



August 8, 2023

Ms. Kortney Pedigo
McDonald's USA, LLC

Re: McDonald's – Parker Stroh 3
Traffic Compliance Letter
Parker, Colorado

Dear Ms. Pedigo:

This traffic study letter has been prepared to provide a trip generation comparison to identify compliance with the original traffic impact study including a shopping center as well as provide a drive-through queue length analysis for a proposed McDonald's restaurant to be developed near the southeast corner of the Stroh Road and Parker Road intersection in Parker, Colorado. An approximate 4,795 square foot McDonald's fast-food restaurant with drive-through is proposed to be constructed on this site. The conceptual site plan is attached to this traffic compliance letter. The site is currently undeveloped land. Aldridge Transportation Consultants, LLC completed the SEC Stroh Road/Parker Road Traffic Impact Study in January 2017 which included this development area. The trip generation of this proposed McDonald's restaurant is compared with the trip generation for the retail building(s) that would have been constructed on this site based on the previous traffic impact study analysis. Applicable documents from the original traffic study are attached for reference.

SITE INFORMATION AND TRIP GENERATION COMPARISON

McDonald's is proposed to contain an approximate 4,795 square foot restaurant building with a drive-through window. This section will provide a comparison of the trip generation from the proposed McDonald's site to the originally studied retail use.

Site-generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land use to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the *Trip Generation Manual*¹ published by the Institute of Transportation Engineers (ITE). ITE has established trip rates in nationwide studies of similar land uses.

The original traffic study completed for this area consisted of 14 acres of land that included an estimated 70,000 square feet of retail uses. The proposed McDonald's development would occupy roughly 1.48 acres of this area. As such, the trip generation estimates from the previous traffic impact study were prorated based on its floor-to-area ratio down to the lot size of the proposed McDonald's, which would have provided approximately 7,400 square feet of retail uses. Of note, the previous traffic study used information from the ITE Trip Generation, 9th Edition average rates for Shopping Center (ITE Land Use Code 820).

¹ Institute of Transportation Engineers, *Trip Generation Manual*, Tenth Edition, Washington DC, 2017.

The trip generation for the proposed McDonald's is based on the ITE Trip Generation, 11th Edition (most current edition) average rates for Fast-Food Restaurant with Drive-Through Window (ITE Land Use Code 934). The following table compares the trip generation from the original study compared to the expected trip generation for the proposed McDonald's on this specific lot. The trip generation estimates from the original traffic study as well as from the current proposal are attached for reference.

Trip Generation Comparison: Original Study vs. Current Proposal

Use and Size	Daily Vehicle Trips	Weekday Vehicle Trips					
		AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Original Traffic Study – Shopping Center (9th Edition)							
Shopping Center (ITE 820) – 7,400 Square Feet	316	4	3	7	13	14	27
Current Proposal – McDonald's Restaurant (11th Edition)							
Fast-Food Restaurant w/ DT (ITE 934) – 4,795 Square Feet	2,242	109	105	214	82	76	158
Net Difference in Trips	+1,926	+105	+102	+207	+69	+62	+131

As summarized in the table, the shopping center that would have occupied this area based on the previous traffic impact study was anticipated to generate approximately 316 weekday daily trips, with 7 of these trips occurring during the morning peak hour and 27 trips occurring during the afternoon peak hour. The proposed McDonald's is expected to generate 2,242 weekday daily trips, with 214 of these trips occurring during the morning peak hour and 158 trips occurring during the afternoon peak hour. Therefore, this proposed McDonald's is anticipated to generate 207 more trips during the morning peak hour and 131 more trips during the afternoon peak hour than previously studied.

DRIVE-THROUGH QUEUEING ANALYSIS

As provided in the Institute of Transportation Engineers (ITE) Drive-Through Queue Generation, 1st Edition, by Mike Spack, P.E., PTOE (data and information attached), the recommended vehicle queue length for fast food restaurants with drive-through is 240 feet or 12 vehicles, represented by the 85th percentile queue. Based on the attached site plan, the queue of cars anticipated to be accommodated specifically within the drive-through lanes is 16 vehicles, with approximately 8 of those vehicles accommodated at or prior to the order boards. Several more vehicles can be accommodated onsite within the drive aisle. Therefore, it is believed that the site has been designed with an appropriate configuration to accommodate the drive-through queueing needs onsite.

However, to further confirm drive-through queueing needs, a queueing analysis was completed at a nearby McDonald's located on the southeast corner of Mainstreet and Parker Road, approximately 2.8 miles to the north of this site. The analysis was conducted on Wednesday, July 27, 2022, during the midday peak period of the McDonald's from 12:00 PM to 1:00 PM. This site can hold approximately 13 vehicles within the drive-through lanes,

with 8 of those vehicles accommodated at or after the order boards. The maximum vehicle queue generated by the McDonald's drive-through during this period was collected each minute during this period and the complete results are attached for reference. The maximum drive-through queue experienced at this site was observed as 17 vehicles (5 between the window and order boards plus 12 on approach to the order boards) and occurred one time during this peak lunch period. The average drive-through queue experienced is approximately 10.05 vehicles. With the maximum queue experienced of 17 vehicles, 12 of those were within the drive-through lanes on approach to the order boards. All 12 of these vehicles were accommodated onsite, with 8 vehicles accommodated within designated drive-through lanes on approach to the order boards and the remaining 4 vehicles accommodated within the provided parking aisles onsite.

Based on the queuing analysis completed at the Mainstreet and Parker Road intersection, a maximum of 17 vehicles may be expected to be using the drive-through lanes, with up to 12 of those vehicles at or prior to the order boards. If 12 vehicles queue at or prior to the order boards at the proposed McDonald's near Stroh Road and Parker Road, 8 of those are expected to be accommodated within the drive-through lanes with the remaining 4 vehicles easily accommodated within the parking aisle. During an average peak midday queue of approximately 10 vehicles, all vehicles using the drive-through would be accommodated within the provided drive-through lanes without any spillback into the parking lot onsite. Therefore, this study reinforces the belief this site has been designed with an appropriate configuration to accommodate maximum drive-through queuing needs onsite.

CONCLUSIONS

The proposed McDonald's to be located near the southeast corner of the Stroh Road and Parker Road intersection in Parker, Colorado is anticipated to generate approximately 207 more trips during the morning peak hour and 131 more trips during the afternoon peak hour when compared to the original traffic study completed by Aldridge Transportation Consultants, LLC in January 2017 for this specific development site. A drive-through queuing analysis was completed on Wednesday, July 27, 2022, during the peak lunch period from 12:00 PM to 1:00 PM. The maximum drive-through queue experienced during this period was 17 vehicles (5 between the window and order boards, 12 on approach to the order boards), while the average drive-through queue was approximately 10 vehicles; the proposed McDonald's can accommodate 16 vehicles within the drive-through queue and several more vehicles (four to five upon shortest entry from closest driveway) within the drive aisle onsite. It is believed that development of this 4,795 square foot McDonald's will have its drive-through queue successfully accommodated onsite. Please let us know if you have any questions or require anything further. If you have any questions or require anything further, please feel free to call me at (303) 228-2304.

Sincerely,

KIMLEY-HORN AND ASSOCIATES, INC.

Curtis D. Rowe
Curtis D. Rowe, P.E., PTOE
Vice President



08/08/2023

Original Traffic Study Documents



ALDRIDGE TRANSPORTATION CONSULTANTS, LLC

Advanced Transportation Planning and Traffic Engineering

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Colorado Licensed Professional Engineer

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January 17, 2017

Mr. Dan Yacovetta
1265 W. 68th Place
Arvada, CO 80004

Re: Traffic Impact Study
SEC Parker Road/Stroh Road, Parker, CO

Dear Mr. Yacovetta:

Aldridge Transportation Consultants (ATC) is pleased to present this traffic impact study regarding the proposed development of a 14-acre shopping center on the southeast corner of Parker Road and Stroh in Parker.

ATC is professional service firm specializing in traffic engineering and transportation planning. ATC's principal, John M.W. Aldridge, is a Colorado licensed professional engineer. In the past 20 years, ATC has prepared over 1,000 traffic impact studies, designed over 100 traffic signals, and has provided expert witness testimony on engineering design and access issues on multi-million dollar interchange and highway projects in Kansas and Colorado.

ATC appreciates the opportunity to be of service. Please call if you have any questions. We can be reached at 303-703-9112.



Respectfully submitted,

Aldridge Transportation Consultants, LLC

John M.W. Aldridge, P.E.
Principal



1. Introduction/Project Description

This traffic impact study provides an evaluation and analysis of the traffic impact occasioned by development of a retail center on the southeast corner of Parker Road and Stroh Road in Parker. Figure 1 shows the location of the site and surrounding streets and intersections.



Figure 1 Project Vicinity



The site is approximately 14 acres and zoned for commercial development. The site will contain 14 lots for general commercial/retail uses that could include a myriad of uses such as coffee shops, gas stations and convenience stores, day care, bank, and auto parts/service stores.

Three accesses are proposed. From Parker Road at approximately the mid-point (550 feet south of Stroh Road) a right in/right out only access. On Stroh Road at approximately 250 east of Parker Road a right in only access, and at approximately 700 feet and directly opposite the new Stroh Crossing entrance, a full-movement access.

An up-to-date site plan is available separately.



3. Proposed Conditions

The conceptual site plan proposes approximately 70,000 square feet of commercial and retail land uses. The trip generation rates for the uses are from the *ITE Trip Generation Manual, 9th Edition*. The following worksheet provides the ADT and AM/PM Peak Hour traffic volumes.

Trip Generation Worksheet								
ITE CODE	LAND USE	UNIT	QUANTITY	ADT	AM		PM	
					IN	OUT	IN	OUT
820	Shopping Center	KSF	70	42.70	0.60	0.36	1.78	1.93
				2989	42	26	125	135
Total Trips				2989	42	26	125	135

The PM peak hour is the highest time of travel on the adjacent streets and at the intersections and therefore considered the design hour volume (DHV) for operations analysis and geometric design purposes.

About distribution, for the inbound movements, 50 percent of the shopping center traffic will turn left at the intersection and turn into the right in only access from Stroh Road. Five percent will enter the right in only coming from the west on Stroh Road. Five percent will turn left in at the full movement access on Stroh Road. 35 percent will enter by turning right from northbound Parker at the right in/right out access, and the remaining five percent will turn right from Parker Road to Stroh Road and enter at the right in only access. Figure 2 shows the distribution percentage and trip assignment.

Trip Generation Calculations

Project McDonald's Parker Stroh 3
 Subject Trip Generation for Fast-Food Restaurant with Drive-Through Window
 Designed by TJD Date August 03, 2023 Job No. 096806035
 Checked by _____ Date _____ Sheet No. _____ of _____

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 11th Edition, Average Rates

Land Use Code - Fast-Food Restaurant with Drive-Through Window (934)

Independent Variable - 1000 Square Feet (X)

$$SF = 4,795$$

$$X = 4.795$$

T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (900 Series Page 726)

(T) = 44.61 (X)		Directional Distribution:	51% ent.	49% exit.
(T) = 44.61 *	(4.8)	T =	214	Average Vehicle Trip Ends
			109 entering	105 exiting
			109 +	105 = 214

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (900 Series Page 727)

(T) = 33.03 (X)		Directional Distribution:	52% ent.	48% exit.
(T) = 33.03 *	(4.8)	T =	158	Average Vehicle Trip Ends
			82 entering	76 exiting
			82 +	76 = 158

Weekday (900 Series Page 725)

(T) = 467.48 (X)		Directional Distribution:	50% ent.	50% exit.
(T) = 467.48 *	(4.8)	T =	2242	Average Vehicle Trip Ends
			1121 entering	1121 exiting
			1121 +	1121 = 2242

Non Pass-By Trip Volumes (Per ITE Trip Generation Manual, 11th Edition)

AM Peak Hour =	50%	Non-Pass By	PM Peak Hour =	45%	Non-Pass By
	IN	Out	Total		
AM Peak	55	52	107		
PM Peak	37	34	71		
Daily	504	504	1008		PM Peak Hour Rate Applied to Daily

Pass-By Trip Volumes (Per Trip Generation Manual, 11th Edition)

AM Peak Hour =	50%	Pass By	PM Peak Hour =	55%	Pass By
	IN	Out	Total		
AM Peak	55	52	107		
PM Peak	45	42	87		
Daily	617	617	1234		PM Peak Hour Rate Applied to Daily

Drive-Through Queue Length Information

Drive-Through Queue Generation

Mike Spack, PE, PTOE, Max Moreland, EIT, Lindsay de Leeuw, Nate Hood

1.0 Introduction

This report provides queuing data for businesses with drive-through services. It is intended to be an aid for site designers and reviewers, similar to the Institute of Transportation Engineers' *Trip Generation* and *Parking Generation* reports. The data presentation is modeled on the *Parking Generation* report and data is provided based on at least six sites, similar to data sets marked as statistically significant in *Trip Generation*.

Businesses with drive-through lanes are very common in the United States and having data that gives usage information for drive-through lanes will assist designers as well as cities in determining the appropriate amount of storage needed for proposed drive-through businesses. Data for drive-through queues was published by the ITE Technical Council Committee 5D-10 in 1995 based on information collected between the late 1960's and the 1990's. A paper was also published in 2009 by Mark Stuecheli, PTP giving updated information for bank and coffee shop drive-through lanes. The results from the 2009 study are incorporated into this paper (thank you Mark for your assistance).

2.0 Data Collection

Data was collected using COUNTcam video recording systems at a total of 30 drive-through locations in Minneapolis, MN and several surrounding suburbs between 2010 and 2012 (26 of the 30 videos were recorded in February of 2012, which should represent peak usage in the cold Minnesota winter). Videos of drive-through lanes were collected at banks, car washes, coffee shops, fast food restaurants and pharmacies. A total of six locations were selected for each of the five different land uses. Each location was recorded for between one and five days where the majority of locations were recorded for two consecutive days. The days of the week that each video was recorded on varies.

The 24-hour videos were watched at high speeds with the PC-TAS counting software and maximum queues throughout the day were noted. Most of the COUNTcams were set up such that the entire queue lane could be seen, but at a few locations the drive-through lanes wrapped around the building in a way that the entire queue length would not be able to be seen. For these situations, the COUNTcams were set up so that the ordering window and back of the queue could be seen and it was noted how many vehicles could fit between the ordering window and the front of the queue. For drive-through locations with multiple lanes, the number of lanes was noted but the maximum queue is defined as the sum of the queues at each lane for any given point in time, not the queue per lane. This approach provides overall demand, which may assist designers in determining how many drive through lanes are appropriate in addition to determining how long they should be.

Once the maximum queue for each day at each location was determined, the data was compiled and statistics for each land use were calculated. The average maximum queue, standard deviation, coefficient of variation, range, 85th percentile and 33rd percentile were calculated for each land use.

Data for drive-through coffee shops and banks from the Kansas City, Kansas metropolitan area was published in the 2009 paper New Drive-Through Stacking Information for Banks and Coffee Shops by Mark Stuecheli. This data is included in the analysis.

3.0 Data Analysis

Based on the peak queue lengths, it is apparent that each land use will require a different minimum drive through stacking distance. The results for each land use can be found below. The peak queue lengths for each location, broken down by land use and day of the week, can be found in the Appendix.

3.1 Banks

Data collection was done at six banks with drive-through services (including one credit union) in August 2011 and February 2012. Twelve days of data were collected. The banks were located in the cities of Minneapolis, Robbinsdale and St. Louis Park, MN.

All of the locations had a lane with a drive-through ATM and at least two other lanes. Though service times may differ for ATM lanes compared to the regular lanes, the maximum queues were counted together. This is because based upon what was observed, vehicles would occasionally switch the lane they were in. For example, a vehicle waiting in the ATM line with a queue of three vehicles may move over to a regular line with a queue of only one vehicle. Much of what can be done at the bank's drive-through lane can also be accomplished at that bank's ATM and vice versa. Vehicles being served were counted as being in the queue.

Nine days of data from the Kansas City, Kansas area is also included. This data does not factor in vehicles in ATM lanes.

Table 3.1 – Drive-Through Bank Maximum Queue Statistics

	Minnesota Data	Minnesota + Kansas Data
Number of Data Points	12	21
Average Maximum Queue (Vehicles)	5.83	5.76
Standard Deviation (Vehicles)	1.85	2.21
Coefficient of Variation	32%	38%
Range (Vehicles)	3 to 8	1 to 10
85th Percentile (Vehicles)	8.00	8.00
33rd Percentile (Vehicles)	5.00	5.00

Coffee shops produced the longest maximum queues of any of the land uses in this study with all of the maximum queues occurring in the morning. In four of the six cases, the queues spilled out of the parking lot and into the street. These spillovers would typically only happen once or twice a day and last only a few minutes, however, one location had stacking into the street for about 15 minutes in addition to multiple periods of several minutes where cars would queue in the street.

With an 85th percentile maximum queue of 13 vehicles, the data suggests that coffee shops with drive-through lanes should be able to accommodate at least 260 feet of vehicle stacking during morning hours.

3.4 Fast Food Restaurants

Data collection was done at six fast food restaurants with drive-through services in August 2011 and February 2012. Fourteen days of data were collected. The restaurants were located in the cities of Golden Valley, Hopkins, Minneapolis and St. Louis Park, MN. Vehicles being served were counted as being in the queue.

Table 3.4 – Drive-Through Fast Food Restaurant Maximum Queue Statistics

Number of Data Points	14
Average Maximum Queue (Vehicles)	8.50
Standard Deviation (Vehicles)	2.68
Coefficient of Variation	32%
Range (Vehicles)	5-13
85th Percentile (Vehicles)	12.00
33rd Percentile (Vehicles)	7.90

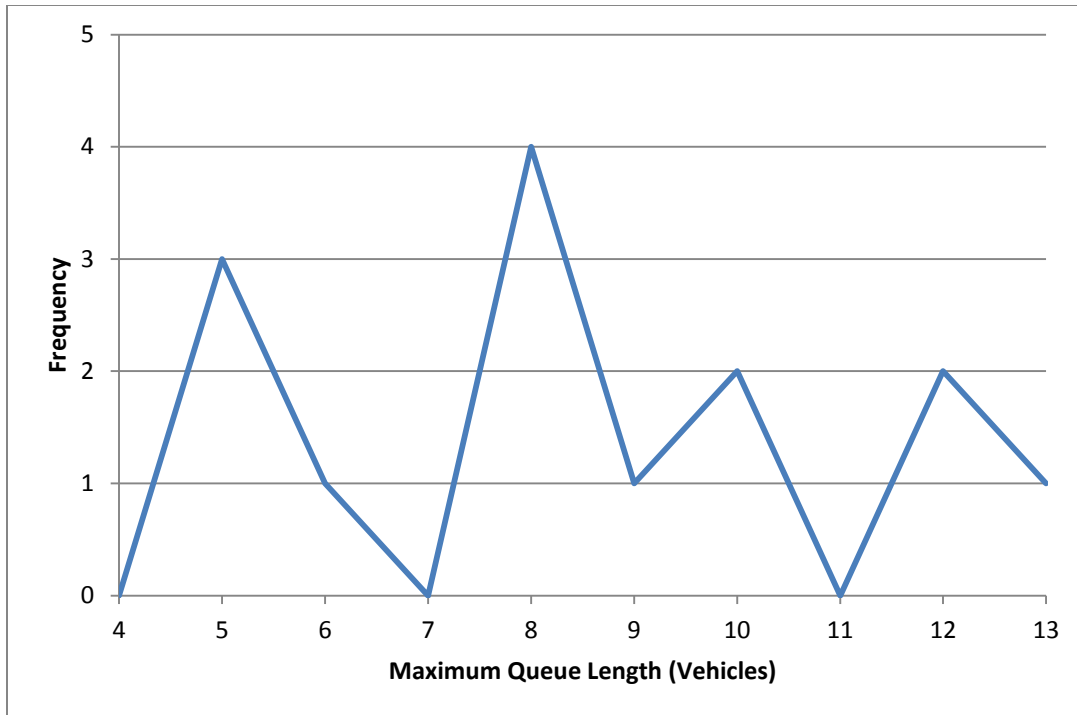


Figure 3.4 – Drive-Through Fast Food Restaurant Maximum Queue Frequency

The maximum queues for fast food restaurants were spread throughout the day from 8:00am to 10:00pm. With an 85th percentile maximum queue of 12 vehicles, the data suggests that fast food restaurants with drive-through lanes should be able to accommodate 240 feet of vehicle stacking throughout the day.

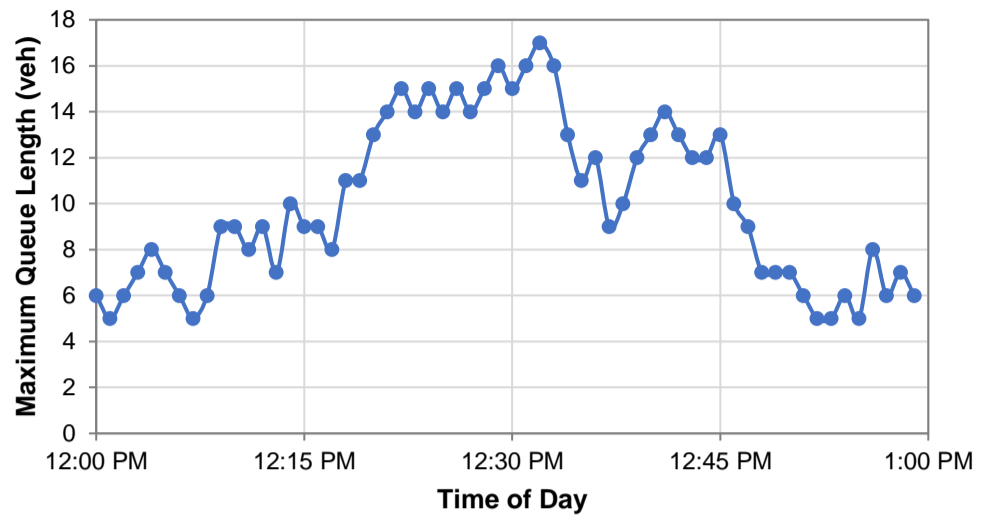
3.5 Pharmacies

Data collection was done at six pharmacies with drive-through services in February 2012. Twelve days of data were collected. The pharmacies were located in the cities of Hopkins, Minneapolis, New Hope and Robbinsdale, MN. Vehicles being served were counted as being in the queue.

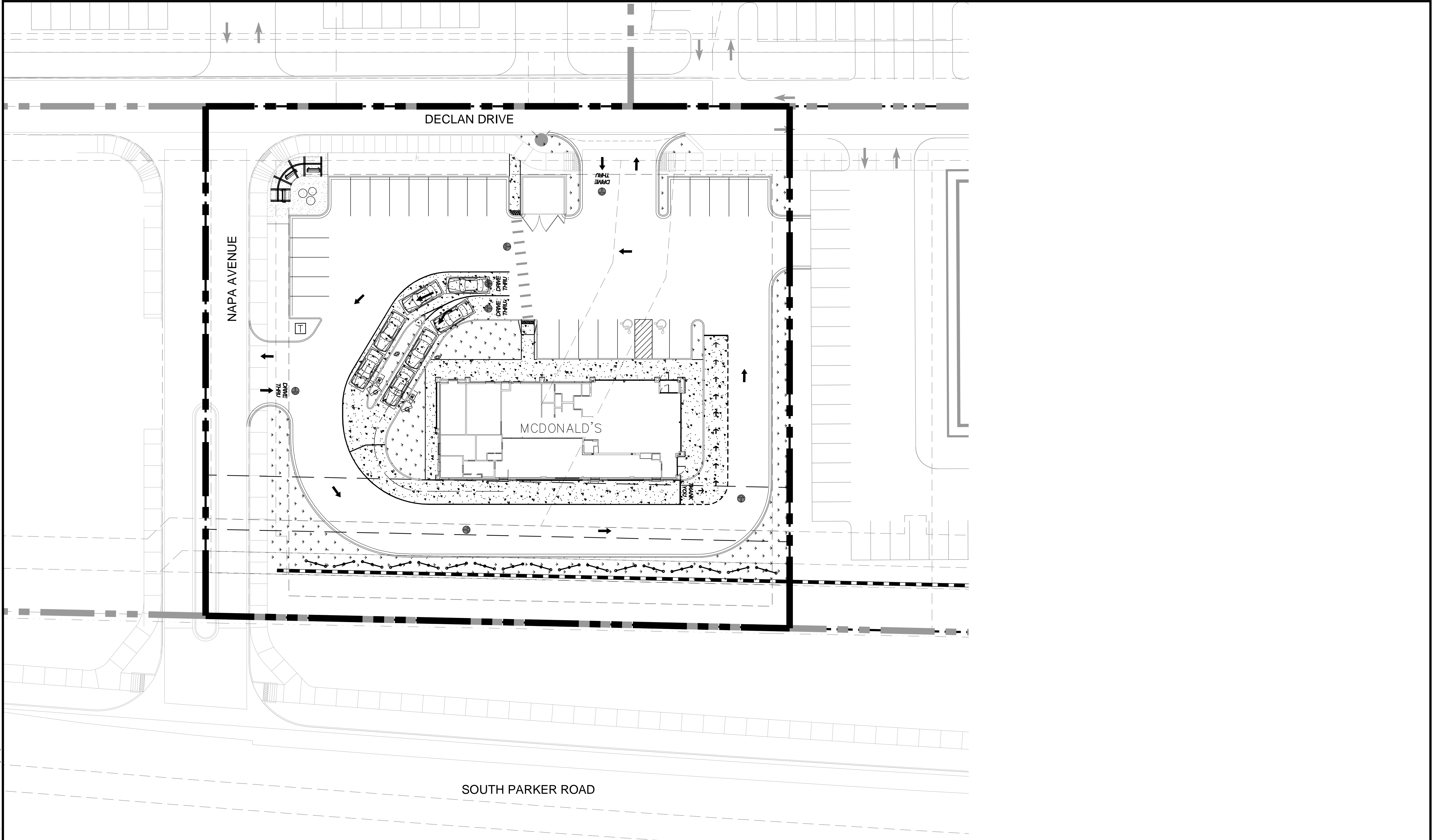
Table 3.5 – Drive-Through Pharmacy Maximum Queue Statistics

Number of Data Points	12
Average Maximum Queue (Vehicles)	2.92
Standard Deviation (Vehicles)	1.16
Coefficient of Variation	40%
Range (Vehicles)	1-5
85th Percentile (Vehicles)	4.05
33rd Percentile (Vehicles)	2.00

McDonald's Drive Through Queue Parker Rd & Mainstreet, Parker, CO	
Time Of Day	Max Queue Length (veh)
12:00 PM	6
12:01 PM	5
12:02 PM	6
12:03 PM	7
12:04 PM	8
12:05 PM	7
12:06 PM	6
12:07 PM	5
12:08 PM	6
12:09 PM	9
12:10 PM	9
12:11 PM	8
12:12 PM	9
12:13 PM	7
12:14 PM	10
12:15 PM	9
12:16 PM	9
12:17 PM	8
12:18 PM	11
12:19 PM	11
12:20 PM	13
12:21 PM	14
12:22 PM	15
12:23 PM	14
12:24 PM	15
12:25 PM	14
12:26 PM	15
12:27 PM	14
12:28 PM	15
12:29 PM	16
12:30 PM	15
12:31 PM	16
12:32 PM	17
12:33 PM	16
12:34 PM	13
12:35 PM	11
12:36 PM	12
12:37 PM	9
12:38 PM	10
12:39 PM	12
12:40 PM	13
12:41 PM	14
12:42 PM	13
12:43 PM	12
12:44 PM	12
12:45 PM	13
12:46 PM	10
12:47 PM	9
12:48 PM	7
12:49 PM	7
12:50 PM	7
12:51 PM	6
12:52 PM	5
12:53 PM	5
12:54 PM	6
12:55 PM	5
12:56 PM	8
12:57 PM	6
12:58 PM	7
12:59 PM	6
Max	17
Average Max	10.05

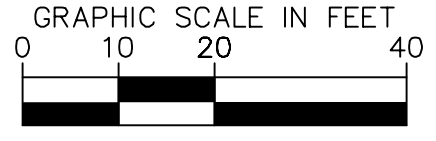
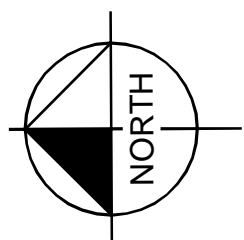


Conceptual Site Plan



LEGEND

-  PROPERTY LINE
-  SETBACK



Kimley»Horn

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