM) listed in the *ITE Manual*.

Table 2: Vehicular Trip Generation Results – Total Site Trips

Total Site Trips[2]									
Land Use Code[1]	Land Use	Unit	ADT	AM Peak Hour			PM Peak Hour		
				Enter	Exit	Total	Enter	Exit	Total
710	General Office	10,790 Sq ft	105	11	2	13	2	10	12
820	General Retail	2,698 Sq ft	102	2	1	3	5	5	10
932	High Turnover (Sit-Down) Restaurant	2,698 Sq ft	303	15	12	27	16	10	26
Development Total			*510*	*28*	*15*	*43*	*23*	*25*	*48*

Notes:

1. Land Use Code and trip generation rates are determined based on *ITE Trip Generation, 10th Edition*

Table 3: Vehicular Trip Generation Results – Internal Capture

Trip Reduction Due to Internal Capture[1]									
Land Use Code	Land Use	Unit	ADT	AM Peak Hour			PM Peak Hour		
				Enter	Exit	Total	Enter	Exit	Total
710	General Office	10,790 sqft	13	2	1	3	0	0	0
820	General Retail	2,698 sqft	24	0	0	0	2	1	3
932	High Turnover (Sit-Down) Restaurant	2,698 sqft	34	0	2	2	1	3	4
Development Total			*70*	*2*	*1*	*3*	*3*	*4*	*7*

Notes:

1. Internal capture was based on NCHRP 684 method and NCDOT IC calculation spreadsheet

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Table 4: Vehicular Trip Generation Results – External Trips

Total External Site Trips									
Land Use Code	Land Use	Unit	ADT	AM Peak Hour			PM Peak Hour		
				Enter	Exit	Total	Enter	Exit	Total
710	General Office	10,790 sqft	92	9	1	10	2	10	12
820	General Retail	2,698 sqft	78	2	1	3	3	4	7
932	High Turnover (Sit-Down) Restaurant	2,698 sqft	269	15	10	25	15	7	22
Development Total			*439*	*26*	*12*	*38*	*20*	*21*	*41*

Table 5: Vehicular Trip Generation Results – Pass-By Trips

Pass-By Site Trips[1]									
Land Use Code	Land Use	Unit	ADT	AM Peak Hour			PM Peak Hour		
				Enter	Exit	Total	Enter	Exit	Total
710	General Office	10,790 sqft	-	0	0	0	0	0	0
820	General Retail	2,698 sqft	-	0	0	0	1	1	2
932	High Turnover (Sit-Down) Restaurant	2,698 sqft	-	0	0	0	5	4	9
Development Total			-	*0*	*0*	*0*	*6*	*5*	*11*

Notes:
1. Unconstrained pass-by trips are calculated based on ITE Trip Generation Handbook, 3rd Edition. The final projections are not expected to exceed 10% of adjacent street volumes.

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Table 6: Vehicular Trip Generation Results – External Non-Pass-By Site Trips

Total Non-Pass-By Site Trips									
Land Use Code	Land Use	Unit	ADT	AM Peak Hour			PM Peak Hour		
				Enter	Exit	Total	Enter	Exit	Total
710	General Office	10,790 sqft	-	9	1	10	2	10	12
820	General Retail	2,698 sqft	-	2	1	3	2	3	5
932	High Turnover (Sit-Down) Restaurant	2,698 sqft	-	15	10	25	10	3	13
Development Total			-	*26*	*12*	*38*	*14*	*16*	*30*

As shown in Table 2, the site is projected to generate a total of 510 daily trips, 43 trips during the AM peak hour, and 48 trips during the PM peak hour. After appropriate trip reductions due to internal capture of the site shown in Table 3, the total external site trips projected for the site are 439 per day, 38 trips in the AM peak hour and 41 trips in the PM peak hour, as shown in Table 4. Adjustments due to pass-by trips in the PM peak hour shown in Table 5 project the overall total for external non-pass-by trips for the proposed development to be 38 trips in the AM peak hour and 30 trips in the PM peak hour, as shown in Table 6.

9b: Identify any bicycle, pedestrian and traffic safety improvements which are being made around the site;

As mentioned previously, the proposed site will provide new bicycle parking for the area and upgrade the sidewalks along the roadways adjacent to the development. This specifically includes enhancing and widening sidewalk segments along both Weaver Street and Greensboro Street as well as the wheelchair curb ramp at the adjacent signalized intersection.

9c: Identify any transit improvements being made around the site.

Adjacent transit stops are in the area. The Chapel Hill Transit CW Route travels along the site's W. Weaver Street frontage, stopping at the Weaver Street Market and Carrboro Century Center one block east of the site. Creating a second stop for this building is not necessary as it's a short walk to the existing stops in each direction and additional stops so close would create unnecessary delay to the CW route. Pedestrians walking to and from this site have continuous sidewalks and painted crosswalks with pedestrian countdown phasing at the W. Weaver Street and N. Greensboro Street signalized intersection. There are no notable transit improvements being made around the proposed site.

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ITE Parking and Trip Generation Summary Reports

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Land Use: 710 General Office Building

Description

A general office building houses multiple tenants. It is a location where affairs of businesses, commercial or industrial organizations, or professional persons or firms are conducted. An office building or buildings may contain a mixture of tenants including professional services, insurance companies, investment brokers, and tenant services, such as a bank or savings and loan institution, a restaurant, or cafeteria and service retail facilities. A general office building with a gross floor area of 5,000 square feet or less is classified as a small office building (Land Use 712). Corporate headquarters building (Land Use 714), single tenant office building (Land Use 715), medical-dental office building (Land Use 720), office park (Land Use 750), and research and development center (Land Use 760) are additional related uses.

If information is known about individual buildings, it is suggested that the general office building category be used rather than office parks when estimating parking generation for one or more office buildings in a single development. The office park category is more general and should be used when a breakdown of individual or different uses is not known. If the general office building category is used and if additional buildings, such as banks, restaurants, or retail stores are included in the development, the development should be treated as a multiuse project. On the other hand, if the office park category is used, internal trips are already reflected in the data and do not need to be considered.

When the buildings are interrelated (defined by shared parking facilities or the ability to easily walk between buildings) or house one tenant, it is suggested that the total area or employment of all the buildings be used for calculating parking generation. When the individual buildings are isolated and not related to one another, it is suggested that parking generation be calculated for each building separately and then summed.

Time of Day Distribution for Parking Demand

The following table presents a time-of-day distribution of parking demand on a weekday at 30 study sites in a general urban/suburban setting and two study sites in a dense multi-use urban setting.

	Percent of Weekday Peak Parking Demand	
Hour Beginning	General Urban/Suburban	Dense Multi–Use Urban
12:00–4:00 a.m.	–	–
5:00 a.m.	–	–
6:00 a.m.	–	–
7:00 a.m.	13	26
8:00 a.m.	48	65
9:00 a.m.	88	95
10:00 a.m.	100	100
11:00 a.m.	100	100
12:00 p.m.	85	99
1:00 p.m.	84	99
2:00 p.m.	93	97
3:00 p.m.	94	94
4:00 p.m.	85	90
5:00 p.m.	56	–
6:00 p.m.	20	–
7:00 p.m.	11	–
8:00 p.m.	–	–
9:00 p.m.	–	–
10:00 p.m.	–	–
11:00 p.m.	–	–

Additional Data

The average parking supply ratios for the study sites with parking supply information are as follows:

- 2.9 spaces per 1,000 square feet GFA in a dense multi-use urban setting that is not within ½ mile of rail transit (seven sites)
- 3.3 spaces per 1,000 square feet GFA (73 sites) and 1.2 spaces per employee (20 sites) in a general urban/suburban setting that is not within ½ mile of rail transit
- 3.0 spaces per 1,000 square feet GFA (seven sites) and 0.8 spaces per employee (two sites) in a general urban/suburban setting that is within ½ mile of rail transit

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Arizona, California, Colorado, Connecticut, Georgia, Illinois, Massachusetts, Minnesota, Montana, New Jersey, New York, Oklahoma, Oregon, Pennsylvania, Texas, Utah, and Washington.

Source Numbers

21, 22, 47, 122, 124, 142, 172, 201, 202, 205, 211, 215, 216, 217, 227, 239, 241, 243, 276, 295, 399, 400, 425, 431, 433, 436, 438, 440, 516, 531, 540, 551, 555, 556, 557, 571, 572, 588

Land Use: 820 Shopping Center

Description

A shopping center is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. A shopping center's composition is related to its market area in terms of size, location, and type of store. A shopping center also provides on-site parking facilities sufficient to serve its own parking demands.

Time of Day Distribution for Parking Demand

The following table presents a time-of-day distribution of parking demand **during the month of December** on a weekday (seven study sites), a Friday (eight study sites), and a Saturday (19 study sites).

	Percent of Peak Parking Demand during December		
Hour Beginning	**Weekday**	**Friday**	**Saturday**
12:00–4:00 a.m.	–	–	–
5:00 a.m.	–	–	–
6:00 a.m.	–	–	–
7:00 a.m.	–	–	–
8:00 a.m.	–	–	–
9:00 a.m.	–	–	–
10:00 a.m.	–	74	–
11:00 a.m.	–	87	85
12:00 p.m.	77	97	97
1:00 p.m.	100	100	98
2:00 p.m.	98	92	100
3:00 p.m.	90	85	97
4:00 p.m.	76	84	88
5:00 p.m.	82	78	77
6:00 p.m.	89	75	64
7:00 p.m.	90	63	–
8:00 p.m.	84	–	–
9:00 p.m.	–	–	–
10:00 p.m.	–	–	–
11:00 p.m.	–	–	–

The following table presents a time-of-day distribution of parking demand **during a non-December month** on a weekday (18 study sites), a Friday (seven study sites), and a Saturday (13 study sites).

	Percent of Non–December Peak Parking Demand		
Hour Beginning	Weekday	Friday	Saturday
12:00–4:00 a.m.	–	–	–
5:00 a.m.	–	–	–
6:00 a.m.	–	–	–
7:00 a.m.	–	–	–
8:00 a.m.	15	32	27
9:00 a.m.	32	50	46
10:00 a.m.	54	67	67
11:00 a.m.	71	80	85
12:00 p.m.	99	100	95
1:00 p.m.	100	98	100
2:00 p.m.	90	90	98
3:00 p.m.	83	78	92
4:00 p.m.	81	81	86
5:00 p.m.	84	86	79
6:00 p.m.	86	84	71
7:00 p.m.	80	79	69
8:00 p.m.	63	70	60
9:00 p.m.	42	–	51
10:00 p.m.	15	–	38
11:00 p.m.	–	–	–

Additional Data

The parking demand database includes data from strip, neighborhood, community, town center, and regional shopping centers. Some of the centers contain non-merchandising facilities, such as office buildings, movie theaters, restaurants, post offices, banks, health clubs, and recreational facilities.

Many shopping centers, in addition to the integrated unit of shops in one building or enclosed around a mall, include outparcels (peripheral buildings or pads located on the perimeter of the center adjacent to the streets and major access points). These buildings are typically drive-in banks, retail stores, restaurants, or small offices. Although the data herein do not indicate which of the centers studied included peripheral buildings, it can be assumed that some of the data show their effect.

The parking demand data plots and analysis are based on the total gross leasable area (GLA) of the center. In cases of smaller centers without an enclosed mall or peripheral buildings, the GLA could be the same as the gross floor area (GFA) of the center.

The average parking supply ratios for the study sites with parking supply information are the following:

- 5.1 spaces per 1,000 square feet GFA (137 sites) in a general urban/suburban setting
- 4.7 spaces per 1,000 square feet GFA (five sites) in a dense multi-use urban setting

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alabama, Alberta (CAN), Arizona, California, Colorado, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, North Carolina, New Jersey, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Virginia, and Washington.

Future data submissions should attempt to provide information on the composition of each study site (types and number of stores, restaurants, or other tenants within the shopping center).

Source Numbers

3, 18, 21, 32, 39, 47, 87, 88, 89, 103, 142, 145, 152, 153, 154, 174, 175, 176, 179, 202, 203, 204, 205, 209, 215, 219, 224, 241, 265, 274, 313, 314, 315, 431, 432, 433, 436, 438, 441, 511, 525, 527, 531, 533, 542, 556, 558, 565

Land Use: 932 High-Turnover (Sit-Down) Restaurant

Description

This land use consists of sit-down, full-service eating establishments with a typical duration of stay of 60 minutes or less. They are commonly referred to as casual dining. This type of restaurant is usually moderately priced and frequently belongs to a restaurant chain. Generally, these restaurants serve lunch and dinner; they may also be open for breakfast and are sometimes open 24 hours a day. These restaurants typically do not accept reservations. A patron commonly waits to be seated, is served by wait staff, orders from a menu, and pays after the meal. Some facilities offer carry-out for a small proportion of its customers. Some facilities within this land use may also contain lounge or bar area for serving food and alcoholic drinks. Fast casual restaurant (Land Use 930), quality restaurant (Land Use 931), fast-food restaurant without drive-through window (Land Use 933), and fast-food restaurant with drive-through window (Land Use 934) are related uses.

The analysis of parking demand for this land use has identified different parking demand rates between high-turnover restaurants with and without lounges. The term “family restaurant” is used interchangeably as an abbreviated version of “high-turnover (sit-down) restaurant without lounge or bar facilities.”

Time of Day Distribution for Parking Demand

The following table presents a time-of-day distribution of parking demand **on a weekday** at family restaurants that serve breakfast, lunch, and dinner (12 study sites); family restaurants that serve lunch and dinner (38 sites), and restaurants with a lounge or bar (four sites).

	Percent of Weekday Peak Parking Demand		
Hour Beginning	Family (breakfast, lunch, and dinner)	Family (lunch and dinner)	Lounge or Bar
12:00–4:00 a.m.	–	–	–
5:00 a.m.	–	–	–
6:00 a.m.	10	–	–
7:00 a.m.	25	–	–
8:00 a.m.	68	–	–
9:00 a.m.	72	–	–
10:00 a.m.	77	26	9
11:00 a.m.	83	43	15
12:00 p.m.	100	95	100
1:00 p.m.	91	95	81
2:00 p.m.	56	49	54
3:00 p.m.	42	39	33
4:00 p.m.	42	37	26
5:00 p.m.	64	62	29
6:00 p.m.	87	99	58
7:00 p.m.	79	100	70
8:00 p.m.	65	83	77
9:00 p.m.	42	51	61
10:00 p.m.	21	28	41
11:00 p.m.	–	–	–

The following table presents a time-of-day distribution of parking demand **on a Saturday** at family restaurants that serve breakfast, lunch, and dinner (six study sites); family restaurants that serve lunch and dinner (10 sites), and restaurants with a lounge or bar (six sites).

	Percent of Saturday Peak Parking Demand		
Hour Beginning	Family (breakfast, lunch, and dinner)	Family (lunch and dinner)	Lounge or Bar
12:00–4:00 a.m.	–	–	–
5:00 a.m.	–	–	–
6:00 a.m.	15	–	–
7:00 a.m.	28	–	–
8:00 a.m.	52	–	–
9:00 a.m.	75	–	–
10:00 a.m.	91	87	15
11:00 a.m.	100	90	23
12:00 p.m.	90	100	37
1:00 p.m.	80	98	50
2:00 p.m.	67	85	44
3:00 p.m.	45	73	37
4:00 p.m.	39	58	48
5:00 p.m.	40	63	64
6:00 p.m.	40	76	90
7:00 p.m.	58	78	100
8:00 p.m.	40	76	89
9:00 p.m.	35	55	71
10:00 p.m.	33	46	56
11:00 p.m.	–	–	–

Additional Data

The outdoor seating area is not included in the overall gross floor area. Therefore, the number of seats may be a more reliable independent variable on which to establish parking generation rates for facilities having significant outdoor seating.

The average parking supply ratios for the study sites with parking supply information are as follows:

- in a general urban/suburban setting, 15 spaces per 1,000 square feet GFA (53 sites) and 0.5 spaces per seat (42 sites)
- in a dense multi-use urban setting, 7 spaces per 1,000 square feet GFA (six sites) and 0.4 spaces per seat (one site)

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Connecticut, Florida, Illinois, Indiana, Massachusetts, Minnesota, New Jersey, New York, Oklahoma, Oregon, Pennsylvania, Texas, and Washington.

Source Numbers

8, 9, 21, 22, 47, 168, 182, 201, 218, 274, 276, 299, 527, 531, 556, 557, 567, 568

ITETripGen **Web-based App**

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Graph Look Up

ITETripGen Web-based App

Graph Look Up

Technical Support

Add Users

Comments

Query Filter

DATA SOURCE:
Trip Gen Manual, 10th Ed + Supplement

SEARCH BY LAND USE CODE:
710

LAND USE GROUP:
(700-799) Office

LAND USE :
710 - General Office Building

LAND USE SUBCATEGORY:
All Sites

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

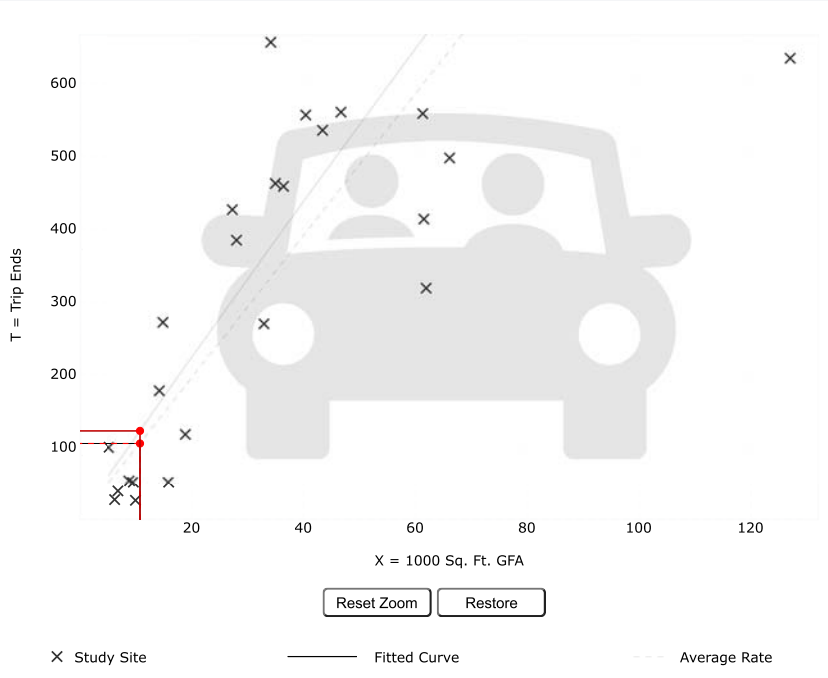
TIME PERIOD:
Weekday

SETTING/LOCATION:
General Urban/Suburban

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
10.79 Calculate

Data Plot and Equation



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

Land Use:
General Office Building (710) Click for more details

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
66

Avg. 1000 Sq. Ft. GFA:
171

Average Rate:
9.74

Range of Rates:
2.71 - 27.56

Standard Deviation:
5.15

Fitted Curve Equation:
Ln(T) = 0.97 Ln(X) + 2.50

R^2:
0.83

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 105 (Total), 52 (Entry), 53 (Exit)
Fitted Curve: 122 (Total), 61 (Entry), 61 (Exit)

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Technical Support

Add Users

Comments

Query Filter

DATA SOURCE:
Trip Gen Manual, 10th Ed + Supplement

SEARCH BY LAND USE CODE:
710

LAND USE GROUP:
(700-799) Office

LAND USE :
710 - General Office Building

LAND USE SUBCATEGORY:
All Sites

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

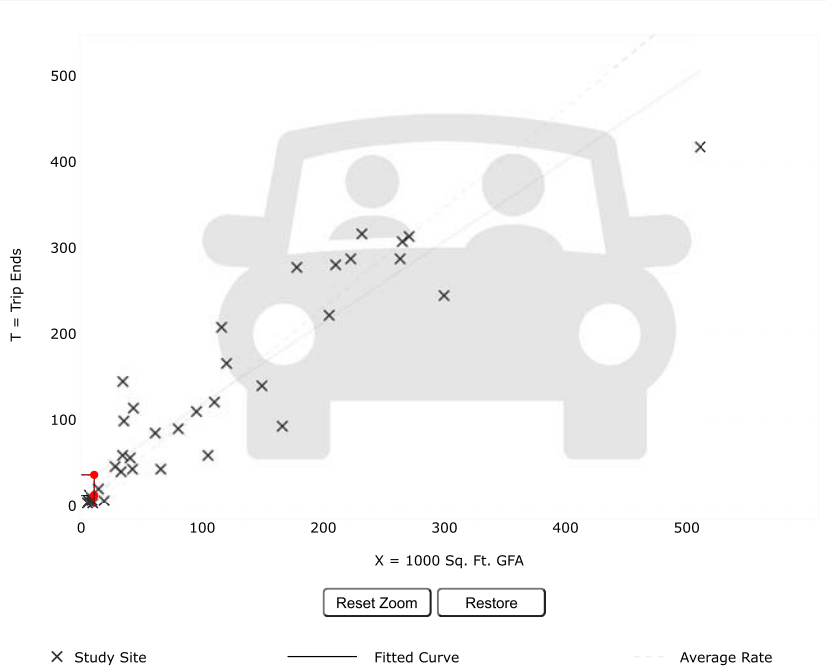
TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

SETTING/LOCATION:
General Urban/Suburban

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
10.79 Calculate

Data Plot and Equation



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

Land Use:
General Office Building (710) Click for more details

Independent Variable:
1000 Sq. Ft. GFA

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:
35

Avg. 1000 Sq. Ft. GFA:
117

Average Rate:
1.16

Range of Rates:
0.37 - 4.23

Standard Deviation:
0.47

Fitted Curve Equation:
T = 0.94(X) + 26.49

R^2:
0.85

Directional Distribution:
86% entering, 14% exiting

Calculated Trip Ends:
Average Rate: 13 (Total), 11 (Entry), 2 (Exit)
Fitted Curve: 37 (Total), 32 (Entry), 5 (Exit)

Add-ons to do more

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DATA SOURCE:
Trip Gen Manual, 10th Ed + Supplement

SEARCH BY LAND USE CODE:
710

LAND USE GROUP:
(700-799) Office

LAND USE :
710 - General Office Building

LAND USE SUBCATEGORY:
All Sites

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

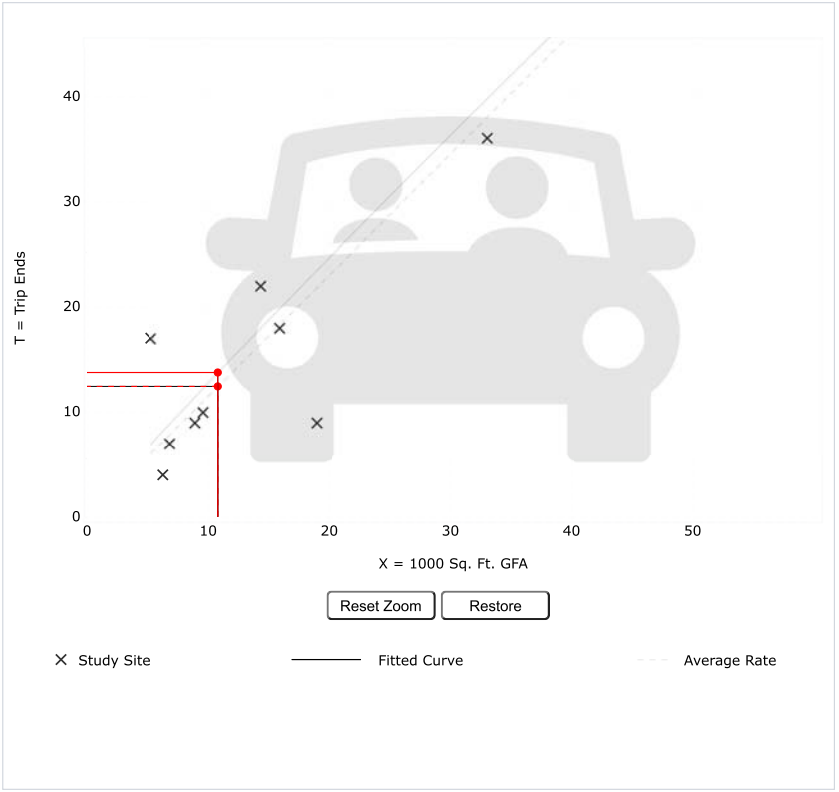
TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

SETTING/LOCATION:
General Urban/Suburban

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
10.79 Calculate

Data Plot and Equation



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

Land Use:
General Office Building (710) Click for more details

Independent Variable:
1000 Sq. Ft. GFA

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:
32

Avg. 1000 Sq. Ft. GFA:
114

Average Rate:
1.15

Range of Rates:
0.47 - 3.23

Standard Deviation:
0.42

Fitted Curve Equation:
Ln(T) = 0.95 Ln(X) + 0.36

R^2:
0.88

Directional Distribution:
16% entering, 84% exiting

Calculated Trip Ends:
Average Rate: 12 (Total), 2 (Entry), 10 (Exit)
Fitted Curve: 14 (Total), 2 (Entry), 12 (Exit)

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DATA SOURCE:
Trip Gen Manual, 10th Ed + Supplement

SEARCH BY LAND USE CODE:
820

LAND USE GROUP:
(800-899) Retail

LAND USE :
820 - Shopping Center

LAND USE SUBCATEGORY:
All Sites

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

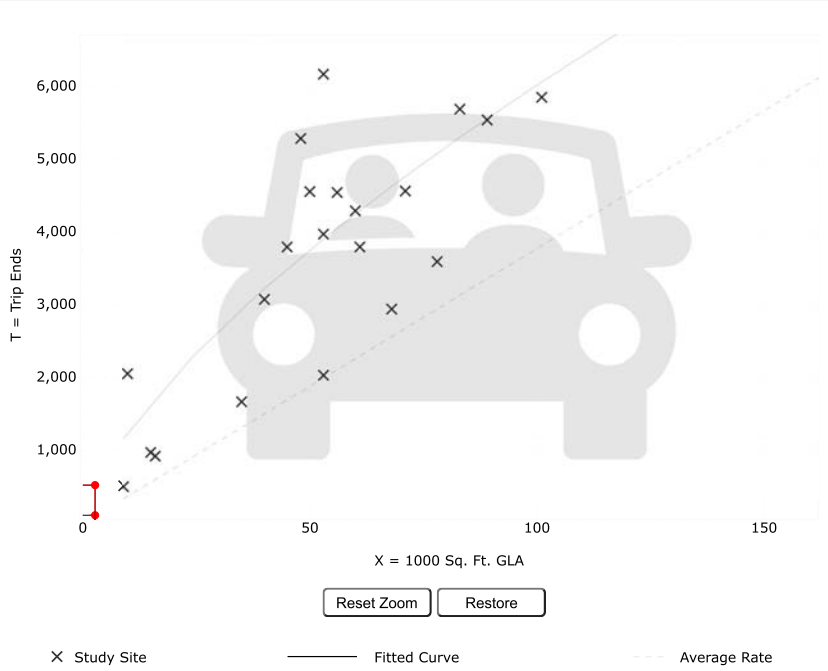
TIME PERIOD:
Weekday

SETTING/LOCATION:
General Urban/Suburban

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
2.7 Calculate

Data Plot and Equation



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

Land Use:
Shopping Center (820) Click for more details

Independent Variable:
1000 Sq. Ft. GLA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
147

Avg. 1000 Sq. Ft. GLA:
453

Average Rate:
37.75

Range of Rates:
7.42 - 207.98

Standard Deviation:
16.41

Fitted Curve Equation:
Ln(T) = 0.68 Ln(X) + 5.57

R^2:
0.76

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 102 (Total), 51 (Entry), 51 (Exit)
Fitted Curve: 516 (Total), 258 (Entry), 258 (Exit)

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DATA SOURCE:
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SEARCH BY LAND USE CODE:
820

LAND USE GROUP:
(800-899) Retail

LAND USE :
820 - Shopping Center

LAND USE SUBCATEGORY:
All Sites

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

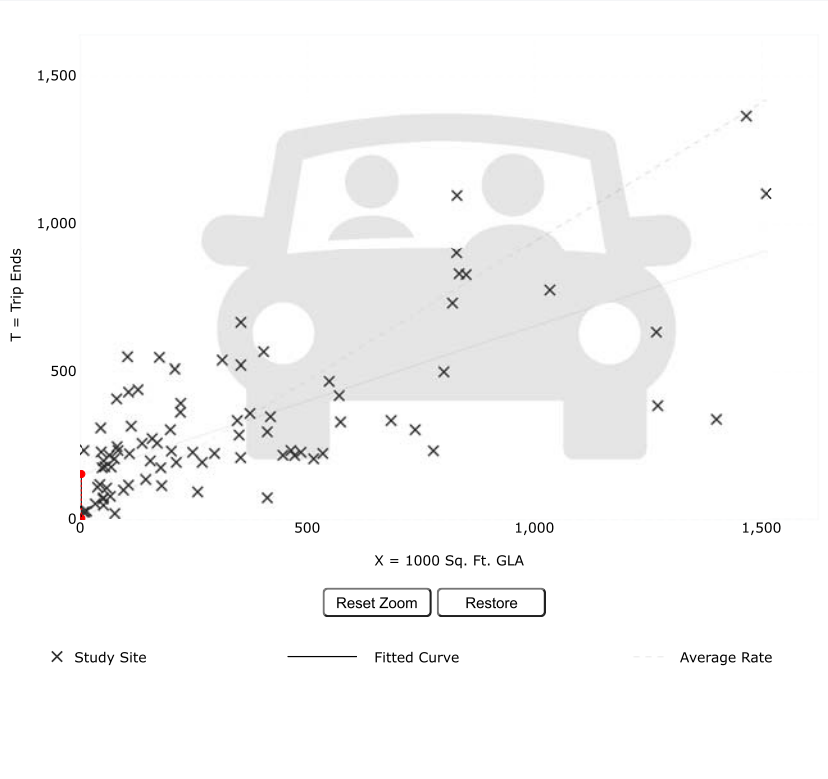
TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

SETTING/LOCATION:
General Urban/Suburban

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
2.7 Calculate

Data Plot and Equation



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

Land Use:
Shopping Center (820) Click for more details

Independent Variable:
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: 3 (Total), 2 (Entry), 1 (Exit)
Fitted Curve: 153 (Total), 95 (Entry), 58 (Exit)

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DATA SOURCE:
Trip Gen Manual, 10th Ed + Supplement

SEARCH BY LAND USE CODE:
820

LAND USE GROUP:
(800-899) Retail

LAND USE :
820 - Shopping Center

LAND USE SUBCATEGORY:
All Sites

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

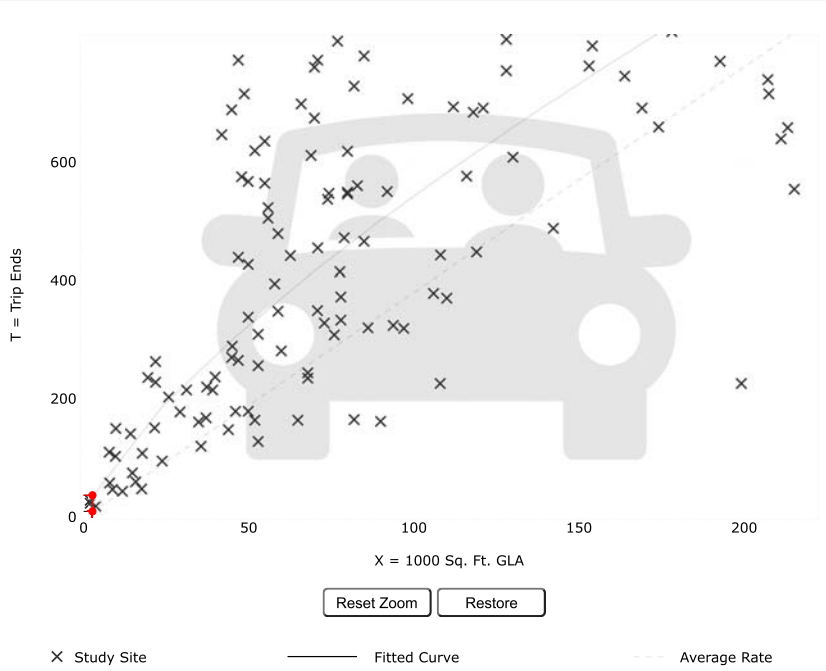
TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

SETTING/LOCATION:
General Urban/Suburban

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
2.7 Calculate

Data Plot and Equation



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

Land Use:
Shopping Center (820) Click for more details

Independent Variable:
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: 10 (Total), 5 (Entry), 5 (Exit)
Fitted Curve: 38 (Total), 18 (Entry), 20 (Exit)

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DATA SOURCE:
Trip Gen Manual, 10th Ed + Supplement

SEARCH BY LAND USE CODE:
932

LAND USE GROUP:
(900-999) Services

LAND USE :
932 - High-Turnover (Sit-Down) Restaurant

LAND USE SUBCATEGORY:
All Sites

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

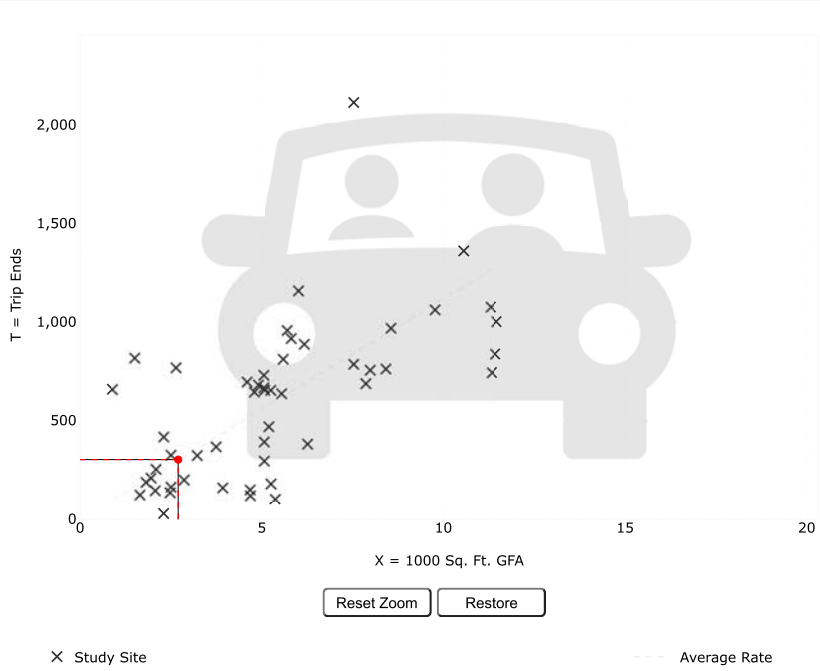
TIME PERIOD:
Weekday

SETTING/LOCATION:
General Urban/Suburban

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
2.7 Calculate

Data Plot and Equation



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

Land Use:
High-Turnover (Sit-Down) Restaurant (932) Click for more details

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
50

Avg. 1000 Sq. Ft. GFA:
5

Average Rate:
112.18

Range of Rates:
13.04 - 742.41

Standard Deviation:
72.51

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 303 (Total), 151 (Entry), 152 (Exit)

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DATA SOURCE:
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SEARCH BY LAND USE CODE:
932

LAND USE GROUP:
(900-999) Services

LAND USE :
932 - High-Turnover (Sit-Down) Restaurant

LAND USE SUBCATEGORY:
All Sites

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

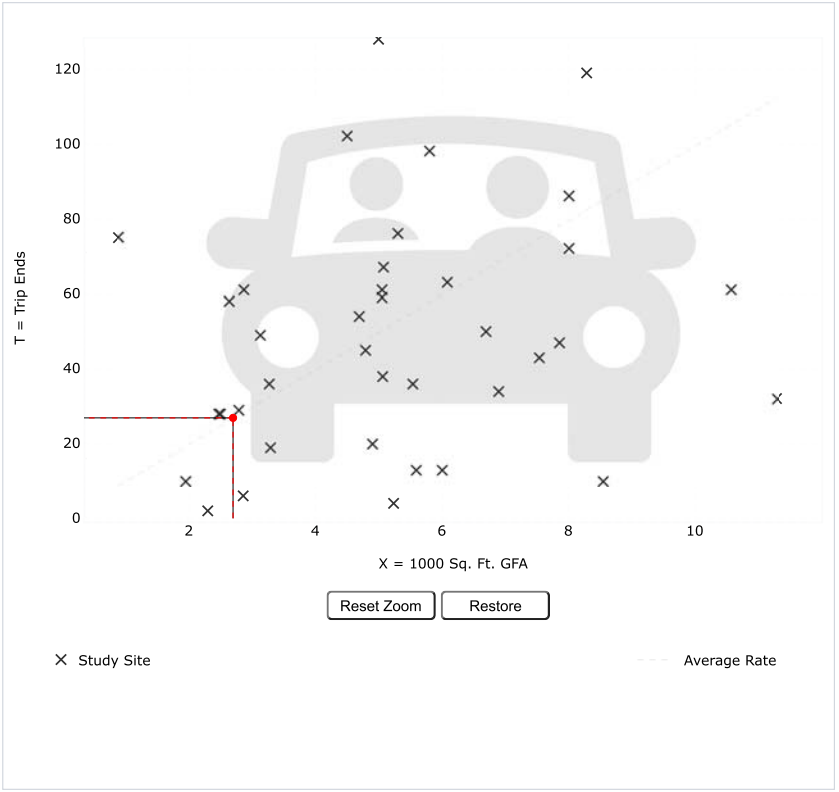
TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

SETTING/LOCATION:
General Urban/Suburban

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
2.7 Calculate

Data Plot and Equation



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

Land Use:
High-Turnover (Sit-Down) Restaurant (932) Click for more details

Independent Variable:
1000 Sq. Ft. GFA

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:
39

Avg. 1000 Sq. Ft. GFA:
5

Average Rate:
9.94

Range of Rates:
0.76 - 102.39

Standard Deviation:
11.33

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
55% entering, 45% exiting

Calculated Trip Ends:
Average Rate: 27 (Total), 15 (Entry), 12 (Exit)

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SEARCH BY LAND USE CODE:
932

LAND USE GROUP:
(900-999) Services

LAND USE :
932 - High-Turnover (Sit-Down) Restaurant

LAND USE SUBCATEGORY:
All Sites

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

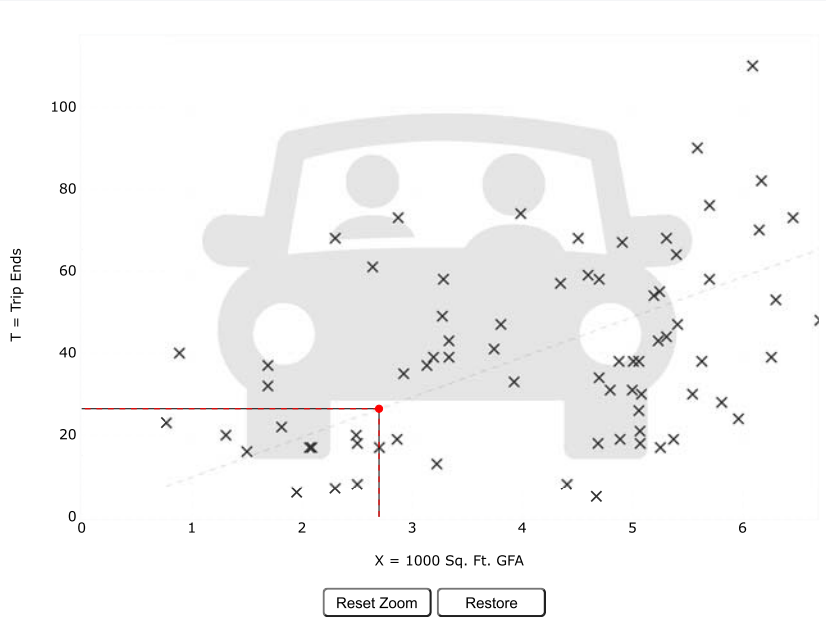
TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

SETTING/LOCATION:
General Urban/Suburban

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
2.7 Calculate

Data Plot and Equation



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

Land Use:
High-Turnover (Sit-Down) Restaurant (932) Click for more details

Independent Variable:
1000 Sq. Ft. GFA

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:
107

Avg. 1000 Sq. Ft. GFA:
6

Average Rate:
9.77

Range of Rates:
0.92 - 62.00

Standard Deviation:
7.37

Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
62% entering, 38% exiting

Calculated Trip Ends:
Average Rate: 26 (Total), 16 (Entry), 10 (Exit)

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