McDonald's PSL

Project № 24336.01.03 December 13, 2024

Queue Analysis City of Port St. Lucie Florida

Prepared for:



Integrity Engineering & Development Services, Inc. 3615 Braselton Highway, Suite 201 Dacula, Georgia 30019

Prepared by:



3725 SE Ocean Boulevard, Suite 201 Stuart, Florida 34996 www.trafficmobility.com (772) 781-7918

EXECUTIVE SUMMARY

Project Information

Name: McDonald's PSL

Location: Northeast corner of US Highway 1 and SE Jennings Road in Port St.

Lucie, Florida

Jurisdiction: City of Port St. Lucie, Florida

Description: 3,859 Square Foot Fast Food Restaurant with Drive-Through

<u>Findings</u>

Trip Generation: 857 daily net new trips / 86 AM peak hour trips / 57 PM peak hour trips

Queue Analysis: The vehicle storage on the site is adequate for the projected queue

length at the drive-through window.



PROFESSIONAL ENGINEERING CERTIFICATION

I hereby certify that I am a Professional Engineer properly registered in the State of Florida practicing with Susan E. O'Rourke, PE, LLC, a corporation authorized to operate as an engineering business, CA-26869, by the State of Florida Department of Professional Regulation, Board of Professional Engineers, and that I have prepared or approved the evaluations, findings, opinions, conclusions, or technical advice attached hereto for:

PROJECT: McDonald's PSL

LOCATION: City of Port St. Lucie, Florida

CLIENT: Integrity Engineering & Development Services, Inc.

I hereby acknowledge that the procedures and references used to develop the results contained in these computations are standard to the professional practice of Transportation Engineering as applied through professional judgment and experience.



THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY

ON THE DATE ADJACENT TO THE SEAL

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

SUSAN E. O'ROURKE, PE, LLC 3725 SE OCEAN BLVD SUITE 201 SEWALL'S POINT, FLORIDA 34996

CERTIFICATE OF AUTHORIZATION CA-26869

CHARLOTTE N. DAVIDSON, P.E. № 50725

TABLE OF CONTENTS

Pa	ge
TABLE OF CONTENTS	
1.0 INTRODUCTION	. 1
2.0 TRIP GENERATION	. 3
3.0 QUEUE ANALYSIS	. 4
4.0 FINDINGS & CONCLUSION	. 6
APPENDICES	
Appendix A Site Plan / Information Appendix B ITE Information Sheets Appendix C Queue Data / Surrogate Site Data	
LIST OF TABLES	
Table 1 Trip Generation Summary	. 3
Table 2 Maximum Queue for Morning Peak Hours	. 5
Table 3 Maximum Queue for Afternoon Peak Hours	. 5
LIST OF FIGURES	
Figure 1 Site Location Map	. 2

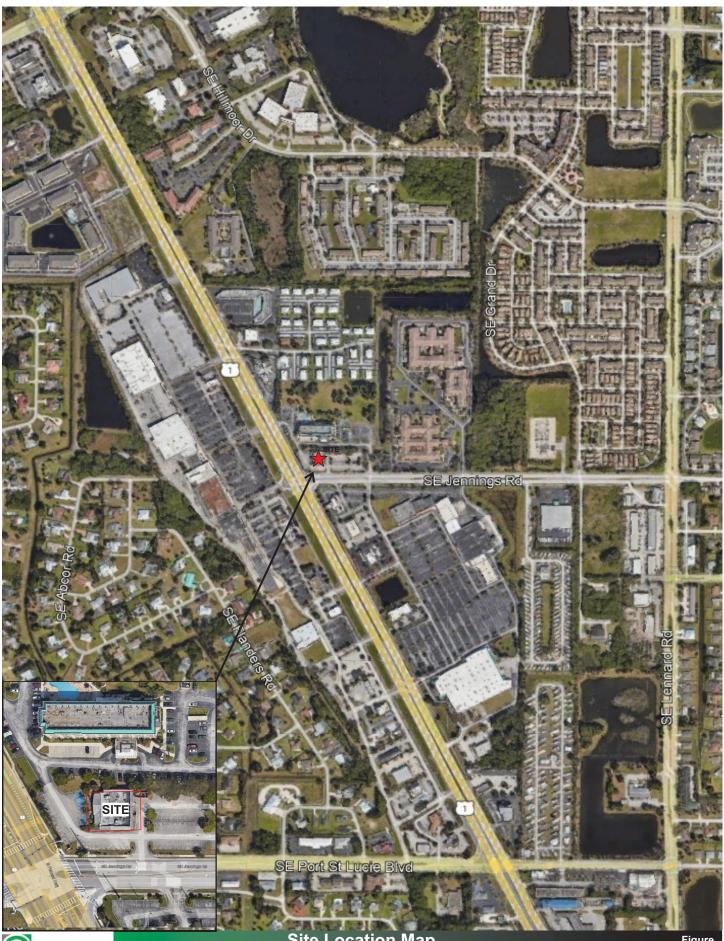


1.0 INTRODUCTION

This analysis was prepared to provide queue analysis of the proposed 3,859 square foot McDonald's to be located north of SE Jennings Road Parkway and east of US Highway 1 in Port St. Lucie, Florida. The site location is illustrated in **Figure 1**. An overall site plan depicting the site layout, land uses, and access points is included in **Appendix A**.

Information used in this analysis includes data collected by O' Rourke Engineering & Planning, a TMC Company, information provided by the project team, and/or other data and information obtained from the City of Port St. Lucie, the Institute of Transportation Engineers (ITE), and the Florida Department of Transportation (FDOT).





2.0 TRIP GENERATION

The traffic generation of the proposed development was calculated using the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition.* The pass-by percentage was derived from the Appendices of the *ITE Trip Generation Handbook, 11th Edition.*

ITE Code 934 presents pass-by rates for fast food restaurants with drive-through service and indoor seating, with observed averages of 50% for the AM and 55% for the PM. For the daily rate, an average of the AM and PM rates (52.5%) was used. It should be noted that the pass-by rate applies only to off-site intersections and is not used for the queue analysis. The trip generation for the project is summarized in **Table 1** and the ITE information sheets are provided in **Appendix B.**

Table 1
Trip Generation Summary

ITE			Dai	ily	AM Peak Hour				PM Peak Hour			
Code	Land Use	Size	Rate	Trips	Rate	Total	Enter	Exit	Rate	Total	Enter	Exit
934	Fast Food Restaurant with Drive- Through Window	3,859 SF	467.48	1,804	44.61	172	88	84	33.03	127	66	61
F	Pass-By Percentages (Daily 52.5%, AM 50%, PM 55%)					86	44	42		70	36	34
	Net New External Trips					86	44	42		57	30	27

Trip Generation analysis based on ITE Trip Generation Manual, 11th Edition.

Pass-By analysis based on ITE Trip Generation Manual, 11th Edition.

The proposed development is projected to generate 857 net new daily trips, of which 86 trips occur during the AM peak hour and 57 trips occur during the PM peak hour.



3.0 Queue Analysis

The drive-through service point is located south of the building, where the queue can begin to form and can extend in a circular path counterclockwise. The east side of the building also has available space where additional queues can form.

On the south side of the building, the entire stretch from the service point to the point where the drive-through lane separates from the exit access driveway could be used for queues. Based on the available site information and assuming each 20-foot segment can accommodate one (1) car, the total queue capacity of the proposed McDonald's is fifteen (15) vehicles.

For the queue analysis, this study gathered data from three (3) similar sites in Port St. Lucie, Florida and Jensen Beach, Florida to assess potential queuing. The sites studied were:

- Site 1: McDonald's at 3546 Northwest Federal Highway
- Site 2: McDonald's at 7626 South Federal Highway
- Site 3: McDonald's at 1080 Southeast Port Saint Lucie Boulevard

The observed queues for the three (3) surrogate sites during AM and PM peak hours are included in **Appendix C**.

Based on gross trip generation rates for LUC 934, the proposed site is estimated to generate 88 trips entering during the AM peak hour and 66 trips entering during the PM peak hour. The maximum queued vehicle per trip generated observed at the three (3) similar sites was found to be 0.14 for the AM peak hour and 0.117 for the PM peak hour. The maximum queue calculations for McDonald's PSL during AM and PM peak hours are shown in **Table 2** and **Table 3**, respectively. The results indicate that the maximum queue at the proposed McDonald's will be thirteen (13) vehicles during AM peak hours and eight (8) vehicles during PM peak hours.



Table 2
Maximum Queue for Morning Peak Hours

maximum quous is: morning i sun i sun i								
	Sit	e 1	Sit	e 2	Site 3			
	7 AM to 8 AM	8 AM to 9 AM	7 AM to 8 AM	8 AM to 9 AM	7 AM to 8 AM	8 AM to 9 AM		
Vehicle/hr (V)	100	86	92	110	95	97		
Maximum Queue (Q)	10	11	13	15	12	11		
Q/V	0.10	0.128	0.141	0.136	0.13	0.1		
Maximum Q/V		0.14						
McDonald's PSL Trips	88							
McDonald's PSL Maximum Q/V		12.4 = 13						

Table 3
Maximum Queue for Afternoon Peak Hours

	Sit	e 1	Sit	e 2	Site 3			
	4 PM to 5 PM	5 PM to 6 PM	4 PM to 5 PM	5 PM to 6 PM	4 PM to 5 PM	5 PM to 6 PM		
Vehicle/hr (V)	110	105	128	145	141	136		
Maximum Queue (Q)	12	11	12	17	15	13		
Q/V	0.109	0.105	0.094	0.117	0.11	0.1		
Maximum Q/V		0.117						
McDonald's PSL Trips	66							
McDonald's PSL Maximum Q/V			7.7	= 8				

The analysis indicates that the proposed McDonald's has more than enough capacity to accommodate the projected vehicular demand, ensuring that queuing does not spill into the cross-access easement driveway or outside the site's entrances.



4.0 FINDINGS / CONCLUSION

This study was conducted to analyze the drive-through queue. The site is located on the northeast corner of US Highway 1 and SE Jennings Road in St. Lucie County, Florida. The proposed commercial development is a 3,859 square foot drive-through fast food restaurant.

The analysis included a determination of project trip generation and the queue analysis of the drive-through lanes. The results of the analysis are summarized as follows:

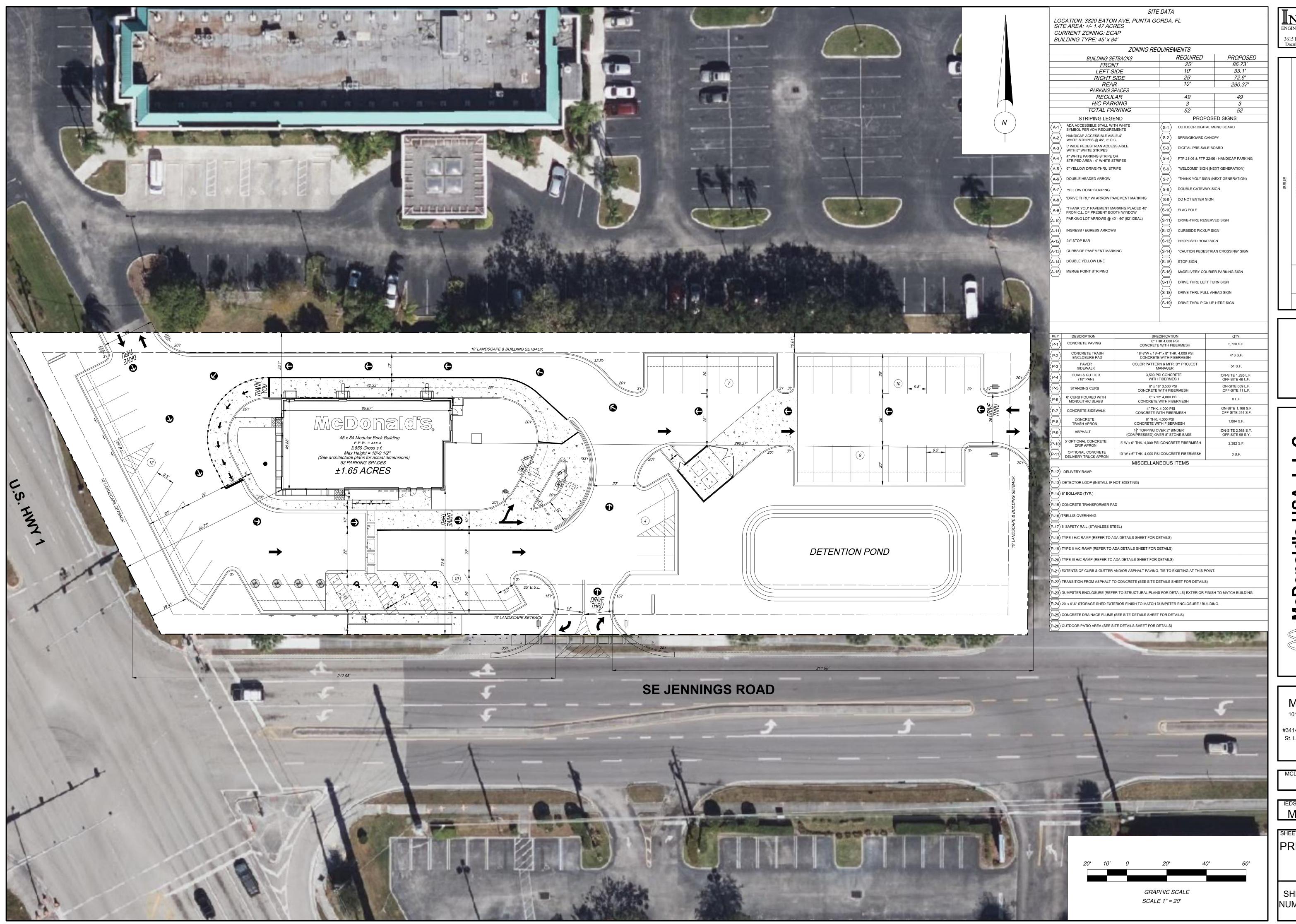
Summary of Findings

- The proposed development is projected to generate 857 net new external trips per day, of which 86 trips occur during the AM peak hour and 57 trips occur during the PM peak hour.
- A maximum projected queue of 13 vehicles is expected based on the patterns observed at three (3) other McDonald's locations in the area.
- The vehicle storage within the site is projected to adequately accommodate the queue length at the drive-through window.

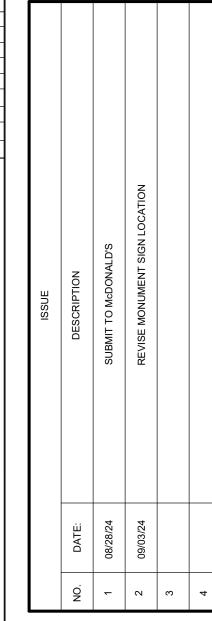


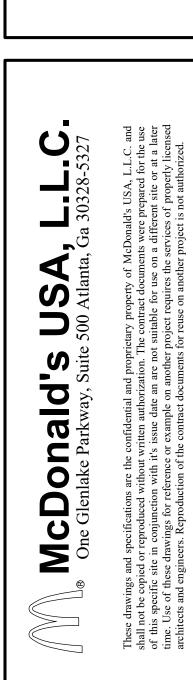


Appendix ASite Plan / Information



ENGINEERING & DEVELOPMENT SERVICES, INC.
3615 Braselton Highway, Suite 201 Dacula, Ga 30019 (678) 546-0446





McDonald's
10180 S. US Highway 1

Parcel ID #3414-501-3810-100-1 Port St. Lucie, St. Lucie County Zoned: GC

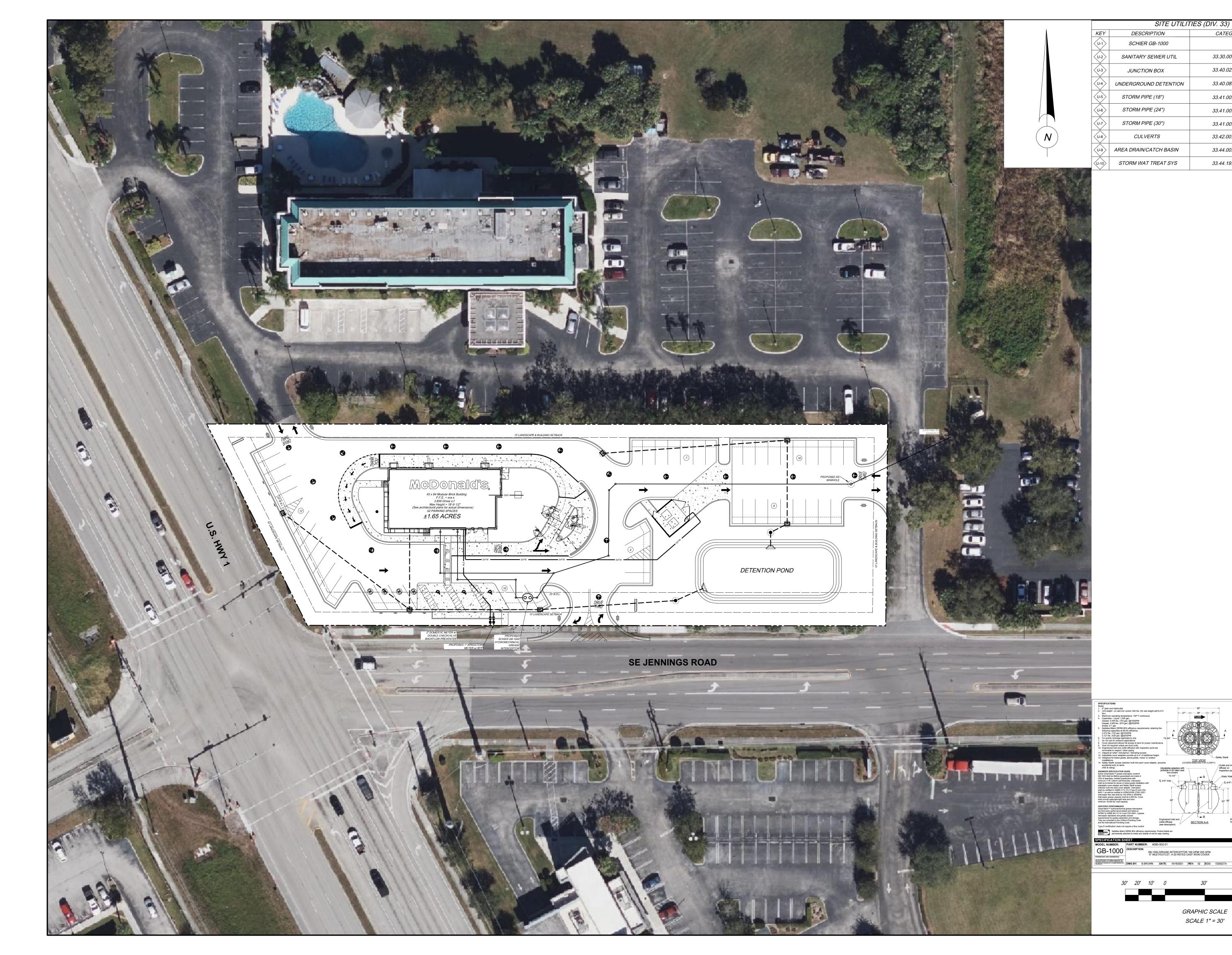
MCD STATE SITE CODE: 9-2788

IEDS PROJECT NUMBER:

MCD-24129

PRELIMINARY
SITE
PLAN

SHEET 1 NUMBER 3



ENGINEERING & DEVELOPMENT SERVICES, INC.
3615 Braselton Highway, Suite 201 Dacula, Ga 30019 (678) 546-0446

CATEGORY

33.30.00.S

33.40.02.S

33.40.08.S

33.41.00.S

33.41.00.S

33.41.00.S

33.42.00.S

33.44.00.S

33.44.19.S

LF

LF

LF

LF

QTY.

QTY.

LF 631'

DATE: 08/28/24 09/03/24

onald's McD

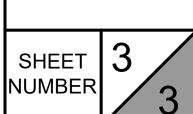
McDonald's 10180 S. US Highway 1 Parcel ID

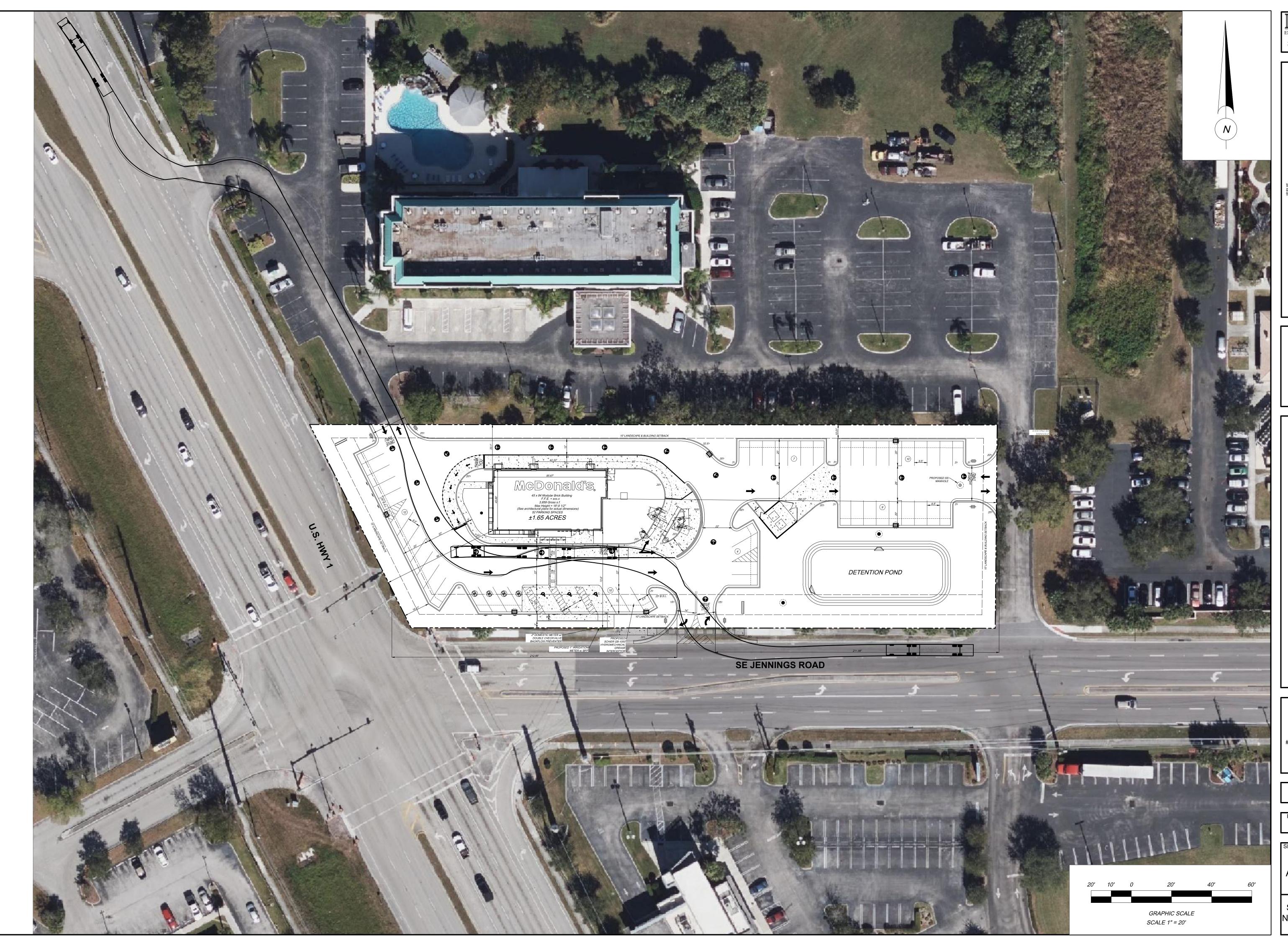
#3414-501-3810-100-1 Port St. Lucie, St. Lucie County Zoned: GC

9-2788

IEDS PROJECT NUMBER: MCD-24129

PRELIMINARY UTILITY PLAN





ENGINEERING & DEVELOPMENT SERVICES, INC.
3615 Braselton Highway, Suite 201 Dacula, Ga 30019 (678) 546-0446

| NO. DATE: DESCRIPTION | DESCRIPTION | SUBMIT TO McDONALD'S | SUBMI

McDonald's USA, L.L. (

McDonald's

10180 S. US Highway 1
Parcel ID
#3414-501-3810-100-1 Port
St. Lucie, St. Lucie County
Zoned: GC

MCD STATE SITE CODE: 9-2788

IEDS PROJECT NUMBER:
MCD-24129

TRUCK

ACCESS PLAN

SHEET 3
NUMBER 3

Appendix B
ITE Information Sheets

Fast-Food Restaurant with Drive-Through Window (934)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA

On a: Weekday

Setting/Location: General Urban/Suburban

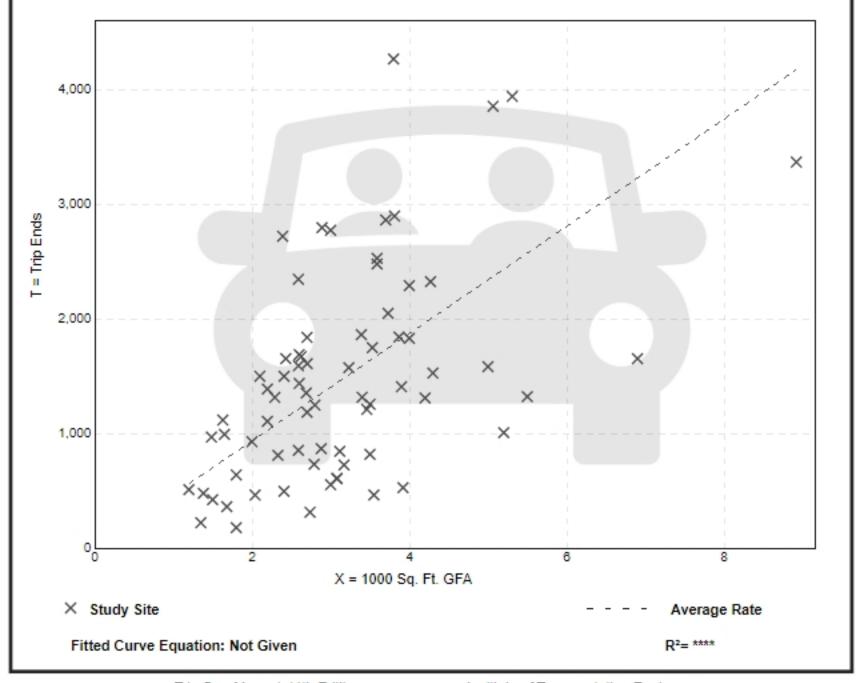
Number of Studies: 71 Avg. 1000 Sq. Ft. GFA: 3

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
467.48	98.89 - 1137.66	238.62

Data Plot and Equation



Fast-Food Restaurant with Drive-Through Window (934)

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

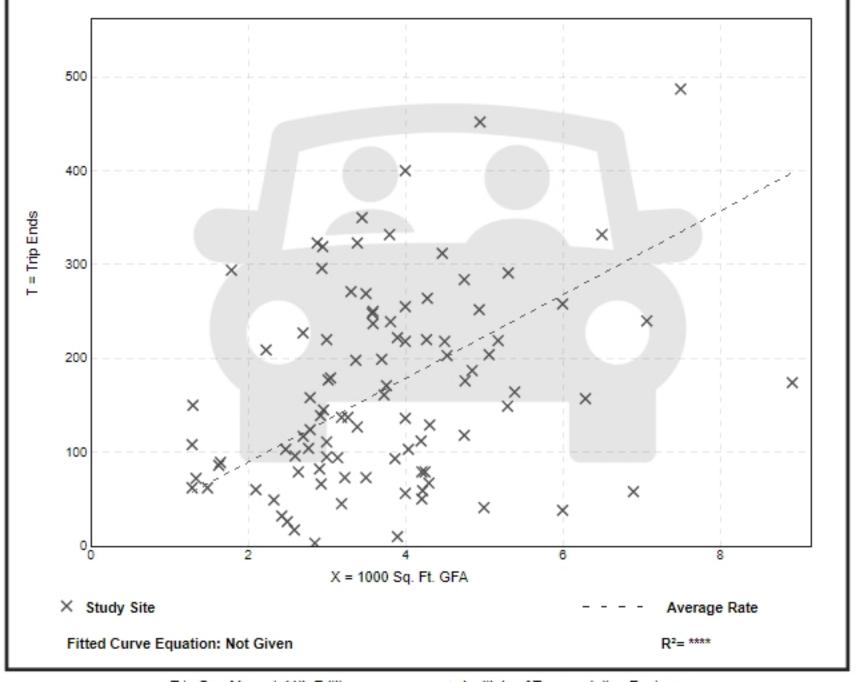
Number of Studies: 96 Avg. 1000 Sq. Ft. GFA: 4

Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
44.61	1.05 - 164.25	27.14

Data Plot and Equation



Fast-Food Restaurant with Drive-Through Window (934)

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

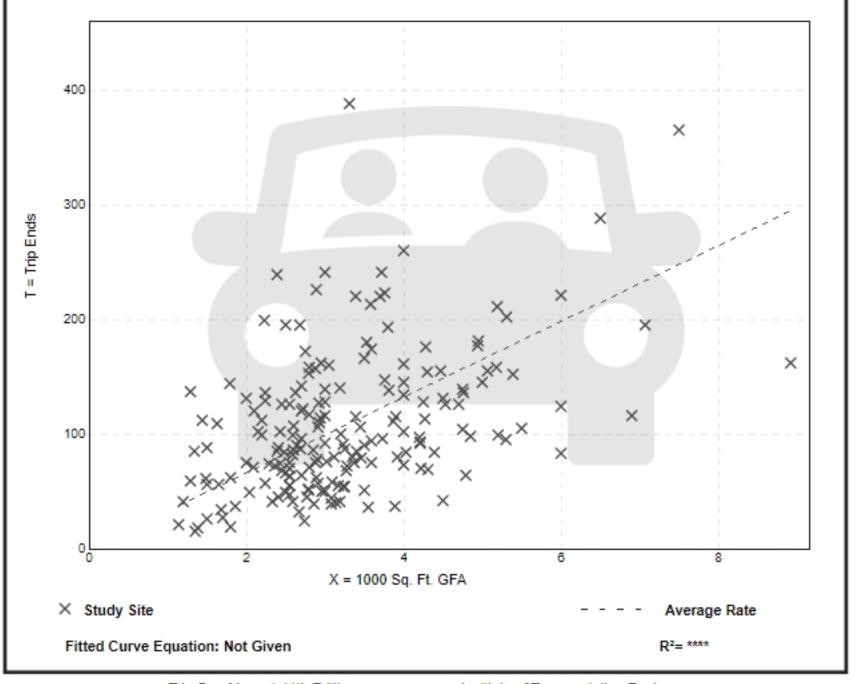
Number of Studies: 190 Avg. 1000 Sq. Ft. GFA: 3

Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
33.03	8.77 - 117.22	17.59

Data Plot and Equation



	Vehicle Pass-By Rates by Land Use								
	Source: ITE <i>Trip Generation Manual</i> , 11th Edition								
Land Use Code					934				
Land Use			Fast-F	ood Restau	rant with Drive-	Through Windo	W		
Setting				Gene	eral Urban/Subu	ırban			
Time Period				Weel	kday AM Peak P	eriod			
# Data Sites					5				
Average Pass-By Rate					50%				
			Р	ass-By Char	acteristics for Ir	dividual Sites			
				-					
	State or	Survey		Pass-By	No	n-Pass-By Trips		Adj Street Peak	
GFA (000)	Province	Year	# Interviews	Trip (%)	Primary (%)	Diverted (%)	Total (%)	Hour Volume	Source
1.4	Kentucky	1993		62	22	16	38	1407	2
3	Kentucky	1993	_	43	14	43	57	2903	2
3.3		1996	_	68	_	_	32	_	21
3.6	Kentucky	1993	_	32	47	21	68	437	2
4.2	Indiana	1993	_	46	23	31	54	1049	2

			venicie Pas	ss-by Rates	by Land Use				
		Sou	rce: ITE <i>Trip G</i>	eneration N	<i>lanual</i> , 11th Ed	ition			
Land Use Code					934				
Land Use			Fast-F	ood Restau	rant with Drive	-Through Windo	w		
Setting				Gene	eral Urban/Subu	urban			
Time Period				Wee	kday PM Peak P	eriod			
# Data Sites					11				
Average Pass-By Rate					55%				
			Р	ass-By Char	acteristics for Ir	ndividual Sites			
	State or	Survey		Pass-By	No	n-Pass-By Trips		Adj Street Peak	
GFA (000)	Province	Year	# Interviews	Trip (%)	Primary (%)	Diverted (%)	Total (%)	Hour Volume	Sour
1.3	Kentucky	1993	_	68	22	10	32	2055	2
1.9	Kentucky	1993	33	67	24	9	33	2447	2
2.8	Florida	1995	47	66	_	_	34	_	30
2.9	Florida	1996	271	41	41	18	59	_	30
3	Kentucky	1993	_	31	31	38	69	4250	2
3.1	Florida	1995	28	71	_	_	29	_	30
3.1	Florida	1996	29	38	_	_	62	_	30
3.2	Florida	1996	202	40	39	21	60	_	30
3.3		1996	_	62		_	38	_	21
4.2	Indiana	1993	_	56	25	19	44	1632	2
4.3	Florida	1994	304	62	_	_	38	_	30

Appendix C
Queue Date / Surrogate Site Data

3546 NW Federal Hwy - Jensen Beach

	Inside Lane 1	Outside Lane 2	Window to	
Time	Order Board to	Order Board to	End of	Totals
	End of Queue	End of Queue	Queue	
7:00 AM	6	1	3	10
7:05 AM	4	0	4	8
7:10 AM	3	2	2	7
7:15 AM	4	2	3	9
7:20 AM	2	2	4	8
7:25 AM	3	1	2	6
7:30 AM	3	2	3	8
7:35 AM	3	2	4	9
7:40 AM	0	2	5	7
7:45 AM	5	1	4	10
7:50 AM	4	3	2	9
7:55 AM	4	2	3	9
8:00 AM	5	2	4	11
8:05 AM	1	1	2	4
8:10 AM	2	2	3	7
8:15 AM	1	1	4	6
8:20 AM	3	2	2	7
8:25 AM	3	1	4	8
8:30 AM	1	2	4	7
8:35 AM	4	2	2	8
8:40 AM	1	0	3	4
8:45 AM	3	2	5	10
8:50 AM	2	2	3	7
8:55 AM	2	1	4	7
Totals	69	38	79	186

Time	Inside Lane 1 Order Board to End of Queue	Outside Lane 2 Order Board to End of Queue	Pickup Window to End of Queue	Totals
4:00 PM	2	2	3	7
4:05 PM	3	3	4	10
4:10 PM	4	2	2	8
4:15 PM	3	3	3	9
4:20 PM	4	1	4	9
4:25 PM	2	2	5	9
4:30 PM	4	3	4	11
4:35 PM	3	1	2	6
4:40 PM	4	2	3	9
4:45 PM	5	2	4	11
4:50 PM	4	3	5	12
4:55 PM	2	1	6	9
5:00 PM	3	2	4	9
5:05 PM	4	2	2	8
5:10 PM	2	3	4	9
5:15 PM	3	2	2	7
5:20 PM	4	1	4	9
5:25 PM	5	2	3	10
5:30 PM	4	3	4	11
5:35 PM	2	1	5	8
5:40 PM	3	2	4	9
5:45 PM	4	3	2	9
5:50 PM	2	2	2	6
5:55 PM	3	3	4	10
Totals	79	51	85	215

Window Board

7626 S Federal Hwy - PSL

	Inside Lane 1	Outside Lane 2	Pickup	
Time	Order Board to	Order Board to	Window to	Totals
	End of Queue	End of Queue	End of Queue	
7:00 AM	4	3	3	10
7:05 AM	0	4	2	6
7:10 AM	1	4	1	6
7:15 AM	1	2	3	6
7:20 AM	1	2	4	7
7:25 AM	1	5	2	8
7:30 AM	0	2	3	5
7:35 AM	4	5	4	13
7:40 AM	1	4	2	7
7:45 AM	1	1	1	3
7:50 AM	2	5	1	8
7:55 AM	5	5	3	13
8:00 AM	2	3	4	9
8:05 AM	2	3	3	8
8:10 AM	3	3	4	10
8:15 AM	5	6	2	13
8:20 AM	1	4	3	8
8:25 AM	2	4	4	10
8:30 AM	2	3	4	9
8:35 AM	3	5	2	10
8:40 AM	2	4	3	9
8:45 AM	5	6	4	15
8:50 AM	1	1	2	4
8:55 AM	1	2	2	5
Totals	50	86	66	202

	Inside Lane 1	Outside Lane 2	Pickup	
Time	Order Board to	Order Board to	Window to	Totals
	End of Queue	End of Queue	End of Queue	
4:00 PM	3	3	3	9
4:05 PM	1	4	4	9
4:10 PM	3	6	3	12
4:15 PM	4	4	4	12
4:20 PM	3	5	4	12
4:25 PM	4	2	5	11
4:30 PM	5	3	2	10
4:35 PM	4	4	3	11
4:40 PM	3	5	4	12
4:45 PM	4	4	2	10
4:50 PM	4	2	3	9
4:55 PM	3	4	4	11
5:00 PM	4	3	5	12
5:05 PM	2	4	2	8
5:10 PM	3	5	3	11
5:15 PM	4	4	4	12
5:20 PM	2	6	5	13
5:25 PM	3	4	4	11
5:30 PM	4	8	5	17
5:35 PM	4	4	4	12
5:40 PM	2	5	4	11
5:45 PM	4	6	5	15
5:50 PM	2	4	2	8
5:55 PM	3	8	4	15
Totals	78	107	88	273

Window Board Window Board

1080 SE Port St. Lucie Blvd - PSL

	Instala Lana 4	0	VAC and according	
Time	Inside Lane 1	Outside Lane 2	Window to	Totalo
Time	Order Board to	Order Board to	End of	Totals
	End of Queue	End of Queue	Queue	
7:00 AM	1	1	3	5
7:05 AM	1	2	4	7
7:10 AM	1	0	2	3
7:15 AM	1	3	3	7
7:20 AM	2	3	4	9
7:25 AM	0	3	6	9
7:30 AM	3	4	5	12
7:35 AM	1	3	4	8
7:40 AM	2	3	5	10
7:45 AM	1	3	5	9
7:50 AM	1	4	4	9
7:55 AM	1	2	4	7
8:00 AM	1	3	4	8
8:05 AM	1	2	6	9
8:10 AM	2	5	2	9
8:15 AM	2	3	6	11
8:20 AM	3	3	4	10
8:25 AM	2	1	4	7
8:30 AM	0	1	2	3
8:35 AM	2	2	5	9
8:40 AM	2	4	3	9
8:45 AM	2	4	2	8
8:50 AM	2	2	2	6
8:55 AM	2	4	2	8
Totals	36	65	91	192

Time	Inside Lane 1 Order Board to End of Queue	Outside Lane 2 Order Board to End of Queue	Pickup Window to End of Queue	Totals
4:00 PM	2	3	3	8
4:05 PM	1	4	4	9
4:10 PM	3	2	6	11
4:15 PM	4	3	4	11
4:20 PM	2	4	5	11
4:25 PM	3	5	4	12
4:30 PM	4	5	6	15
4:35 PM	3	4	4	11
4:40 PM	2	5	5	12
4:45 PM	3	6	6	15
4:50 PM	4	4	4	12
4:55 PM	5	4	5	14
5:00 PM	4	4	5	13
5:05 PM	2	5	6	13
5:10 PM	3	4	4	11
5:15 PM	2	3	5	10
5:20 PM	3	4	4	11
5:25 PM	2	5	6	13
5:30 PM	4	4	4	12
5:35 PM	2	2	6	10
5:40 PM	3	3	4	10
5:45 PM	4	4	5	13
5:50 PM	2	2	6	10
5:55 PM	3	3	4	10
Totals	70	92	115	277

Window Board Window Board