



ITE Data Collection Project 2015 University of Washington

To Richard Hutchinson

From Luka Ukrainczyk

Abstract

The UW ITE chapter studied traffic volumes at Starbucks Coffee in Lake City, Seattle. Trips generated by the store as well as parking and drive-thru demand were recorded and analyzed. Data was collected on three consecutive non-holiday weekdays in March 2015. Motor vehicle and drive-thru demand were found to be drastically high in the morning. Non-motorized demand was steady throughout the day. All data collected is organized and presented in this report.

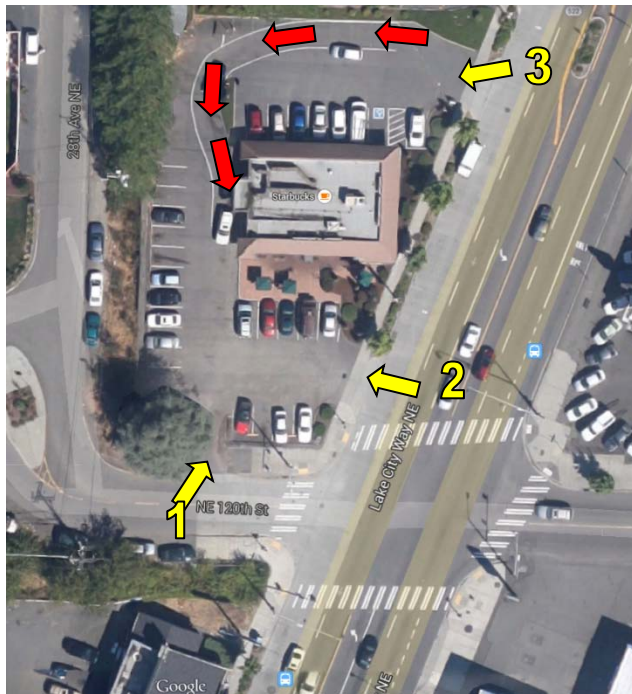
Please contact Luka Ukrainczyk at lukra@uw.edu with any questions or requests.

Study Scope

During three days in March 2015, members of the University of Washington ITE chapter and volunteers from courses CEE 327 and CEE 410 collected data on driveway entrance volume, queue, and parking as well as pedestrian and bicycle entrance volumes. There were 32 total people working on the study. The data collection was done at Starbucks Coffee at 12001 Lake City Way NE in the Lake City neighborhood of Seattle, WA. There were at least two team members collecting data at all times between 6:00 AM and 6:00 PM on Tuesday March 10th, Wednesday March 11th, and Thursday March 12th. These days were typical weekdays. Part 1 of the appendix details the characteristics of the establishment. Figure 1 shows the satellite image of the site with driveways, drive-thru, and bus stops notated.

Table 1 Site Characteristics

Figure 1 Site map. Drive-thru marked in red. Driveways marked in yellow.



Location	12001 Lake City Way NE Seattle, WA 98125
Parking Lot	28 parking stalls (2 of which are ADA stalls)
Site Area	.45 acres
Area of Facility	3,500 sq-ft
Winter hours	5am ~ 10pm

Methodology

Motor vehicles were counted when they crossed the driveway threshold into the site. Only incoming cars were counted. Exit trips were calculated from the difference between entrances and parking turnover. Motor vehicles were distinguished by type; car, van, truck, and motorcycle. Bikes were counted when they entered Starbucks property. Pedestrians and bus riders were counted when they walked through the doors of the building. Parking tally was taken every 15 minutes of the site's 28 spots. The longest drive-thru line was recorded every five minutes.

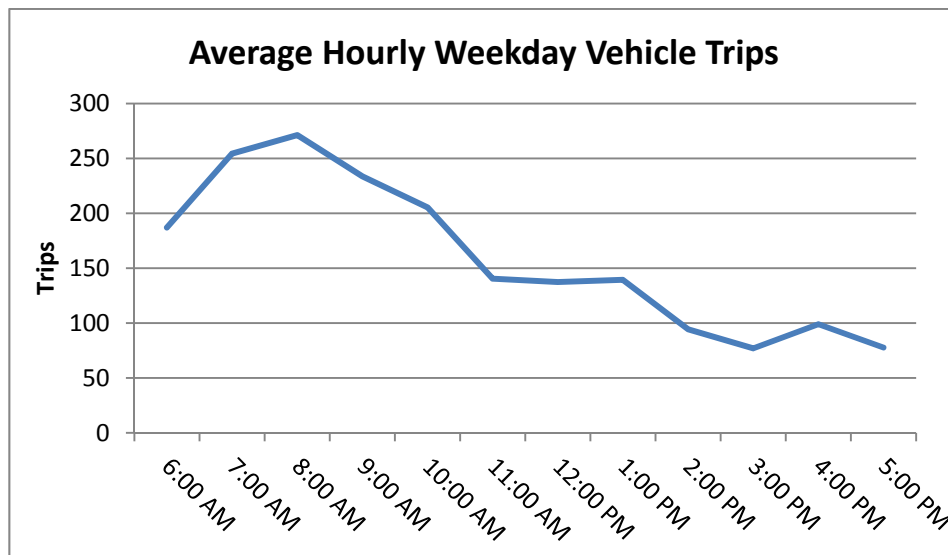
Driveway Volumes

Figure 2 shows the hourly volumes entering all driveways on the premises. Demand is strongest in the morning, as expected at a coffee shop. Demand peaks between 8 AM and 9 AM, with much smaller minor peaks around noon and 4 PM, which correspond to lunch and the end of the work day respectively. The store remains open until 10 PM, with a much smaller stream of customers. For the safety of our data collectors, we stopped collecting data at 6 PM.

Heavy trucks were very uncommon. 64 truck trips were recorded over all three days of data collection. Part 2 and part 3 of the appendix detail the driveway volumes.

Figure 2

Average Hourly Weekday Vehicle Trips



Parking and Queuing

Figure 3 shows the maximum parking occupancy for every hour of data collection. Curiously, parking occupancy grows throughout the day and reaches its peak at 4 PM. There is a smaller but significant peak at 9 AM, which corresponds to the peak driveway volume in Figure 2. Data collectors observed that many customers would park and leave their car idling for as much as ten minutes while they bought coffee inside the store.

Figure 4 shows the maximum drive-thru line recorded each hour. Drive-thru queue length more closely reflects entrance demand, with a peak between 7 AM and 8 AM and a much smaller peak around noon. Drive-thru queue lengths are heavily stacked in the morning, suggesting people are in a hurry at that time and want to save time using the drive-thru. The Parking and Queue Demand Survey Forms in the Appendix detail parking volume and queue length.

Figure 3 Maximum hourly parking occupancy

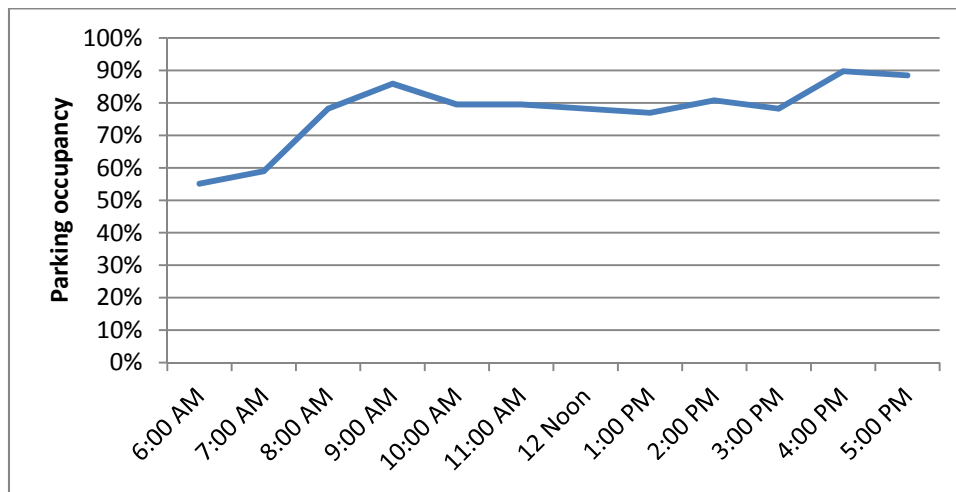
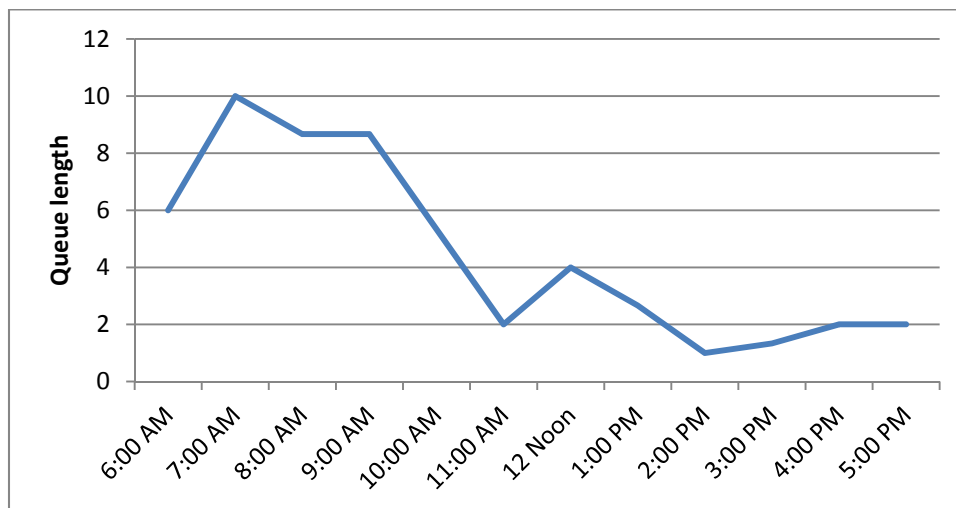


Figure 4 Maximum hourly queue length



Non-Motorized Transportation and Trucks

Figure 5 shows the entrance volumes of bicycle riders and pedestrians. Bicycle riders were rarely seen patronizing Starbucks. The surrounding area does have bike lanes and the Starbucks does have a bike rack. However, Lake City Way NE is a heavily driven arterial with a 30 mph speed limit. The surrounding area is very hilly. This may limit the feasibility of cycling for many Lake City residents.

Pedestrians were more common, especially in the afternoon times in comparison to motorize vehicle users, with very steady arrivals between 6 AM and 10 AM and significant peaks at 1 PM and 4 PM.

Bus riders were extremely rare, with less than 60 transit trips recorded in all three days of data collection. Part 4 of the Appendix details pedestrian and bicycle volume.

Figure 5 Average Hourly Weekday Non-car Trips

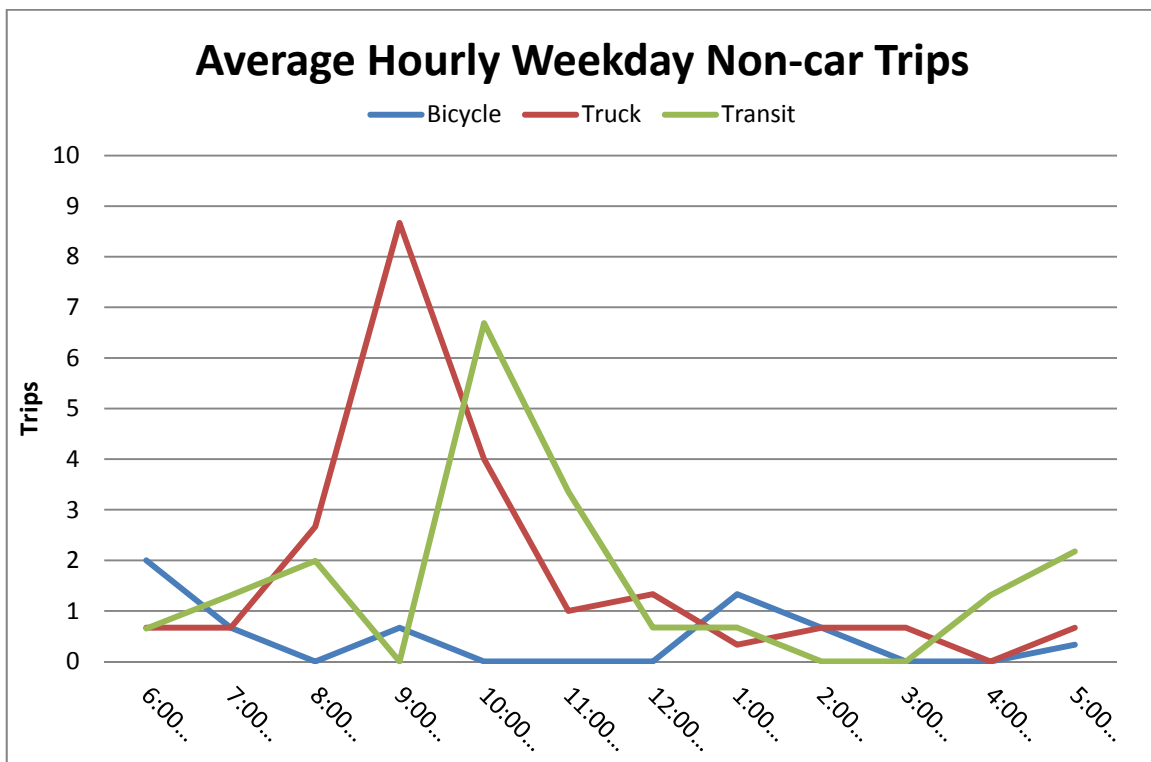


Figure 6 Average Hourly Weekday Pedestrian Trips

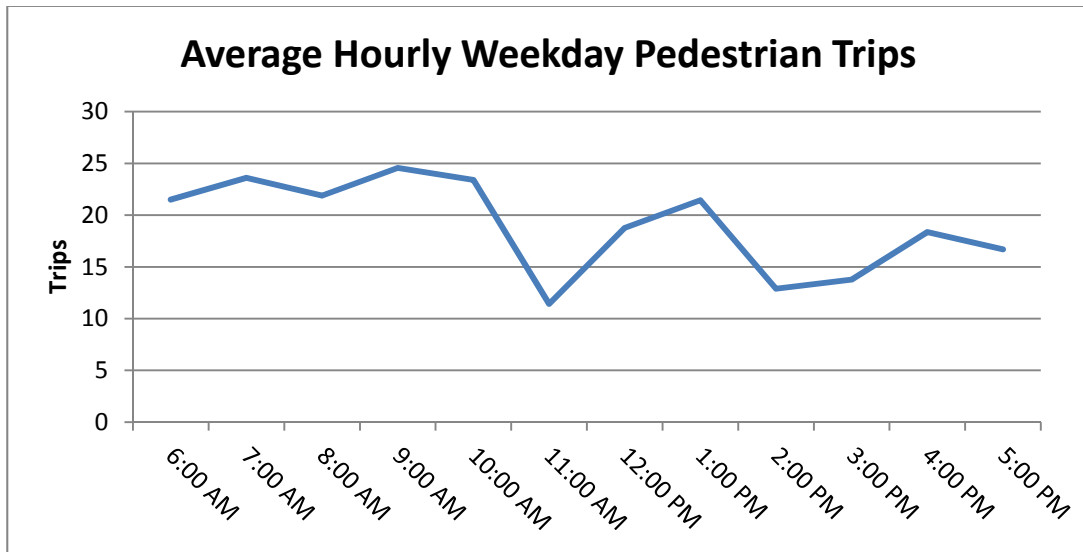


Table 2 Average trip generation

	2015 UW ITE Study	Previous ITE studies
Weekday AM Trip generation per 1000 sq ft of retail space	77.90	110.75
Weekday AM directional distribution	50% entering, 50% exiting	51% entering, 49% exiting
Weekday mid-day Trip generation per 1000 sq ft of retail space	73.00	--
Weekday mid-day directional distribution	50% entering, 50% exiting	--
Weekday PM Trip generation per 1000 sq ft of retail space	27.43	42.93
Weekday PM directional distribution	51% entering, 49% exiting	50% entering, 50% exiting
Square footage	3500	2000

Conclusions

Driveway demand and drive-thru demand were heavily skewed to the morning rush, while parking demand remained steady throughout the day. The majority of extra driveway demand in the morning was attributed to drive-thru usage. Pedestrian demand was more steady and uniform throughout the day. Consistent idling by patrons was noticed, with some leaving their car parked and running for ten minutes while they bought coffee inside. Combatting this habit would be a great opportunity for emission reduction from this land use.



Luka Ukrainczyk
UW ITE Chapter President
April 14th 2015

Appendix

Trip Generation Rate for Land Use

1. Weekday Trip Generation
2. A.M. Peak Weekday Trip Generation
3. P.M. Peak Weekday Trip Generation

Trip Generation Data Forms

4. Part 1 Tuesday
5. Part 1 Wednesday
6. Part 1 Thursday
7. Part 2
8. Part 3 Tuesday
9. Part 3 Wednesday
10. Part 3 Thursday
11. Part 4

Demand Survey Forms

12. Parking Demand Survey Form
13. Queueing Demand Survey Form

Trip Generation

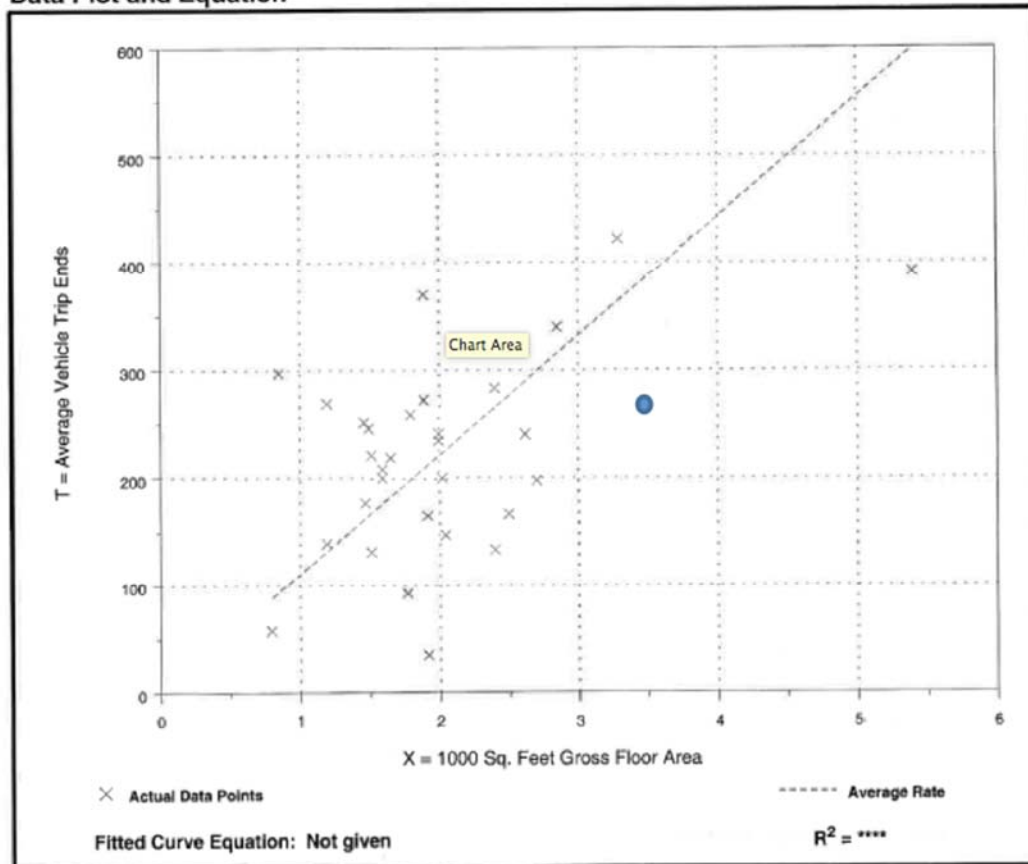
1. AM Peak (8AM-9AM)

Daily AM Peak-Hour Trips

Time	Tuesday	Wednesday	Thursday
8:15AM	39	46	65
8:30AM	69	108	48
8:45AM	75	97	60
9:00AM	54	82	71
Total Trips	237	333	244

Plotting the values of the hourly trips for each of the three days onto the ITE trip generation graph for the AM peak hour traffic yields:

Data Plot and Equation



2.

PM Peak (4PM-5PM):

Daily PM Peak-Hour Trips

Time	Tuesday	Wednesday	Thursday
4:15 PM	27	31	23
4:30 PM	29	29	29
4:45 PM	27	22	23
5:00 PM	17	24	16
Total Trips	100	106	91

Plotting the values of the hourly trips for each of the three days onto the ITE trip generation graph for the PM peak hour traffic yields:

