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TRANSPORTATION ANALYSIS

Wawa - SR 70 and S. Jenkins Road

Prepared for:

Bohler Engineering

Transportation Analysis
Wawa – SR 70 and S. Jenkins Road

June 2016

Prepared for:
Bohler Engineering

Prepared by:
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Project No. T0018.00

Vicki L. Castro, P.E.
P.E. No. 47128

_____
_____Date

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INTRODUCTION

The purpose of this report is to provide the Transportation Analysis to support the proposed driveway connection request to SR 70 and S. Jenkins Road. The proposed development is located south of SR 70 and east of S. Jenkins Road in the City of Ft. Pierce, Florida, as shown in Figure 1.

PROJECT DESCRIPTION

The project is proposed to have the following uses for the purpose of this analysis:

- 6,119 Square Foot of Convenience Market with Gasoline Pumps

The accesses for the project are proposed to be as follows:

- One (1) right-in/right-out access to SR 70
- One (1) full access to S. Jenkins Road.

A conceptual site plan is included in the Appendix of this report.

ESTIMATED DAILY PROJECT TRAFFIC

The trip rates utilized in this report were obtained from the latest computerized version of "OTISS" which utilizes the Institute of Transportation Engineers' (ITE) Trip Generation, 9th Edition, 2012, as its database. Based on these trip rates, it is estimated that the proposed project will attract approximately 5,175 daily trip ends, as shown in Table 1.

Studies contained in the ITE Trip Generation Handbook, 3rd Edition, indicate that a percentage of the project trips already exist on the adjacent roadways – passerby capture. Therefore, the new daily trip ends attracted to the proposed project would be 1,915 trip ends, as shown in Table 1.

Figure 1. Project Location

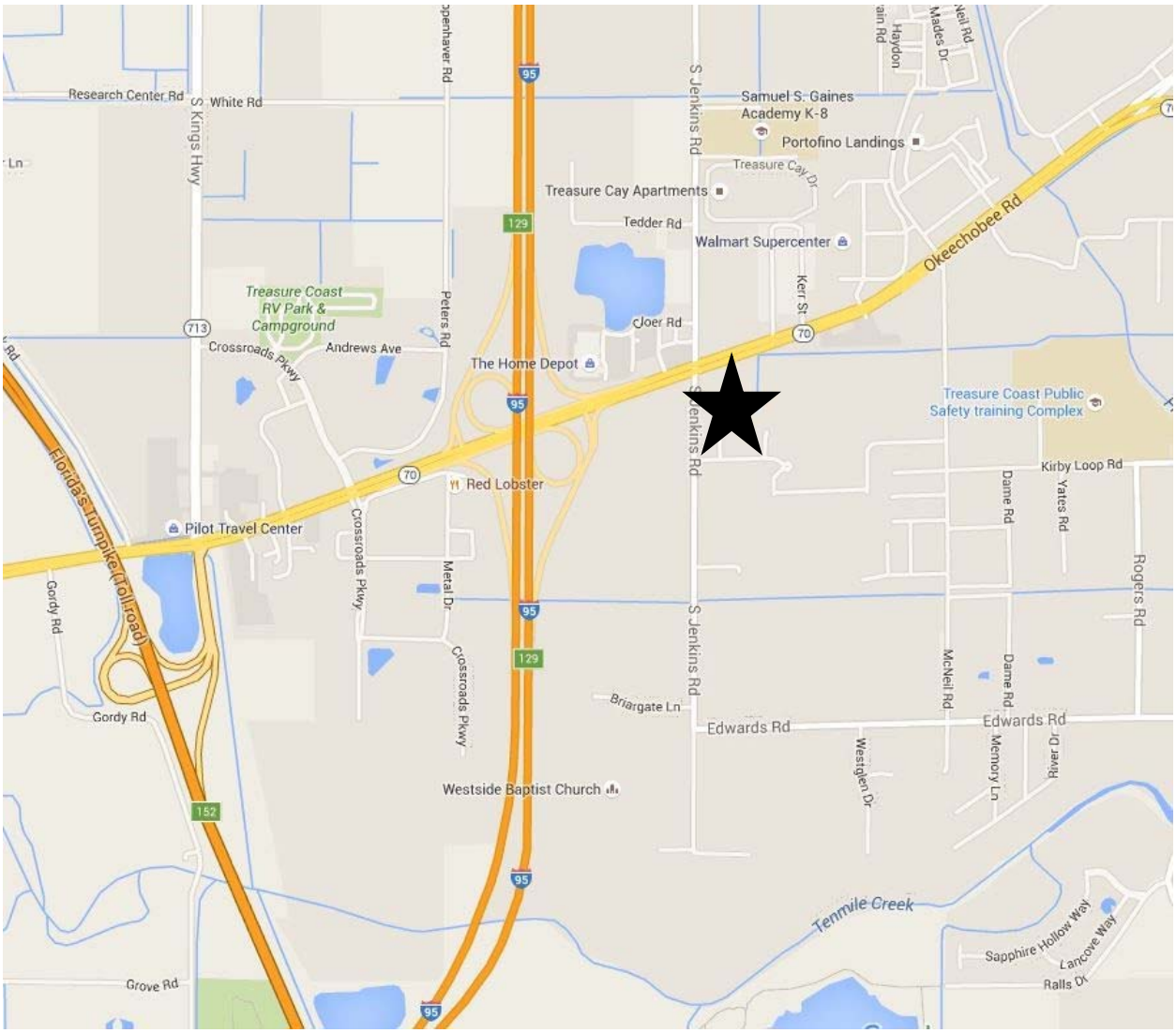


Table 1. Estimated Daily Project Traffic

Land Use	ITE LUC	Size	Daily Trip Ends (1)	Passerby Capture (2)	New Daily Trip Ends
Convenience Market w Gas	853	6,119 SF	5,175	3,260	1,915

(1) Source: ITE Trip Generation, 9th Edition, 2012.

(2) Source: ITE Trip Generation Handbook, 3rd Edition.

ESTIMATED AM PEAK HOUR PROJECT TRAFFIC

Again, based on data contained in the ITE Trip Generation, 9th Edition, the proposed project would attract approximately 250 trip ends during the AM peak hour with 125 inbound and 125 outbound, as shown in Table 2.

As previously stated, studies contained in the ITE Trip Generation Handbook, 3rd Edition, indicate that a percentage of the project trips already exist on the adjacent roadways – passerby capture. Therefore, the new AM peak hour trip ends attracted to the proposed project would be 92 trip ends with 46 inbound and 46 outbound, as shown in Table 2.

ESTIMATED PM PEAK HOUR PROJECT TRAFFIC

Again, based on data contained in the ITE Trip Generation, 9th Edition, during the PM peak hour, the proposed project would attract approximately 312 trip ends during the PM peak hour with 156 inbound and 156 outbound, as shown in Table 3.

As previously stated, studies contained in the ITE Trip Generation Handbook, 3rd Edition, indicate that a percentage of the projects trips already exist on the adjacent roadways – passerby capture. Therefore, the new PM peak hour trip ends attracted to the proposed project would be 106 trip ends with 53 inbound and 53 outbound, as shown in Table 3.

Table 2. AM Peak Hour Project Traffic

Land Use	ITE LUC	Size	AM Peak Hour Trip Ends (1) In	Out	Total	Passerby Capture (2) In	Out	Total	New AM Peak Hour Trip Ends In	Out	Total
Convenience Market w Gas	853	6,119 SF	125	125	250	79	79	158	46	46	92

(1) Source: ITE Trip Generation, 9th Edition, 2012.

(2) Source: ITE Trip Generation Handbook, 3rd Edition.

Table 3. PM Peak Hour Project Traffic

Land Use	ITE LUC	Size	PM Peak Hour Trip Ends (1) In	Out	Total	Passerby Capture (2) In	Out	Total	New PM Peak Hour Trip Ends In	Out	Total
Convenience Market w Gas	853	6,119 SF	156	156	312	103	103	206	53	53	106

(1) Source: ITE Trip Generation, 9th Edition, 2012.

(2) Source: ITE Trip Generation Handbook, 3rd Edition.

ANALYSIS PERIOD

The study period for this project includes both the AM and PM peak hours.

PROJECT TRIP DISTRIBUTION / ASSIGNMENT

The following distribution of the AM and PM peak hour trip ends was based on the existing traffic and development patterns with hand assignment to the local network:

- 15% to and from the north (via S. Jenkins Road)
- 15% to and from the south (via S. Jenkins Road)
- 20% to and from the east (via SR 70)
- 50% to and from the west (via SR 70)

Table 4 shows the distribution of the new AM and PM peak hour project trip ends. Figure 2 and Figure 3 illustrate the project trip ends on the adjacent roadway network for the AM and PM peak hours, respectively.

ADJACENT ROADWAYS

As stated previously, the site is located south of SR 70 and east of S. Jenkins Road. S. Jenkins Road is a two (2) lane roadway and SR 70 is a six (6) lane divided roadway in the vicinity of the project. According to the Florida Department of Transportation (FDOT) Five-Year Work Program, there is a widening project currently under construction that will widen SR 70 to eight (8) lanes with major modifications to the intersection. The new geometry of the intersection will be utilized in the analysis.

Table 4. Estimated Peak Hour Project Traffic Distribution

Time	North (15%)		South (15%)		East (20%)		West (50%)		Total	
Period	In	Out	In	Out	In	Out	In	Out	In	Out
AM	7	7	7	7	9	9	23	23	46	46
PM	8	8	8	8	11	11	26	26	53	53

Figure 2. AM Peak Hour Project Traffic

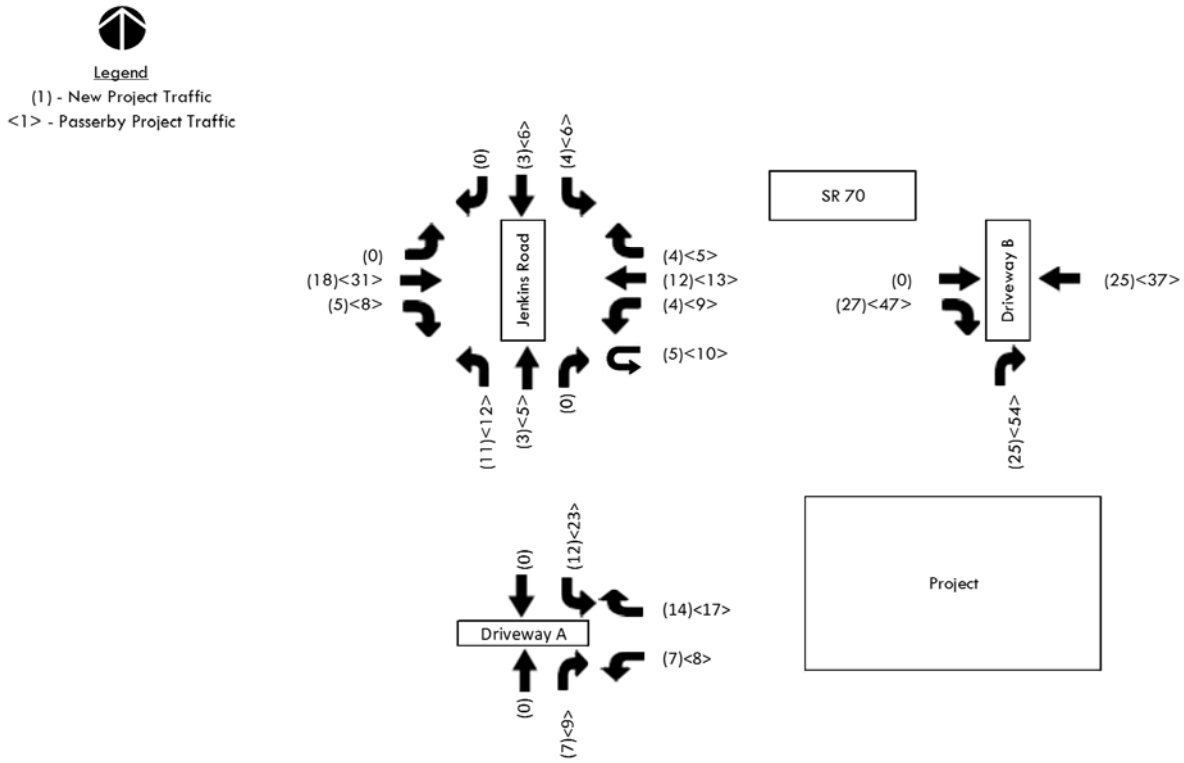
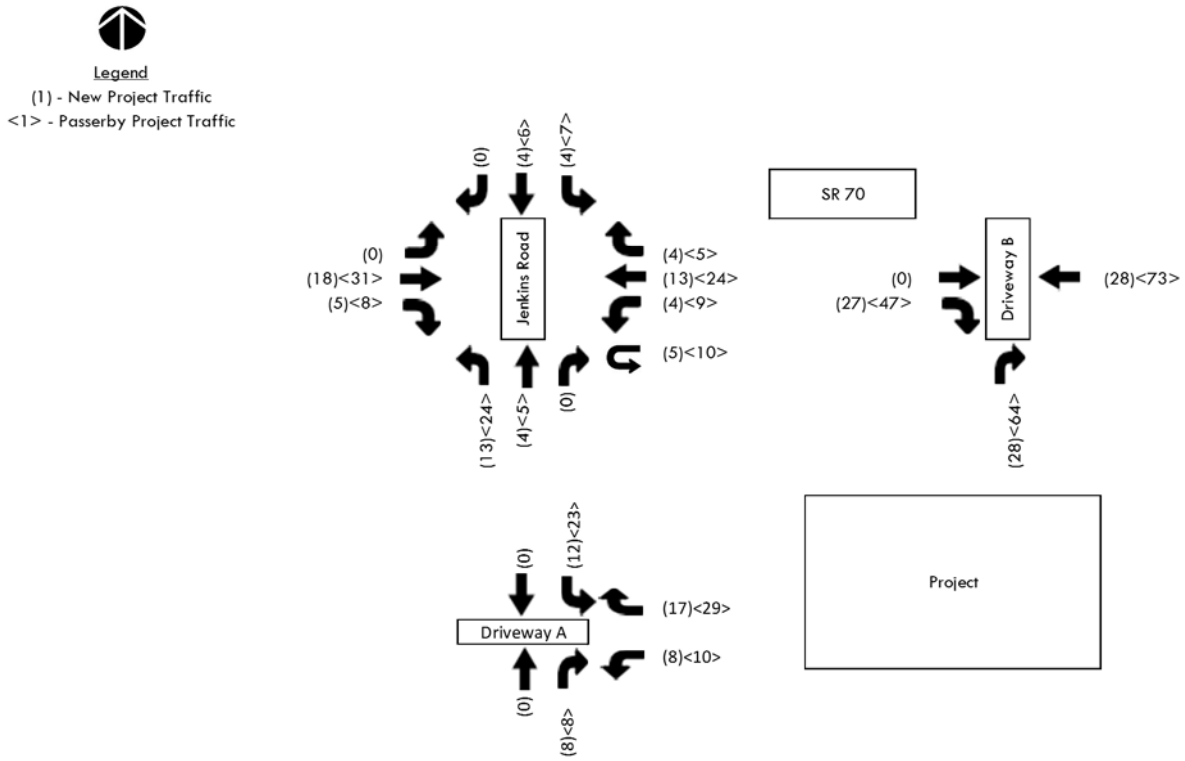


Figure 3. PM Peak Hour Project Traffic



PEAK SEASON TRAFFIC

The following methodology was utilized to estimate the existing volumes within the study area:

1. WHITEHOUSE GROUP INC. obtained AM and PM turning movement counts at intersection of SR 70 and S. Jenkins Road.
2. The turning movement counts were adjusted to peak season based on the FDOT 2014 Peak Season Adjustment Factors for St. Lucie County. Figure 4 illustrates the existing traffic, Figure 5 illustrates the peak season traffic, Figure 6 illustrates the AM peak season plus project traffic, and Figure 7 illustrates the PM peak season plus project traffic.

Figure 4. Existing Traffic

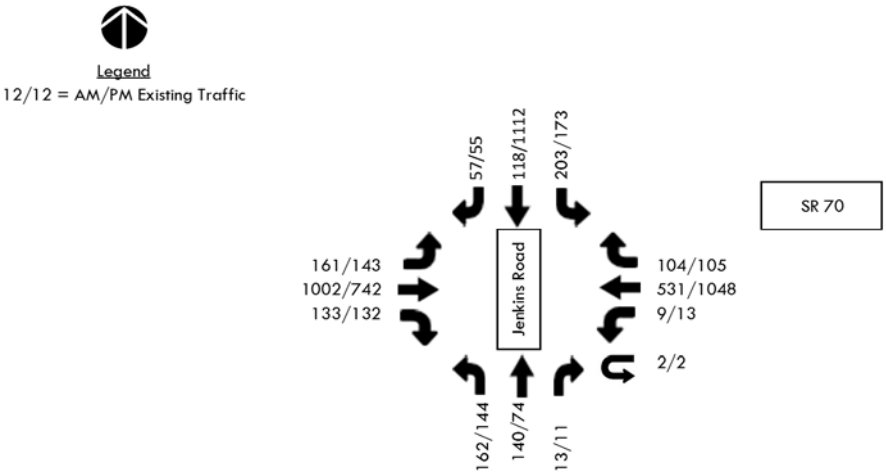


Figure 5. Peak Season Traffic

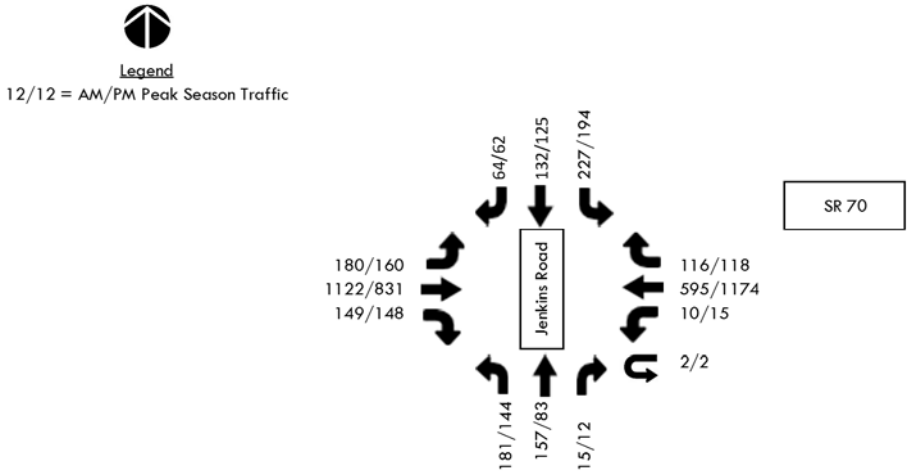


Figure 6. AM Peak Hour Peak Season + Project Traffic

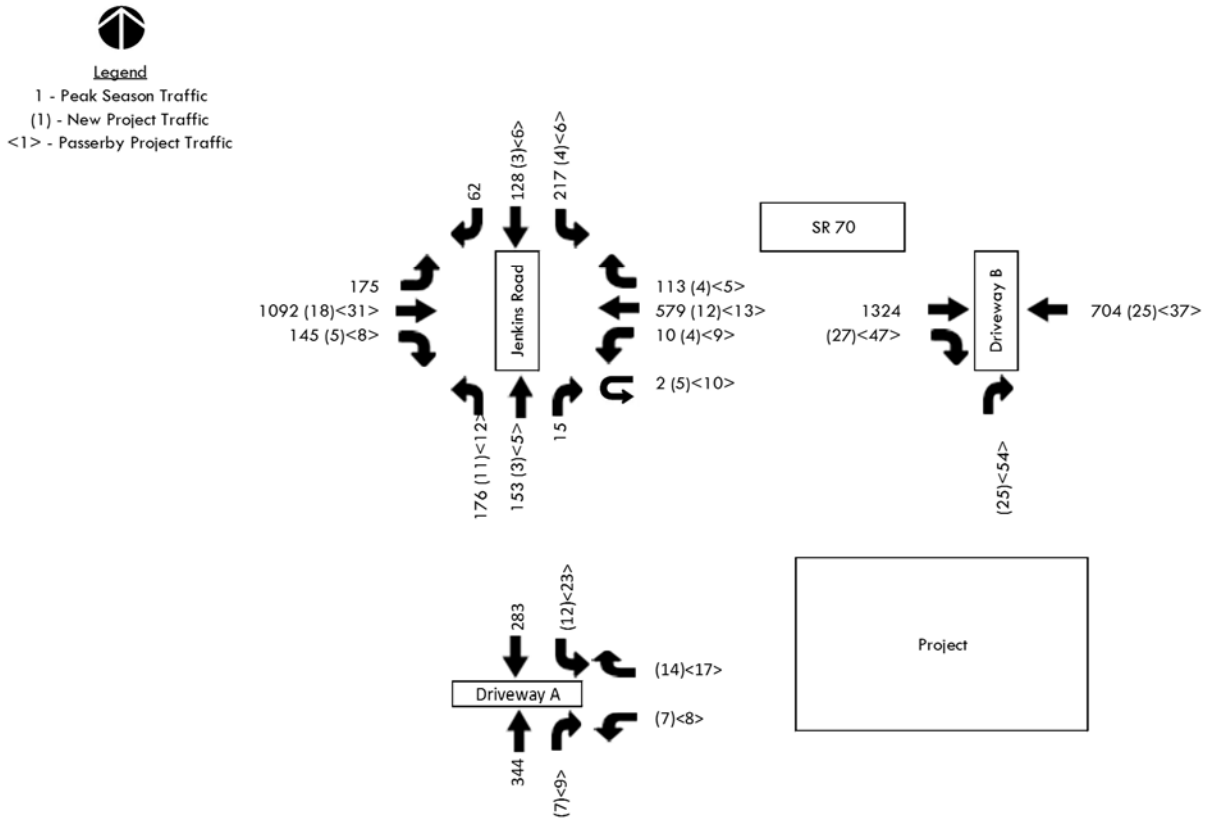
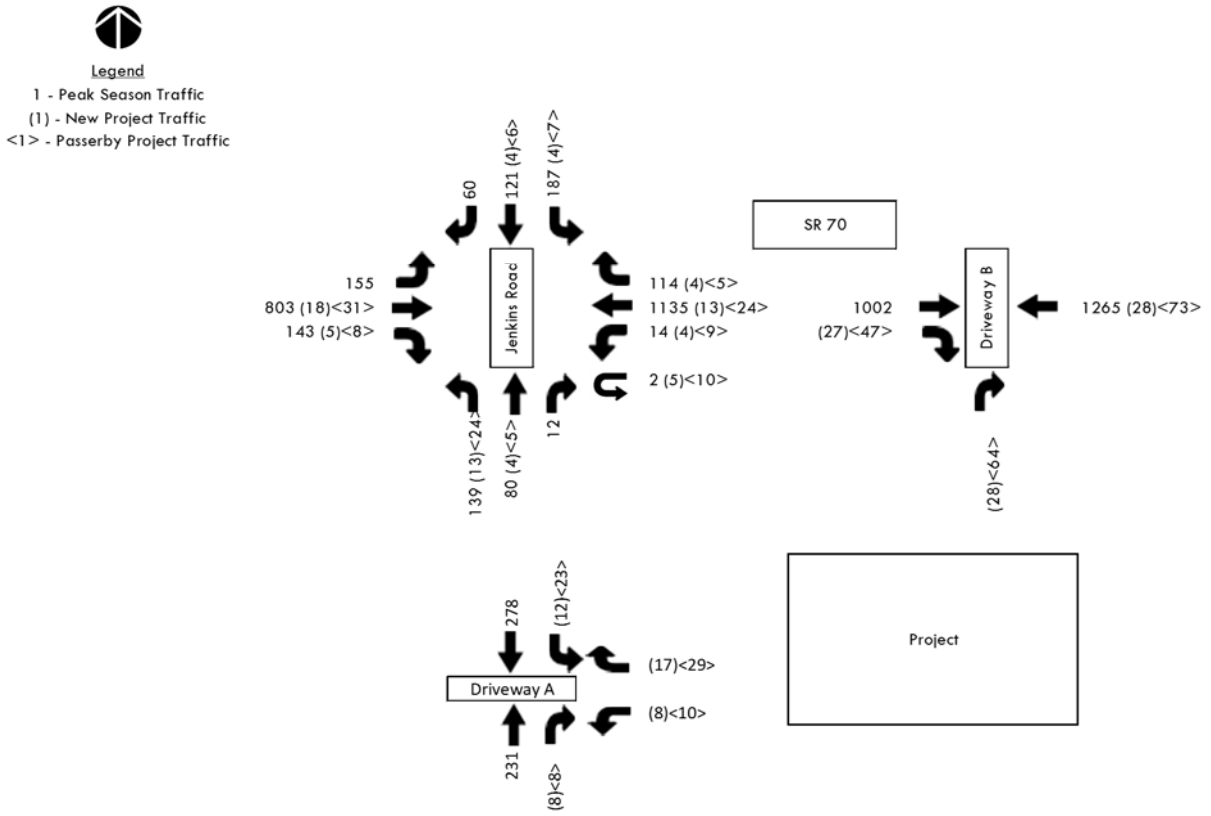


Figure 7. PM Peak Hour Peak Season + Project Traffic



INTERSECTION ANALYSIS

Intersection analysis was conducted for the AM and PM peak hours at the following intersections within the study network:

- SR 70 and S. Jenkins Road
- SR 70 and Project Driveway A
- S. Jenkins Road and Project Driveway B

The analysis was based on SYNCHRO for both with and without the proposed project traffic. Table 5 and Table 6 summarize the analysis for the signalized and unsignalized intersections, respectively, and are described in detail in the following paragraphs.

SR 70 and S. Jenkins Road

This intersection is signalized. Signalized intersection analysis indicates that this intersection should operate at a Level of Service D during the AM and PM peak hours with the peak season plus project traffic, as shown in Table 5.

SR 70 and Project Driveway

This project driveway is purposed to be unsignalized. Unsignalized intersection analysis indicates that this intersection should operate at a Level of Service B during the AM and PM peak hours with the peak season plus project traffic, as shown in Table 6.

S. Jenkins Road and Project Driveway

This project driveway is purposed to be unsignalized. Unsignalized intersection analysis indicates that this intersection should operate at a Level of Service A during the AM and PM peak hours with the peak season plus project traffic, as shown in Table 6.

Table 5. Estimated Intersection Level of Service (Signalized)

Intersection	Time Period	Peak Season Traffic		Peak Season Plus Project Traffic	
		Delay	LOS	Delay	LOS
SR 70 and Jenkins Road	AM	38.1	D	42.8	D
	PM	39.8	D	41.6	D

Table 6. Estimated Intersection Level of Service (Unsignalized)

Intersection	Movement	Peak Season Plus Project Traffic AM Peak Hour			Peak Season Plus Project Traffic PM Peak Hour		
		Left	Through	Right	Left	Through	Right
SR 70 and Driveway A	NB	-	-	B	-	-	B
Jenkins Road and Driveway B	NB	-	*	*	-	*	*
	SB	A	*	-	A	*	-
	WB	B	-	A	B	-	A

*Free flow movement; therefore, the level of service was not calculated.

ACCESS RECOMMENDATIONS

The recommendations included in this report are based on a field review of the site, the proposed site plan and the Transportation Analysis. The methodology utilized to determine the need for a left turn lane on S. Jenkins Road was based on the Highway Research Record 211 – Volume Warrants for Left-turn Storage Lanes at Unsignalized Grade Intersections (Harmelink Curves). The FDOT Driveway Guide was utilized to determine the need for right turn lanes on SR 70 and S. Jenkins Road. The access recommendations are summarized in Table 7 and described in the following paragraph:

SR 70 and Project Driveway A

The project driveway is proposed to have right-in/right-out access to US 27. Based on the estimated project traffic, an eastbound right turn lane is not warranted. However, at the request of the FDOT, an eastbound right turn lane is being constructed. Based on the posted speed limit of SR 70, it is recommended that the turn lane be 240'-foot, which includes a 50-foot taper.

S. Jenkins Road and Project Driveway B

The project driveway is proposed to have full access to S. Jenkins Road. Based on the estimated project traffic, neither a northbound right turn lane or southbound left turn lane is warranted.

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Table 7. Access Recommendations

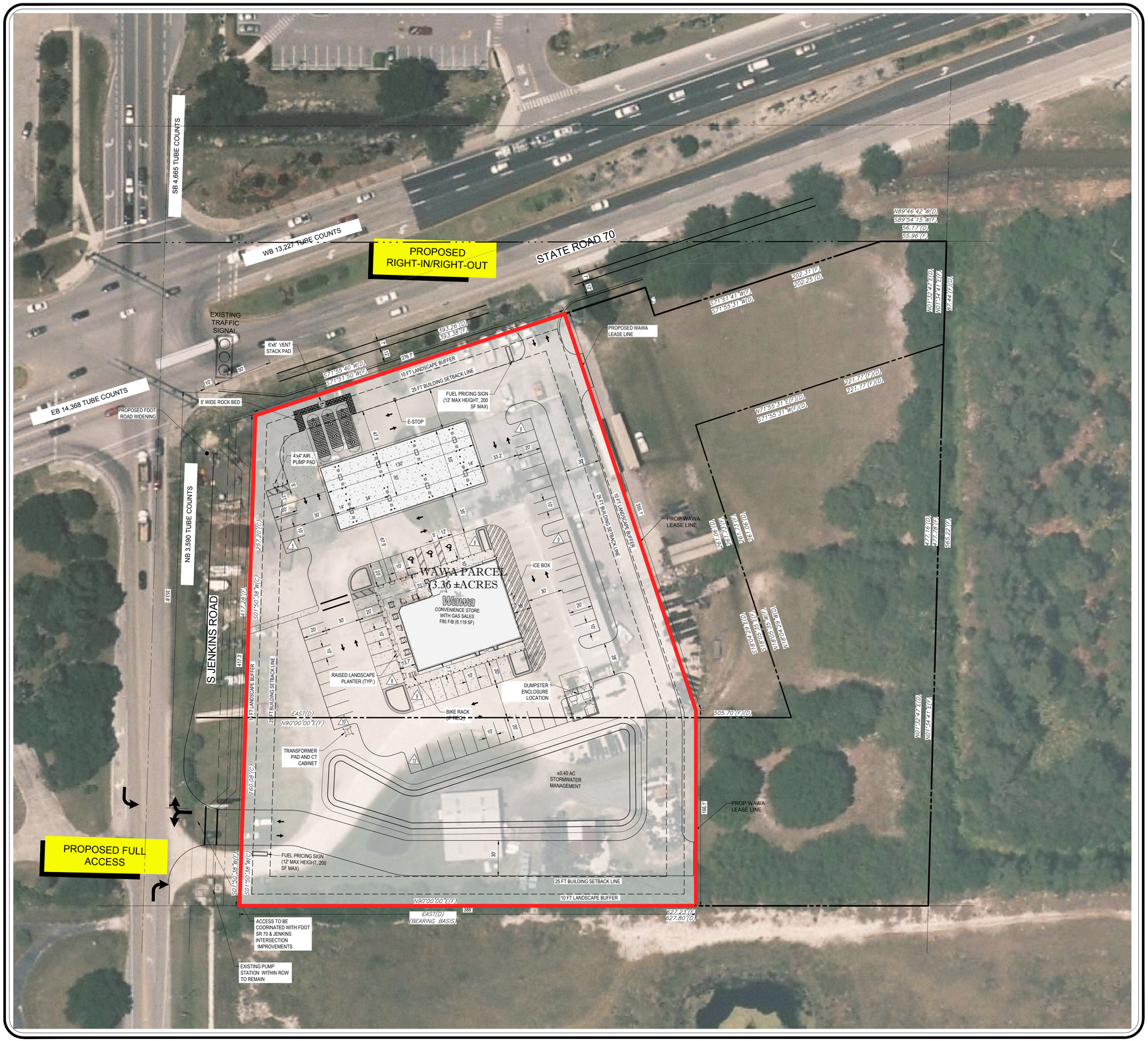
Intersection	Movement	Peak Hour Volume (1)	Turn Lane Warrented?	Queue Storage	Length (2) Length (2)	Length Length
SR 70 and Driveway A	EBR	74/90	N	0'	240'	240'
Jenkins Road and Driveway B	NBR	16/16	N			
	SBL	35/50	N			

(1) See Figures 6 and 7, Peak Hour Peak Season Plus Project Traffic, from the report.
(2) Based on FDOT Standard Index #301 and a posted speed limit of 45 mph of SR 70.

APPENDIX

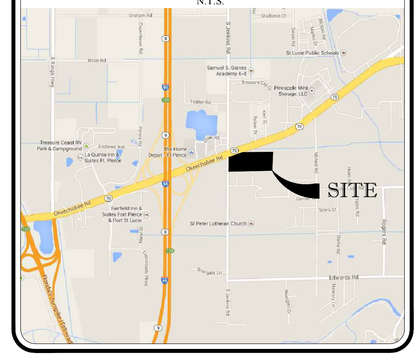
APPENDIX

CONCEPTUAL SITE PLAN



VICINITY MAP

N.T.S.



N

W E

S

40 20 10 0 40

1"= 40'

BOHLER ENGINEERING

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN PROGRAM MANAGEMENT PERMITTING AND FEASIBILITY TRANSPORTATION SERVICES

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- NEW ENGLAND
- NEW YORK METRO
- PHILADELPHIA, PA
- LEHIGH VALLEY, PA
- SOUTHEASTERN, PA
- NORTHERN VIRGINIA
- CENTRAL VIRGINIA
- CHARLOTTE, NC
- RALEIGH, NC
- TAMPA, FL
- BOCA RATON, FL
- SOUTHERN MARYLAND

REVISIONS

REV	DATE	COMMENT	BY

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NOT APPROVED FOR CONSTRUCTION

PROJECT No.:	FLB150009
DRAWN BY:	JRT
CHECKED BY:	CTW
DATE:	11/06/2015
SCALE:	AS NOTED
CAD I.D.:	EX0

PROJECT:

LEASE EXHIBIT

FOR

WAWA

LOCATION OF SITE

SEC SR 70 & S JENKINS RD
ST. LUCIE COUNTY, FLORIDA

BOHLER ENGINEERING
3820 NORTHDALE BLVD., SUITE 300B
TAMPA, FLORIDA 33624
Phone: (813) 812-4100
Fax: (813) 812-4101
FLORIDA BUSINESS CERT. OF AUTH. No. 30780

SHEET TITLE:

CONCEPT PLAN

SHEET NUMBER:

A

APPENDIX

TRIP GENERATION

PERIOD SETTING

Analysis Name :	Daily		
Project Name :	Wawa	**No :**	
Date:	4/14/2016	**City:**	
State/Province:		**Zip/Postal Code:**	
Country:		**Client Name:**	
Analyst's Name:		**Edition:**	ITE-TGM 9th Edition

Land Use	Independent Variable	Size	Time Period	Method	Entry	Exit	Total
853 - Convenience Market with Gasoline Pumps	1000 Sq. Feet Gross Floor Area	6.12(0)	Weekday	Average 845.6	2588 50%	2587 50%	5175

(0) indicates size out of range.

TRAFFIC REDUCTIONS

Land Use	Entry Reduction	Adjusted Entry	Exit Reduction	Adjusted Exit
853 - Convenience Market with Gasoline Pumps	0 %	2588	0 %	2587

EXTERNAL TRIPS

Land Use	External Trips	Pass-by%	Pass-by Trips	Non-pass-by Trips
853 - Convenience Market with Gasoline Pumps	5175	63 %	3260	1915

ITE DEVIATION DETAILS

Weekday

Landuse — No deviations from ITE.

Methods — No deviations from ITE.

External Trips — 853 - Convenience Market with Gasoline Pumps
ITE does not recommend a particular pass-by% for this case.

SUMMARY

Total Entering	2588
Total Exiting	2587
Total Entering Reduction	0
Total Exiting Reduction	0
Total Entering Internal Capture Reduction	0
Total Exiting Internal Capture Reduction	0
Total Entering Pass-by Reduction	1630
Total Exiting Pass-by Reduction	1630
Total Entering Non-Pass-by Trips	958
Total Exiting Non-Pass-by Trips	957

PERIOD SETTING

Analysis Name :	AM Peak Hour		
Project Name :	Wawa	**No :**	
Date:	4/14/2016	**City:**	
State/Province:		**Zip/Postal Code:**	
Country:		**Client Name:**	
Analyst's Name:		**Edition:**	ITE-TGM 9th Edition

Land Use	Independent Variable	Size	Time Period	Method	Entry	Exit	Total
853 - Convenience Market with Gasoline Pumps	1000 Sq. Feet Gross Floor Area	6.12	Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.	Average 40.92	125 50%	125 50%	250

TRAFFIC REDUCTIONS

Land Use	Entry Reduction	Adjusted Entry	Exit Reduction	Adjusted Exit
853 - Convenience Market with Gasoline Pumps	0 %	125	0 %	125

EXTERNAL TRIPS

Land Use	External Trips	Pass-by%	Pass-by Trips	Non-pass-by Trips
853 - Convenience Market with Gasoline Pumps	250	63 %	158	92

ITE DEVIATION DETAILS

Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.

Landuse No deviations from ITE.

Methods No deviations from ITE.

External Trips No deviations from ITE.

SUMMARY

Total Entering	125
Total Exiting	125
Total Entering Reduction	0
Total Exiting Reduction	0
Total Entering Internal Capture Reduction	0
Total Exiting Internal Capture Reduction	0
Total Entering Pass-by Reduction	79
Total Exiting Pass-by Reduction	79
Total Entering Non-Pass-by Trips	46
Total Exiting Non-Pass-by Trips	46

PERIOD SETTING

Analysis Name :	PM Peak Hour		
Project Name :	Wawa	**No :**	
Date:	4/14/2016	**City:**	
State/Province:		**Zip/Postal Code:**	
Country:		**Client Name:**	
Analyst's Name:		**Edition:**	ITE-TGM 9th Edition

Land Use	Independent Variable	Size	Time Period	Method	Entry	Exit	Total
853 - Convenience Market with Gasoline Pumps	1000 Sq. Feet Gross Floor Area	6.12	Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.	Average 50.92	156 50%	156 50%	312

TRAFFIC REDUCTIONS

Land Use	Entry Reduction	Adjusted Entry	Exit Reduction	Adjusted Exit
853 - Convenience Market with Gasoline Pumps	0 %	156	0 %	156

EXTERNAL TRIPS

Land Use	External Trips	Pass-by%	Pass-by Trips	Non-pass-by Trips
853 - Convenience Market with Gasoline Pumps	312	66 %	206	106

ITE DEVIATION DETAILS

Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.

Landuse No deviations from ITE.

Methods No deviations from ITE.

External Trips No deviations from ITE.

SUMMARY

Total Entering	156
Total Exiting	156
Total Entering Reduction	0
Total Exiting Reduction	0
Total Entering Internal Capture Reduction	0
Total Exiting Internal Capture Reduction	0
Total Entering Pass-by Reduction	103
Total Exiting Pass-by Reduction	103
Total Entering Non-Pass-by Trips	53
Total Exiting Non-Pass-by Trips	53

APPENDIX

PASSERBY CAPTURE RATES

Table F.14 Pass-By and Non-Pass-By Trips Weekday, PM Peak Period Land Use Code 851—Convenience Market (Open 24 Hours)

SIZE (1,000 SQ. FT GFA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIPS (%)			ADJ. STREET PEAK HOUR VOLUME	SOURCE
						PRIMARY	DIVERTED	TOTAL		
3	Overland Park, KS	Aug. 1987	68	4:30–5:30 p.m.	34	53	13	66	—	—
3	Overland Park, KS	July 1987	68	4:30–5:30 p.m.	28	50	22	72	—	—
~1.9	Billings, MT	1987	461	4:00–6:00 p.m.	62	13	25	38	—	ITE Montana Section Tech Comm
<50.0	Chicago suburbs, IL	1987	72	3:00–6:00 p.m.	28	—	—	72	—	Kenig, O'Hara, Humes, Flock
<50.0	Chicago suburbs, IL	1987	54	3:00–6:00 p.m.	78	—	—	22	—	Kenig, O'Hara, Humes, Flock
<50.0	Chicago suburbs, IL	1987	34	3:00–6:00 p.m.	69	—	—	31	—	Kenig, O'Hara, Humes, Flock
<50.0	Chicago suburbs, IL	1987	100	3:00–6:00 p.m.	63	—	—	37	—	Kenig, O'Hara, Humes, Flock
<50.0	Chicago suburbs, IL	1987	43	3:00–6:00 p.m.	43	—	—	57	—	Kenig, O'Hara, Humes, Flock
<50.0	Chicago suburbs, IL	1987	135	3:00–6:00 p.m.	39	—	—	61	—	Kenig, O'Hara, Humes, Flock
<50.0	Chicago suburbs, IL	1987	74	3:00–6:00 p.m.	53	—	—	47	—	Kenig, O'Hara, Humes, Flock
<50.0	Chicago suburbs, IL	1987	80	3:00–6:00 p.m.	64	—	—	36	—	Kenig, O'Hara, Humes, Flock

Average Pass-By Trip Percentage: 51
"—" means no data were provided

Table F.15 Pass-By and Non-Pass-By Trips Weekday, AM Peak Period Land Use Code 853—Convenience Market with Gasoline Pumps

SIZE (1,000 SQ. FT GFA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIPS (%)			ADJ. STREET PEAK HOUR VOLUME	SOURCE
						PRIMARY	DIVERTED	TOTAL		
2.8	Louisville area, KY	1993	—	7:00–9:00 a.m.	54	11	35	46	1,240	Barton-Aschman Assoc.
2.4	Louisville area, KY	1993	—	7:00–9:00 a.m.	48	17	35	52	1,210	Barton-Aschman Assoc.
4.2	Louisville area, KY	1993	47	7:00–9:00 a.m.	62	19	19	38	1,705	Barton-Aschman Assoc.
2.6	Crestwood, KY	1993	—	7:00–9:00 a.m.	72	15	13	28	940	Barton-Aschman Assoc.
3.7	Louisville area, KY	1993	49	7:00–9:00 a.m.	66	16	18	34	990	Barton-Aschman Assoc.
3.0	New Albany, IN	1993	62	7:00–9:00 a.m.	74	10	16	26	790	Barton-Aschman Assoc.
2.3	Louisville, KY	1993	58	7:00–9:00 a.m.	64	5	31	36	1,255	Barton-Aschman Assoc.
2.2	New Albany, IN	1993	79	7:00–9:00 a.m.	56	6	38	44	635	Barton-Aschman Assoc.
3.6	Louisville area, KY	1993	49	7:00–9:00 a.m.	67	4	29	33	1,985	Barton-Aschman Assoc.

Average Pass-By Trip Percentage: 63
"—" means no data were provided

Table F.16 Pass-By and Non-Pass-By Trips Weekday, PM Peak Period
Land Use Code 853—Convenience Market with Gasoline Pumps

SIZE (1,000 SQ. FT GFA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIPS (%)			ADJ. STREET PEAK HOUR VOLUME	SOURCE
						PRIMARY	DIVERTED	TOTAL		
2.8	Louisville area, KY	1993	—	4:00–6:00 p.m.	62	11	27	38	2,875	Barton-Aschman Assoc.
2.4	Louisville area, KY	1993	—	4:00–6:00 p.m.	58	13	29	42	2,655	Barton-Aschman Assoc.
4.2	Louisville area, KY	1993	61	4:00–6:00 p.m.	58	26	16	42	2,300	Barton-Aschman Assoc.
2.6	Crestwood, KY	1993	68	4:00–6:00 p.m.	67	15	18	33	950	Barton-Aschman Assoc.
3.7	Louisville area, KY	1993	70	4:00–6:00 p.m.	61	16	23	39	2,175	Barton-Aschman Assoc.
3.0	New Albany, IN	1993	80	4:00–6:00 p.m.	65	15	20	35	1,165	Barton-Aschman Assoc.
2.3	Louisville, KY	1993	67	4:00–6:00 p.m.	57	16	27	43	1,954	Barton-Aschman Assoc.
2.2	New Albany, IN	1993	115	4:00–6:00 p.m.	48	16	36	52	820	Barton-Aschman Assoc.
3.6	Louisville area, KY	1993	60	4:00–6:00 p.m.	56	17	27	44	2,505	Barton-Aschman Assoc.
2.6	Seminole Co., FL	1989	82	4:00–6:00 p.m.	73	20	7	27	—	Tipton Associates Inc.
2.6	Seminole Co., FL	1989	98	4:00–6:00 p.m.	81	15	4	19	—	Tipton Associates Inc.
2.6	Seminole Co., FL	1989	115	4:00–6:00 p.m.	69	16	15	31	—	Tipton Associates Inc.
2.6	Volusia Co., FL	1989	98	4:00–6:00 p.m.	74	15	11	26	—	Tipton Associates Inc.
2.4	Volusia Co., FL	1989	38	4:00–6:00 p.m.	74	24	2	26	—	Tipton Associates Inc.
2.7	Volusia Co., FL	1989	82	4:00–6:00 p.m.	87	8	5	13	—	Tipton Associates Inc.
2.6	Seminole Co., FL	1989	99	2:00–4:00 p.m.	64	28	8	36	—	Tipton Associates Inc.
2.4	Volusia Co., FL	1989	38	2:00–4:00 p.m.	68	21	11	32	—	Tipton Associates Inc.

Average Pass-By Trip Percentage: 66
"—" means no data were provided

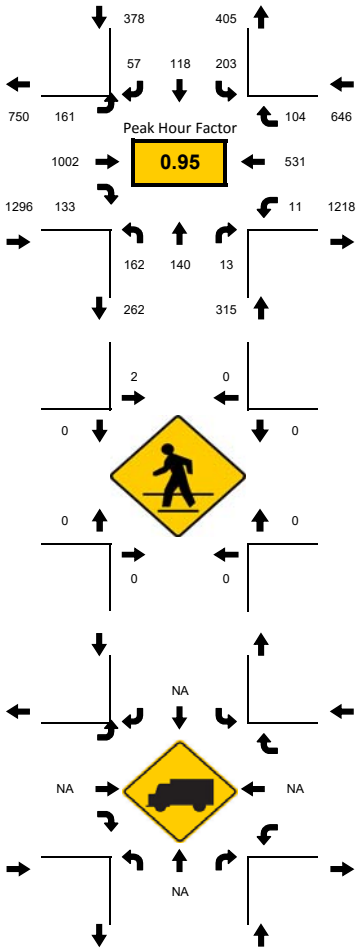
APPENDIX

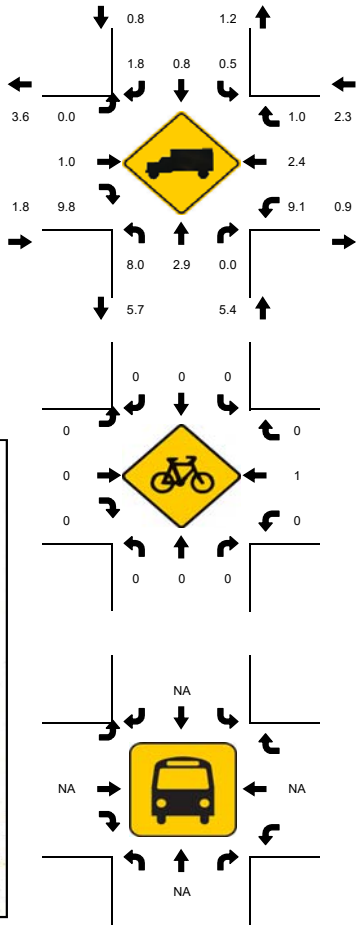
TURNING MOVEMENT COUNTS

LOCATION: S. Jenkins Rd & SR 70
CITY/STATE: FORT PIERCE

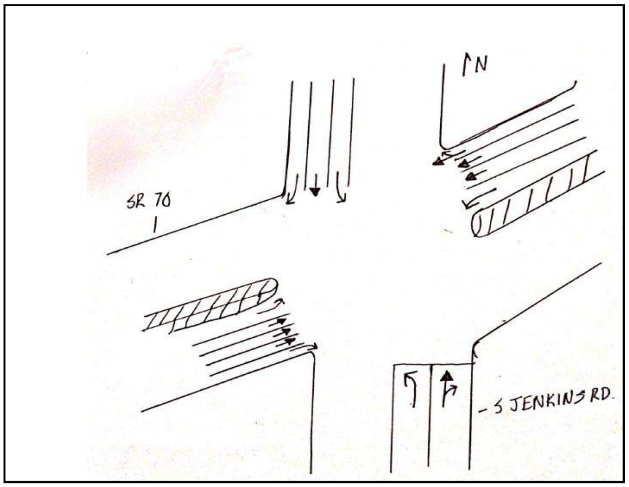
PROJECT ID: 16-3181-001
DATE: Thu, Jun 09, 2016

Peak-Hour: 07:30 AM - 08:30 AM
Peak 15-Minute: 08:00 AM - 08:15 AM





National Data & Surveying Services



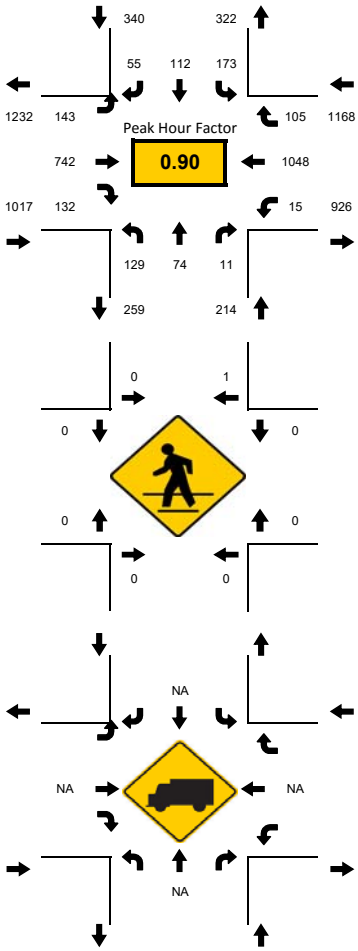
15-Min Count Period Beginning At	S. Jenkins Rd Northbound					S. Jenkins Rd Southbound					SR 70 Eastbound					SR 70 Westbound					Total	Hourly Total
	Left	Thru	Rgt	U	R*	Left	Thru	Rgt	U	R*	Left	Thru	Rgt	U	R*	Left	Thru	Rgt	U	R*		
07:00 AM	39	19	0	0		13	15	13	0		29	163	22	20		2	125	9	0		449	2317
07:15 AM	54	26	0	0		38	29	10	0		32	182	34	19		1	111	13	0		530	2565
07:30 AM	34	33	3	0		50	23	15	0		33	275	30	16		0	143	22	0		661	2635
07:45 AM	58	46	2	0		44	33	10	0		55	269	35	21		2	100	23	0		677	2543
08:00 AM	30	31	5	0		67	35	22	0		35	247	43	19		2	153	27	0		697	2425
08:15 AM	40	30	3	0		42	27	10	0		38	211	25	27		7	135	32	2		600	1728
08:30 AM	46	24	4	0		45	27	15	0		33	179	21	15		4	159	12	0		569	1128
08:45 AM	42	22	5	0		41	20	6	0		37	207	27	20		6	130	16	0		559	559

Peak 15-Min Flowrates	Northbound					Southbound					Eastbound					Westbound					Total
	Left	Thru	Rgt	U	R*	Left	Thru	Rgt	U	R*	Left	Thru	Rgt	U	R*	Left	Thru	Rgt	U	R*	
All Vehicles	232	184	20	0		268	140	88	0		220	1100	172	108		28	612	128	8		**3192**
Heavy Trucks	20	8	0			4	4	4			0	20	16			4	16	4			**100**
Pedestrians		0					8					0					0				**8**
Bicycles	0	0	0			0	0	0			0	0	0			0	4	0			**4**
Railroad Stopped Buses																					

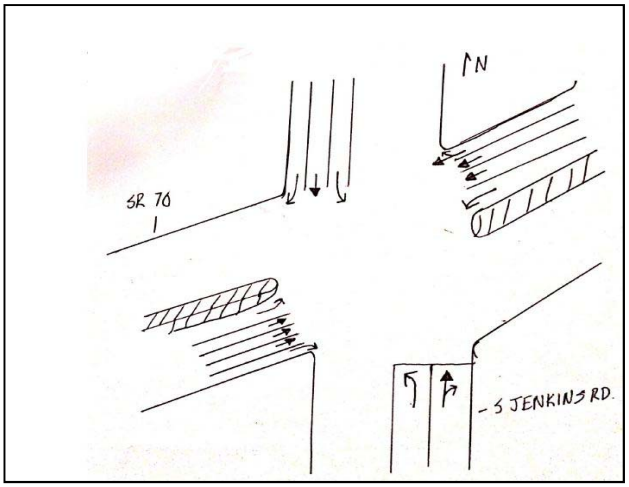
LOCATION: S. Jenkins Rd & SR 70
CITY/STATE: FORT PIERCE

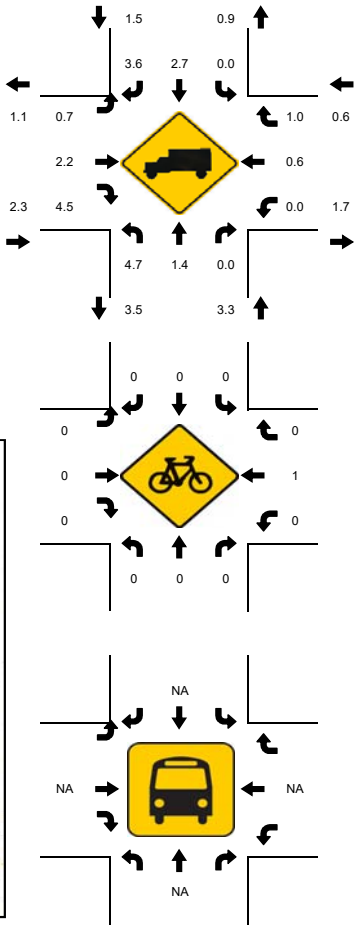
PROJECT ID: 16-3181-001
DATE: Thu, Jun 09, 2016

Peak-Hour: 04:30 PM - 05:30 PM
Peak 15-Minute: 05:15 PM - 05:30 PM



National Data & Surveying Services





15-Min Count Period Beginning At	S. Jenkins Rd Northbound					S. Jenkins Rd Southbound					SR 70 Eastbound					SR 70 Westbound					Total	Hourly Total
	Left	Thru	Rgt	U	R*	Left	Thru	Rgt	U	R*	Left	Thru	Rgt	U	R*	Left	Thru	Rgt	U	R*		
04:00 PM	30	17	2	0		27	20	7	0		18	131	31	9		1	161	14	0		459	2450
04:15 PM	40	23	2	0		41	31	9	0		38	203	31	22		1	240	14	0		673	2653
04:30 PM	31	15	0	0		52	33	13	0		29	167	39	10		1	226	26	0		632	2739
04:45 PM	21	17	2	0		36	20	12	0		33	203	32	17		5	274	31	1		686	2728
05:00 PM	41	21	8	0		43	35	14	0		34	167	34	19		4	245	16	1		662	2617
05:15 PM	36	21	1	0		42	24	16	0		47	205	27	28		5	303	32	0		759	1955
05:30 PM	49	22	3	0		55	21	12	0		31	154	32	13		4	221	17	1		621	1196
05:45 PM	30	12	5	0		48	25	10	0		36	154	30	15		6	194	25	0		575	575

Peak 15-Min Flowrates	Northbound					Southbound					Eastbound					Westbound					Total
	Left	Thru	Rgt	U	R*	Left	Thru	Rgt	U	R*	Left	Thru	Rgt	U	R*	Left	Thru	Rgt	U	R*	
All Vehicles	164	84	32	0		208	140	64	0		188	820	156	112		20	1212	128	4		**3216**
Heavy Trucks	16	4	0			0	8	8			4	20	12			0	12	4			**88**
Pedestrians		0					4					0					0				**4**
Bicycles	0	0	0			0	0	0			0	0	0			0	4	0			**4**
Railroad Stopped Buses																					

APPENDIX

FDOT SEASONAL ADJUSTMENT FACTORS

2014 Peak Season Factor Category Report - Report Type: ALL
Category: 9401 CEN.-W OF US1 TO I95

MOCF: 0.93

Week	Dates	SF	PSCF
1	01/01/2014 - 01/04/2014	0.99	1.06
2	01/05/2014 - 01/11/2014	0.99	1.06
3	01/12/2014 - 01/18/2014	0.98	1.05
4	01/19/2014 - 01/25/2014	0.97	1.04
* 5	01/26/2014 - 02/01/2014	0.95	1.02
* 6	02/02/2014 - 02/08/2014	0.94	1.01
* 7	02/09/2014 - 02/15/2014	0.92	0.99
* 8	02/16/2014 - 02/22/2014	0.91	0.98
* 9	02/23/2014 - 03/01/2014	0.91	0.98
*10	03/02/2014 - 03/08/2014	0.92	0.99
*11	03/09/2014 - 03/15/2014	0.92	0.99
*12	03/16/2014 - 03/22/2014	0.92	0.99
*13	03/23/2014 - 03/29/2014	0.93	1.00
*14	03/30/2014 - 04/05/2014	0.94	1.01
*15	04/06/2014 - 04/12/2014	0.95	1.02
*16	04/13/2014 - 04/19/2014	0.96	1.03
*17	04/20/2014 - 04/26/2014	0.97	1.04
18	04/27/2014 - 05/03/2014	0.98	1.05
19	05/04/2014 - 05/10/2014	1.00	1.08
20	05/11/2014 - 05/17/2014	1.01	1.09
21	05/18/2014 - 05/24/2014	1.02	1.10
22	05/25/2014 - 05/31/2014	1.03	1.11
23	06/01/2014 - 06/07/2014	1.03	1.11
24	06/08/2014 - 06/14/2014	1.04	1.12
25	06/15/2014 - 06/21/2014	1.04	1.12
26	06/22/2014 - 06/28/2014	1.05	1.13
27	06/29/2014 - 07/05/2014	1.06	1.14
28	07/06/2014 - 07/12/2014	1.06	1.14
29	07/13/2014 - 07/19/2014	1.07	1.15
30	07/20/2014 - 07/26/2014	1.07	1.15
31	07/27/2014 - 08/02/2014	1.06	1.14
32	08/03/2014 - 08/09/2014	1.06	1.14
33	08/10/2014 - 08/16/2014	1.05	1.13
34	08/17/2014 - 08/23/2014	1.05	1.13
35	08/24/2014 - 08/30/2014	1.06	1.14
36	08/31/2014 - 09/06/2014	1.07	1.15
37	09/07/2014 - 09/13/2014	1.08	1.16
38	09/14/2014 - 09/20/2014	1.09	1.17
39	09/21/2014 - 09/27/2014	1.07	1.15
40	09/28/2014 - 10/04/2014	1.06	1.14
41	10/05/2014 - 10/11/2014	1.04	1.12
42	10/12/2014 - 10/18/2014	1.02	1.10
43	10/19/2014 - 10/25/2014	1.02	1.10
44	10/26/2014 - 11/01/2014	1.02	1.10
45	11/02/2014 - 11/08/2014	1.02	1.10
46	11/09/2014 - 11/15/2014	1.02	1.10
47	11/16/2014 - 11/22/2014	1.02	1.10
48	11/23/2014 - 11/29/2014	1.01	1.09
49	11/30/2014 - 12/06/2014	1.01	1.09
50	12/07/2014 - 12/13/2014	1.00	1.08
51	12/14/2014 - 12/20/2014	0.99	1.06
52	12/21/2014 - 12/27/2014	0.99	1.06
53	12/28/2014 - 12/31/2014	0.98	1.05

* Peak Season

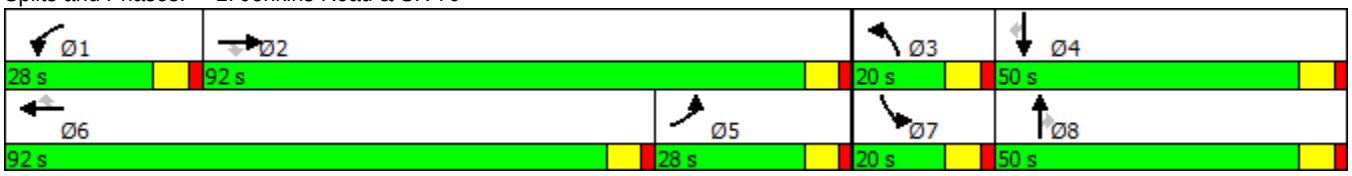
APPENDIX

INTERSECTION ANALYSIS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	1122	149	12	595	116	181	157	15	227	132	64
Future Volume (vph)	180	1122	149	12	595	116	181	157	15	227	132	64
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	10.0	15.0	15.0	10.0	15.0	15.0	7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	17.0	22.0	22.0	17.0	22.0	22.0	14.0	17.0	17.0	14.0	17.0	17.0
Total Split (s)	28.0	92.0	92.0	28.0	92.0	92.0	20.0	50.0	50.0	20.0	50.0	50.0
Total Split (%)	14.7%	48.4%	48.4%	14.7%	48.4%	48.4%	10.5%	26.3%	26.3%	10.5%	26.3%	26.3%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	Max	Max
Act Effct Green (s)	13.7	36.3	36.3	10.1	18.5	18.5	11.6	43.3	43.3	13.1	44.7	44.7
Actuated g/C Ratio	0.12	0.31	0.31	0.09	0.16	0.16	0.10	0.37	0.37	0.11	0.38	0.38
v/c Ratio	0.46	0.58	0.26	0.04	0.60	0.34	0.55	0.23	0.02	0.61	0.10	0.09
Control Delay	51.8	35.5	6.0	53.3	48.7	10.7	57.7	28.3	0.1	58.2	25.6	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.8	35.5	6.0	53.3	48.7	10.7	57.7	28.3	0.1	58.2	25.6	0.3
LOS	D	D	A	D	D	B	E	C	A	E	C	A
Approach Delay		34.5			42.7			42.3			39.3	
Approach LOS		C			D			D			D	

Intersection Summary	
Cycle Length: 190	
Actuated Cycle Length: 116.7	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 38.1	Intersection LOS: D
Intersection Capacity Utilization 62.7%	ICU Level of Service B
Analysis Period (min) 15	

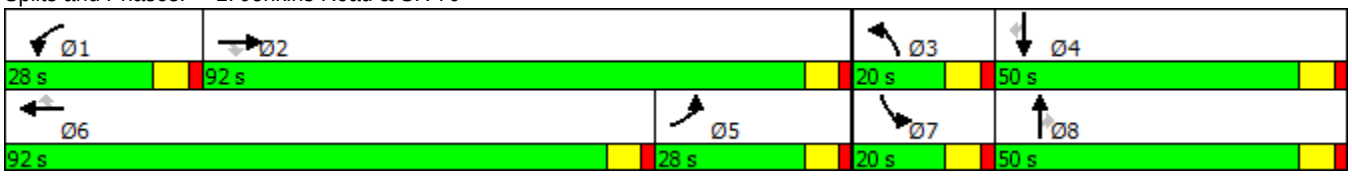
Splits and Phases: 1: Jenkins Road & SR 70



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	831	148	17	1174	118	144	83	12	194	125	62
Future Volume (vph)	160	831	148	17	1174	118	144	83	12	194	125	62
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	10.0	15.0	15.0	10.0	15.0	15.0	7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	17.0	22.0	22.0	17.0	22.0	22.0	14.0	17.0	17.0	14.0	17.0	17.0
Total Split (s)	28.0	92.0	92.0	28.0	92.0	92.0	20.0	50.0	50.0	20.0	50.0	50.0
Total Split (%)	14.7%	48.4%	48.4%	14.7%	48.4%	48.4%	10.5%	26.3%	26.3%	10.5%	26.3%	26.3%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	Max	Max
Act Effct Green (s)	12.0	47.7	47.7	10.0	35.0	35.0	10.8	43.2	43.2	12.4	44.7	44.7
Actuated g/C Ratio	0.09	0.36	0.36	0.08	0.27	0.27	0.08	0.33	0.33	0.09	0.34	0.34
v/c Ratio	0.52	0.37	0.23	0.07	0.70	0.24	0.52	0.14	0.02	0.62	0.11	0.10
Control Delay	64.0	31.9	5.7	60.1	45.6	7.1	65.5	33.7	0.1	66.9	31.8	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.0	31.9	5.7	60.1	45.6	7.1	65.5	33.7	0.1	66.9	31.8	0.3
LOS	E	C	A	E	D	A	E	C	A	E	C	A
Approach Delay		33.0			42.3			51.2			44.5	
Approach LOS		C			D			D			D	

Intersection Summary	
Cycle Length: 190	
Actuated Cycle Length: 130.7	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 39.8	Intersection LOS: D
Intersection Capacity Utilization 62.8%	ICU Level of Service B
Analysis Period (min) 15	

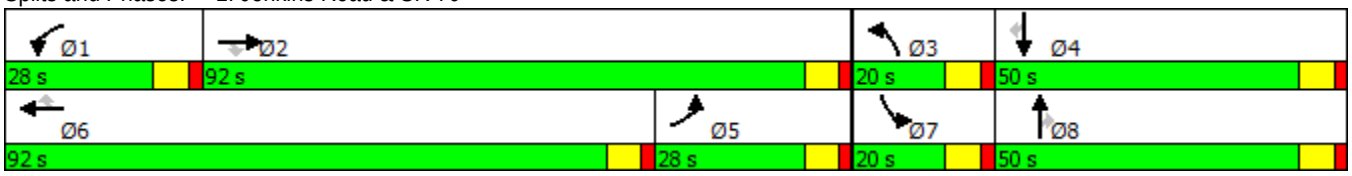
Splits and Phases: 1: Jenkins Road & SR 70



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	1141	158	40	604	122	199	161	15	227	137	62
Future Volume (vph)	175	1141	158	40	604	122	199	161	15	227	137	62
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	10.0	15.0	15.0	10.0	15.0	15.0	7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	17.0	22.0	22.0	17.0	22.0	22.0	14.0	17.0	17.0	14.0	17.0	17.0
Total Split (s)	28.0	92.0	92.0	28.0	92.0	92.0	20.0	50.0	50.0	20.0	50.0	50.0
Total Split (%)	14.7%	48.4%	48.4%	14.7%	48.4%	48.4%	10.5%	26.3%	26.3%	10.5%	26.3%	26.3%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	Max	Max
Act Effct Green (s)	21.4	34.4	34.4	10.1	19.2	19.2	12.4	43.2	43.2	13.1	43.9	43.9
Actuated g/C Ratio	0.17	0.28	0.28	0.08	0.15	0.15	0.10	0.35	0.35	0.10	0.35	0.35
v/c Ratio	0.31	0.67	0.29	0.15	0.63	0.36	0.60	0.26	0.02	0.65	0.11	0.10
Control Delay	46.6	42.7	6.6	57.8	53.1	10.9	63.3	32.5	0.1	64.6	29.8	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	42.7	6.6	57.8	53.1	10.9	63.3	32.5	0.1	64.6	29.8	0.3
LOS	D	D	A	E	D	B	E	C	A	E	C	A
Approach Delay		39.3			46.6			47.6			44.0	
Approach LOS		D			D			D			D	

Intersection Summary	
Cycle Length: 190	
Actuated Cycle Length: 125	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 42.8	Intersection LOS: D
Intersection Capacity Utilization 63.2%	ICU Level of Service B
Analysis Period (min) 15	

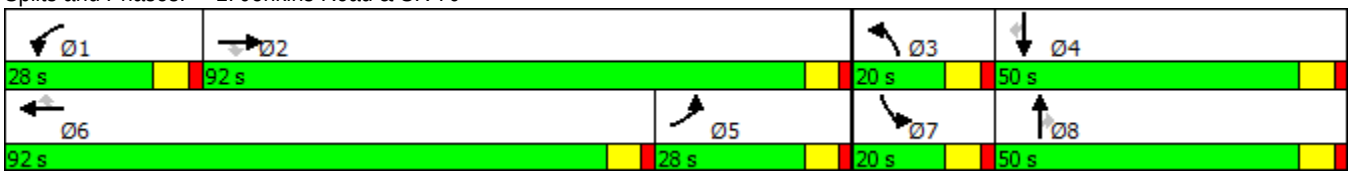
Splits and Phases: 1: Jenkins Road & SR 70



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	852	156	44	1172	123	176	89	12	198	131	60
Future Volume (vph)	155	852	156	44	1172	123	176	89	12	198	131	60
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	10.0	15.0	15.0	10.0	15.0	15.0	7.0	10.0	10.0	7.0	10.0	10.0
Minimum Split (s)	17.0	22.0	22.0	17.0	22.0	22.0	14.0	17.0	17.0	14.0	17.0	17.0
Total Split (s)	28.0	92.0	92.0	28.0	92.0	92.0	20.0	50.0	50.0	20.0	50.0	50.0
Total Split (%)	14.7%	48.4%	48.4%	14.7%	48.4%	48.4%	10.5%	26.3%	26.3%	10.5%	26.3%	26.3%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	Max	Max
Act Effct Green (s)	11.8	40.5	40.5	10.0	35.0	35.0	11.8	43.2	43.2	12.5	43.8	43.8
Actuated g/C Ratio	0.09	0.31	0.31	0.08	0.27	0.27	0.09	0.33	0.33	0.10	0.34	0.34
v/c Ratio	0.52	0.44	0.27	0.17	0.70	0.25	0.58	0.15	0.02	0.62	0.11	0.10
Control Delay	63.9	37.4	5.9	60.8	45.5	7.1	66.1	33.7	0.1	66.9	32.2	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.9	37.4	5.9	60.8	45.5	7.1	66.1	33.7	0.1	66.9	32.2	0.3
LOS	E	D	A	E	D	A	E	C	A	E	C	A
Approach Delay		36.7			42.5			52.9			44.9	
Approach LOS		D			D			D			D	

Intersection Summary	
Cycle Length: 190	
Actuated Cycle Length: 130.5	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 41.6	Intersection LOS: D
Intersection Capacity Utilization 62.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Jenkins Road & SR 70



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1324	74	0	766	0	79
Future Volume (Veh/h)	1324	74	0	766	0	79
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1365	76	0	790	0	81
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	640					
pX, platoon unblocked			0.81		0.81	0.81
vC, conflicting volume			1441		1760	682
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1064		1460	122
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	89
cM capacity (veh/h)			524		97	730

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	682	682	76	395	395	81
Volume Left	0	0	0	0	0	0
Volume Right	0	0	76	0	0	81
cSH	1700	1700	1700	1700	1700	730
Volume to Capacity	0.40	0.40	0.04	0.23	0.23	0.11
Queue Length 95th (ft)	0	0	0	0	0	9
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	10.5
Lane LOS						B
Approach Delay (s)	0.0			0.0		10.5
Approach LOS						B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	48.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	15	31	344	16	35	283
Future Volume (Veh/h)	15	31	344	16	35	283
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	15	32	355	16	36	292
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						450
pX, platoon unblocked	0.98					
vC, conflicting volume	581	186			371	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	541	186			371	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	96			97	
cM capacity (veh/h)	450	825			1184	

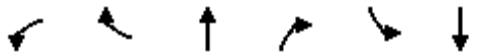
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	15	32	237	134	133	195
Volume Left	15	0	0	0	36	0
Volume Right	0	32	0	16	0	0
cSH	450	825	1700	1700	1184	1700
Volume to Capacity	0.03	0.04	0.14	0.08	0.03	0.11
Queue Length 95th (ft)	3	3	0	0	2	0
Control Delay (s)	13.3	9.5	0.0	0.0	2.4	0.0
Lane LOS	B	A			A	
Approach Delay (s)	10.7		0.0		1.0	
Approach LOS	B					

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	32.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1002	74	0	1366	0	92
Future Volume (Veh/h)	1002	74	0	1366	0	92
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1033	76	0	1408	0	95
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	640					
pX, platoon unblocked			0.87		0.87	0.87
vC, conflicting volume			1109		1737	516
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			817		1542	132
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	88
cM capacity (veh/h)			699		92	773

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	516	516	76	704	704	95
Volume Left	0	0	0	0	0	0
Volume Right	0	0	76	0	0	95
cSH	1700	1700	1700	1700	1700	773
Volume to Capacity	0.30	0.30	0.04	0.41	0.41	0.12
Queue Length 95th (ft)	0	0	0	0	0	10
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	10.3
Lane LOS						B
Approach Delay (s)	0.0			0.0		10.3
Approach LOS						B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	41.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	18	46	231	16	50	278
Future Volume (Veh/h)	18	46	231	16	50	278
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	19	47	238	16	52	287
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						450
pX, platoon unblocked	0.98					
vC, conflicting volume	494	127			254	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	447	127			254	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	95			96	
cM capacity (veh/h)	509	900			1308	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	19	47	159	95	148	191
Volume Left	19	0	0	0	52	0
Volume Right	0	47	0	16	0	0
cSH	509	900	1700	1700	1308	1700
Volume to Capacity	0.04	0.05	0.09	0.06	0.04	0.11
Queue Length 95th (ft)	3	4	0	0	3	0
Control Delay (s)	12.3	9.2	0.0	0.0	3.0	0.0
Lane LOS	B	A			A	
Approach Delay (s)	10.1		0.0		1.3	
Approach LOS	B					

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	29.4%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX

TURN LANE WARRANTS

7.2

WHEN SHOULD WE BUILD RIGHT TURN LANES?

Exhibit 44
Recommended Guidelines for Exclusive Right Turn Lanes to Unsignalized* Driveway

Roadway Posted Speed Limit	Number of Right Turns Per Hour
45 mph or less	**80-125** (see note 1)
Over 45 mph	**35-55** (see note 2)

*May not be appropriate for signalized locations where signal phasing plays an important role in determining the need for right turn lanes.

1. The lower threshold of 80 right turn vehicles per hour would be most used for higher volume (greater than 600 vehicles per hour, per lane in one direction on the major roadway) or two-lane roads where lateral movement is restricted. The 125 right turn vehicles per hour upper threshold would be most appropriate on lower volume roadways, multilane highways, or driveways with a large entry radius (50 feet or greater).

2. The lower threshold of 35 right turn vehicles per hour would be most appropriately used on higher volume two-lane roadways where lateral movement is restricted. The 55 right turn vehicles per hour upper threshold would be most appropriate on lower volume roadways, multilane highways, or driveways with large entry radius (50 feet or greater).

***Note*:** A posted speed limit of 45 mph may be used with these thresholds if the operating speeds are known to be over 45 mph during the time of peak right turn demand.

Note on Traffic projections: Projecting turning volumes is, at best, a knowledgeable estimate. Keep this in mind especially if the projections of right turns are close to meeting the guidelines. In that case, consider requiring the turn lane.

Where The Right Turn Lane Guidelines Came From

These recommendations are primarily based on the research done in ***NCHRP Report 420, Impacts of Access Management Techniques,*** Chapter 4 – Unsignalized Access Spacing (Technique 1B), and *Use of Speed Differential as a Measure To Evaluate the Need for Right-Turn Deceleration Lane at Unsignalized Intersections,* by Jan Thakkar, P.E., and Mohammed A. Hadi, Ph.D., P.E.

In the ***NCHRP Report 420***, the observed high-speed roads, 30 to 40 right turn vehicles per hour caused evasive maneuvers on 5 to 10 percent of the following through vehicles. For lower speed roadways, 80 to 110 right turn vehicles caused 15 to 20 percent of the following through vehicles to make evasive maneuvers. The choice of acceptable percentages of through vehicles impacted is a decision based on reasonable expectations of the different roadways.

In the Thakkar-Hadi study, by modeling speed differentials, a better understanding of the impacts of through volume and driveway radius was discovered.

7.3

IMPACT OF LARGE AND SLOW MOVING VEHICLES TURNING RIGHT

Speed and the volume of right turns should not be the only criteria used to determine the requirement for an exclusive right turn lane at unsignalized intersections. In order to minimize the rear-end collision potential of some situations, a right turn lane may be required where large and slow moving vehicles need to turn right such as;

- Trucking facilities (or locations that have a high volume of large vehicle traffic such as water ports, train stations, etc.)
- Recreational facilities attracting boats, trailers and other large recreation vehicles
- Transit facilities
- Schools

SOUTHBOUND LEFT TURN LANE - PM

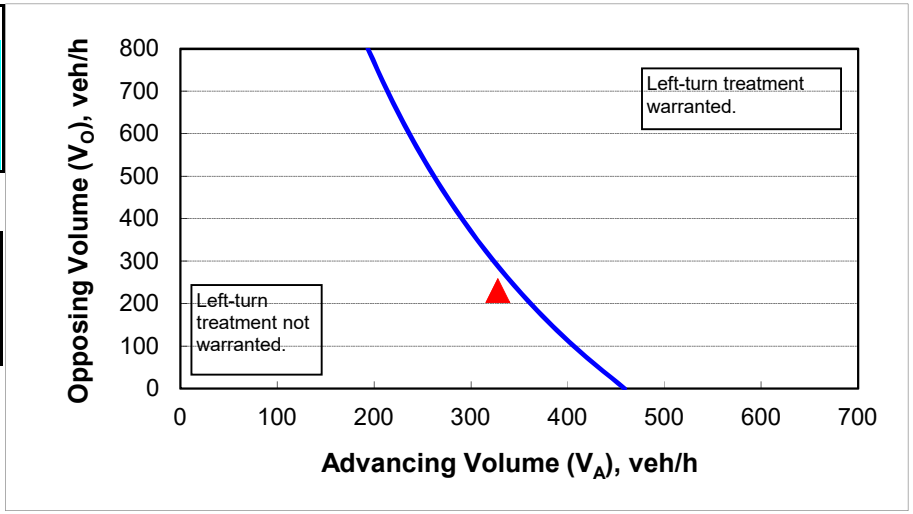
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	45
Percent of left-turns in advancing volume (V_A), %:	15%
Advancing volume (V_A), veh/h:	328
Opposing volume (V_O), veh/h:	231

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	349
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane , s:	1.9

SOUTHBOUND LEFT TURN LANE - AM

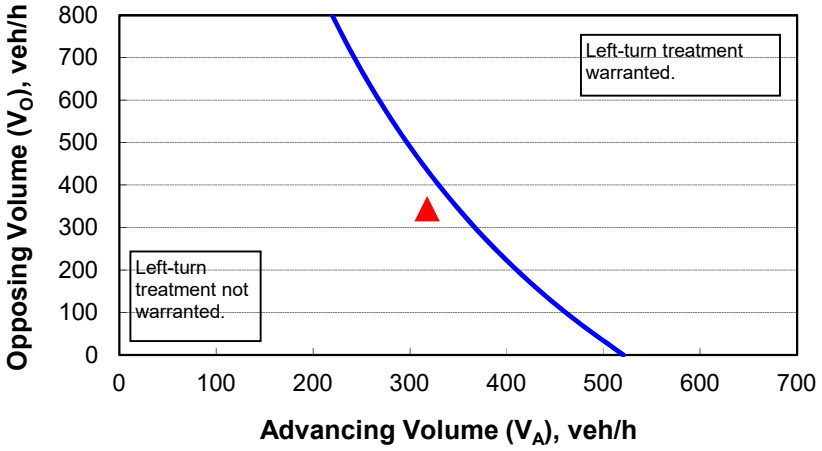
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	45
Percent of left-turns in advancing volume (V_A), %:	11%
Advancing volume (V_A), veh/h:	318
Opposing volume (V_O), veh/h:	344

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	350
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane , s:	1.9

APPENDIX

FDOT STANDARD INDEX 301

TURN LANES • CURBED AND UNCURBED MEDIANS

Design Speed (mph)	Entry Speed (mph)	Clearance Distance L_1	URBAN CONDITIONS			RURAL CONDITIONS		
			Brake To Stop Distance L_2	Total Decel. Distance L	Clearance Distance L_3	Brake To Stop Distance L_2	Total Decel. Distance L	Clearance Distance L_3
35	25	70'	75'	145'	110'	——	——	——
40	30	80'	75'	155'	120'	——	——	——
45	35	85'	100'	185'	135'	——	——	——
50	40/44	105'	135'	240'	160'	185'	290'	160'
55	48	125'	——	——	——	225'	350'	195'
60	52	145'	——	——	——	260'	405'	230'
65	55	170'	——	——	——	290'	460'	270'

DESIGN NOTES

1. Basis for turn lane configurations:
   - Informed Driver.
   - Stop condition (With Or Without Stop Control).
   - Wet Pavement.
   - Reaction preceding entry point.
   - Minimum braking distance for urban conditions.
   - 75' min. for L_2.
   - Comfortable deceleration rates for rural conditions (AASHTO 2001 threshold rate of 11.2 ft./s²).

GENERAL NOTES

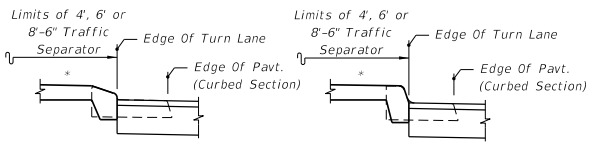
1. The plan views shown are for turn lane taper shapes and dimensional purposes only, they do not prescribe the use of curb, curb and gutter, shoulders nor separators specifically to either rural or urban conditions.

2. Total deceleration distances must not be reduced except where lesser values are imposed by unrelocatable control points.

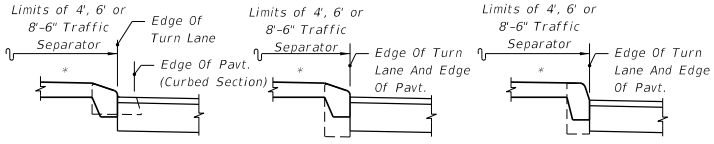
3. Right turn lane tapers and distances identical to left turn lanes under stop control conditions. Right turn lane tapers and/or distances are site specific under free flow or yield conditions.

4. These left turn configurations apply to continuous left turn lanes only where specifically called for in the plans.

5. For pavement markings see Index No. 17346.



TYPE E CURB AND GUTTER TYPE F

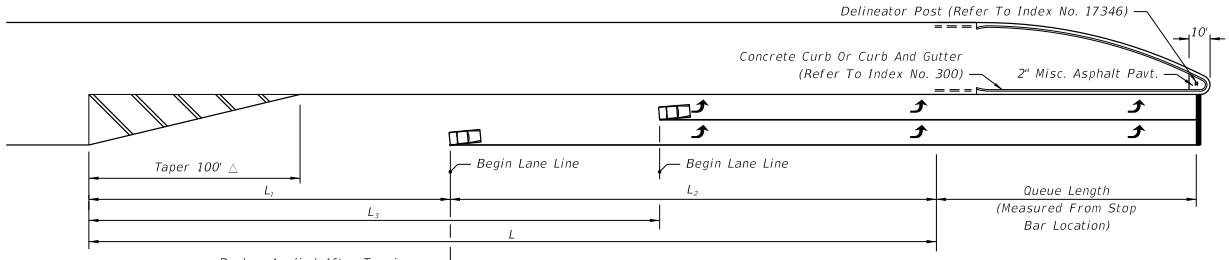


TYPE A TYPE B CURB TYPE D

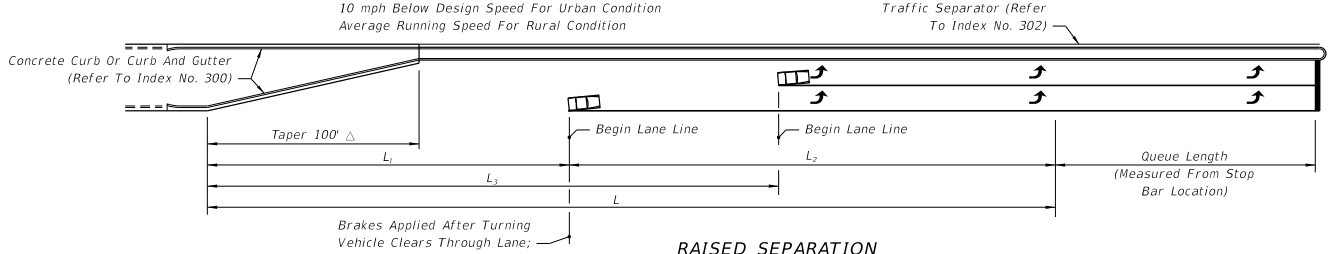
For Curb And Curb & Gutter Types, See Index No. 300

* Option I Separators Shown (Refer To Index No. 302)

MEDIAN CURB AND TRAFFIC SEPARATOR JUNCTURE DETAILS

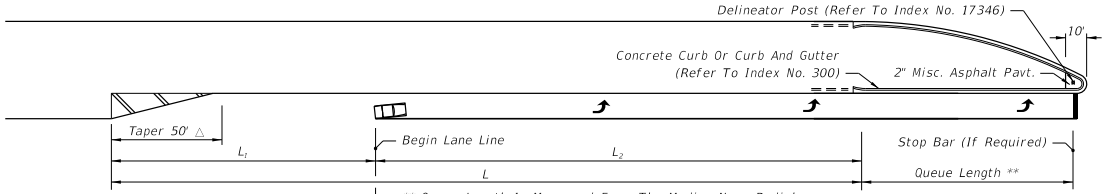


FLUSH AND/OR CURBED SEPARATION



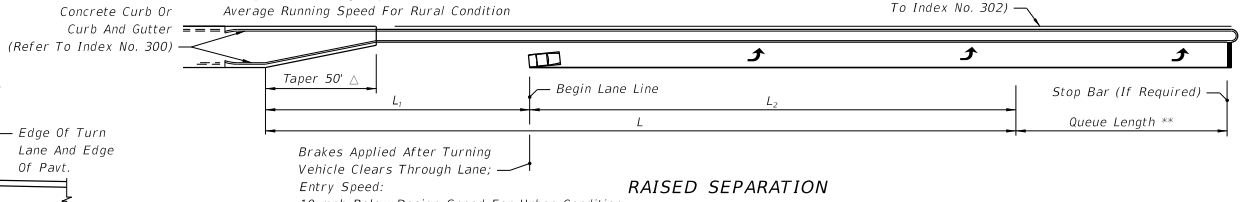
RAISED SEPARATION

DOUBLE LEFT TURNS



** Queue Length Is Measured From The Median Nose Radial Point Or, When A Stop Bar Is Required, From The Stop Bar.

FLUSH AND/OR CURBED SEPARATION



RAISED SEPARATION

SINGLE LEFT TURNS

△ The length of taper may be increased to L_1 for single left turns and L_3 for double left turns when:
- a. Left turn queue vehicles are adequately provided for within the design queue length.
- b. Through vehicle queues will not block access to left turn lane.
- c. Approved by District Design Engineer.

LAST REVISION	REVISION	DESCRIPTION:	FDOT 2014 DESIGN STANDARDS	TURN LANES	INDEX NO.	SHEET NO.
07/01/05					301	1 of 1