



January 12, 2024

Mr. John Sponseller  
Ethos Architecture Group  
8025 W. 25<sup>th</sup> Pl.  
Lakewood, CO 80214

SUBJECT: DOUGLAS 234, FILING NO. 6, LOT 4 TRAFFIC COMPLIANCE LETTER  
(JOB NUMBER 2243)

Dear Mr. Sponseller:

The following Traffic Compliance Letter has been prepared to provide a trip generation comparison and on-site queuing evaluation based on the proposed changes to Lot 4 of Douglas 234, Filing No. 6 and identify compliance with the original approved *Chambers and Hess Development Traffic Impact Study (TIS)*, dated September 14, 2020.

## INTRODUCTION

The project proposes to construct a 1,800 square-foot Dunkin Donuts on Lot 4 of the Chambers and Hess Development. On the same lot, the original TIS assumed a 2,000 square-foot coffee/donut shop with a drive-thru window. The project is located along the east side of S. Chambers Road between S. Red Sky Drive and Hess Road in the Town of Parker, Colorado.

**Exhibit A** shows the project vicinity map. **Exhibit B** shows the project site plan. **Appendix A** contains excerpts from the original approved TIS.

## SITE TRIP GENERATION

The project traffic volumes estimated for Lot 4 in the original TIS were expected to be 1,641 daily weekday trips, of which 178 trips (91 inbound and 87 outbound) were anticipated to be generated during the AM peak hour, and 87 trips (44 inbound and 44 outbound) during the PM peak hour. These project generated trips were calculated using the nationally published trip generation rates from the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10<sup>th</sup> Edition.

In September 2021, after the original TIS was approved, ITE released an updated *Trip Generation Manual*, the 11<sup>th</sup> Edition, which provides the latest trip generation data for a given development. The proposed project traffic volumes anticipated to be generated by the proposed development for Lot 4 were estimated using the latest ITE *Trip Generation Manual* (11<sup>th</sup> Edition). The proposed project is anticipated to generate 960 daily weekday trips, of which 154 trips (79 inbound and 75 outbound) are anticipated to be generated during the AM peak hour, and 70 trips (35 inbound and 35 outbound) during the PM peak hour. These trips account for internal capture reductions, as explained in the original TIS. As shown in **Table 1** below, the proposed development is expected to generate 681 fewer daily weekday trips, 24 less AM peak hour trips, and 17 less PM peak hour trip in comparison to the original TIS.

**Table 1  
 PROJECT TRIP GENERATION COMPARISON**

Land Use	Unit	Daily (per unit)	AM Peak Hour			PM Peak Hour			
			Total (per unit)	Inbound (% AM)	Outbound (% AM)	Total (per unit)	Inbound (% PM)	Outbound (% PM)	
<b>Trip Generation Rates (ITE)</b>									
Coffee/Donut Shop with Drive-Through Window (ITE 10 <sup>th</sup> Edition Code 937)	TSF	820.38	88.99	51%	49%	43.38	50%	50%	
Coffee/Donut Shop with Drive-Through Window (ITE 11 <sup>th</sup> Edition Code 937)	TSF	533.57	85.88	51%	49%	38.99	50%	50%	
<b>Forecast Project Generated Trips</b>									
Land Use	Size	Unit	Daily Trips	AM Peak Hour			PM Peak Hour		
				Total	Inbound	Outbound	Total	Inbound	Outbound
<b>Original Development for Lot 4 Per TIS</b>									
Coffee/Donut Shop with Drive-Through Window (ITE 10 <sup>th</sup> Edition Code 937)	2	TSF	1,641	178	91	87	87	44	44
<b>Proposed Development for Lot 4</b>									
Coffee/Donut Shop with Drive-Through Window (ITE 11 <sup>th</sup> Edition Code 937)	1.8	TSF	960	154	79	75	70	35	35
<b>Net Change in Trips</b>			<b>-681</b>	<b>-24</b>	<b>-12</b>	<b>-12</b>	<b>-17</b>	<b>-9</b>	<b>-9</b>

SOURCE: ITE 10<sup>th</sup> Edition *Trip Generation Manual* (2018), ITE 11<sup>th</sup> Edition *Trip Generation Manual* (2021).  
 TSF = Thousand Square Feet

**Appendix B** contains the ITE *Trip Generation Manual* (10<sup>th</sup> Edition, 2018 and 11<sup>th</sup> Edition, 2021) rate sheets.

**SITE CIRCULATION/QUEUING**

Access to the project is provided by one full access driveway at Sliceroo Drive, as proposed in the original TIS. As shown in Exhibit 2, the drive-thru entrance is located adjacent to the project access driveway. The drive-thru is proposed with one lane and approximately 180 feet of available queuing storage. There is one pedestrian crossing near the entrance of the drive-thru that will not interfere with normal operations and queuing.

To analyze the anticipated queuing at the site, a queuing analysis that was conducted by Linscott Law and Greenspan Engineers in 2015 at 3 Dunkin Donuts sites in California and Arizona (see **Appendix C**) was reviewed to estimate the queued vehicles. The analysis showed a maximum observed queue of 9 vehicles (approximately 180 feet) across the 3 sites, each of which are slightly larger than the Dunkin Donuts that is proposed on the Chambers and Hess site. Therefore, it is anticipated that the proposed Dunkin Donuts site will provide adequate storage for queued vehicles. It should be noted that if the traffic from the proposed project queues onto the adjacent shared access or impacts adjacent properties, the owner will be required to re-analyze and make any necessary improvements to mitigate the issue immediately at their own expense.

## PROPOSED RECOMMENDATIONS IMPROVEMENTS/CONCLUSIONS

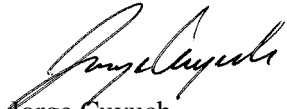
The project does not propose any significant changes to the site from the original approved TIS. The decrease in floor area of 200 square-feet, and the updated trip generation rates based on the latest ITE *Trip Generation Manual* (11<sup>th</sup> Edition) result in minimal difference. Based on the Town of Parker's Traffic Impact Study guidelines outlined within the Town's Roadway Design and Construction Manual Section 5, a Standard TIS would not be required if the average trip generation of the proposed project is less than 200 trips per day and 20 trips or less in the peak hour. As shown in Table 1, the change in trips anticipated by the proposed project is anticipated to be 681 fewer daily weekday trips, 24 less AM peak hour trips, and 17 less PM peak hour trips. Due to the minimal difference in peak hour trips, it is anticipated that the project would incur similar impacts to the surrounding transportation system and therefore, the proposed development is in conformance with the approved *Chambers and Hess Development Traffic Impact Study (TIS)*, dated September 14, 2020.

Based on the queuing analysis for existing Dunkin Donuts sites, the drive-thru should be designed to accommodate at least 9 vehicles in the morning peak hours, or approximately 180 feet of available storage. The proposed available storage for the drive-thru is approximately 9 vehicles, or 180 feet of available storage. Therefore, the proposed drive-thru can sufficiently accommodate the anticipated queues.

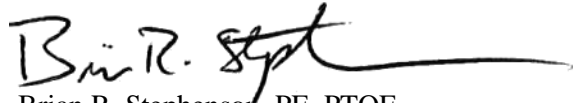
Should you have any questions, please contact either Jorge Cuyuch or Brian Stephenson at (619) 291-0707.

Sincerely,

RICK ENGINEERING COMPANY



Jorge Cuyuch  
Assistant Project Manager



Brian R. Stephenson, PE, PTOE  
Associate Principal

K:\Files\19593\text\19593-A.003.2243\_Dunkin\_ComplianceLetter\_2024-0112.doc

Attachments

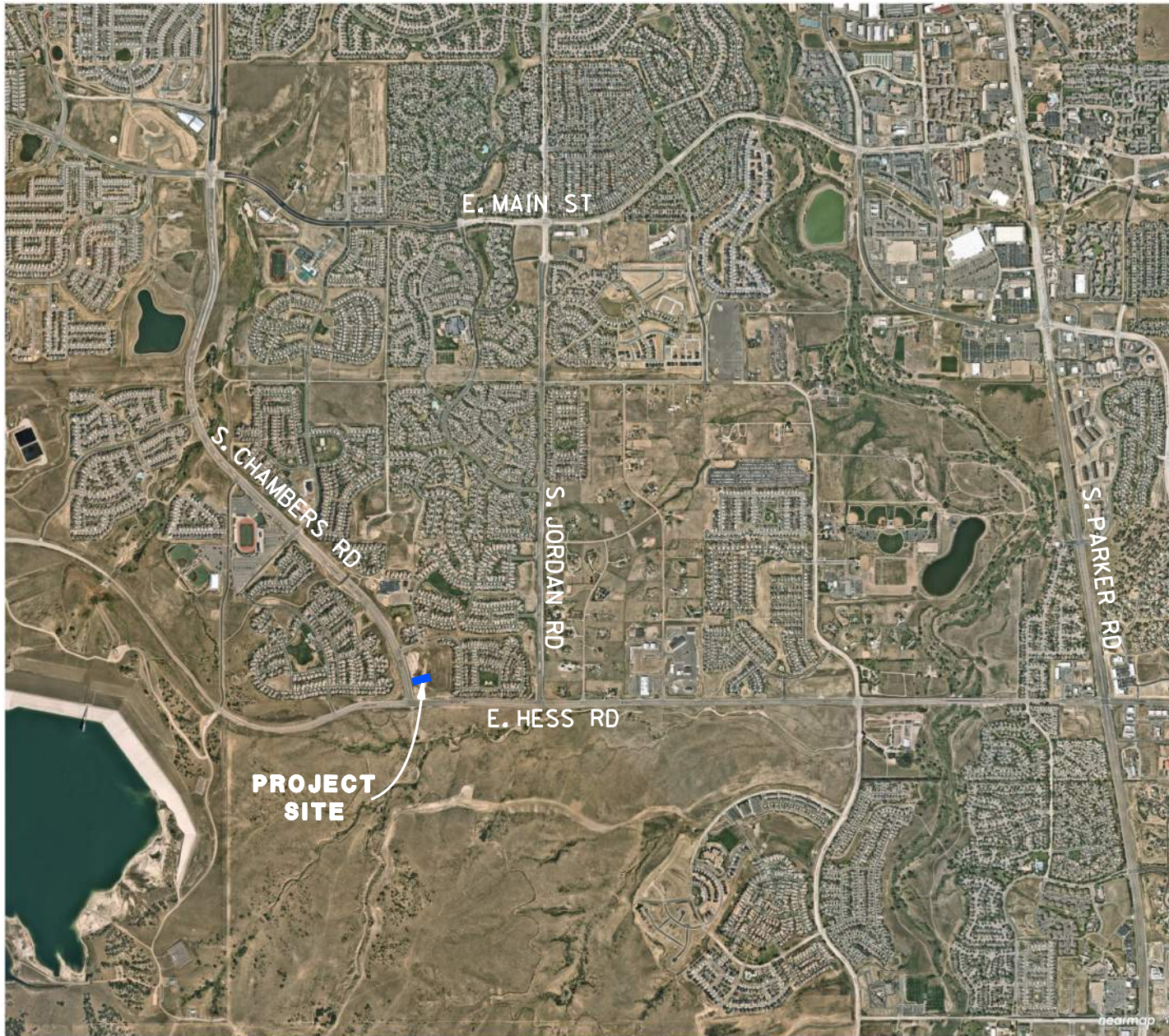
**Exhibit 1** – Project vicinity map

**Exhibit 2** – Project site plan

**Appendix A** – Excerpts from approved *Chambers and Hess Development Traffic Impact Study (TIS)*, dated September 14, 2020

**Appendix B** – ITE *Trip Generation Manual* (10<sup>th</sup> Edition, 2018 and 11<sup>th</sup> Edition, 2021) rate sheets

**Appendix C** – Linscott Law and Greenspan Engineers 2015, *Access and Queuing Study for Dunkin Donuts*

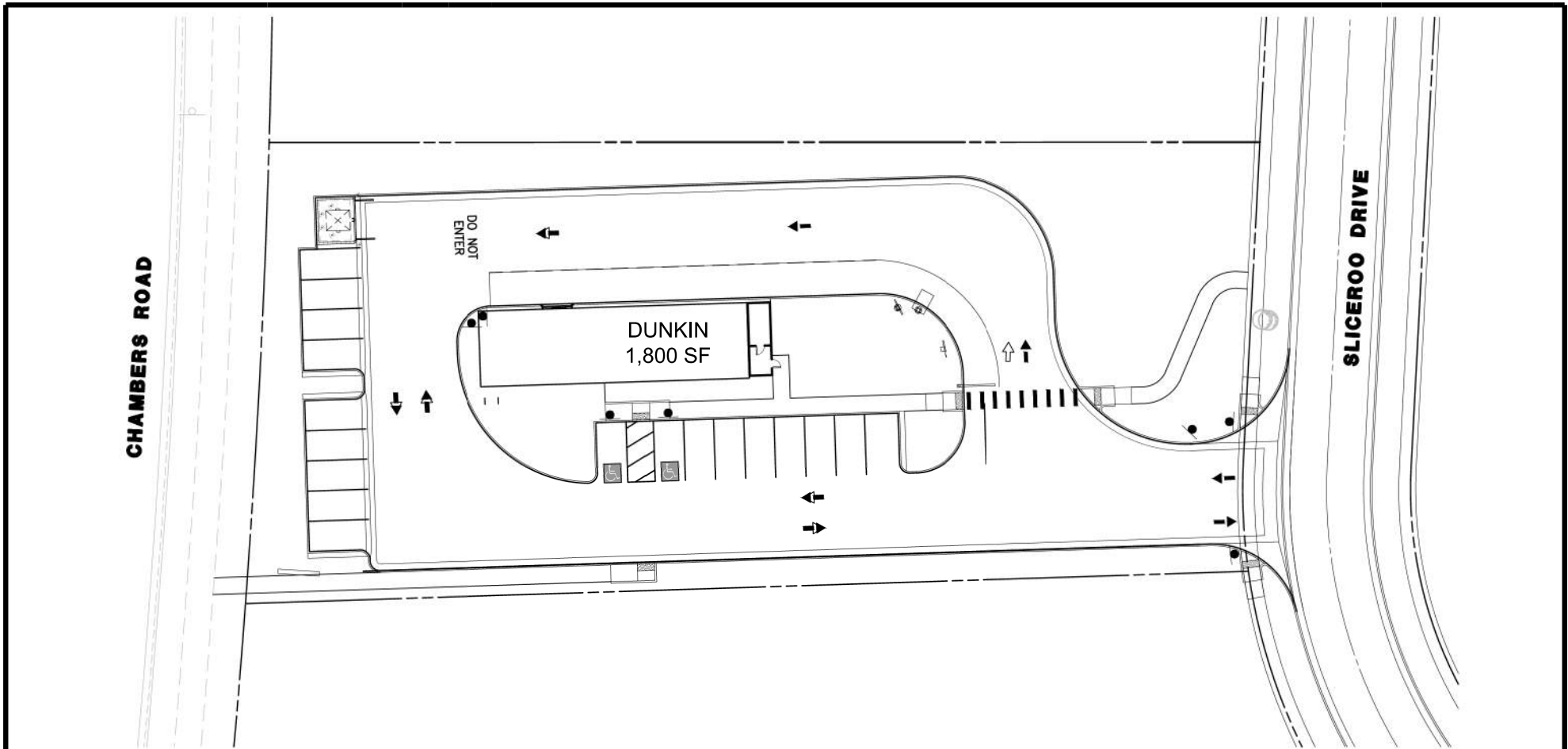


N  
↑  
○  
↓  
NOT TO SCALE



**EXHIBIT 1**  
VICINITY MAP

CHAMBERS AND HESS DUNKIN DONUTS



DUNKIN DONUTS: S. CHAMBERS RD. & HESS RD.  
 PARKER, CO  
 NO SCALE



**ethos**  
 ARCHITECTURE  
 GROUP  
 8025 W. 25TH PL  
 LAKEWOOD, CO 80214  
 TEL: (303) 815-0161  
 WEB: www.ethos-arch-group.com



**EXHIBIT 2**  
 PROJECT SITE PLAN

CHAMBERS AND HESS DUNKIN DONUTS

**APPENDIX A**

**CHAMBERS AND HESS DEVELOPMENT**

**TRAFFIC IMPACT STUDY, SEPTEMBER 14, 2020**

**CHAMBERS AND HESS DEVELOPMENT**

**TRAFFIC IMPACT STUDY (TIS)**

**TOWN OF PARKER, CO**

**SEPTEMBER 14, 2020**

**JOB NUMBER: 18633**

**RICK**

**RICK ENGINEERING COMPANY**



[rickengineering.com](http://rickengineering.com)

**CHAMBERS AND HESS DEVELOPMENT  
TRAFFIC IMPACT STUDY (TIS)  
TOWN OF PARKER, CO**

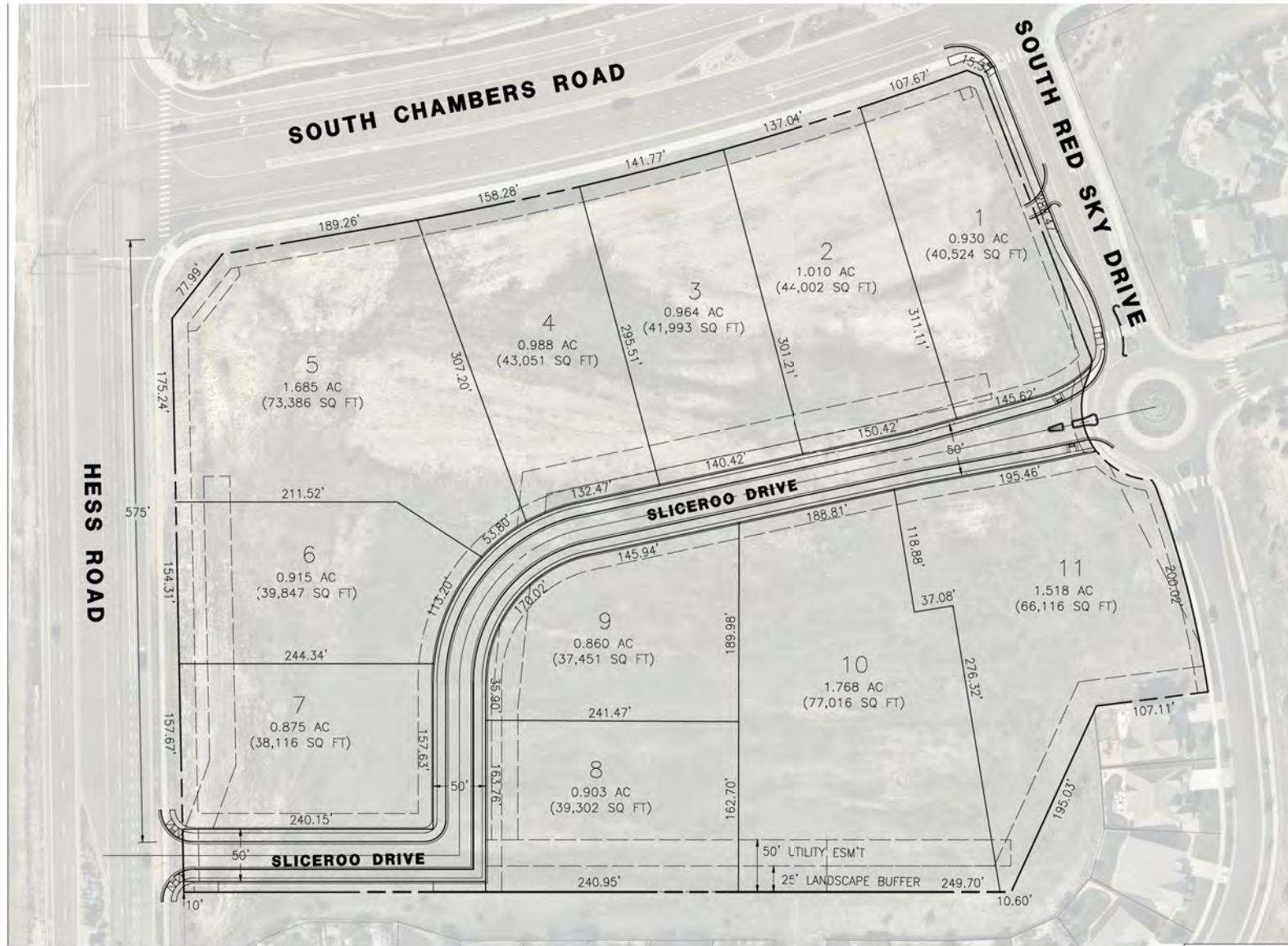
**ORIGINAL JANUARY 23, 2020  
REVISED SEPTEMBER 14, 2020**

**PREPARED FOR:  
VENTANA CAPITAL  
9801 EAST EASTER AVENUE  
CENTENNIAL, CO 80112**



*Brian R. Stephens*

**PREPARED BY:**



NOT TO SCALE



## EXHIBIT 2

PROJECT SITE PLAN

CHAMBERS AND HESS DEVELOPMENT

**TABLE 3  
PROJECT TRIP GENERATION SUMMARY  
CHAMBERS AND HESS DEVELOPMENT**

LAND USE	QUANTITY		ITE Trip Gen. 10th Edition Code	ADT	AM PEAK HOUR			PM PEAK HOUR		
					VOLUMES			VOLUMES		
					IN	OUT	TOTAL	IN	OUT	TOTAL
Day Care Center	13	TSF	565	619	76	67	143	68	77	145
General Office Building	15	TSF	710	168	35	6	41	3	16	19
Pharmacy/Drugstore With a Drive-Through Window	12	TSF	881	1310	24	22	46	61	62	123
Drive-in Bank	3	TSF	912	324	14	10	24	26	26	51
Fast-Food Restaurant with Drive-Through Window	2.5	TSF	934	1177	51	49	100	43	39	82
Fast-Food Restaurant with Drive-Through Window	2	TSF	934	942	41	39	80	34	31	65
Coffee/Donut Shop with Drive-Through Window	2	TSF	937	1641	91	87	178	44	44	87
Quick Lubrication Vehicle Shop	3	TSF	941	209	13	4	17	11	15	26
Automobile Care Center <sup>1</sup>	6	TSF	942	See Footnote 1	9	5	14	12	14	26
Gasoline/Service Station with Convenience Market	16	VFP	945	3134	106	101	207	114	110	224
Automated Car Wash <sup>2</sup>	1	CWT	948	See Footnote 2			39	39	78	
Sub Total				9,524	460	390	850	455	473	926
Internal Capture				74	21	17	38	23	22	44
External Walk, Bike				79	4	4	8	3	4	7
<b>TOTAL NET NEW PROJECT TRIPS</b>				<b>9,371</b>	<b>435</b>	<b>369</b>	<b>804</b>	<b>429</b>	<b>446</b>	<b>875</b>

Source : *Fehr and Peers MXD + Methodology and Validation Technical Memorandum, Dated May 06, 2020* - with revisions based on Town's Comments on July 16, 2020, and further coordination with the Town on August 7, 2020

TSF = Thousand Square Feet

VFP = Vehicle Fueling Position

CWT = Car Wash Tunnels

<sup>1</sup>ITE Trip Generation Manual does not publish Weekday Daily Trips for Auto Care Centers. Instead, weekend (Saturday/Sunday) trips are provided in ITE to depict realistic use and hours of operation.

<sup>2</sup>ITE Trip Generation Manual does not publish Weekday Daily Trips or AM peak hour for Automated Car Wash. Instead, weekend (Saturday/Sunday) trips are provided in ITE to depict realistic use and hours of operation.

for all movements and the closely spaced intersections (less than half a mile) along the corridor in long-term conditions, the green time allowed for each movement is limited and the 40 second minimum bandwidth is unachievable. Based on the results, the long-term scenarios showed bandwidth between 22 – 56 seconds.

**Appendix H** contains the time space diagrams.

## 5.6 SAFETY

The traffic pattern proposed with this project presents few safety hazards. This project proposes three access locations, as mentioned in the previous sections where the entrances have approach grades meeting the Town’s criteria and will be constructed with standard pedestrian crossings with appropriate signage and markings. In addition, each intersection has been reviewed for appropriate sight distance. Conflicts are also minimized at the driveways along Hess Road and S. Red Sky Drive, as the driveways are proposed to be right-in/right-out onto Hess Road and right-in only onto S. Red Sky Drive, with less conflict points than a full-access intersection. These movements typically cause few traffic incidents, and therefore, are not anticipated to have any significant or unusual safety concerns at these driveways. The S. Red Sky Dr. access will connect to the existing roundabout. Roundabouts are by nature safer than a standard four-way intersection due to reduced conflict points and a reduction in the severity of conflicts in the intersection. Additionally, the project proposes to install a traffic signal and an additional westbound left turn lane to mitigate the S. Chambers Road and S. Red Sky Drive intersection in the future. This will invariably improve the safety of traffic movements at the S. Red Sky Drive and S. Chambers Road intersection. As a result, it is assumed that this project will improve the overall safety of the traffic patterns in this area in the future.

## 6.0- CONCLUSION AND MITIGATIONS/RECOMMENDATIONS

---

Based on the analysis and results contained within this report, the traffic study evaluated any potential traffic impacts due to the proposed construction of the Chambers and Hess Development. In coordination with the Town of Parker, the study analyzed the nearby intersections and roadways based on the operational capabilities for the different study scenarios with and without the project generated traffic.

Recommendations are made in accordance with the Town of Parker’s benchmark for overall intersection to operate at LOS C or better for each peak period of every study year and that no approach or movement of an intersection shall fall below LOS E, and maintaining LOS D for all roadway segments. Based on the traffic generated by the project, and access roads requirements for the project site, the following are recommendations at the study area intersections and roadway segments:

- S. Chambers Road/E. Hess Road – Modify the traffic signal to allow for westbound U-turn movements for the short-term scenario, until the ultimate four-legged intersection is installed (by others) in the future. However, due to the high volumes proposed by the near-by Anthology development assumed to be opened by 2041; this intersection operates at LOS F. The recommendations provided by the Anthology study to install free-right turns for the westbound and eastbound directions have minimal improvements to the level of service and the intersection is anticipated to continue to operate at LOS F in the long-term.

- S. Chambers Road/S. Red Sky Drive - Install a traffic signal as warranted in the existing scenario. The traffic signal will help mitigate this intersection to operate at an acceptable level of service (LOS C or better). To further mitigate queuing for the long-term scenario with project conditions, install an additional westbound left turn lane at this intersection.
- S. Red Sky Drive/S. Swift Fox Way-Future Project Dwy - Install a yield controlled fourth-leg to provide a full northerly project access driveway at the existing roundabout, with a shared left-through-right lane for the northbound approach.
- E. Hess Road/Future Project Dwy – Install a right-in/right-out driveway with stop control for the southbound approach to provide a southerly access to the project.
- S. Red Sky Drive/ Future Project Dwy - Install a right-in only driveway along S. Red Sky Drive to provide a secondary northerly access to the project, west of the existing roundabout. This will also alleviate project trips from the roundabout.

The following are additional monitoring and coordination recommendations related to the nearby study area intersections to be installed by others:

- E. Hess Road/Fire Fly Lane – the installation of a traffic signal would mitigate this intersection to operate at acceptable levels of service.

## **APPENDIX B**

### **ITE TRIP GENERATION 10<sup>TH</sup> AND 11<sup>TH</sup> EDITION RATE SHEETS**



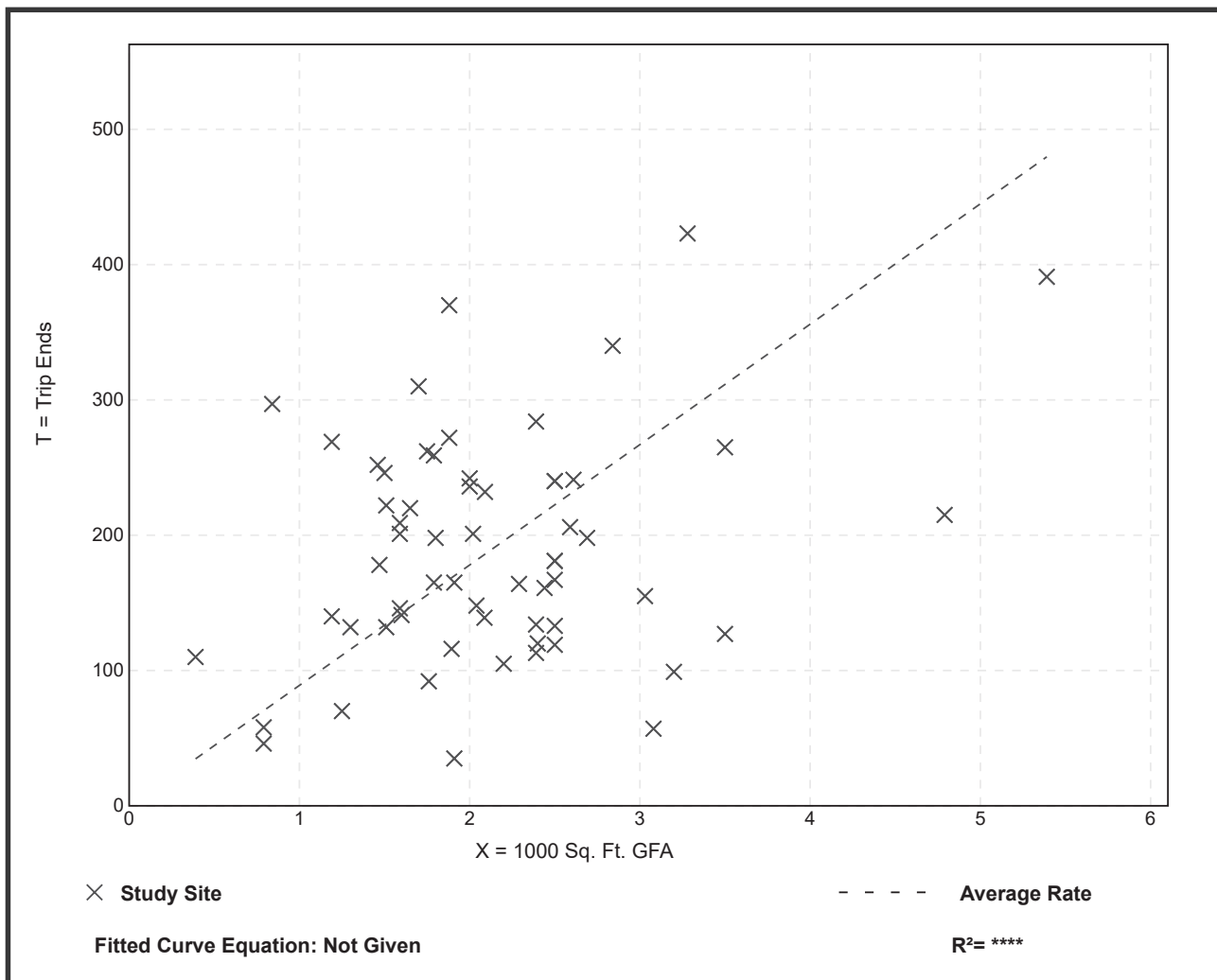
# Coffee/Donut Shop with Drive-Through Window (937)

**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: 61  
 1000 Sq. Ft. GFA: 2  
 Directional Distribution: 51% entering, 49% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
88.99	18.32 - 353.57	48.19

## Data Plot and Equation





# Coffee/Donut Shop with Drive-Through Window (937)

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

Setting/Location: General Urban/Suburban

Number of Studies: 6

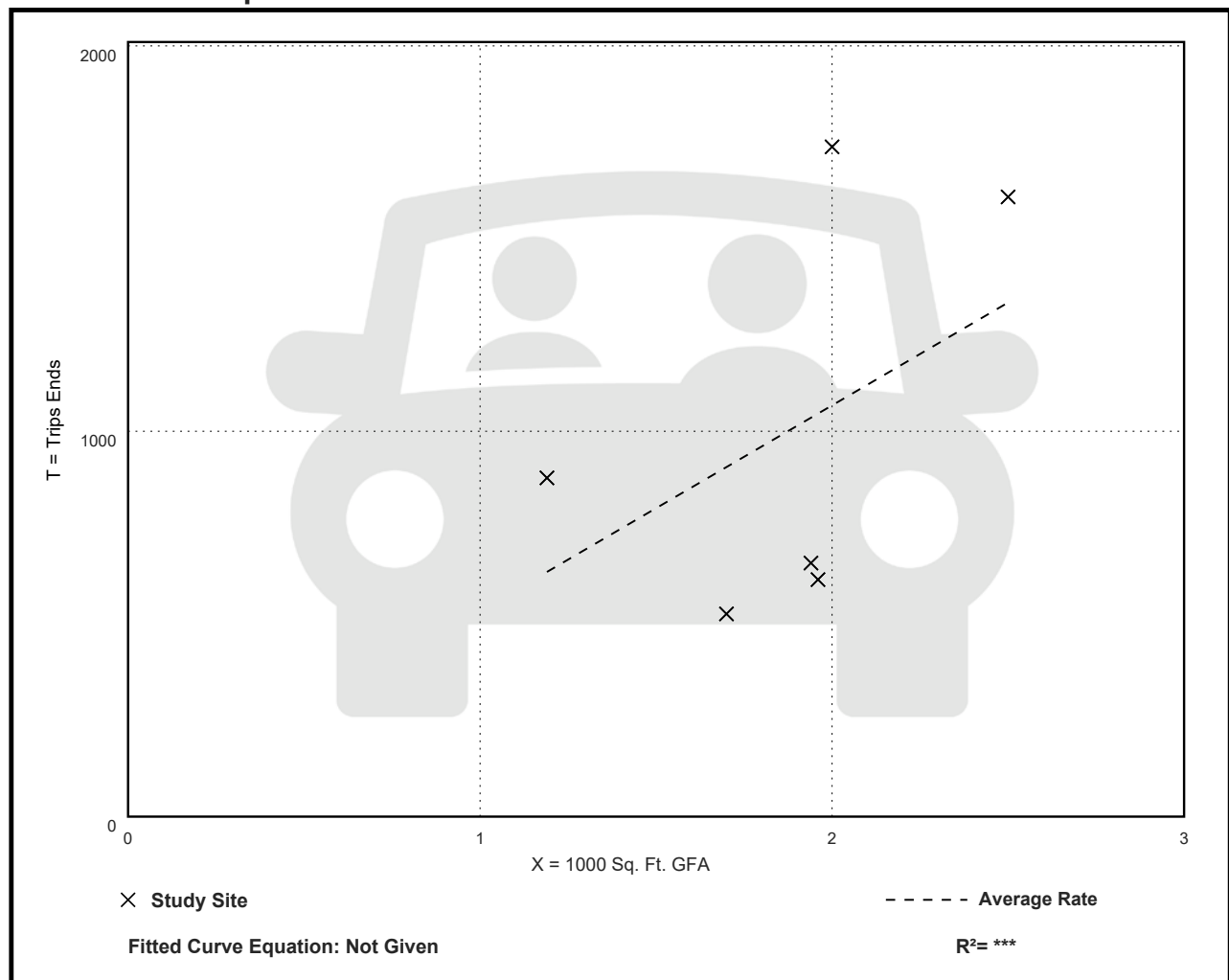
Avg. 1000 Sq. Ft. GFA: 2

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
533.57	309.41 - 869.00	243.65

## Data Plot and Equation



# Coffee/Donut Shop with Drive-Through Window (937)

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: 78

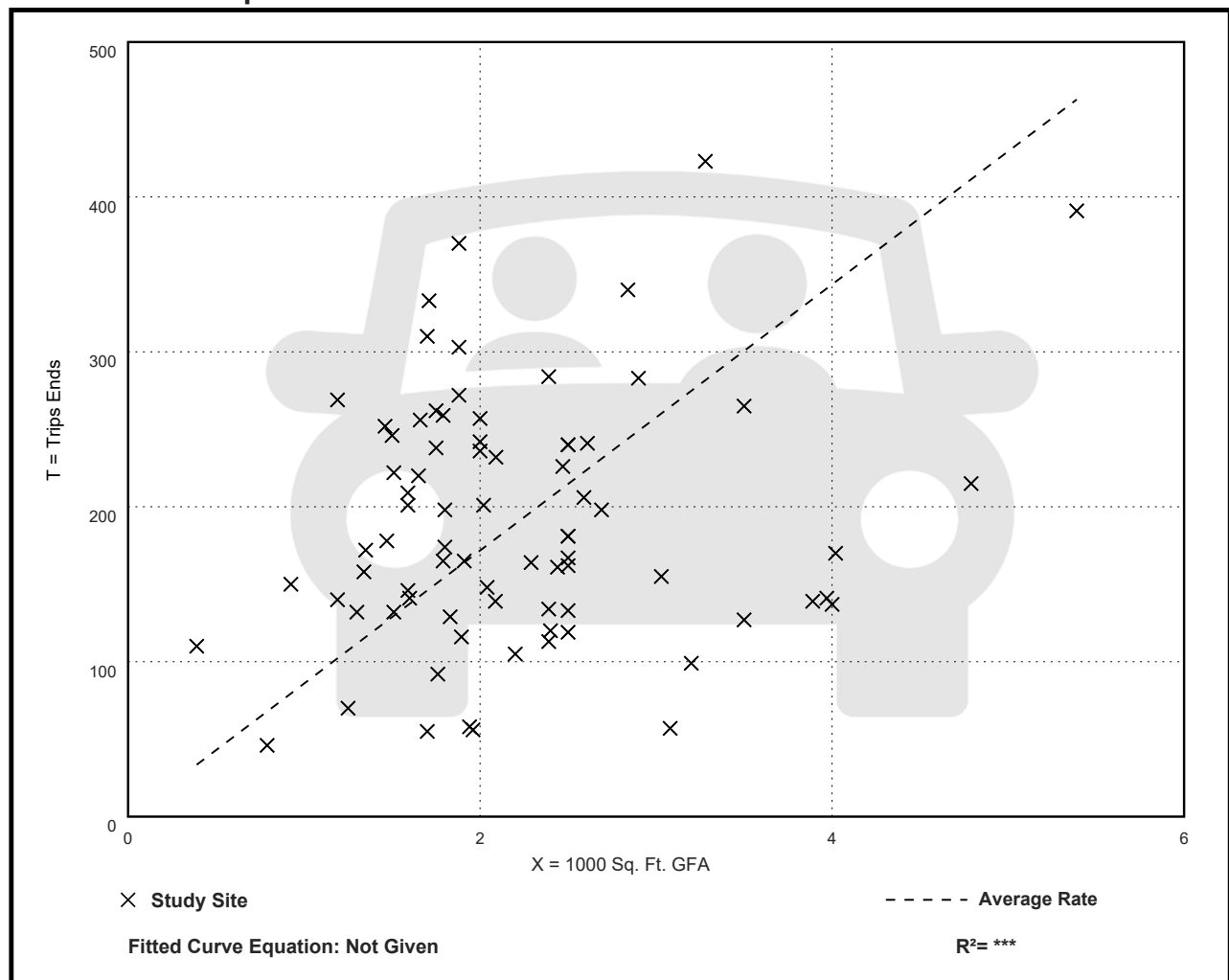
Avg. 1000 Sq. Ft. GFA: 2

Directional Distribution: 51% entering, 49% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
85.88	18.51 - 282.05	44.92

## Data Plot and Equation



# Coffee/Donut Shop with Drive-Through Window (937)

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: 36

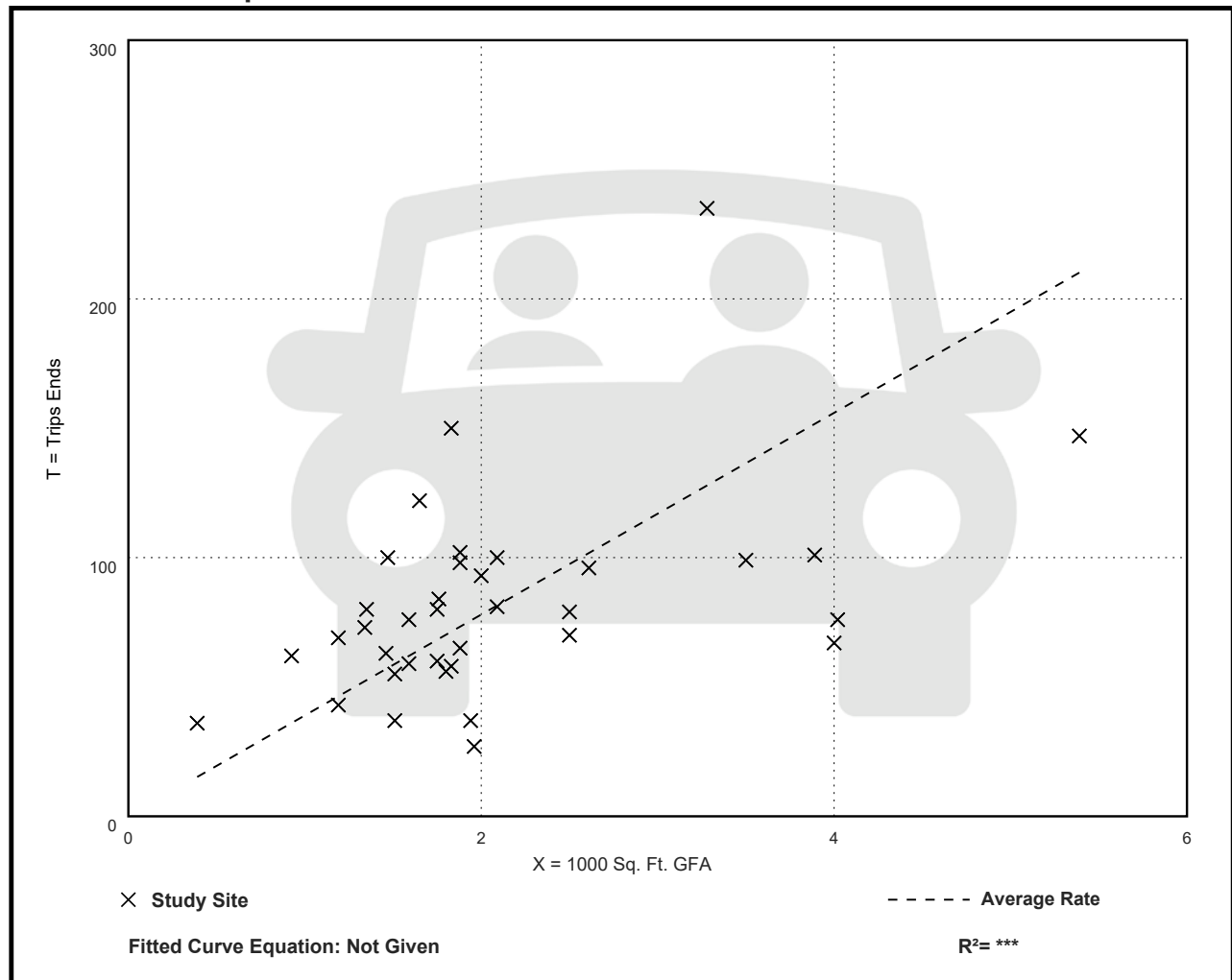
Avg. 1000 Sq. Ft. GFA: 2

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
38.99	13.78 - 92.31	17.79

## Data Plot and Equation



## **APPENDIX C**

**LINSCOTT LAW AND GREENSPAN ENGINEERS 2015,  
ACCESS AND QUEUING STUDY FOR DUNKIN DONUTS**



Engineers & Planners  
Traffic  
Transportation  
Parking

Linscott, Law & Greenspan, Engineers  
2 Executive Circle  
Suite 250  
Irvine, CA 92614  
949.825.6175 T  
949.825.6173 F  
www.llgengineers.com

Pasadena  
Irvine  
San Diego  
Woodland Hills

March 11, 2015

Mr. Joe Haupt  
Spectrum Development Group  
27525 Puerta Real, Suite 100-154  
Mission Viejo, California 92691

LLG Reference: 2.15.3559.1

Subject: **Access and Queuing Study for Dunkin Donuts**  
Irvine, California

Dear Mr. Haupt:

Per your request, Linscott, Law & Greenspan, Engineers (LLG) is pleased to present the findings of an access and queueing study for the proposed Dunkin Donuts project, totaling 2,245 square feet (SF) of gross floor area, to be located within an existing commercial center at 15415 Jeffrey Road, Suite 100, in the City of Irvine, California.

This study has been prepared to evaluate potential access and drive-thru queueing issues based on the application of the following study methods contained in the City of Irvine *Transportation Design Procedures* manual [2007]:

- TDP-15: Vehicle Stacking and Gate Stacking Analysis
- TDP-14: Driveway Lengths
- TDP-3: Left-turn In/Out Access

Briefly, based on the findings of our analysis, we conclude that the proposed design and configuration of the drive-thru facility will be adequate in serving the forecast drive-thru demand for Dunkin Donuts. Our method of analysis, findings and conclusions are described in detail below.

## PROJECT DESCRIPTION

**Figure 1** presents the location of the project and the surrounding street system. **Figure 2** illustrates the site plan, and **Figure 3** depicts the proposed drive-thru design.

The proposed Dunkin Donuts will be occupying 2,245 SF of Building B in the southeastern corner of the existing commercial center. Building B has an existing drive-thru facility, and the project's footprint was previously occupied by a bank, then dry cleaners.

Philip M. Linscott, PE (1924-2000)  
Jack M. Greenspan, PE (Ret.)  
William A. Law, PE (Ret.)  
Paul W. Wilkinson, PE  
John P. Keating, PE  
David S. Shender, PE  
John A. Boarman, PE  
Clare M. Look-Jaeger, PE  
Richard E. Barretto, PE  
Keil D. Maberry, PE

Primary vehicle access for Dunkin Donuts will be via an existing unsignalized, driveway along Jeffrey Road, which currently provides entry into the project site via an eastbound left-turn lane and a westbound shared through/right-turn lane. Outbound movements onto Jeffrey Road from the same driveway is limited to southbound right-turns (i.e., outbound left-turns are restricted).

The commercial center has another driveway located off Irvine Center Drive and this would serve as secondary access for the Dunkin Donuts project. As a conservative measure, this access and queuing study presumes that all future traffic to be generated by Dunkin Donuts will be added to the primary driveway intersection at Jeffrey Road.

As shown on *Figure 3*, approximately 8 vehicles could be accommodated within the drive-thru lane, consisting of 4 vehicles before reaching the order/menu board, 2 vehicles between the order/menu board and the pick-up window, and 2 vehicles in a “pull-out” lane downstream of the pick-up window.

## DRIVE-THRU QUEUING ANALYSIS

### *Queuing Survey Methodology*

To determine the amount of storage required to adequately stack drive-thru traffic at the proposed Dunkin Donuts, queuing surveys were performed at the following three existing Dunkin Donut restaurants:

- 9070 Firestone Boulevard, Downey, CA: 3,500 SF
- 14215 Whittier Boulevard, Whittier, CA: 2,300 SF
- 2420 West Bethany Home Road, Phoenix, AZ: 2,300 SF

The queuing surveys were conducted on typical weekdays in February 2015, and were performed continuously between the hours of 7:00 AM to 9:00 AM. Data was collected based on the procedures set forth in the City’s TDP-15. *Appendix A* contains the individual count data sheets for each day and each site.

*Figure 4* presents the hourly transaction profile for the Downey and Whittier sites on each respective survey date. It shows that the peak number of transactions for the entire day occurred between 7:00 AM and 9:00 AM; therefore, the drive-thru queuing observations were conducted during peak operating hours of the sites surveyed.

### *Survey Results and Data Interpretation (TDP-15)*

*Figures 5, 6, and 7* graphically present the results of the weekday AM peak period queue observations conducted for the Downey, Whittier, and Phoenix sites, respectively. Blue columns indicate the observed queues for Queue #1(queue at the

menu/order board) and green columns report Queue #2 (queue at the pick-up window). A summary table is provided on each of *Figures 5, 6, and 7* to indicate the maximum queue, 85<sup>th</sup> percentile queue, and average queue for Queue #1, Queue #2, and entire queue observed. Each figure also shows orange lines with varying thickness to indicate the 85<sup>th</sup> percentile queue (considered as the design level/threshold for queuing analysis, per TDP-15) for Queue #1, Queue #2, and entire queue observed.

**Tables 1, 2, and 3** summarize the results, as required by TDP-15, for the Downey, Whittier, and Phoenix sites, respectively. **Table 4** provides a comparison of the 85<sup>th</sup> percentile queues observed, and the “adjusted” values from each site to account for size differences with the proposed Dunkin Donuts project. The average of adjusted queues from the three sites surveyed correspond to 2 vehicles for Queue #1 and 3 vehicles for Queue #2.

As shown previously on *Figure 3*, approximately 8 vehicles could be accommodated within the proposed drive-thru lane, consisting of 4 vehicles before reaching the order/menu board, 2 vehicles between the order/menu board and the pick-up window, plus 2 vehicles in a “pull-out” lane downstream of the pick-up window.

Based on the above, there are adequate queue lengths provided in the proposed design of the drive-thru lane, even without accounting for the pull-out lane portion of the drive-thru, to fully accommodate 85<sup>th</sup> percentile levels for Queue #1 and Queue #2. It can be seen from the findings that the pull-out lane is not necessary from a stacking capacity standpoint, but is a desirable feature to enhance queuing contingency, and customer experience/convenience.

In addition, Dunkin Donuts has indicated that the service standard for how long a customer is on the drive-thru lane is 150 seconds from the order/menu board until the pickup window. The Phoenix, Arizona facility averages about 140 seconds during the morning peak hour. These drive-thru service times are much lower than other fast-food restaurants that have service rates between 180 and 240 seconds.

The proposed design of the drive-thru lane is adequate, and meets or exceeds design standards from the Quick Service Restaurant Magazine, and LLG’s prior studies of fast-food restaurants. Earlier studies have indicated an empirical queue storage ratio of 2 vehicles per 1,000 SF. Applying this ratio to 2,245 SF for Dunkin Donuts yields a queue storage requirement for only 4 vehicles. Compared to these standards, the proposed Dunkin Donuts drive-thru could accommodate double the number of vehicles expected on the drive-thru lane.

It should be noted further that a drive-thru lane is self-regulating. That is, customers will approach the property and evaluate whether it would be faster to enter the drive-thru lane, or park the car and walk in. Dunkin Donuts intends to operate the drive-thru lane in the same efficient manner as their other facilities, and beat or maintain the 150-second service objective.

In order to identify any potential impacts of the drive-thru operations on accessibility to nearby parking spaces, parking demand counts were conducted in the commercial center's entire parking lot. **Table 5** presents a summary of the parking demand counts collected every 30 minutes between 7:00 AM and 1:00 PM on a Tuesday (February 10, 2015). **Figure 8** illustrates the 6 parking zones counted, with Zones 1, 2, and 3 being the parking areas closest to Dunkin Donuts. As **Table 5** indicates, there are adequate spaces available within Zones 1, 2, and 3 to accommodate Dunkin Donuts customers who choose to park, even if a lengthy queue forms and obstructs access to some spaces.

## DRIVEWAY AND INTERSECTION ANALYSIS

### *Existing Traffic Volumes*

Existing AM and PM peak hour traffic volumes were collected at the unsignalized intersection of the project driveway along Jeffrey Road. **Figures 9** and **10** illustrate the existing AM and PM peak hour traffic volumes, respectively.

### *Existing + Project Traffic Volumes*

**Table 6** presents the ITE trip rates and the average of ITE pass-by percentages applied to Dunkin Donuts. As indicated in **Table 6**, the project would generate 1,838 weekday daily trips, 226 AM peak hour trips, and 96 PM peak hour trips. Of these total trips, only 570 daily trips, 70 AM peak hour trips, and 30 PM peak hour trips are non-pass-by trips and would be additive and "new" to the external street system.

**Figures 11** and **12** illustrate the Existing Plus Project AM and PM peak hour traffic volumes, respectively.

### *Driveway Length (TDP-14)*

The project driveway currently has a length of 37 feet, which is the distance between the stop bar and the first intersection internal to the site (i.e., formed with the drive aisle leading to the exiting drive-thru facility).

Based on TDP-14, the existing AM peak hour inbound volume at the study driveway (57 inbound trips) requires a driveway length of 75 feet, which exceeds the existing length of 37 feet; therefore, under existing conditions without the Dunkin Donuts project, the driveway configuration is deficient.

Based on TDP-14 procedures, the addition of 115 inbound AM peak hour trips generated by Dunkin Donuts (per **Table 6**) to existing volumes (57 inbound trips) will total 172 inbound trips, and would require 175 feet of driveway storage. However,

this is a long standing center with no queuing issues associated with the design of the driveway along Jeffrey Avenue and the proposed project will have no impact on the operation of said driveway based on the queuing analysis above. In addition, . **Figure 13** highlights the preferred circulation pattern for drive-thru use and as part of the project, way finding signage will be implemented directing drive-thru users to drive past the first drive aisle and utilize the second opening in order to facilitate optimum functionality of the project drive-through operation.

### ***Intersection Analysis (TDP-3)***

Based on TDP-3, the HCM unsignalized level of service methodology was applied to evaluate left-turns into the site from eastbound Jeffrey Road, and to also determine overall intersection operations and queues for specific movements. **Table 7** indicates that the driveway's intersection with Jeffrey Road currently operates at acceptable levels of service, and would continue to operate at acceptable LOS D or better with the addition of project-generated trips. Furthermore, queues in the eastbound left-turn lane and southbound right-turn lane are/would be adequately served by existing turn-pocket or turn-lane storage lengths. **Appendix B** contains the detailed LOS worksheets.

We appreciate the opportunity to work on this study. If you have any questions regarding this analysis, please call us at 949.825.6175.

Sincerely,

**Linscott, Law & Greenspan, Engineers**



Trissa (de Jesus) Allen, P.E.  
Senior Transportation Engineer

Attachments

TABLE 1  
AM PEAK QUEUEING SUMMARY - DOWNEY, CA  
Dunkin Donuts, Irvine

# of veh. in queue (N)	Queue #1 at Menu/Order Board			Queue #2 at Pick-up Window		
	# of Occurrences	Cumulative Frequency	Probability of queue length not exceeding N	# of Occurrences	Cumulative Frequency	Probability of queue length not exceeding N
0	57	57	32%	25	25	14%
1	77	134	74%	72	97	54%
2	39	173	96%	40	137	76%
3	7	180	100%	26	163	91%
4	0	180	100%	17	180	100%
<b>85th Percentile Queue = 2 Vehicles</b>				<b>85th Percentile Queue = 3 Vehicles</b>		

TABLE 2  
AM PEAK QUEUEING SUMMARY - WHITTIER, CA  
Dunkin Donuts, Irvine

# of veh. in queue (N)	Queue #1 at Menu/Order Board			Queue #2 at Pick-up Window		
	# of Occurrences	Cumulative Frequency	Probability of queue length not exceeding N	# of Occurrences	Cumulative Frequency	Probability of queue length not exceeding N
0	39	39	19%	21	21	10%
1	60	99	48%	41	62	30%
2	48	147	72%	51	113	55%
3	33	180	88%	49	162	79%
4	20	200	98%	43	205	100%
5	5	205	100%	0	205	100%
<b>85th Percentile Queue = 3 Vehicles</b>				<b>85th Percentile Queue = 4 Vehicles</b>		

TABLE 3  
AM PEAK QUEUEING SUMMARY - PHOENIX, CA  
Dunkin Donuts, Irvine

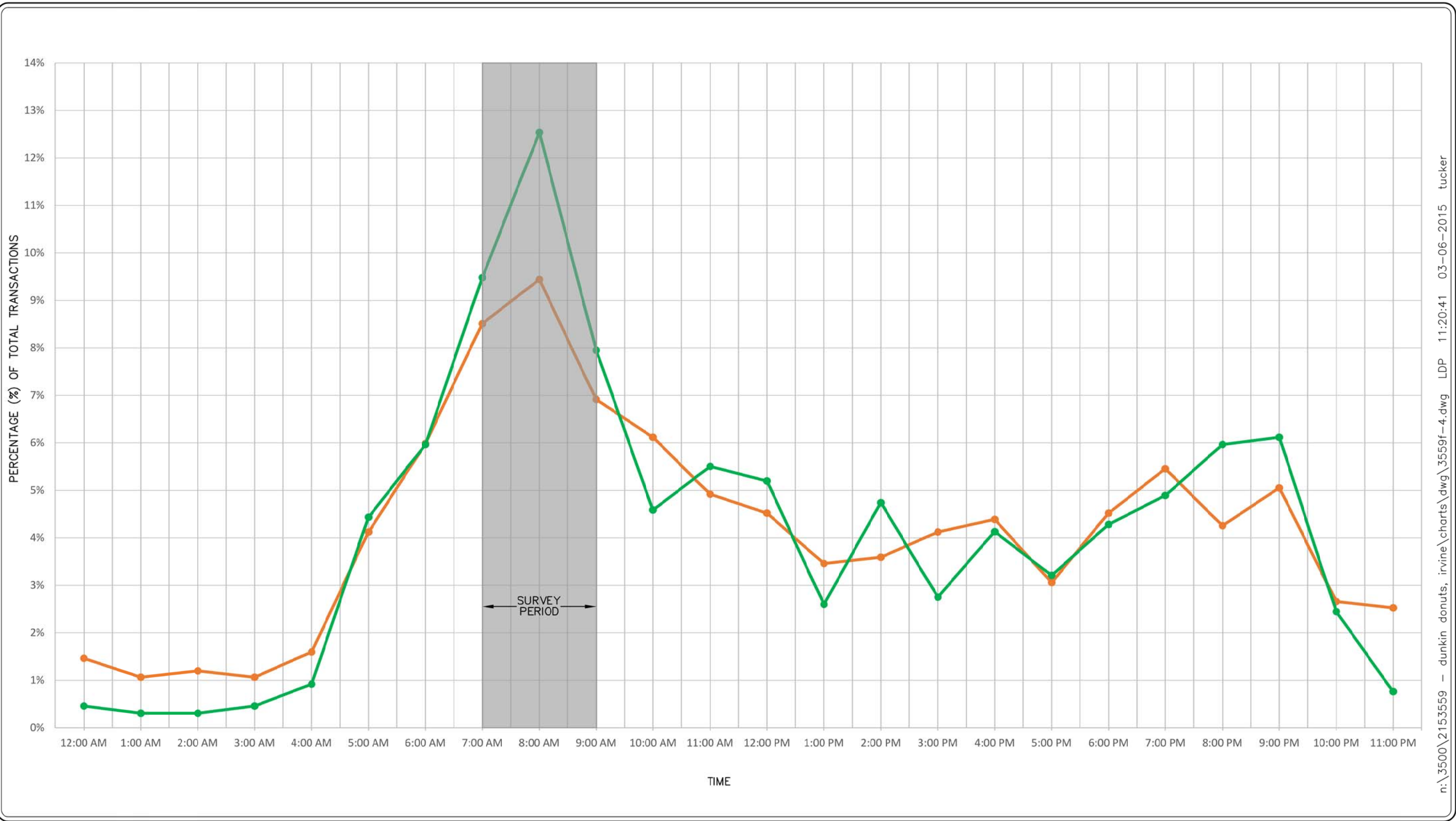
# of veh. in queue (N)	Queue #1 at Menu/Order Board			Queue #2 at Pick-up Window		
	# of Occurrences	Cumulative Frequency	Probability of queue length not exceeding N	# of Occurrences	Cumulative Frequency	Probability of queue length not exceeding N
0	70	70	27%	45	45	17%
1	87	157	60%	84	129	49%
2	49	206	79%	65	194	74%
3	25	231	88%	50	244	93%
4	9	240	92%	18	262	100%
5	9	249	95%	0	262	100%
6	10	259	99%	0	262	100%
7	3	262	100%	0	262	100%
<b>85th Percentile Queue = 3 Vehicles</b>				<b>85th Percentile Queue = 3 Vehicles</b>		

TABLE 4  
QUEUE SUMMARY  
Dunkin Donuts, Irvine

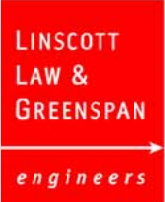
Dunkin Donuts Survey Site	AM Peak 85th Percentile Queue (veh)	
	Queue #1 (at Menu/Order Board)	Queue #2 (at Pick-Up Window)
<b>Downey, CA</b> 9070 Firestone Blvd. 3,500 SF	Observed: 2 <i>Adjusted [a]: 1</i>	Observed: 3 <i>Adjusted [a]: 2</i>
<b>Whittier, CA</b> 14215 Whittier Blvd. 2,300 SF	Observed: 3 <i>Adjusted [a]: 3</i>	Observed: 4 <i>Adjusted [a]: 4</i>
<b>Phoenix, AZ</b> 2420 West Bethany Home Rd. 2,300 SF	Observed: 3 <i>Adjusted [a]: 3</i>	Observed: 3 <i>Adjusted [a]: 3</i>
<b>Average of Adjusted Queues</b>	<b>2</b>	<b>3</b>

Note:

[a] The proposed Dunkin Donuts in Irvine is 2,245 SF. The observed queue was adjusted based on the size difference between the survey site and proposed project.



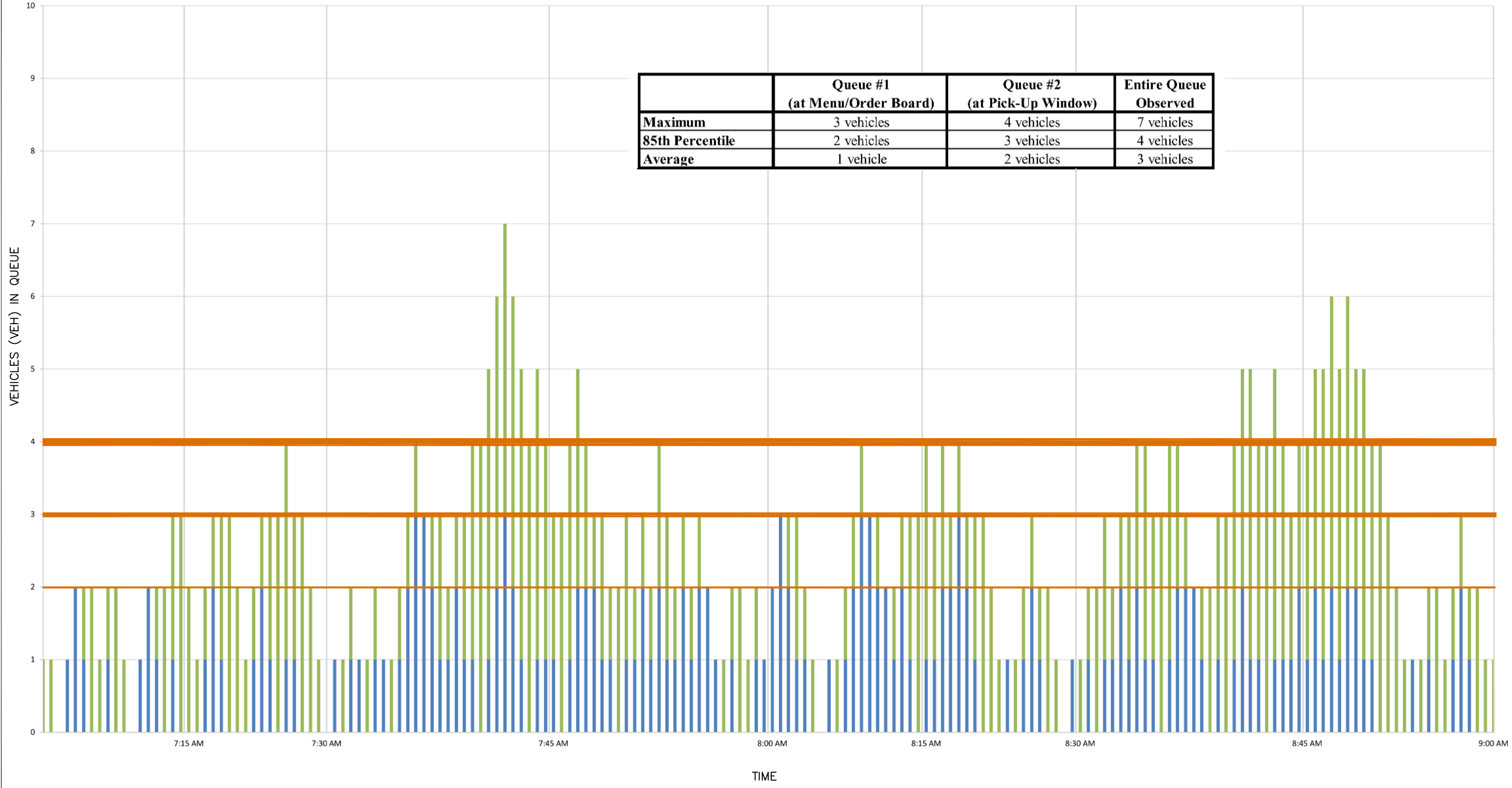
n:\3500\2153559 - dunkin donuts, irvine\charts\dwg\3559f-4.dwg LDP 11:20:41 03-06-2015 tucker



KEY  
 — = WHITTIER, CALIFORNIA TRANSACTION DATA  
 — = DOWNEY, CALIFORNIA TRANSACTION DATA

**FIGURE 4**

HOURLY TRANSACTION PROFILE  
 DUNKIN DONUTS, IRVINE

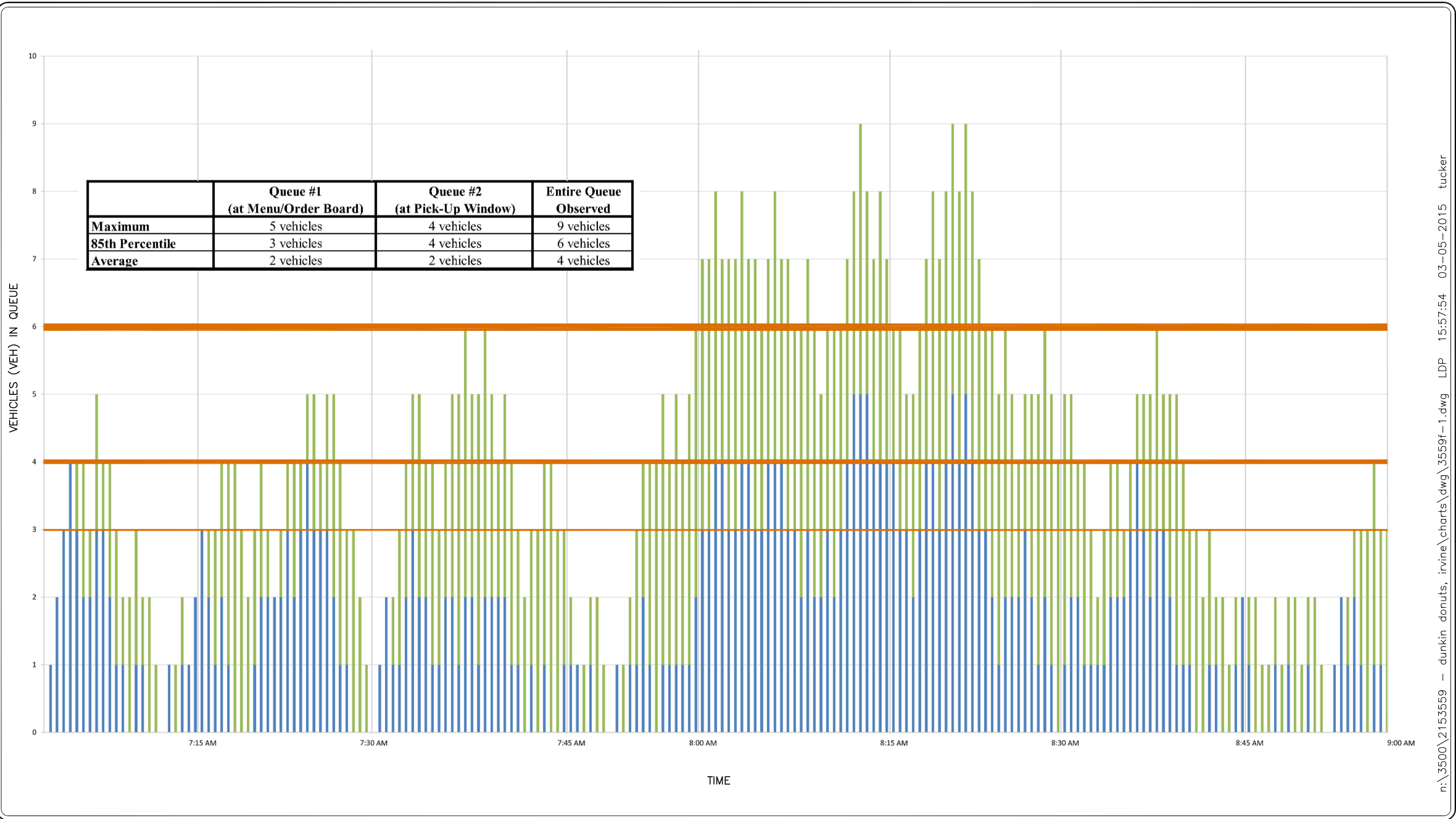


n:\3500\2153559 - dunkin donuts, irvine\charts\dwg\3559f-5.dwg LDP 10:20:11 03-06-2015 tucker



**KEY**  
 = QUEUE #1 (AT MENU/ORDER BOARD)  
 = QUEUE #2 (AT PICK-UP WINDOW)  
 = 85TH PERCENTILE, QUEUE #1  
 = 85TH PERCENTILE, QUEUE #2  
 = 85TH PERCENTILE, ENTIRE QUEUE

**FIGURE 5**  
 DOWNEY, CALIFORNIA  
 WEEKDAY AM PEAK PERIOD QUEUE OBSERVATIONS  
 DUNKIN DONUTS, IRVINE

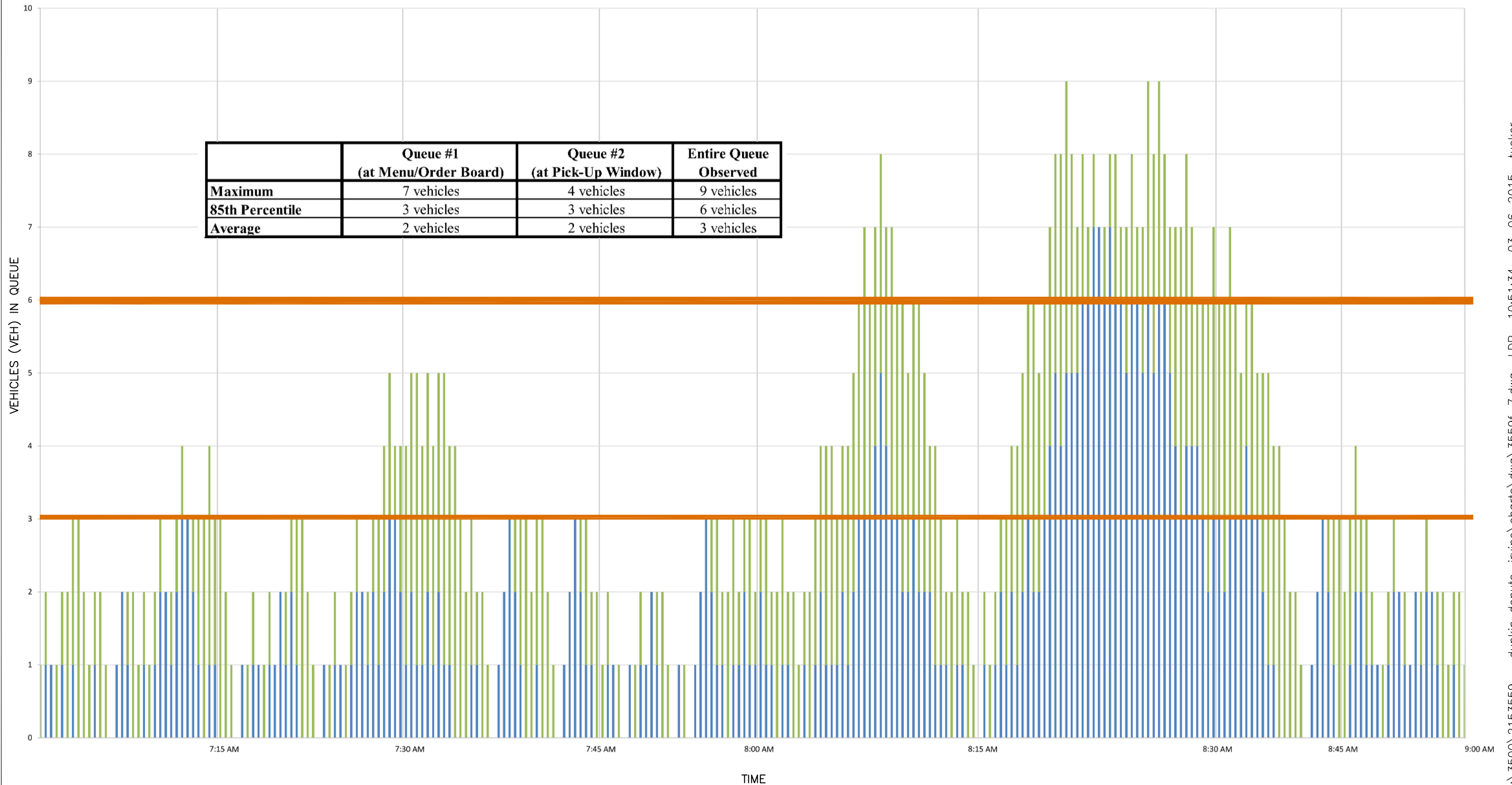


n:\3500\2153559 - dunkin donuts, irvine\charts\dwg\3559f-1.dwg LDP 15:57:54 03-05-2015 tucker



- KEY
- █ = QUEUE #1 (AT MENU/ORDER BOARD)
  - █ = QUEUE #2 (AT PICK-UP WINDOW)
  - = 85TH PERCENTILE, QUEUE #1
  - = 85TH PERCENTILE, QUEUE #2
  - = 85TH PERCENTILE, ENTIRE QUEUE

**FIGURE 6**  
 WHITTIER, CALIFORNIA  
 WEEKDAY AM PEAK PERIOD QUEUE OBSERVATIONS  
 DUNKIN DONUTS, IRVINE



n:\3500\2153559 - dunkin donuts, irvine\charts\dwg\3559f-7.dwg LDP 10:51:34 03-06-2015 tucker



KEY  
 = QUEUE #1 (AT MENU/ORDER BOARD)  
 = QUEUE #2 (AT PICK-UP WINDOW)  
 = 85TH PERCENTILE, QUEUE #1 AND QUEUE #2  
 = 85TH PERCENTILE, ENTIRE QUEUE

### FIGURE 7

PHOENIX, ARIZONA  
 WEEKDAY AM PEAK PERIOD QUEUE OBSERVATIONS  
 DUNKIN DONUTS, IRVINE

**APPENDIX A**  
**QUEUE OBSERVATIONS**

## DRIVE THRU STACKING / QUEUE STUDY

LOCATION: 9070 Firestone Blvd  
CITY: Downey, CA

DAY: Tuesday  
DATE: 2/10/2015

TIME PERIOD: 7:00 A.M. TO 9:00 A.M.

TIME	TIME BETWEEN ARRIVALS	Order Board	Pick-up Window
7:00:00	-	0	1
7:01:00	0:01:00	0	1
7:01:22	0:00:22	0	0
7:02:08	0:00:46	1	0
7:02:11	0:00:03	2	0
7:02:34	0:00:23	1	1
7:03:24	0:00:50	0	2
7:04:27	0:01:03	0	1
7:05:11	0:00:44	1	1
7:05:32	0:00:21	0	2
7:05:51	0:00:19	0	1
7:06:50	0:00:59	0	0
7:13:01	0:06:11	1	0
7:13:03	0:00:02	2	0
7:13:57	0:00:54	1	1
7:14:01	0:00:04	0	2
7:14:14	0:00:13	1	2
7:14:28	0:00:14	0	3
7:15:13	0:00:45	0	2
7:15:54	0:00:41	0	1
7:16:04	0:00:10	1	1
7:16:23	0:00:19	2	1
7:16:44	0:00:21	1	2
7:17:26	0:00:42	0	3
7:17:46	0:00:20	0	2
7:18:11	0:00:25	0	1
7:18:28	0:00:17	1	1
7:19:14	0:00:46	2	1
7:19:17	0:00:03	1	2
7:20:03	0:00:46	0	3
7:20:50	0:00:47	1	3
7:21:03	0:00:13	1	2
7:21:29	0:00:26	0	3
7:22:15	0:00:46	0	2
7:25:20	0:03:05	0	1
7:30:18	0:04:58	0	0
7:31:34	0:01:16	1	0
7:32:58	0:01:24	0	1
7:34:16	0:01:18	1	1
7:34:34	0:00:18	1	0
7:34:44	0:00:10	0	1
7:36:07	0:01:23	1	1
7:36:34	0:00:27	1	0
7:36:51	0:00:17	0	1
7:37:01	0:00:10	1	1
7:37:03	0:00:02	2	1
7:37:22	0:00:19	3	1

TIME	TIME BETWEEN ARRIVALS	Order Board	Pick-up Window
7:37:34	0:00:12	3	0
7:37:37	0:00:03	2	1
7:38:18	0:00:41	1	2
7:38:42	0:00:24	1	1
7:39:13	0:00:31	2	1
7:39:42	0:00:29	1	2
7:39:46	0:00:04	1	3
7:40:23	0:00:37	0	4
7:41:00	0:00:37	1	4
7:41:03	0:00:03	2	4
7:41:26	0:00:23	3	4
7:41:40	0:00:14	2	4
7:42:15	0:00:35	1	4
7:43:18	0:01:03	0	4
7:44:08	0:00:50	1	4
7:44:25	0:00:17	1	3
7:45:11	0:00:46	1	2
7:45:32	0:00:21	0	3
7:45:44	0:00:12	1	3
7:45:51	0:00:07	2	3
7:46:20	0:00:29	2	2
7:47:03	0:00:43	2	1
7:47:12	0:00:09	1	2
7:47:25	0:00:13	1	1
7:47:45	0:00:20	0	2
7:47:59	0:00:14	1	2
7:48:20	0:00:21	1	1
7:48:29	0:00:09	2	1
7:49:06	0:00:37	1	1
7:50:19	0:01:13	2	2
7:51:00	0:00:41	1	2
7:52:11	0:01:11	1	1
7:52:23	0:00:12	2	1
7:53:59	0:01:36	1	1
7:54:47	0:00:48	2	1
7:55:34	0:00:47	2	0
7:56:02	0:00:28	1	0
7:56:28	0:00:26	0	1
7:57:05	0:00:37	1	1
7:57:15	0:00:10	0	2
7:58:50	0:01:35	0	1
7:59:30	0:00:40	1	1
7:59:36	0:00:06	1	0
8:00:05	0:00:29	2	0
8:00:21	0:00:16	3	0
8:01:05	0:00:44	2	1
8:01:38	0:00:33	1	2



## DRIVE THRU STACKING / QUEUE STUDY

LOCATION: 14215 Whittier Blvd  
CITY: Whittier, CA

DAY: Tuesday  
DATE: 2/10/2015

TIME PERIOD: 7:00 A.M. TO 9:00 A.M.

TIME	TIME BETWEEN ARRIVALS	Order Board	Pick-up Window	TIME	TIME BETWEEN ARRIVALS	Order Board	Pick-up Window
7:00:00	-	0	0	7:29:34	0:00:32	0	3
7:03:12	0:03:12	1	0	7:29:46	0:00:12	0	2
7:03:16	0:00:04	2	0	7:30:24	0:00:38	0	1
7:03:39	0:00:23	3	0	7:31:30	0:01:06	0	0
7:03:59	0:00:20	4	0	7:31:48	0:00:18	1	0
7:04:03	0:00:04	3	1	7:32:52	0:01:04	2	0
7:04:46	0:00:43	2	2	7:33:08	0:00:16	1	1
7:05:34	0:00:48	2	1	7:33:29	0:00:21	1	2
7:05:50	0:00:16	3	2	7:33:45	0:00:16	2	2
7:06:01	0:00:11	3	1	7:33:57	0:00:12	3	2
7:07:15	0:01:14	2	2	7:34:29	0:00:32	2	3
7:07:34	0:00:19	1	2	7:34:54	0:00:25	2	2
7:08:29	0:00:55	1	1	7:35:04	0:00:10	1	3
7:09:12	0:00:43	0	2	7:35:40	0:00:36	1	2
7:09:23	0:00:11	1	2	7:36:04	0:00:24	2	2
7:09:41	0:00:18	1	1	7:36:43	0:00:39	2	3
7:10:08	0:00:27	0	2	7:37:18	0:00:35	1	4
7:10:25	0:00:17	0	1	7:37:36	0:00:18	2	4
7:11:29	0:01:04	0	0	7:37:52	0:00:16	2	3
7:13:59	0:02:30	1	0	7:38:17	0:00:25	1	4
7:14:12	0:00:13	0	1	7:38:22	0:00:05	2	4
7:14:38	0:00:26	1	1	7:38:49	0:00:27	2	3
7:15:07	0:00:29	1	0	7:39:36	0:00:47	2	2
7:15:19	0:00:12	2	0	7:40:12	0:00:36	2	3
7:17:17	0:01:58	3	0	7:40:50	0:00:38	1	3
7:17:33	0:00:16	2	1	7:41:15	0:00:25	1	2
7:18:16	0:00:43	1	2	7:42:20	0:01:05	0	2
7:19:12	0:00:56	2	2	7:42:32	0:00:12	1	2
7:20:00	0:00:48	1	3	7:43:10	0:00:38	0	3
7:20:29	0:00:29	0	4	7:43:22	0:00:12	1	3
7:21:03	0:00:34	0	3	7:43:54	0:00:32	0	4
7:21:46	0:00:43	0	2	7:44:30	0:00:36	0	3
7:22:03	0:00:17	1	2	7:45:31	0:01:01	1	2
7:22:13	0:00:10	2	2	7:46:01	0:00:30	1	1
7:22:22	0:00:09	2	1	7:46:30	0:00:29	1	0
7:22:54	0:00:32	2	0	7:47:11	0:00:41	0	1
7:23:59	0:01:05	2	1	7:50:20	0:03:09	1	1
7:24:08	0:00:09	3	1	7:50:57	0:00:37	0	2
7:24:43	0:00:35	2	2	7:51:27	0:00:30	0	1
7:25:13	0:00:30	3	1	7:52:30	0:01:03	0	0
7:25:36	0:00:23	4	1	7:52:49	0:00:19	1	0
7:25:44	0:00:08	3	2	7:53:24	0:00:35	0	1
7:26:25	0:00:41	3	1	7:54:16	0:00:52	1	1
7:26:45	0:00:20	3	2	7:55:08	0:00:52	1	2
7:27:18	0:00:33	2	3	7:55:17	0:00:09	2	2
7:27:51	0:00:33	1	3	7:56:06	0:00:49	1	3
7:29:02	0:01:11	1	2	7:56:37	0:00:31	0	4

## DRIVE THRU STACKING / QUEUE STUDY

LOCATION: 14215 Whittier Blvd  
CITY: Whittier, CA

DAY: Tuesday  
DATE: 2/10/2015

TIME PERIOD: 7:00 A.M. TO 9:00 A.M.

TIME	TIME BETWEEN ARRIVALS	Order Board	Pick-up Window
7:57:29	0:00:52	1	4
7:58:23	0:00:54	1	3
7:58:41	0:00:18	1	4
7:59:09	0:00:28	1	3
7:59:47	0:00:38	1	4
8:01:04	0:01:17	2	4
8:01:18	0:00:14	3	4
8:01:34	0:00:16	3	4
8:01:50	0:00:16	4	4
8:02:15	0:00:25	4	3
8:02:25	0:00:10	3	4
8:03:27	0:01:02	3	4
8:03:54	0:00:27	4	4
8:04:05	0:00:11	4	3
8:04:35	0:00:30	3	4
8:04:49	0:00:14	3	3
8:05:14	0:00:25	4	3
8:05:46	0:00:32	4	4
8:06:06	0:00:20	4	3
8:06:28	0:00:22	3	4
8:06:51	0:00:23	3	3
8:07:13	0:00:22	2	4
8:09:29	0:02:16	3	4
8:09:39	0:00:10	2	4
8:10:36	0:00:57	2	3
8:10:56	0:00:20	3	3
8:11:22	0:00:26	2	4
8:11:49	0:00:27	3	3
8:12:01	0:00:12	4	3
8:12:21	0:00:20	5	3
8:12:36	0:00:15	5	4
8:13:10	0:00:34	5	3
8:13:57	0:00:47	4	3
8:14:49	0:00:52	4	4
8:15:36	0:00:47	4	3
8:16:32	0:00:56	4	2
8:16:54	0:00:22	3	3
8:17:31	0:00:37	3	2
8:17:53	0:00:22	2	3
8:18:12	0:00:19	3	3
8:18:39	0:00:27	4	3
8:18:51	0:00:12	4	4
8:19:20	0:00:29	3	4
8:19:44	0:00:24	4	4
8:21:00	0:01:16	5	4
8:21:16	0:00:16	4	4
8:21:52	0:00:36	5	4

TIME	TIME BETWEEN ARRIVALS	Order Board	Pick-up Window
8:22:53	0:01:01	4	4
8:24:57	0:02:04	3	4
8:25:40	0:00:43	3	3
8:25:52	0:00:12	2	4
8:26:51	0:00:59	1	4
8:27:11	0:00:20	2	4
8:27:35	0:00:24	2	3
8:27:53	0:00:18	2	2
8:28:08	0:00:15	3	2
8:28:30	0:00:22	2	3
8:29:17	0:00:47	1	4
8:29:27	0:00:10	2	4
8:30:02	0:00:35	1	4
8:31:05	0:01:03	0	4
8:31:45	0:00:40	1	4
8:32:33	0:00:48	2	3
8:33:00	0:00:27	2	2
8:33:19	0:00:19	1	3
8:33:57	0:00:38	1	2
8:35:05	0:01:08	1	1
8:35:11	0:00:06	1	2
8:35:23	0:00:12	2	2
8:36:19	0:00:56	2	2
8:36:44	0:00:25	2	1
8:37:01	0:00:17	3	1
8:37:22	0:00:21	4	1
8:37:30	0:00:08	3	2
8:37:51	0:00:21	2	3
8:38:01	0:00:10	3	3
8:38:23	0:00:22	3	2
8:38:55	0:00:32	2	3
8:39:45	0:00:50	1	4
8:40:16	0:00:31	1	3
8:41:00	0:00:44	1	2
8:41:40	0:00:40	0	3
8:42:23	0:00:43	0	2
8:42:42	0:00:19	1	2
8:43:10	0:00:28	1	1
8:44:07	0:00:57	0	2
8:44:09	0:00:02	0	1
8:45:01	0:00:52	1	1
8:45:26	0:00:25	2	0
8:45:44	0:00:18	1	1
8:46:33	0:00:49	0	2
8:46:57	0:00:24	0	1
8:47:26	0:00:29	0	1
8:47:43	0:00:17	1	1



## DRIVE THRU STACKING / QUEUE STUDY

LOCATION: 2420 West Bethany Home Road  
CITY: Phoenix, AZ

DAY: Tuesday  
DATE: 2/17/2015

TIME PERIOD: 7:00 A.M. TO 9:00 A.M.

TIME	TIME BETWEEN	Order Board	Pick-up Window
7:00:00	-	0	1
7:00:05	0:00:05	1	1
7:00:44	0:00:39	1	0
7:01:02	0:00:18	0	1
7:01:12	0:00:10	1	1
7:01:56	0:00:44	0	2
7:02:06	0:00:10	1	2
7:02:38	0:00:32	0	3
7:03:23	0:00:45	0	2
7:04:17	0:00:54	0	1
7:04:50	0:00:33	1	1
7:05:31	0:00:41	0	2
7:05:45	0:00:14	0	1
7:06:21	0:00:36	0	0
7:07:25	0:01:04	1	0
7:07:45	0:00:20	2	0
7:08:07	0:00:22	1	1
7:09:02	0:00:55	0	2
7:09:20	0:00:18	0	1
7:09:41	0:00:21	1	1
7:10:13	0:00:32	0	1
7:10:24	0:00:11	1	1
7:10:28	0:00:04	2	1
7:11:22	0:00:54	2	0
7:11:29	0:00:07	1	1
7:11:36	0:00:07	2	1
7:12:28	0:00:52	3	1
7:12:46	0:00:18	3	0
7:12:54	0:00:08	2	1
7:13:31	0:00:37	1	2
7:14:05	0:00:34	0	3
7:15:08	0:01:03	1	3
7:15:10	0:00:02	1	2
7:15:40	0:00:30	0	3
7:15:48	0:00:08	0	2
7:16:24	0:00:36	0	1
7:16:46	0:00:22	0	0
7:17:28	0:00:42	1	0
7:18:31	0:01:03	0	1
7:19:15	0:00:44	1	1
7:19:36	0:00:21	1	0
7:19:59	0:00:23	0	1
7:20:54	0:00:55	1	1
7:21:10	0:00:16	1	0
7:21:15	0:00:05	2	0
7:21:41	0:00:26	1	1
7:21:43	0:00:02	2	1

TIME	TIME BETWEEN	Order Board	Pick-up Window
7:22:07	0:00:24	1	2
7:22:52	0:00:45	0	3
7:23:02	0:00:10	0	2
7:23:45	0:00:43	0	1
7:24:23	0:00:38	0	0
7:25:54	0:01:31	1	0
7:26:25	0:00:31	0	1
7:27:11	0:00:46	1	1
7:27:15	0:00:04	1	0
7:28:02	0:00:47	0	1
7:28:05	0:00:03	1	1
7:28:26	0:00:21	2	1
7:28:40	0:00:14	2	0
7:28:41	0:00:01	1	1
7:28:55	0:00:14	2	1
7:29:05	0:00:10	1	2
7:29:10	0:00:05	2	2
7:29:45	0:00:35	3	2
7:29:47	0:00:02	3	1
7:30:15	0:00:28	2	2
7:30:36	0:00:21	1	3
7:31:02	0:00:26	2	3
7:31:15	0:00:13	1	4
7:31:48	0:00:33	1	3
7:32:10	0:00:22	2	3
7:32:45	0:00:35	1	3
7:33:21	0:00:36	2	3
7:33:25	0:00:04	1	4
7:33:43	0:00:18	1	3
7:34:07	0:00:24	0	4
7:34:26	0:00:19	0	3
7:34:34	0:00:08	0	2
7:35:20	0:00:46	1	2
7:35:22	0:00:02	1	1
7:36:05	0:00:43	0	2
7:37:00	0:00:55	0	1
7:37:48	0:00:48	0	0
7:39:05	0:01:17	1	0
7:39:10	0:00:05	2	0
7:39:37	0:00:27	3	0
7:39:41	0:00:04	2	1
7:40:41	0:01:00	1	2
7:41:08	0:00:27	0	3
7:41:38	0:00:30	0	2
7:41:41	0:00:03	1	2
7:42:08	0:00:27	0	3
7:42:29	0:00:21	0	2

## DRIVE THRU STACKING / QUEUE STUDY

LOCATION: 2420 West Bethany Home Road  
CITY: Phoenix, AZ

DAY: Tuesday  
DATE: 2/17/2015

TIME PERIOD: 7:00 A.M. TO 9:00 A.M.

TIME	TIME BETWEEN	Order Board	Pick-up Window
7:43:12	0:00:43	0	1
7:44:01	0:00:49	0	0
7:44:10	0:00:09	1	0
7:44:15	0:00:05	2	0
7:44:20	0:00:05	3	0
7:44:37	0:00:17	2	1
7:44:52	0:00:15	1	2
7:45:20	0:00:28	1	1
7:45:22	0:00:02	0	2
7:45:55	0:00:33	0	1
7:46:43	0:00:48	1	1
7:47:00	0:00:17	1	0
7:47:22	0:00:22	0	1
7:48:16	0:00:54	0	0
7:48:35	0:00:19	1	0
7:49:02	0:00:27	0	1
7:49:31	0:00:29	1	1
7:49:55	0:00:24	1	0
7:50:11	0:00:16	2	0
7:50:28	0:00:17	1	1
7:51:18	0:00:50	0	2
7:51:27	0:00:09	0	1
7:55:00	0:03:33	0	0
7:55:05	0:00:05	1	0
7:55:26	0:00:21	0	1
7:56:06	0:00:40	0	0
7:57:35	0:01:29	1	0
7:57:47	0:00:12	2	0
7:57:58	0:00:11	3	0
7:58:03	0:00:05	2	1
7:58:40	0:00:37	1	2
7:58:55	0:00:15	1	1
7:59:19	0:00:24	0	2
7:59:27	0:00:08	1	2
7:59:36	0:00:09	1	1
7:59:45	0:00:09	2	1
8:00:25	0:00:40	1	2
8:00:40	0:00:15	1	1
8:01:10	0:00:30	2	1
8:01:39	0:00:29	1	2
8:01:42	0:00:03	1	1
8:01:51	0:00:09	0	2
8:02:55	0:01:04	1	2
8:03:12	0:00:17	1	1
8:03:32	0:00:20	0	2
8:03:43	0:00:11	0	1
8:04:27	0:00:44	1	1

TIME	TIME BETWEEN	Order Board	Pick-up Window
8:04:40	0:00:13	0	2
8:04:42	0:00:02	1	2
8:05:30	0:00:48	2	2
8:05:45	0:00:15	1	3
8:05:46	0:00:01	1	3
8:05:49	0:00:03	1	2
8:05:52	0:00:03	2	2
8:06:25	0:00:33	1	3
8:06:35	0:00:10	2	3
8:07:00	0:00:25	3	3
8:07:10	0:00:10	3	4
8:07:52	0:00:42	3	3
8:08:02	0:00:10	4	3
8:08:14	0:00:12	5	3
8:08:44	0:00:30	4	3
8:09:08	0:00:24	3	4
8:09:10	0:00:02	3	3
8:09:55	0:00:45	2	4
8:10:35	0:00:40	2	3
8:10:50	0:00:15	3	3
8:11:30	0:00:40	2	4
8:11:59	0:00:29	2	3
8:12:41	0:00:42	2	2
8:12:58	0:00:17	1	3
8:13:15	0:00:17	1	2
8:13:39	0:00:24	1	1
8:13:45	0:00:06	0	2
8:13:50	0:00:05	1	2
8:14:15	0:00:25	1	1
8:15:23	0:01:08	0	2
8:15:30	0:00:07	0	1
8:15:40	0:00:10	0	0
8:16:40	0:01:00	1	1
8:17:55	0:01:15	0	1
8:18:10	0:00:15	1	1
8:18:12	0:00:02	2	1
8:19:05	0:00:53	1	2
8:19:10	0:00:05	2	2
8:19:27	0:00:17	1	3
8:19:45	0:00:18	2	3
8:19:47	0:00:02	3	3
8:20:02	0:00:15	2	4
8:20:23	0:00:21	2	3
8:20:40	0:00:17	3	3
8:20:42	0:00:02	4	3
8:20:51	0:00:09	5	3
8:21:11	0:00:20	4	4

## DRIVE THRU STACKING / QUEUE STUDY

LOCATION: 2420 West Bethany Home Road  
CITY: Phoenix, AZ

DAY: Tuesday  
DATE: 2/17/2015

TIME PERIOD: 7:00 A.M. TO 9:00 A.M.

TIME	TIME BETWEEN	Order Board	Pick-up Window
8:21:48	0:00:37	5	4
8:21:50	0:00:02	5	3
8:22:18	0:00:28	5	2
8:22:53	0:00:35	6	2
8:23:02	0:00:09	6	1
8:23:15	0:00:13	7	1
8:23:32	0:00:17	7	0
8:23:49	0:00:17	6	1
8:24:08	0:00:19	7	1
8:24:22	0:00:14	6	2
8:24:32	0:00:10	6	1
8:25:05	0:00:33	5	2
8:25:47	0:00:42	6	2
8:26:00	0:00:13	6	1
8:26:27	0:00:27	5	2
8:26:49	0:00:22	6	3
8:27:00	0:00:11	5	3
8:27:05	0:00:05	6	3
8:27:11	0:00:06	6	2
8:27:15	0:00:04	5	2
8:27:49	0:00:34	4	3
8:28:21	0:00:32	3	4
8:28:30	0:00:09	4	4
8:28:44	0:00:14	4	3
8:29:19	0:00:35	4	2
8:29:44	0:00:25	3	3
8:30:42	0:00:58	2	4
8:30:56	0:00:14	3	4
8:31:00	0:00:04	3	3
8:31:43	0:00:43	2	4
8:32:07	0:00:24	3	4
8:32:26	0:00:19	3	3
8:33:41	0:01:15	3	2
8:34:27	0:00:46	4	2
8:34:38	0:00:11	3	3
8:34:46	0:00:08	3	2
8:35:19	0:00:33	2	3
8:36:33	0:01:14	1	4
8:37:03	0:00:30	1	3

TIME	TIME BETWEEN	Order Board	Pick-up Window
8:37:20	0:00:17	0	4
8:38:48	0:01:28	0	3
8:39:15	0:00:27	0	2
8:39:15	0:00:00	0	2
8:39:59	0:00:44	0	1
8:41:40	0:01:41	0	0
8:44:02	0:02:22	1	0
8:44:20	0:00:18	2	0
8:44:45	0:00:25	3	0
8:45:00	0:00:15	2	1
8:45:20	0:00:20	1	2
8:45:46	0:00:26	0	3
8:46:21	0:00:35	0	2
8:46:30	0:00:09	1	2
8:47:02	0:00:32	2	2
8:47:15	0:00:13	2	1
8:47:22	0:00:07	1	2
8:47:47	0:00:25	1	1
8:49:31	0:01:44	1	0
8:50:40	0:01:09	0	1
8:51:00	0:00:20	1	1
8:51:10	0:00:10	2	1
8:51:21	0:00:11	2	0
8:51:43	0:00:22	1	1
8:51:55	0:00:12	1	0
8:52:04	0:00:09	2	0
8:52:30	0:00:26	1	1
8:52:35	0:00:05	2	1
8:53:41	0:01:06	2	0
8:54:00	0:00:19	1	1
8:55:37	0:01:37	0	2
8:55:45	0:00:08	0	1
8:56:06	0:00:21	1	1
8:56:45	0:00:39	0	2
8:58:10	0:01:25	0	1