APPENDIX J:

Trip Generation Excerpts

Land Use: 150
Warehouse

Description

A warehouse is a large building primarily devoted to the storage of goods and materials but may also include office and maintenance areas. Stored goods can include raw materials, packing materials, parts, or other finished goods. A warehouse may provide long-term storage or serve as a distribution center for transferring goods between carriers (e.g., from long-haul carrier to a local delivery vehicle). A warehouse typically has loading docks to load and unload goods from trucks.

Additional Data

An additional resource which provides more information about warehouse types and definitions is available from NAIOP Research Foundation: Commercial Real Estate Terms and Definitions report from April 2024. https://www.naiop.org/globalassets/research-and-publications/report/terms-and-definitions-/naiop-2024-terms-and-definitions.pdf

The sites were surveyed in the 1990s, the 2000s, the 2010s, and the 2020s in California, Connecticut, Florida, Minnesota, New Jersey, Ohio, Oregon, Pennsylvania, and Texas.

Source Numbers

406, 411, 443, 579, 583, 596, 598, 611, 619, 642, 752, 869, 875, 876, 914, 940, 1050, 1214, 1221, 1257, 1286

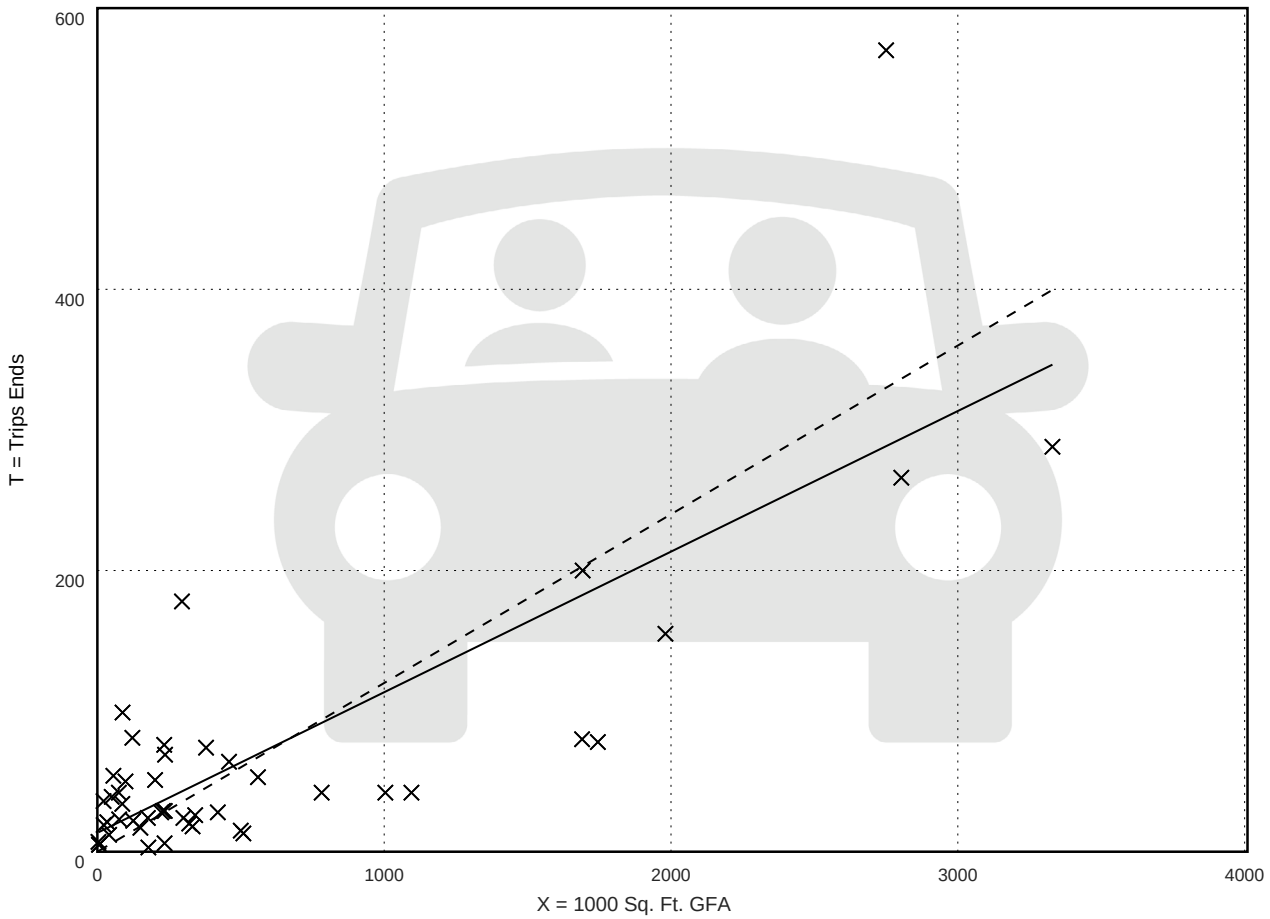
Warehouse
(150)

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: 47
Avg. 1000 Sq. Ft. GFA: 559
Directional Distribution: 77% entering, 23% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.12	0.02 - 1.80	0.14

Data Plot and Equation



Fitted Curve Equation: T = 0.10(X) + 13.43

R^2= 0.62

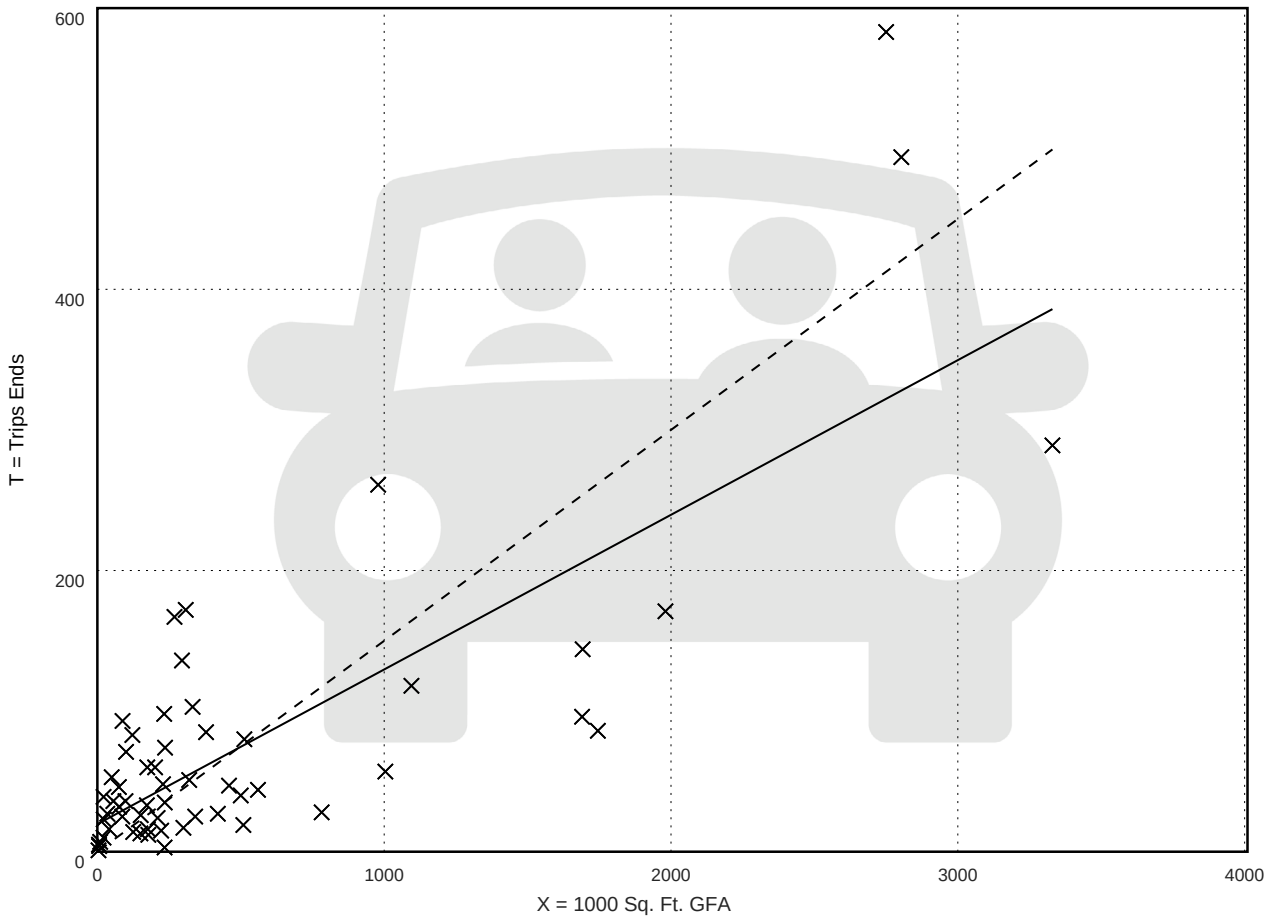
Warehouse
(150)

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:	58
Avg. 1000 Sq. Ft. GFA:	503
Directional Distribution:	28% entering, 72% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.15	0.01 - 1.80	0.15

Data Plot and Equation



Fitted Curve Equation: T = 0.11(X) + 19.62

R^2= 0.63

Warehouse
(150)

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

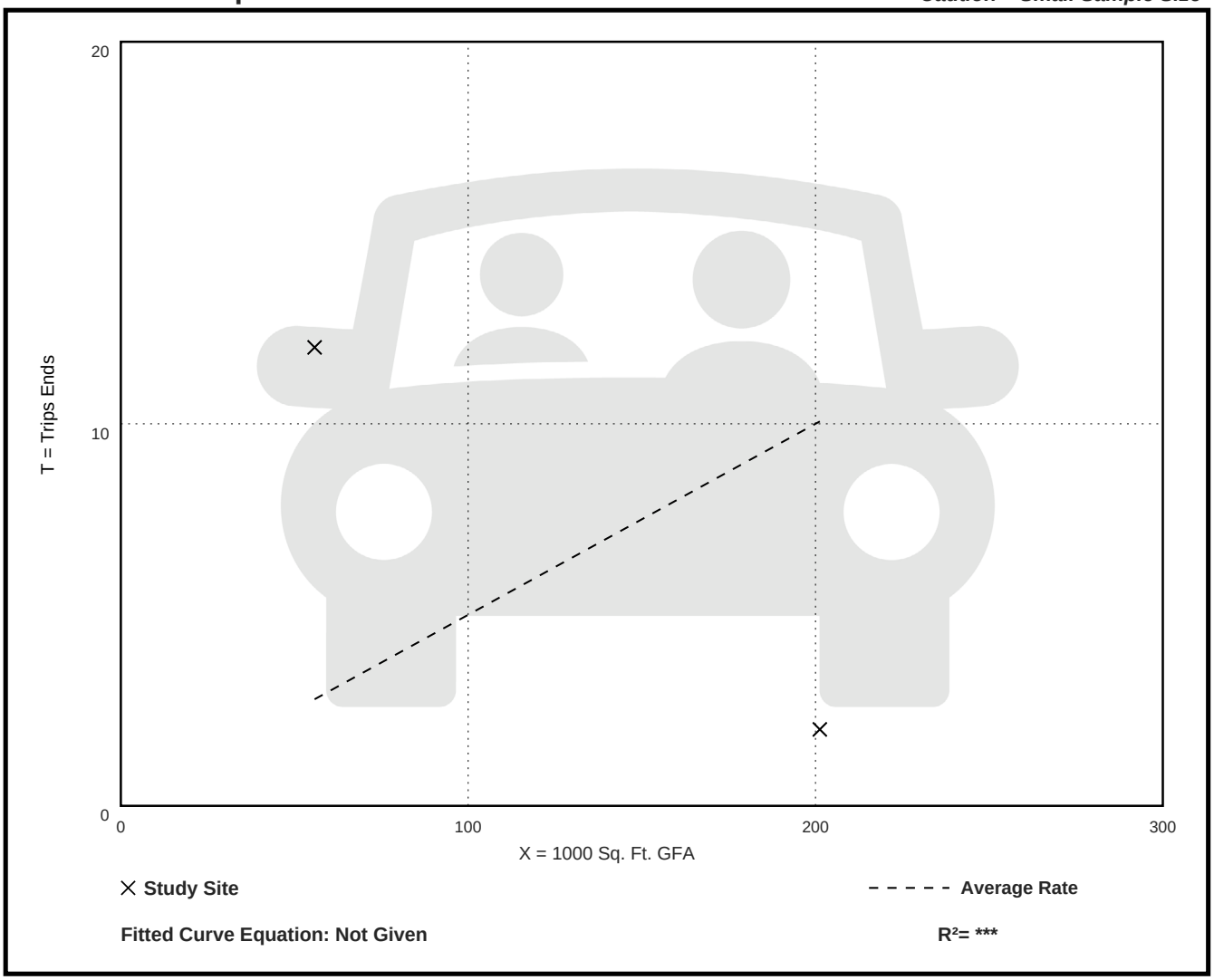
Setting/Location: **General Urban/Suburban**
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 129
Directional Distribution: 64% entering, 36% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.05	0.01 - 0.22	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= ***

DAVIS DRIVE & HIGHWAY 404 RETAIL DEVELOPMENT

TRANSPORTATION MOBILITY PLAN

FINAL ▪ MARCH 2022

REPORT PREPARED FOR

DAVIS DRIVE 404 RETAIL LIMITED PARTNERSHIP
75 TIVERTON COURT
MARKHAM, ON L3R 4M8

REPORT PREPARED BY

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PROJECT NUMBER 10054

6 SITE GENERATED TRAFFIC

6.1 Previous Trip Generation

The analysis contained within this addendum to the prior submissions was based upon the updated site plan, dated January 31, 2022, which provides site statistics for both Phase 1 and Phase 2 of the subject site. TMIG was provided with basic traffic model outputs and Synchro models from the WSP TIS to inform the updated analysis. As per the updated site plan, Buildings A1 through A5 within Phase 1 of the site have received prior approval and are currently under construction. The remaining Phase 1 buildings, including Buildings A6, B1, and B2, have been updated compared to the original site plan that informed the 2018 TIS.

To account for the modifications made to the site plan after submission of the 2018 report, TMIG removed and replaced the Phase 1 site trips from the traffic model outputs and replaced them with updated site trips based on the latest site plan statistics. Phase 2 site trip generation estimates from the 2018 TIS were also replaced. Of note, the 2018 WSP TIS estimated site traffic using the 9th Edition of the *Trip Generation Manual* published by the ITE. The updated site traffic estimates used in this addendum study were estimated using the 10th edition of the ITE *Trip Generation Manual*.

6.2 Trip Generation

For analysis purposes of this addendum, full build-out of both Phase 1 and Phase 2 of the subject site will be complete by the 2025 horizon year. 5-year and 10-year post-build-out horizons of 2030 and 2035 were also analyzed. Identical site trip volume estimates were applied to all three study horizon years.

During the weekday p.m. peak hour, Phase 1 and 2 are predicted to generate a combined total of 1,536 two-way trips consisting of 782 inbound trips and 754 outbound trips. The subject site is estimated to generate a total of 1,926 two-way trips during the Saturday peak hour, consisting of 1,050 inbound trips and 876 outbound trips. This does represent an increase in the trip generation assumed in the original studies. **Table 6-2** presents the original trip generation and compares it to the current site plan concept.

Based on the comparison, during the weekday p.m. peak hour, Phase 1 and 2 are predicted to generate an additional 919 two-way trips consisting of 501 inbound trips and 418 outbound trips. The subject site is estimated to generate an additional 1,248 two-way trips during the Saturday peak hour, consisting of 669 inbound trips and 579 outbound trips.

Table 6-1 provides a summary of the updated site trip generation according to the latest site plan statistics. 10th edition ITE *Trip Generation Manual* equations and average rates were used to estimate trips generated by Buildings A1-A6, B1-B3, and C1-C2. Site trips for Building D1, a membership retail warehouse, were generated using proxy site data (May 7, 2019) collected at an existing membership retail warehouse at 55 New Huntington Road in Woodbridge which also included a members-only gas bar and similar proximity to major arterial roads and a highway. The proxy site data and trip rate calculations are provided in **Appendix B**.

During the weekday p.m. peak hour, Phase 1 and 2 are predicted to generate a combined total of 1,536 two-way trips consisting of 782 inbound trips and 754 outbound trips. The subject site is estimated to generate a total of 1,926 two-way trips during the Saturday peak hour, consisting of 1,050 inbound trips and 876 outbound trips. This does represent an increase in the trip generation assumed in the original studies. **Table 6-2** presents the original trip generation and compares it to the current site plan concept.

Based on the comparison, during the weekday p.m. peak hour, Phase 1 and 2 are predicted to generate an additional 919 two-way trips consisting of 501 inbound trips and 418 outbound trips. The subject site is estimated to generate an additional 1,248 two-way trips during the Saturday peak hour, consisting of 669 inbound trips and 579 outbound trips.

Building D1 – Membership Retail Warehouse *(167,338 sq. ft. G.F.A.)*						
Average Rate from Proxy[1]	8.49			11.28		
Directional Split	49%	51%	-	52%	48%	-
Gross Rate	4.16	4.33	8.49	5.86	5.41	11.28
Gross Trips	696	724	1,420	981	906	1,887
Multi-use Reduction	0	0	0	0	0	0
Pass-by	178	178	355	236	236	472
Net Trips	**518**	**547**	**1,065**	**745**	**670**	**1,415**
Total Net Site Trips	**782**	**754**	**1,536**	**1,050**	**876**	**1,926**

[1] Membership Retail Warehouse Gross Trip Rates based on proxy site data (Woodbridge, May 2019)

APPENDIX B

Proxy Site Data and Trip Rate Calculations

Access	AM			PM			SATURDAY		
	8:30am - 9:30am			6:00pm - 7:00pm			3:00pm - 4:00pm		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
New Huntington - Access 1	162	19	181	368	95	463	449	142	591
Motion Court - Access 2	120	221	341	149	319	468	173	308	481
Motion Court - Access 3	7	38	45	83	129	212	187	206	393
Motion Court - Access 4	21	10	31	55	126	181	99	195	294
Total Vehicles	**310**	**288**	**598**	**655**	**669**	**1324**	**908**	**851**	**1759**
%	51.8%	48.2%		49.5%	50.5%		51.6%	48.4%	
Estimated GFA (from 2015 Report)	156000 ft^2								
Trip Rates (Trips/1000 ft^2)	**1.987**	**1.846**	**3.833**	**4.199**	**4.288**	**8.487**	**5.821**	**5.455**	**11.276**

Land Use: 821
Shopping Plaza (40-150k)

Description

A shopping plaza is an integrated group of commercial establishments planned, developed, owned, and managed as a unit. Each study site in this land use has between 40,000 and 150,000 square feet of gross leasable area (GLA). The term “plaza” in the land use name rather than “center” is simply a distinction between the different shopping center size ranges. Various other names are commonly used to categorize a shopping plaza within this size range depending on its specific size and tenants, such as neighborhood center, community center, and fashion center.

A supermarket is often the major tenant of a shopping plaza, but many shopping centers are anchored by home improvement, discount, or other stores. A shopping plaza typically contains more than retail merchandising facilities. Common tenants include office space, a movie theater, restaurants, a post office, banks, a health club, and recreational facilities. A shopping plaza is almost always open-air and the GLA is the same as the gross floor area of the building.

The 150,000-square-foot GLA threshold value between a shopping plaza and a shopping center (Land Use 820) is based on an examination of trip generation data. For a shopping plaza that is smaller than the threshold value, the presence or absence of a supermarket within the plaza has a measurable effect on site trip generation. For a shopping center that is larger than the threshold value, the trips generated by its other major tenants mask any effects of the presence or absence of an on-site supermarket.

The 40,000-square-foot GFA threshold between a shopping plaza and a strip retail plaza (Land Use 822) was selected based on an examination of the overall shopping center/plaza database. All shopping plazas in the database with a supermarket as their anchor are larger than 40,000 square feet GLA.

Land Use Subcategory

The presence or absence of a supermarket in a shopping plaza has a measurable effect on-site trip generation. Therefore, data are presented for two subcategories for this land use: (1) sites with a supermarket anchor and (2) sites without a supermarket.

Additional Data

The sites were surveyed in the 1990s, the 2000s, the 2010s, and the 2020s in Alberta (CAN), British Columbia (CAN), California, Delaware, District of Columbia, Florida, Illinois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Nevada, New Jersey, Ontario (CAN), Oregon, Pennsylvania, South Dakota, Vermont, and Wisconsin.

Source Numbers

358, 390, 404, 437, 444, 446, 507, 580, 598, 658, 728, 908, 926, 944, 946, 960, 974, 1004, 1009, 1025, 1069, 1219

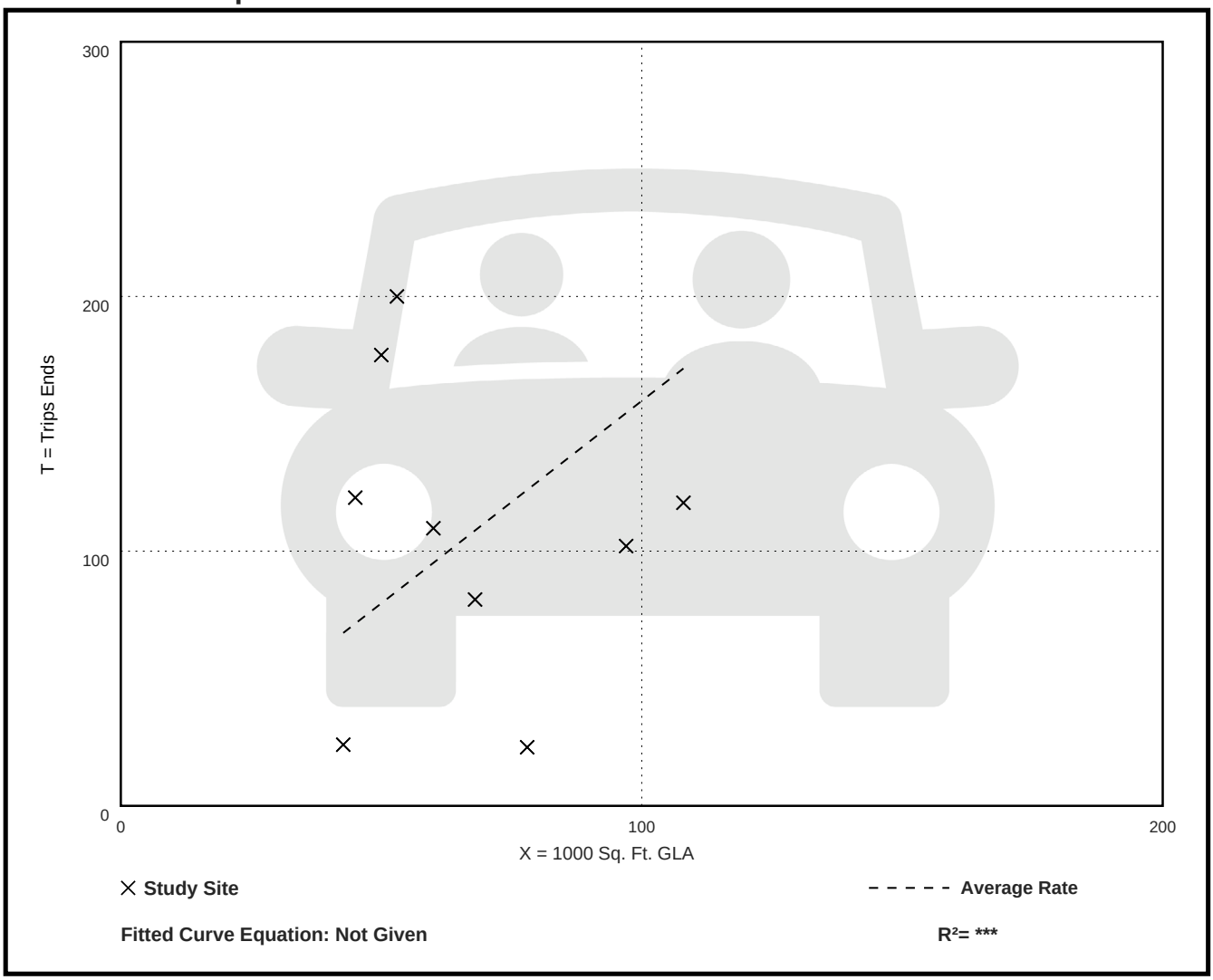
Shopping Plaza (40-150k) - Supermarket - No (821)

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:	9
Avg. 1000 Sq. Ft. GLA:	67
Directional Distribution:	62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
1.59	0.29 - 3.77	1.18

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

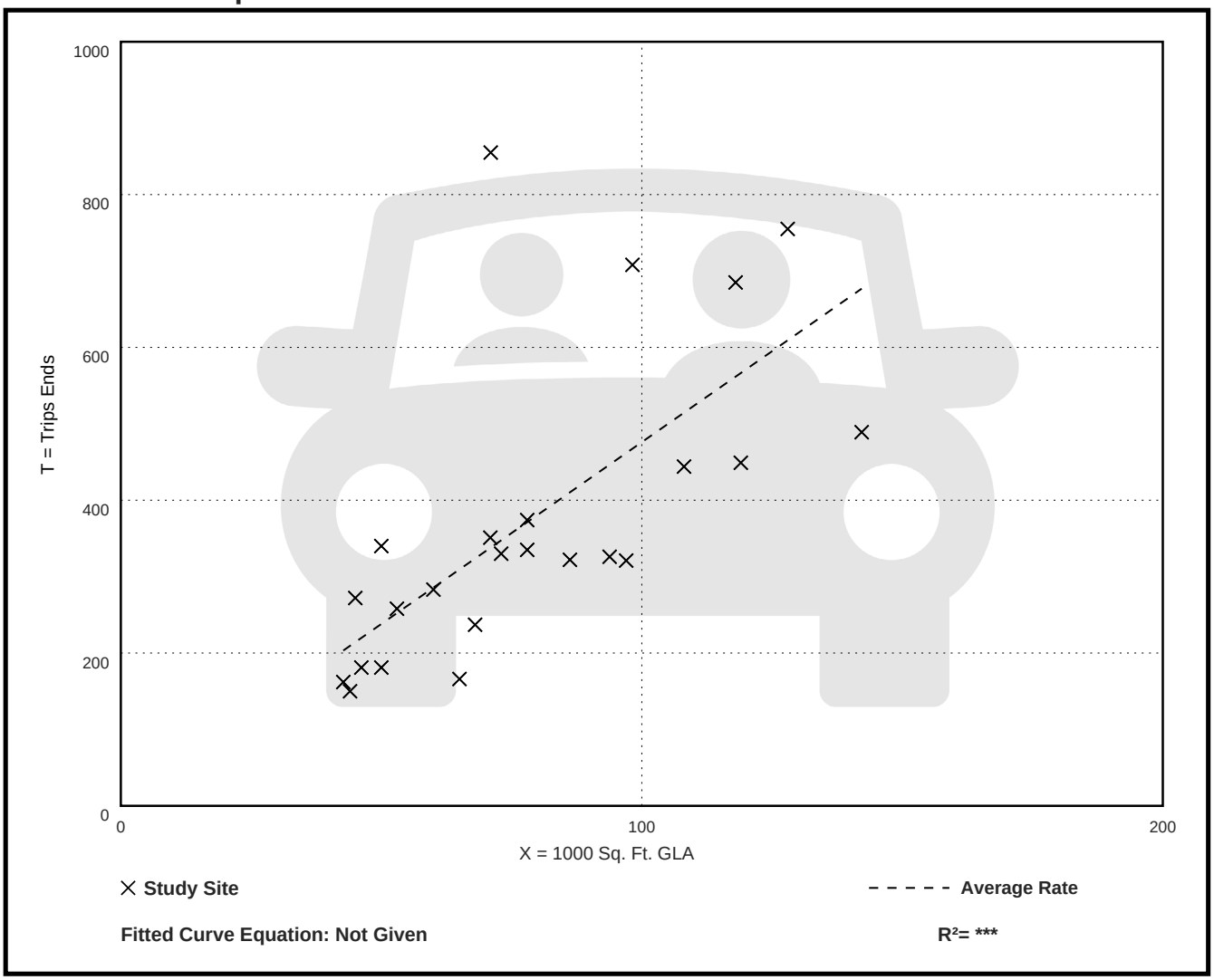
Shopping Plaza (40-150k) - Supermarket - No (821)

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:	24
Avg. 1000 Sq. Ft. GLA:	79
Directional Distribution:	49% entering, 51% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
4.76	2.55 - 12.04	1.89

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= *

Shopping Plaza (40-150k) - Supermarket - No (821)

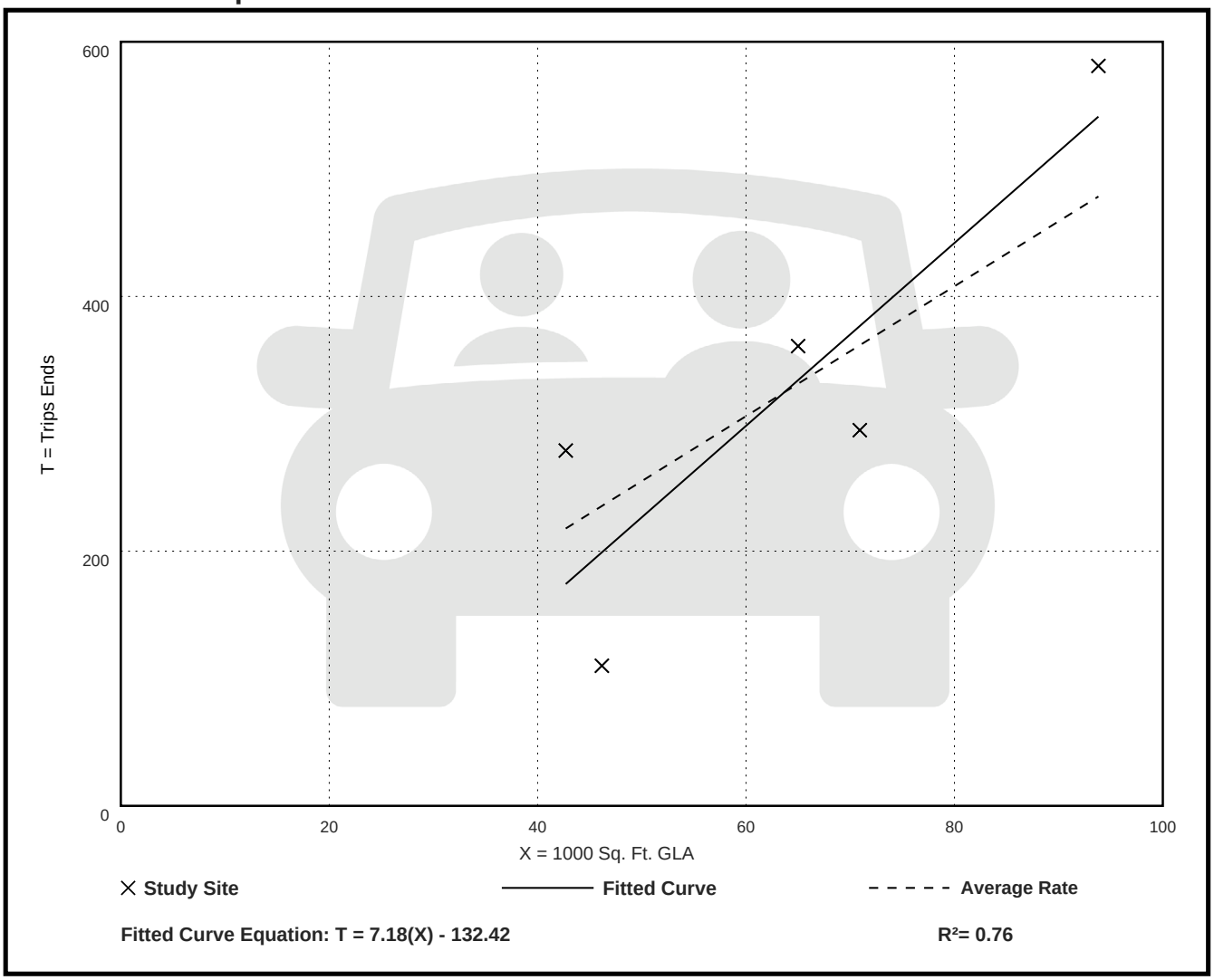
Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Saturday, Peak Hour of Generator**

Setting/Location: **General Urban/Suburban**
Number of Studies: 5
Avg. 1000 Sq. Ft. GLA: 64
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
5.10	2.38 - 6.53	1.56

Data Plot and Equation



Fitted Curve Equation: T = 7.18(X) - 132.42

R^2= 0.76

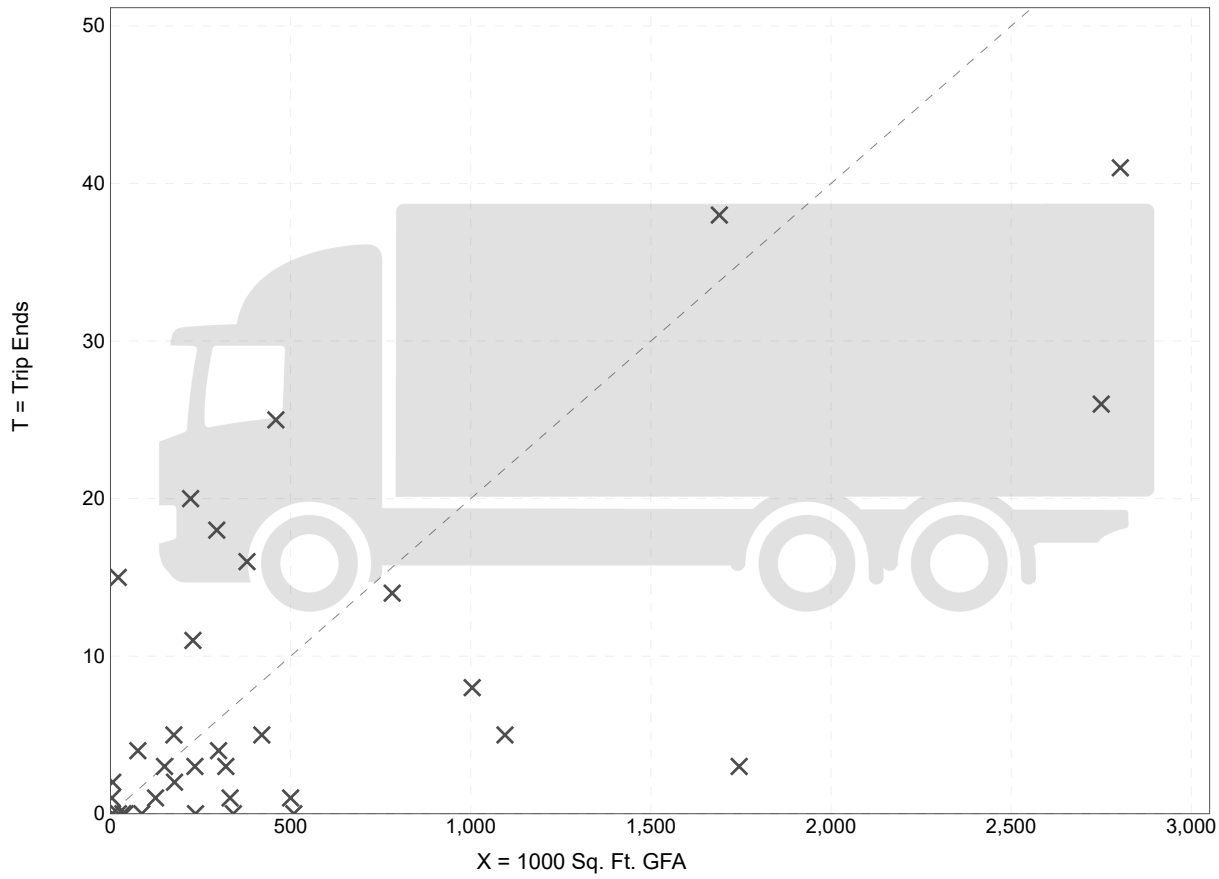
Warehouse
(150)

Truck 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:	34
Avg. 1000 Sq. Ft. GFA:	517
Directional Distribution:	52% entering, 48% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 0.69	0.03

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

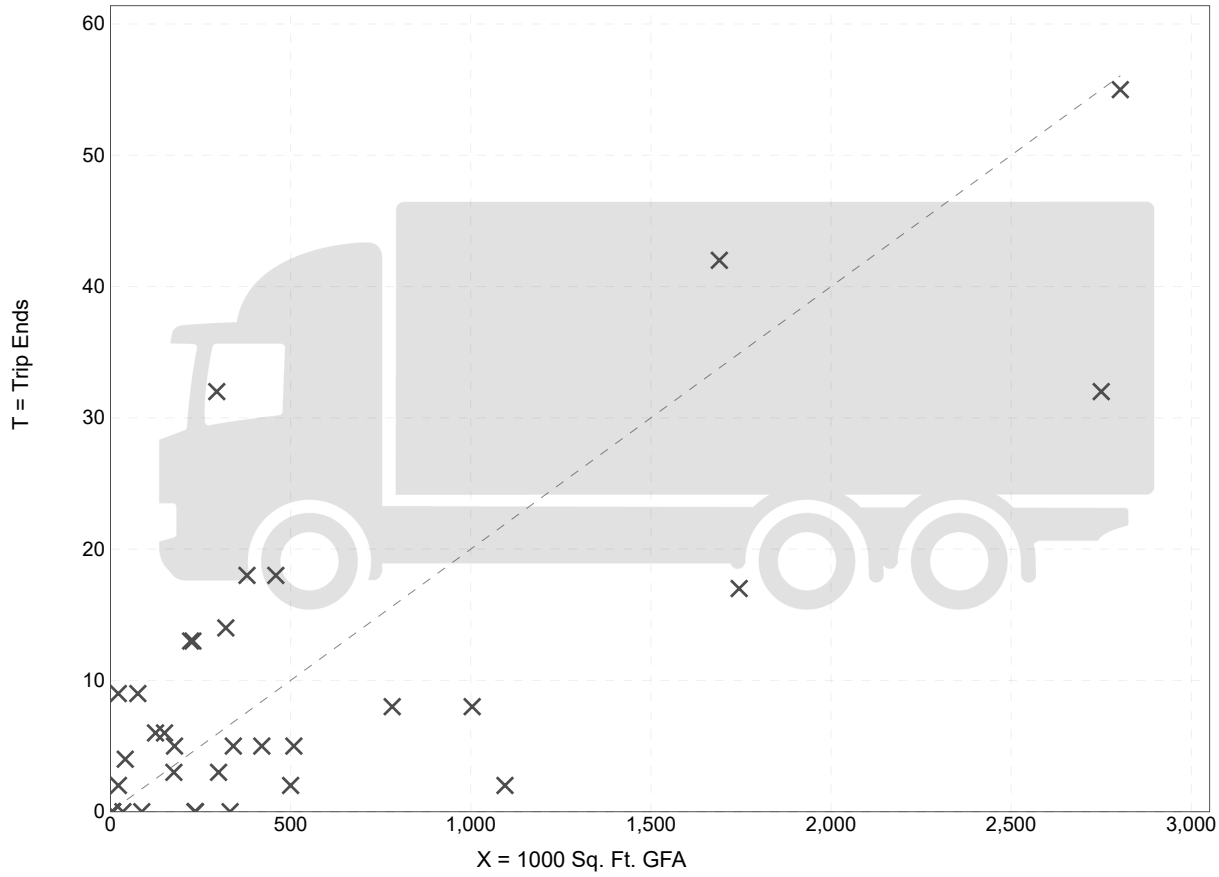
Warehouse
(150)

Truck 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:	34
Avg. 1000 Sq. Ft. GFA:	517
Directional Distribution:	53% entering, 47% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 0.42	0.02

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

Trip Generation Handbook
3rd Edition

SEPTEMBER 2017

INSTITUTE OF TRANSPORTATION ENGINEERS

5.5.2 Baseline Site Mode Shares and Vehicle Occupancy

Baseline person trips are calculated by

- First, converting ITE **baseline vehicle trip generation** estimates to **vehicle person trips** using the baseline vehicle occupancy for the specific land use code (or the same general land use category), and
- Second, converting **vehicle person trips** to **person trips by mode** through the use of applicable baseline mode shares.

Baseline vehicle trip generation can be estimated from data provided in *Trip Generation Manual*. Procedures for making those estimates are described in Chapters 3 and 4. Little information is provided regarding baseline vehicle occupancy or mode shares.

For this *Handbook*, a limited amount of weekday commuter peak period (7:00–9:00 a.m., 4:00–6:00 p.m.) mode share and vehicle occupancy data were collected for baseline sites to provide a general starting point for some of the more common land use types. Baseline data were collected at apartments, motels, offices, shopping centers, restaurants, a bank, and a bowling alley.[5] These baseline mode share and vehicle occupancy data are presented in Appendix B.

There are not enough samples in the Appendix B data to derive precise percentages by mode for the land use types for which data were collected. However, in almost all cases, the percentage of total person trips in vehicles exceeds 95 percent. In some cases the averages by land use are 100 percent motor vehicle. Based on the limited data shown, the analyst can reasonably conclude the following with regard to baseline mode shares:

- The percentage mode share of person trips made by vehicle (personal passenger vehicle plus truck) for most baseline sites is 95 percent or more.
- The majority of non-vehicle trips are by walking.
- From the limited number of samples with more than 100 observations, it appears there may be only very small directional differences in total vehicle share percentages for some land uses. Smaller samples contain slightly larger variations. Those could be real or could be just statistical data noise from smaller samples.
- Percentages of person trips in vehicles are only available in this data set for a few land uses. The findings may or may not be transferrable to other land uses. It is not suggested at this time to assume the same results for other land uses. However, it may be reasonable to assume similar results for land uses within the same land use category (such as residential, lodging, or general retail).

If the analyst assumes a mode share of 95 percent of person trips are in vehicles, then the ITE vehicle trip generation rates/equations (when converted to person trips) represent 95 percent of the total person trips (both drivers and passengers). The other 5 percent are walk, bicycle, and transit trips.

[5] The land use types were selected so the data would be transferrable to similar land uses. For example, residential apartment mode shares should be applicable to all suburban baseline apartment classifications.

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual* , 12th Edition

Land Use Code	857
Land Use	Discount Club
Setting	General Urban/Suburban
Time Period	Weekday PM Peak Period
# Data Sites	5
Average Pass-By Rate	34%

Pass-By Characteristics for Individual Sites

GFA (000)	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Non-Pass-By Trips			Adj Street Peak Hour Volume	Source
					Primary (%)	Diverted (%)	Total (%)		
137	Pennsylvania	2009	160	19	—	—	81	—	19
149	Pennsylvania	2009	228	27	—	—	73	—	19
149	Pennsylvania	2009	147	15	—	—	85	—	19
149	Pennsylvania	2009	218	43	—	—	57	—	19
149	New Jersey	2010	255	66	—	—	34	—	19

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual* , 12th Edition

Land Use Code	857
Land Use	Discount Club
Setting	General Urban/Suburban
Time Period	Saturday Midday
# Data Sites	5
Average Pass-By Rate	25%

Pass-By Characteristics for Individual Sites

GFA (000)	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Non-Pass-By Trips			Adj Street Peak Hour Volume	Source
					Primary (%)	Diverted (%)	Total (%)		
137	Pennsylvania	2009	462	18	—	—	82	—	19
149	Pennsylvania	2009	203	11	—	—	89	—	19
149	Pennsylvania	2009	240	25	—	—	75	—	19
149	Pennsylvania	2009	267	40	—	—	60	—	19
149	New Jersey	2010	209	29	—	—	71	—	19

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual* , 12th Edition

Land Use Code	821
Land Use	Shopping Plaza (40 - 150k)
Setting	General Urban/Suburban
Time Period	Weekday PM Peak Period
# Data Sites	15
Average Pass-By Rate	40%

Pass-By Characteristics for Individual Sites

GLA (000)	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Non-Pass-By Trips			Adj Street Peak Hour Volume	Source
					Primary (%)	Diverted (%)	Total (%)		
45	Florida	1992	844	56	24	20	44	—	30
50	Florida	1992	555	41	41	18	59	—	30
52	Florida	1995	665	42	33	25	58	—	30
53	Florida	1993	162	59	—	—	41	—	30
57.23	Kentucky	1993	247	31	53	16	69	2659	34
60	Florida	1995	1583	40	38	22	60	—	30
69.4	Kentucky	1993	109	25	42	33	75	1559	34
77	Florida	1992	365	46	—	—	54	—	30
78	Florida	1991	702	55	23	22	45	—	30
82	Florida	1992	336	34	—	—	66	—	30
92.857	Kentucky	1993	133	22	50	28	78	3555	34
100.888	Kentucky	1993	281	28	50	22	72	2111	34
121.54	Kentucky	1993	210	53	30	17	47	2636	34
144	New Jersey	1990	176	32	44	24	68	—	24
146.8	Kentucky	1993	—	36	39	25	64	—	34

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual* , 12th Edition

Land Use Code	821								
Land Use	Shopping Plaza (40 - 150k)								
Setting	General Urban/Suburban								
Time Period	Saturday Midday								
# Data Sites	1								
Average Pass-By Rate	31%								
	Pass-By Characteristics for Individual Sites								
	State or	Survey		Pass-By	Non-Pass-By Trips			Adjacent Street	
GLA (000)	Province	Year	# Interviews	Trip (%)	Primary (%)	Diverted (%)	Total (%)	Daily Volume	Source
144	New Jersey	1990	264	31	47	22	69	63362	24