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## MEMORANDUM

DCI JOB NO. 2020-067

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**TO:** Martha Taylor  
Town Planner  
Town of Newbury  
12 Kent Way  
Newbury, MA 01922

**FROM:** Stephen Sawyer, P.E.  
Design Consultants, Inc.

**SUBJECT:** **Trip Generation Memorandum**  
2 Old Point Road  
Newbury, MA

**DATE:** December 31, 2020  
**Revised:** January 5, 2021  
**Revised:** March 22, 2021

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Design Consultants, Inc. (DCI) has prepared this Trip Generation Memorandum on behalf of its client, The Cottages Commercial, LLC, to discuss the proposed project and corresponding trip generation for the restaurant to be located at 2 Old Point Road ("Restaurant") in Newbury. This is a revision to the Trip Generation Memorandums dated December 31, 2020 and January 5, 2021. The January 5, 2021 revision included updated trip generation numbers based on more recent discussion about the operation and customer base of the proposed Restaurant. This revision includes the updated parking lot flow and reference to July 2020 traffic data collected along Plum Island Boulevard. Currently, the site houses a former auto repair shop and garage. It is our understanding that the Proponent is proposing to convert the existing site to a Restaurant with both indoor and outdoor seating.

### **Project Description and Overview**

The site is in the northeast part of Newbury in the vicinity of Plum Island. The site will change the use of the space to a restaurant that will consist of 164 seats. The existing garage will be converted to an indoor restaurant. The existing auto repair shop and manufactured home on site will be demolished and this area will be converted to a landscaped area with outdoor seating.

There is also an existing single-family house at the rear of the site that will remain after redevelopment. Food preparation will be done in a mobile kitchen on-site. The Restaurant will not be open during mornings.

Currently there is no curbing on the border of the site, allowing access/egress at any point. After redevelopment, there will be two (2) site-specific driveways: a one-way entrance from Old Point Road and a one-way exit onto Plum Island Boulevard, as requested by the Town of Newbury Planning Department and the Merrimack Valley Planning Commission (MVPC) Transportation Director. The gravel driveway access that exists through the site to 11-14 McLeod Avenue will be maintained and expanded. There will be paved pedestrian zones provided along the border of the site where there are currently no existing sidewalks. After redevelopment, there will be 54 parking spaces provided on-site.

### **Existing Land Uses**

Currently, the site is an auto repair shop with a garage structure and manufactured home. When operational, a majority of the trips were vehicular trips. Given the total number of vehicle-trips to the existing site was unknown, there will be no credit taken for the existing trips.

### **Vehicle Trip Generation**

Trip generation calculations estimate the total number of trips that a site is expected to generate during peak hours and a typical day. These estimates are presented as vehicle-trips to analyze the potential impact on the surrounding roadway system. For this site, trip generation was calculated utilizing the *Trip Generation Manual, 10<sup>th</sup> Edition* (2017) published by the Institute of Transportation Engineers (ITE).

### **Institute of Transportation Engineers (ITE) Estimates**

The *Trip Generation Manual* includes a land use code (LUC) for a High Turnover (Sit Down) Restaurant (LUC 932). The proposed facility will include 164 seats for customers. Unadjusted vehicle-trips for the Weekday PM and Saturday Midday peak hours are shown in Table 1. Trip generation calculations for a typical Weekday and typical Saturday are attached in the Appendix. Through discussions with the Client, it was determined that the Restaurant will not be open during the morning.

**Table 1: Restaurant Trip Generation Calculations (Per ITE)**

Land Use Code: 932 High Turnover Sit-Down Restaurant		
	Weekday PM Peak Hour	Sat. Midday Peak Hour
Size per Seats	164	164
Average Trip Rate	0.42	0.53
<b>Total Trips</b>	<b>69</b>	<b>86</b>
Entering%	57%	53%
Exiting%	43%	47%
Entering Trips	39	46
Exiting Trips	30	40

Based on the ITE trip generation rates, it is estimated that the facility will generate approximately 69 trips during the Weekday PM peak hour and 86 trips on an average weekday. To account for location-specific travel mode trends, a modal split and an Average Vehicle Occupancy (AVO) will be accounted for in the subsequent section.

### Modal Split

Although the site is in an area with minimal bicycle or pedestrian accommodations, it is expected that many of the trips to the Restaurant will originate either from Newbury Beach (an approximate 5-minute walk) or from the surrounding Plum Island community. Data from Census Tract 2691 shows that approximately 79% of residents commute via motor vehicle. However, due to the location of the Restaurant and the expected customer base, it was determined that approximately 50% of customers would be commuting via motor vehicle with the rest either biking or walking. Table 2 shows the modal split by for Census Tract 2691 and the adjusted modal split used for the Restaurant. The US Census Journey to Work data is attached in the Appendix.

**Table 2: Means of Transportation per ACS 2019 5-Year Estimates**

MEANS OF TRANSPORTATION	Census Tract 2691	Census Tract Percentage	Used for Restaurant
Car, truck, or van	2653	79.1%	<b>50.0%</b>
Drove alone	2495	74.4%	<b>25.0%</b>
Carpooled:	158	4.7%	<b>25.0%</b>
In 2-person carpool	130	3.9%	<b>2.5%</b>
In 3-person carpool	0	0.0%	<b>20.0%</b>
In 4 person carpool	28	0.8%	<b>2.5%</b>
Non-Vehicular Modes	701	20.9%	<b>50.0%</b>

The *ITE Trip Generation Handbook, 3<sup>rd</sup> Edition* includes an Average Vehicle Occupancy (AVO) for LUC 932 of 1.34 occupants per vehicle. Based on the adjusted modal split, there is a calculated AVO of 2.0 occupants per vehicle. The AVO is based on the determination that this will be a Restaurant that will serve mostly beachgoers and residents of the surrounding community, rather than customers traveling from further away to meet others, thus eliminating many single-occupant vehicle-trips. The calculated base trips using the ITE trip generation rates were adjusted by the ITE AVO and then further adjusted using the modal split percentages and AVO. The US Census Data that was used for comparison is attached in the Appendix.

### Adjusted Trips

As previously mentioned, DCI assumed 50% of trips to the site would be vehicle-trips and 50% of trips would be made via non-vehicular modes. The number of base trips were adjusted using the ITE AVO and the adjusted modal split percentages and AVO. Table 3 shows the calculations based on the adjustment *ITE Trip Generation Manual*.

**Table 3: Vehicle-Trip Generation Calculations per ITE *Trip Generation Manual, 10<sup>th</sup> Edition***

<b><i>Restaurant Space</i></b>	<b>Weekday PM Peak Hour</b>	<b>Sat. Midday Peak Hour</b>
Base Trips (per ITE)	69	86
Total Person-Trips (adjusted using ITE AVO)	92	116
Total Person-Vehicle-Trips	46	58
<b>Total Vehicle-Trips (adjusted using AVO)</b>	<b>23</b>	<b>29</b>
Entering Vehicle-Trips	13	15
Exiting Vehicle-Trips	10	14
Total Non-Vehicular Trips	46	58

As shown in Table 3, the Restaurant is expected to generate approximately 23 vehicle-trips during the Weekday PM peak hour and 29 vehicle-trips during the Saturday Midday peak hour. This equates to approximately one (1) vehicle-trip every three (3) minutes during the Weekday PM peak hour and approximately one (1) vehicle-trip every two (2) minutes during the Saturday Midday peak hour. Based on the traffic data collected in July 2020, provided by the MVPC, the proposed vehicle-trips will increase volumes along Plum Island Boulevard by approximately 2.2% during the Weekday PM peak hour and 2.9% during the Saturday Midday peak hour.

### **Summary**

The project at 2 Old Point Road is proposed to raze the existing auto repair shop and manufactured home, and repurpose the existing garage, to develop a restaurant that will have 164 combined indoor and outdoor seats. There will be 54 parking spaces provided on-site after the redevelopment, accessed via two (2) driveways: a one-way entrance from Old Point Road and a one-way exit onto Plum Island Boulevard.

Trip generation was calculated using the *Trip Generation Manual (10<sup>th</sup> Edition)*, published by the Institute of Transportation Engineers (ITE) in 2017. Adjusting using the modal split data from Census Tract 2691, it is expected that the Restaurant will generate approximately 23 vehicle-trips during the Weekday PM peak hour and approximately 29 vehicle-trips during the Saturday Midday peak hour, representing less than a 3% increase in traffic along Plum Island Boulevard. These calculations take into account the location of Newbury Beach and surrounding Plum Island community, from which most customers are expected to visit the Restaurant. As such, DCI believes that this site will have minimal impact on traffic after redevelopment.

# *APPENDIX*

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## **TRIP GENERATION**

## *TRIP GENERATION*

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## **Land Use: 932**

### **High-Turnover (Sit-Down) Restaurant**

#### **Description**

This land use consists of sit-down, full-service eating establishments with typical duration of stay of approximately one hour. 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 take reservations. Patrons commonly wait to be seated, are served by a waiter/waitress, order from menus and pay for their meal after they eat. Some facilities contained within this land use may also contain a 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), fast-food restaurant with drive-through window (Land Use 934), and fast-food restaurant with drive-through window and no indoor seating (Land Use 935) are related uses.

#### **Additional Data**

***Users should exercise caution when applying statistics during the AM peak periods, as the sites contained in the database for this land use may or may not be open for breakfast. In cases where it was confirmed that the sites were not open for breakfast, data for the AM peak hour of the adjacent street traffic were removed from the database.***

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 trip generation rates for facilities having significant outdoor seating.

Time-of-day distribution data for this land use for a weekday, Saturday, and Sunday are presented in Appendix A. For the 38 general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 11:45 a.m. and 12:45 p.m. and 12:00 and 1:00 p.m., respectively.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), California, Florida, Georgia, Indiana, Kentucky, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Texas, Vermont, and Wisconsin.

#### **Source Numbers**

126, 269, 275, 280, 300, 301, 305, 338, 340, 341, 358, 384, 424, 432, 437, 438, 444, 507, 555, 577, 589, 617, 618, 728, 868, 884, 885, 903, 927, 944, 961, 962, 977

## High-Turnover (Sit-Down) Restaurant (932)

Vehicle Trip Ends vs: Seats  
On a: Weekday

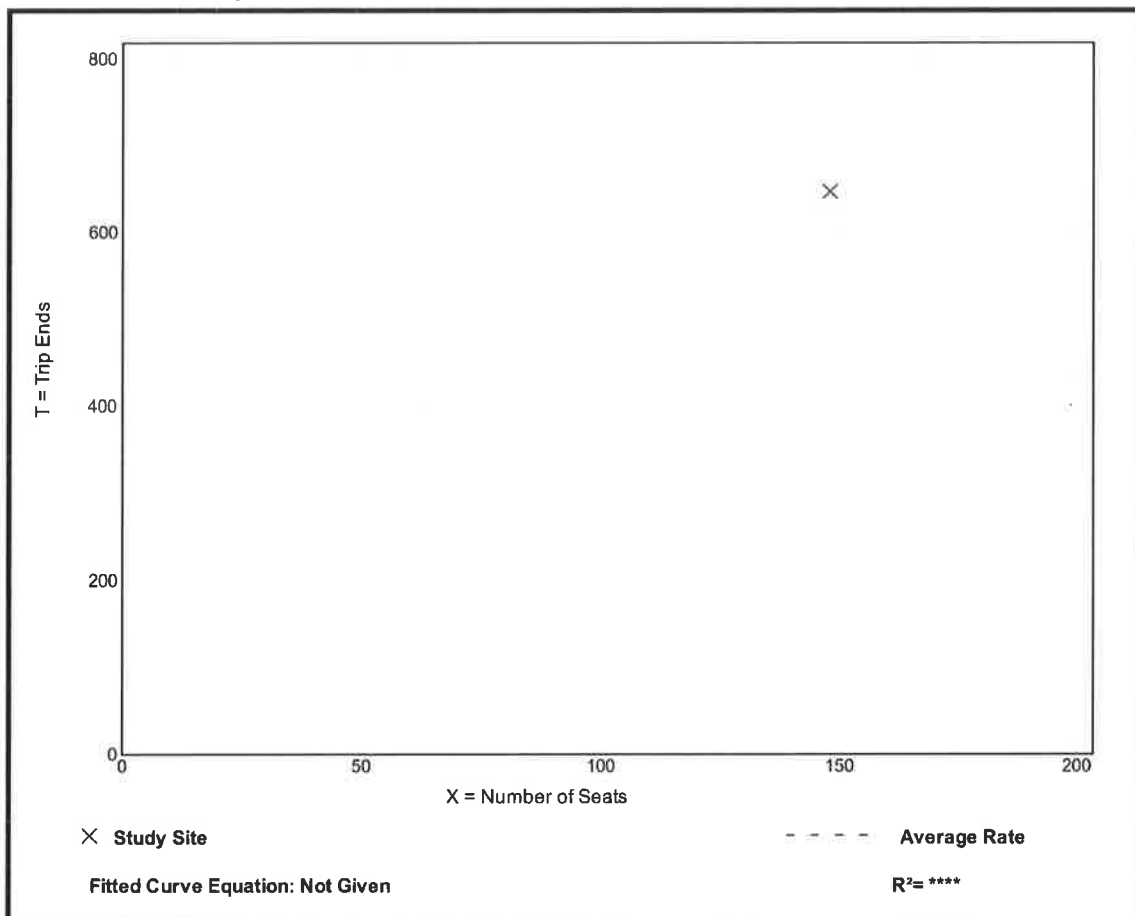
Setting/Location: General Urban/Suburban  
Number of Studies: 1  
Avg. Num. of Seats: 148  
Directional Distribution: 50% entering, 50% exiting

### Vehicle Trip Generation per Seat

Average Rate	Range of Rates	Standard Deviation
4.37	4.37 - 4.37	*

### Data Plot and Equation

*Caution – Small Sample Size*



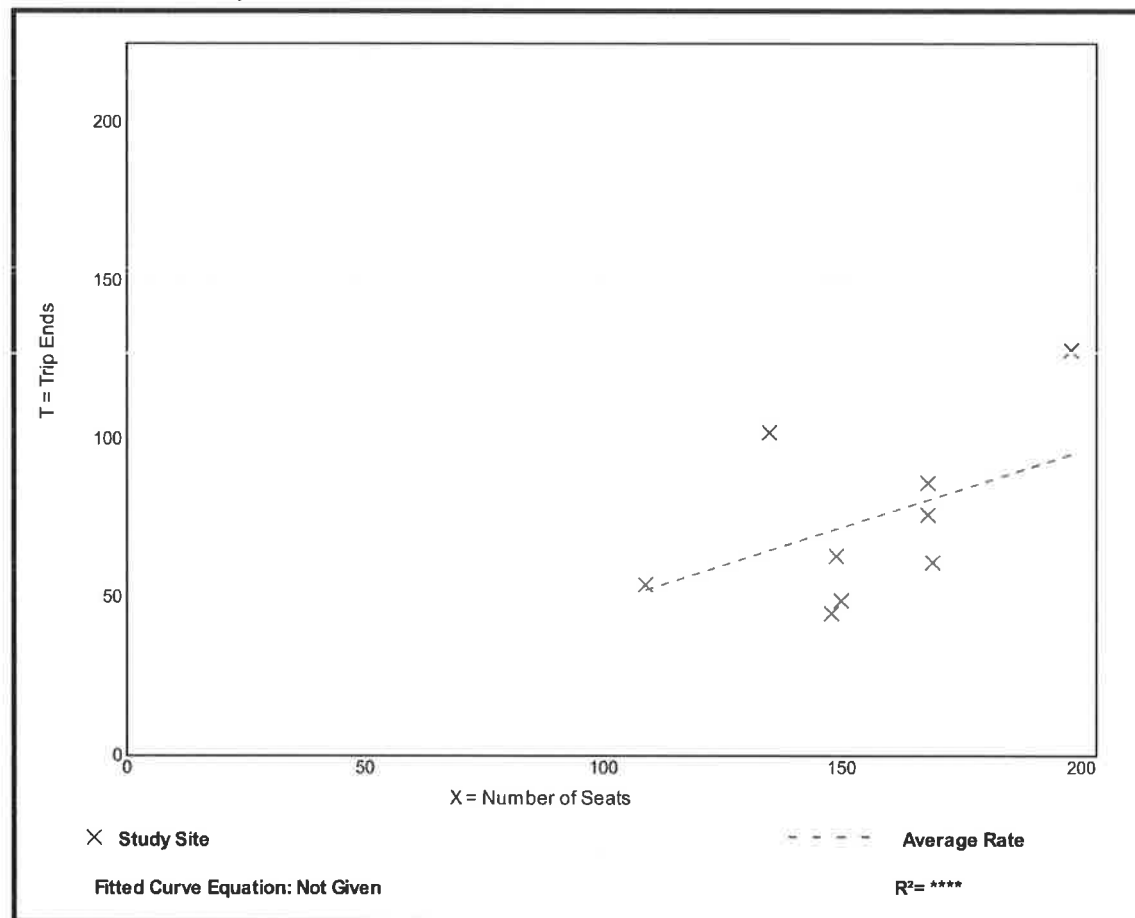
## High-Turnover (Sit-Down) Restaurant (932)

Vehicle Trip Ends vs: **Seats**  
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: **9**  
Avg. Num. of Seats: **155**  
Directional Distribution: **52% entering, 48% exiting**

### Vehicle Trip Generation per Seat

Average Rate	Range of Rates	Standard Deviation
0.48	0.30 - 0.76	0.15

### Data Plot and Equation



## High-Turnover (Sit-Down) Restaurant (932)

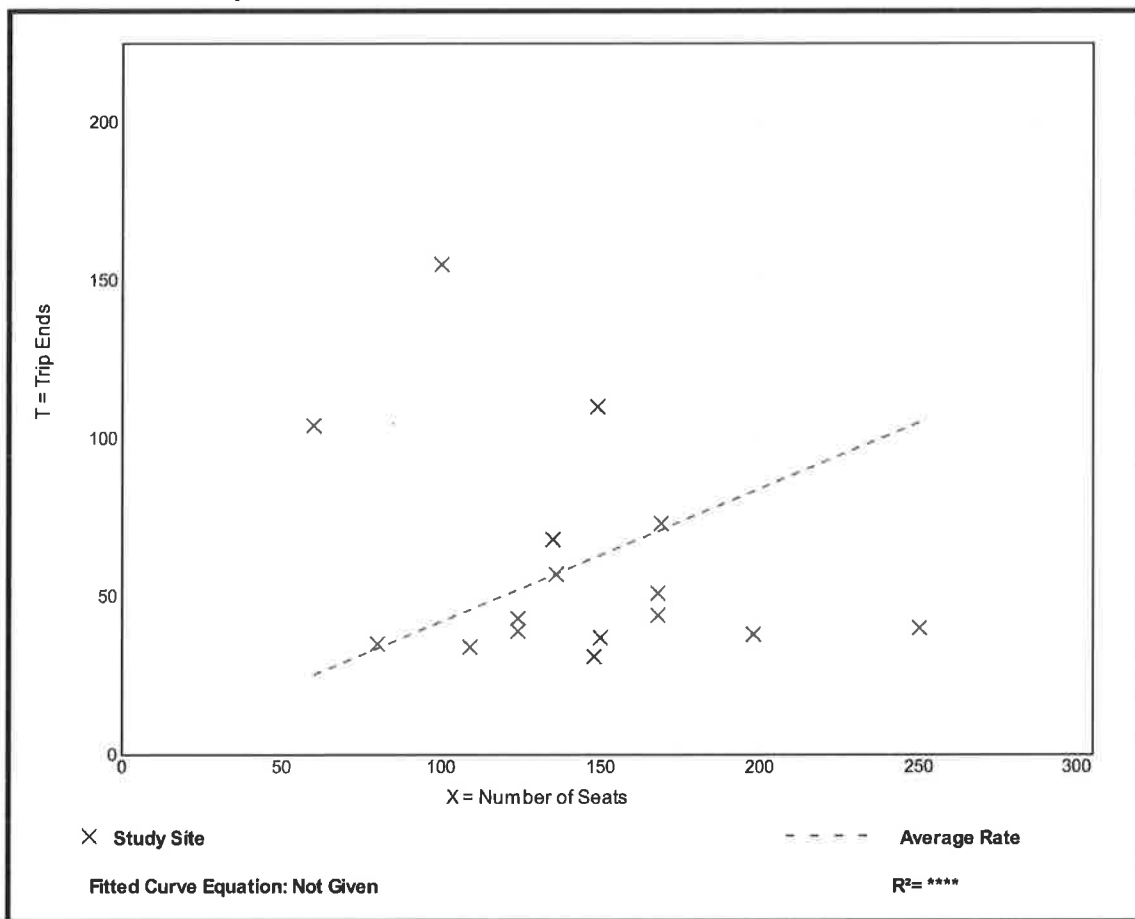
Vehicle Trip Ends vs: Seats  
On a: Weekday,  
Peak Hour of Adjacent Street Traffic,  
One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban  
Number of Studies: 16  
Avg. Num. of Seats: 142  
Directional Distribution: 57% entering, 43% exiting

### Vehicle Trip Generation per Seat

Average Rate	Range of Rates	Standard Deviation
0.42	0.16 - 1.73	0.37

### Data Plot and Equation



## High-Turnover (Sit-Down) Restaurant (932)

Vehicle Trip Ends vs: Seats  
On a: Saturday

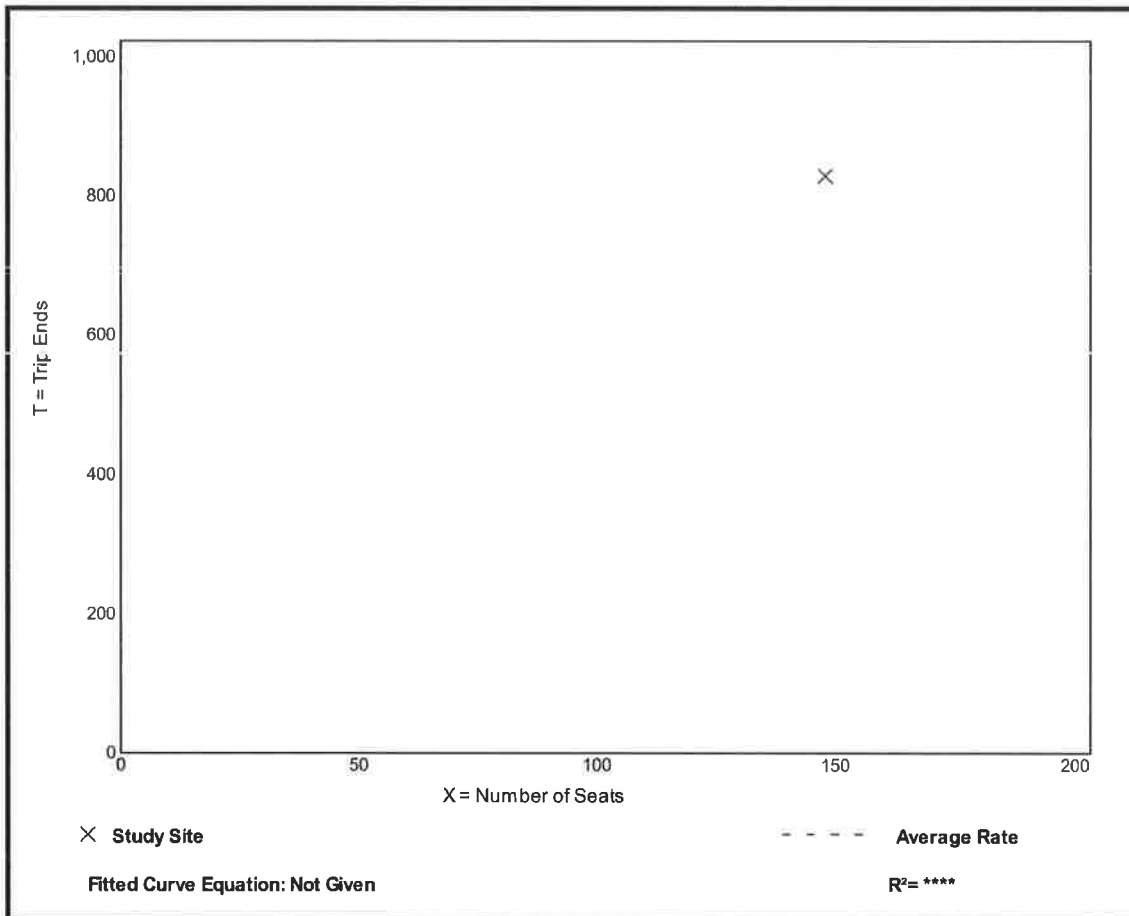
Setting/Location: General Urban/Suburban  
Number of Studies: 1  
Avg. Num. of Seats: 148  
Directional Distribution: 50% entering, 50% exiting

### Vehicle Trip Generation per Seat

Average Rate	Range of Rates	Standard Deviation
5.60	5.60 - 5.60	*

### Data Plot and Equation

*Caution – Small Sample Size*



## High-Turnover (Sit-Down) Restaurant (932)

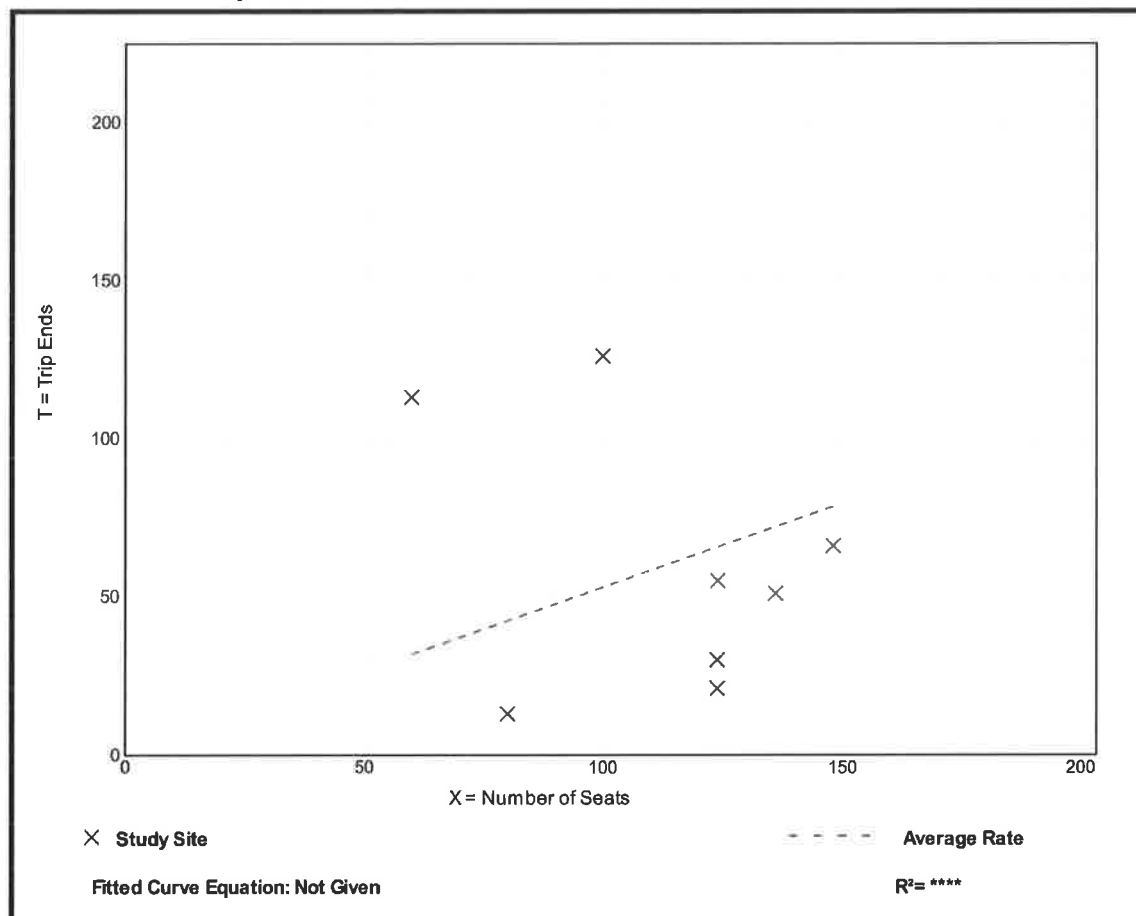
Vehicle Trip Ends vs: **Seats**  
On a: **Saturday, Peak Hour of Generator**

Setting/Location: **General Urban/Suburban**  
Number of Studies: 8  
Avg. Num. of Seats: 112  
Directional Distribution: 53% entering, 47% exiting

### Vehicle Trip Generation per Seat

Average Rate	Range of Rates	Standard Deviation
0.53	0.16 - 1.88	0.51

### Data Plot and Equation



## MEANS OF TRANSPORTATION TO WORK

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TABLE ID: B08301  
SURVEY/PROGRAM American Community Survey  
PRODUCT: ACS 5-Year Estimates Detailed Tables

**Note: The table shown may have been modified by user selections. Some information may be missing.**

	Census Tract 3509, Middlesex County, Massachusetts	
Label	Estimate	Margin of Error
Total:	3,042	±231
Car, truck, or van:	1,148	±195
Drove alone	1,076	±187
Carpooled:	72	±58
In 2-person carpool	63	±56
In 3-person carpool	0	±12
In 4-person carpool	0	±12
In 5- or 6-person carpool	0	±12
In 7-or-more-person carpool	9	±14
Public transportation (excluding taxicab):	1,446	±227
Bus or trolley bus	117	±64
Streetcar or trolley car	24	±29
Subway or elevated	1,272	±221
Railroad	33	±32
Ferryboat	0	±12
Taxicab	0	±12
Motorcycle	0	±12
Bicycle	155	±69
Walked	123	±56
Other means	0	±12
Worked at home	170	±70

### DATA NOTES

TABLE ID B08301

SURVEY/PROGRAM	American Community Survey
VINTAGE	2018
DATASET	ACSDT5Y2018
PRODUCT:	ACS 5-Year Estimates Detailed Tables
FTP URL:	None
API URL:	Download the entire table at <a href="https://api.census.gov/data/2018/acs">https://api.census.gov/data/2018/acs</a>

#### **USER SELECTIONS**

GEOS	Census Tract 3509, Middlesex County, Massachusetts
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#### **EXCLUDED COLUMNS**

None

#### **APPLIED FILTERS**

None

#### **APPLIED SORTING**

None

#### **WEB ADDRESS**

<https://data.census.gov/cedsci/table?q=ACSDT1Y2019.B08301&text=B08301&g=1400000US25017350900&tid=ACSDT5Y2018.B08301&hidePreview=true>

**TABLE NOTES:**

Although the American Community Survey (ACS) produces population, demographic and economic data, it does not produce data on certain subjects. Supporting documentation on code lists, subject definitions, data accuracy, and statistical methods is available at <https://www.census.gov/data/tables/2014/acs/2014-2018/5-year-estimates.html>. Source: U.S. Census Bureau, 2014-2018 American Community Survey 5-Year Estimates. Data are based on a sample and are subject to sampling variability. The degree of uncertainty is indicated by the margin of error. Workers include members of the Armed Forces and civilians who were at work last week. While the 2014-2018 American Community Survey (ACS) data generally reflect the February 2014 to February 2018 period, estimates of urban and rural populations, housing units, and characteristics reflect both the 2014 and 2018 data. Explanation of Symbols: An "\*\*\*" entry in the margin of error column indicates that either the data are not available or the margin of error is too large to report.

**COLUMN NOTES**

None

MEANS OF TRANSPORTATION	Census Tract 2691	Census Tract Percentage	Used for Restaurant
Car, truck, or van	2653	79.1%	50.0%
Drove alone	2495	74.4%	25.0%
Carpooled:	158	4.7%	25.0%
In 2-person carpool	130	3.9%	2.5%
In 3-person carpool	0	0.0%	20.0%
In 4 person carpool	28	0.8%	2.5%
Non-Vehicular Modes	701	20.9%	50.0%
Total	3354	100.0%	100%

Average Vehicle Occupancy (AVO) - Restaurant			
# Occupants	Weight	Occupants	Product
Drove Alone	0.250	1	0.250
Carpool (2)	0.025	2	0.050
Carpool (3)	0.200	3	0.600
Carpool (4)	0.025	4	0.100
<i>Sums</i>	<i>0.500</i>		<i>1.000</i>
<b>AVO (Sum of Products/Sum of Weights)</b>			<b>2.000</b>

Land Use Code: 932		High Turnover Sit-Down Restaurant			
	Weekday AM Peak Hour	Weekday PM Peak Hour	Sat. Midday Peak Hour	Weekday Daily	Saturday Daily
Size per Seats	164	164	164	164	164
Average Trip Rate	0.48	0.42	0.53	4.37	5.60
<b>Total Trips</b>	<b>N/A</b>	<b>69</b>	<b>86</b>	<b>716</b>	<b>918</b>
Entering%	52%	57%	53%	50%	50%
Exiting%	48%	43%	47%	50%	50%
Entering Trips	N/A	39	46	358	459
Exiting Trips	N/A	30	40	358	459

<i><b>Restaurant Space</b></i>	Weekday AM Peak Hour	Weekday PM Peak Hour	Sat. Midday Peak Hour	Weekday Daily	Saturday Daily
Base Trips (per ITE)	0	69	86	716	918
Total Person-Trips (adjusted using ITE AVO)	0	92	116	960	1230
Total Person-Vehicle-Trips	0	46	58	480	615
<b>Total Vehicle-Trips (adjusted using AVO)</b>	<b>0</b>	<b>23</b>	<b>29</b>	<b>240</b>	<b>308</b>
Entering Vehicle-Trips	0	13	15	120	154
Exiting Vehicle-Trips	0	10	14	120	154
Total Non-Vehicular Trips	0	46	58	480	615