



Traffic Impact Study

***Enzian Theater Expansion
City of Maitland, Florida***

*Prepared for:
H. J. High Construction Company*

April 2014

©Kimley-Horn and Associates, Inc. 2014



Kimley-Horn
and Associates, Inc.

Traffic Impact Study

Enzian Theater Expansion
City of Maitland, Florida

Prepared for:
H. J. High Construction Company

Prepared by:
Kimley-Horn and Associates, Inc.
3660 Maguire Boulevard
Suite 200
Orlando, Florida 32803-3062
CA# 696

April 2014

©Kimley-Horn and Associates, Inc. 2014

K:\ORL_Civil\149490001-Enzian Theatre Expansion\TPTO\Documentation\TIA_Enzian_cover.doc

Heather A. S. Roberts
P.E. # 76115

TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 EXISTING CONDITIONS 2
3.0 SITE DEVELOPMENT 3
 3.1 Existing and Proposed Development..... 3
 3.2 Trip Generation 3
4.0 BUILDOUT CONDITIONS 5
5.0 CONCLUSION 6

LIST OF TABLES

Table 1: Existing PM Peak Hour Intersection Performance..... 2
Table 2: Existing and Proposed Development 3
Table 3: Existing and Proposed PM Peak Hour Trip Generation..... 4
Table 4: Buildout PM Peak Hour Intersection Performance 5

LIST OF FIGURES

Figure 1: Project Location 1
Figure 2: Enzian Theater Traffic 4

LIST OF APPENDICES

- A – SIGNAL TIMINGS & EXISTING SYNCHRO REPORTS
- B – SITE PLAN
- C – INTERSECTION VOLUME DEVELOPMENT WORKSHEETS
- D – BUILDOUT SYNCHRO REPORTS

1.0 INTRODUCTION

Kimley-Horn and Associates, Inc. (KHA) was retained by H.J. High Construction Company to analyze and document the traffic impacts associated with the proposed expansion of the Enzian Theater in the City of Maitland. The Enzian Theater is located on the northeast corner of the intersection of US 17-92 and Magnolia Road. The site is served by three driveways (one on US 17-92, and two on Magnolia Road). The project location is shown in *Figure 1*.



Figure 1: Project Location

2.0 EXISTING CONDITIONS

Note: *It is recognized that during the conduct of this study, the intersection of US 17-92 and Magnolia Road experienced significant congestion during the PM peak hour. It appears that this congestion is due to three factors:*

1. *Northbound traffic on US 17-92 backs up south of its intersection with Horatio Avenue, possibly due to poor signal timings of that intersection due to the recent reconstruction of that intersection.*
2. *Northbound traffic on US 17-92 backs up south of its intersection with Packwood Avenue due to unwarranted long green phases for Packwood Avenue which were implemented during the reconstruction of the Horatio Avenue intersection.*
3. *The detector loop for the southbound left turn phase at Magnolia Road is not working correctly and provides unwarranted long green phases for this movement which backs up traffic on northbound US 17-92.*

Thus, the traffic analysis and results that follow represent traffic operating conditions assuming the above issues are corrected.

Existing PM Peak traffic counts were taken on Thursday, March 13, 2014, at the intersection of US 17/92 and Magnolia Road and all three site driveways. The peak hour of traffic was observed from 5:00 PM to 6:00 PM. The theater was active on this day, with an early evening showtime on the calendar. Turning movement counts at the three driveways were combined to determine the existing PM Peak Hour trip generation for the site.

During the traffic counts, some drivers were observed using the Enzian parking lot as a cut-through to US 17/92, in order to avoid the long queues for the westbound traffic from the signal at US 17/92 and Magnolia Road.

The project driveways and the intersection of US 17/92 and Magnolia Road were analyzed under existing conditions using Trafficware’s *Synchro* software. Signal timings for the intersection of US 17/92 and Magnolia Road were obtained from the City of Maitland. The resulting performance of the intersections is included in **Table 1**. As shown in the table, all intersections operate acceptably under existing conditions (see note above). Signal timings and existing *Synchro* reports are included in **Appendix A**.

Table 1: Existing PM Peak Hour Intersection Performance

Intersection	Intersection LOS	Max V/C Ratio	Max V/C Movement
US 17-92 & Magnolia Rd	B	0.97	WBL
US 17-92 & Enzian Driveway	A	0.52	NBT
Magnolia Rd & West Enzian Driveway	A	0.06	WBT
Magnolia Rd & East Enzian Driveway	A	0.07	WBT

3.0 SITE DEVELOPMENT

3.1 Existing and Proposed Development

The Enzian Theater is an alternative cinema showing a variety of independent films, foreign films, and special programming. The theater also houses supporting dining uses on site. Movie showings typically take place during late afternoon and evening hours on weeknights, with additional showings during matinee hours on weekends. The theater currently contains 1 movie screen, 210 theater seats, and 7,150 square feet. As part of the expansion, an additional 2 movie screens, 140 theater seats and 19,500 square feet will be added to the development. The total existing and proposed uses are shown in *Table 2*. The site plan is included in *Appendix B*.

Table 2: Existing and Proposed Development

Enzian Theater	Movie Screens	Theater Seats	Square Feet
Existing	1	210	7,150
Expansion	2	140	19,500
Buildout Total	3	350	26,650

3.2 Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual determines trip generation for theater uses primarily by the number of screens or number of seats. Although two additional theaters are being proposed with the expansion of Enzian, these theaters are much smaller in terms of the number of seats provided. Additionally, it is anticipated that the majority of the activity for the additional theater space will not occur during the PM Peak Hour of traffic. The first show times of the day for the new theater space are anticipated to be scheduled at 6:45 PM or 7:00 PM on a typical weekday, with additional matinee showings on Fridays and during the weekend. As a result, the impact on the adjacent street network during the typical PM Peak Hour will be minor.

Recognizing the uniqueness of the Enzian Theater, and to be conservative, the trip generation of the site was doubled to account for the proposed theater expansion. The resulting PM Peak Hour trip generation for existing and buildout conditions is included in *Table 3*.

Table 3: Existing and Proposed PM Peak Hour Trip Generation

Enzian Theater	PM Peak Hour Trips		
	In	Out	Total
Existing	42	22	64
Expansion	42	22	64
Buildout Total	84	44	128

The anticipated traffic associated with the Enzian expansion was assigned to the project driveways, consistent with the existing distribution. These additional trips are shown in **Figure 2** below.

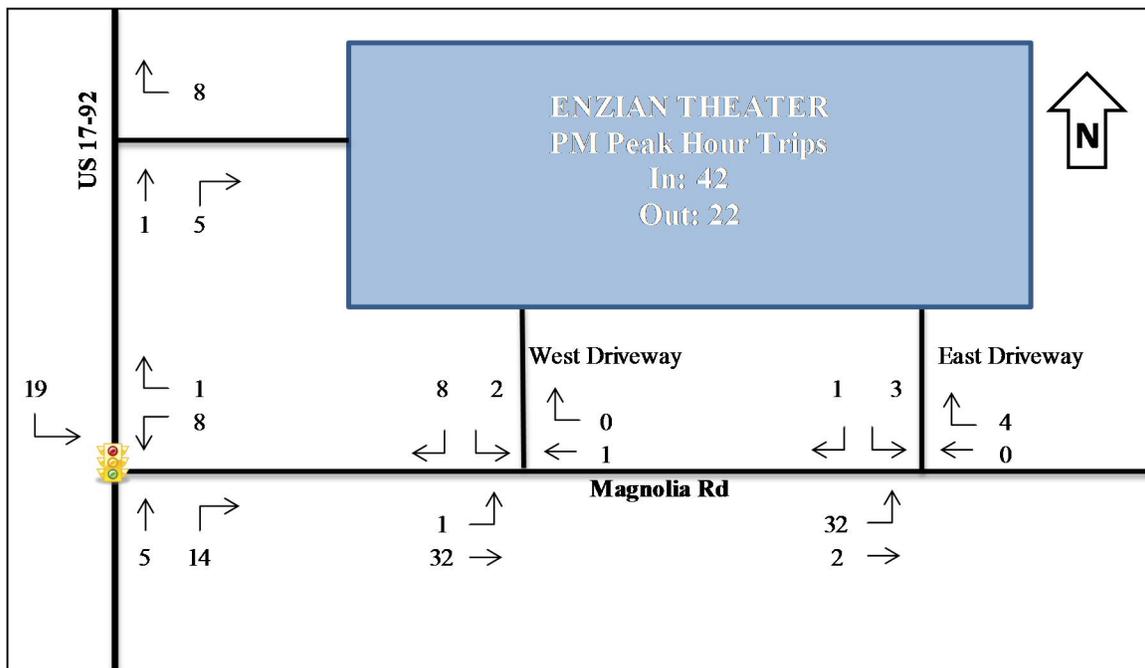


Figure 2: Enzian Expansion Traffic

4.0 BUILDOUT CONDITIONS

The anticipated project trips associated with the expansion were added to the existing traffic volumes to determine volumes at buildout of the expansion. Intersection volume development worksheets are included in *Appendix C*.

The project driveways and the intersection of US 17/92 and Magnolia Road were analyzed under buildout conditions in *Synchro*. Minor adjustments were made to signal timings at the intersection of US 17-92 and Magnolia Road to accommodate the anticipated increase in westbound traffic.

The resulting performance of the intersections is included in *Table 4*. As shown in the table, all intersections are anticipated to operate acceptably under buildout conditions. Synchro reports are included as *Appendix D*.

Table 4: Buildout PM Peak Hour Intersection Performance

Intersection	Intersection LOS	Max V/C Ratio	Max V/C Movement
US 17-92 & Magnolia Rd	B	0.95	WBL
US 17-92 & Enzian Driveway	A	0.52	NBT
Magnolia Rd & West Enzian Driveway	A	0.06	WBT
Magnolia Rd & East Enzian Driveway	A	0.08	WBT

It is noted that this study was performed while retiming efforts were underway for the US 17/92 corridor. Although the signal timings may change as a result of those efforts, the performance of the intersection of US 17/92 and Magnolia Road would be similar.

5.0 CONCLUSION

Based on the analysis, the proposed expansion of the Enzian Theater is not anticipated to have any adverse impacts on the adjacent roadway network and does not warrant any mitigation being required.

It is recognized that during the conduct of this study, the intersection of US 17-92 and Magnolia Road experienced significant congestion during the PM peak hour. It appears that this congestion is due to three factors:

1. Northbound traffic on US 17-92 backs up south of its intersection with Horatio Avenue, possibly due to poor signal timings of that intersection due to the recent reconstruction of that intersection.
2. Northbound traffic on US 17-92 backs up south of its intersection with Packwood Avenue due to unwarranted long green phases for Packwood Avenue which were implemented during the reconstruction of the Horatio Avenue intersection.
3. The detector loop for the southbound left turn phase at Magnolia Road is not working correctly and provides unwarranted long green phases for this movement which backs up traffic on northbound US 17-92.

Based on the analysis, the proposed expansion of the Enzian Theater is not anticipated to cause additional adverse impacts to the adjacent roadway network during the PM Peak Hour.

Appendix A

Signal Timings & Existing Synchro Reports

Local TBC Traffic Data

Date 3/25/2014 Time 12:12:23

Intersection Name

Orlando Ave & Magnolia Ave

Source

Database

Day	HH	MM	Pattern	Phase Func 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	0	Free(OFF=4)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	1	9	0	1/1/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	1	20	0		0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
4	2	0	0	Free(OFF=4)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	2	6	30	4/1/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	2	9	30	4/2/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	2	14	0	4/3/1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	2	19	30	Free(OFF=4)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Coordination Timing Plan Data - Dial 4 Split 3

Date 3/25/2014

Time 12:14:42

Intersection Name Orlando Ave & Magnolia Ave

Source Database

Cycle Length 210

Ring Sum Times 210 183 0 0

Phase	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
Time	13	177	0	20	26	157	0	0
Mode	0-Actuated	1-Coord Ph	0-Actuated	0-Actuated	0-Actuated	1-Coord Ph	0-Actuated	0-Actuated
Ph Min Veh Serv	12	22	0	13	12	22	0	0
Ph Min Ped Serv	0	22	0	0	0	22	0	0

Phase	Phase 9	Phase 10	Phase 11	Phase 12	Phase 13	Phase 14	Phase 15	Phase 16
Time	0	0	0	0	0	0	0	0
Mode	0-Actuated							
Ph Min Veh Serv	0	0	0	0	0	0	0	0
Ph Min Ped Serv	0	0	0	0	0	0	0	0

Offset	Offset 1	Offset 2	Offset 3
Time	108	0	0
Mode	0-Normal	0-Normal	0-Normal
Alternate	0	0	0
Sequence	0	0	0
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time			

Phase Vehicle Basic Timing Data

Date 3/25/2014

Time 12:08:34

Intersection Name

Orlando Ave & Magnolia Ave

Source

Database



Phase	1	2	3	4	5	6	7	8
Minimum Green	5	15	0	7	5	15	0	0
Passage	3.0	4.0	0.0	4.0	3.0	4.0	4.0	0.0
Maximum 1	30	60	0	30	12	60	0	0
Maximum 2	30	50	0	50	12	50	0	0
Yellow Change	4.4	4.4	4.0	3.4	4.4	4.4	4.0	4.0
Red Clearance	2.0	2.0	0.0	2.0	2.0	2.0	0.0	0.0

Phase	9	10	11	12	13	14	15	16
Minimum Green	0	0	0	0	0	0	0	0
Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum 1	0	0	0	0	0	0	0	0
Maximum 2	0	0	0	0	0	0	0	0
Yellow Change	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Lanes, Volumes, Timings
3: US 17-92 & Magnolia Rd

Enzian Theater Expansion
Existing PM Peak



Lane Group	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Lane Configurations	W		U	↑↑↑			S	↑↑↑
Volume (vph)	29	75	14	1944	53	20	80	1750
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0		175	
Storage Lanes	1	0	1		0		1	
Taper Length (ft)	25		25				25	
Satd. Flow (prot)	1681	0	1805	5107	0	0	1791	5136
Flt Permitted	0.983		0.108				0.056	
Satd. Flow (perm)	1681	0	205	5107	0	0	106	5136
Right Turn on Red		Yes			Yes			
Satd. Flow (RTOR)	35			8				
Link Speed (mph)	15			40				40
Link Distance (ft)	179			652				248
Travel Time (s)	8.1			11.1				4.2
Peak Hour Factor	0.58	0.80	0.70	0.90	0.60	0.66	0.71	0.95
Heavy Vehicles (%)	0%	2%	0%	1%	0%	0%	1%	1%
Adj. Flow (vph)	50	94	20	2160	88	30	113	1842
Shared Lane Traffic (%)								
Lane Group Flow (vph)	144	0	20	2248	0	0	143	1842
Turn Type	NA		pm+pt	NA		pm+pt	pm+pt	NA
Protected Phases	4		1	6		5	5	2
Permitted Phases			6			2	2	
Detector Phase	4		1	6		5	5	2
Switch Phase								
Minimum Initial (s)	7.0		5.0	15.0		5.0	5.0	15.0
Minimum Split (s)	12.4		11.4	22.4		11.4	11.4	22.4
Total Split (s)	20.0		13.0	164.0		26.0	26.0	177.0
Total Split (%)	9.5%		6.2%	78.1%		12.4%	12.4%	84.3%
Maximum Green (s)	14.6		6.6	157.6		19.6	19.6	170.6
Yellow Time (s)	3.4		4.4	4.4		4.4	4.4	4.4
All-Red Time (s)	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
Total Lost Time (s)	5.4		6.4	6.4			6.4	6.4
Lead/Lag			Lead	Lag		Lead	Lead	Lag
Lead-Lag Optimize?			Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	4.0		3.0	4.0		3.0	3.0	4.0
Recall Mode	None		None	C-Max		None	None	C-Max
Act Effect Green (s)	14.6		170.3	164.5			183.6	176.2
Actuated g/C Ratio	0.07		0.81	0.78			0.87	0.84
v/c Ratio	0.97		0.10	0.56			0.74	0.43
Control Delay	134.5		3.4	9.7			51.2	4.9
Queue Delay	0.0		0.0	0.0			0.0	0.0
Total Delay	134.5		3.4	9.7			51.2	4.9
LOS	F		A	A			D	A
Approach Delay	134.5			9.7				8.2
Approach LOS	F			A				A

Intersection Summary

Area Type: Other

Intersection

Intersection Delay, s/veh 0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	8	2034	5	0	1850
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None
Storage Length	0	0		0	0	
Median Width	0		12			12
Grade, %	0%		0%			0%
Peak Hour Factor	0.92	0.67	0.92	0.42	0.92	0.92
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	0	12	2211	12	0	2011
Number of Lanes	0	1	3	0	0	3

Major/Minor

		Major 1	Major 2
Conflicting Flow All	3021	1111	0 0 2223 0
Stage 1	2217	-	- - - -
Stage 2	804	-	- - - -
Follow-up Headway	3.8	3.9	- - 3.1 -
Pot Capacity-1 Maneuver	26	177	- - 99 -
Stage 1	42	-	- - - -
Stage 2	368	-	- - - -
Time blocked-Platoon, %	0	0	- - 0 -
Mov Capacity-1 Maneuver	26	177	- - 99 -
Mov Capacity-2 Maneuver	26	-	- - - -
Stage 1	42	-	- - - -
Stage 2	368	-	- - - -

Approach

	WB	NB	SB
HCM Control Delay, s	26.8	0	0
HCM LOS	D	-	-

Minor Lane / Major Mvmt

	NBT	NBR	WBLn1	SBL	SBT
Cap, veh/h	-	-	177	99	-
HCM Control Delay, s	-	-	26.8	0	-
HCM Lane V/C Ratio	-	-	0.07	-	-
HCM Lane LOS	-	-	D	A	-
HCM 95th-tile Q, veh	-	-	0.2	0.0	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection

Intersection Delay, s/veh 0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	132	96	0	2	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	143	104	0	2	9
Number of Lanes	0	1	1	0	1	0

Major/Minor

	Major 1		Major 2			
Conflicting Flow All	104	0	-	0	250	104
Stage 1	-	-	-	-	104	-
Stage 2	-	-	-	-	146	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1488	-	-	-	739	951
Stage 1	-	-	-	-	920	-
Stage 2	-	-	-	-	881	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1488	-	-	-	738	951
Mov Capacity-2 Maneuver	-	-	-	-	738	-
Stage 1	-	-	-	-	920	-
Stage 2	-	-	-	-	880	-

Approach

	EB	WB	SB
HCM Control Delay, s	0.1	0	9.1
HCM LOS	-	-	A

Minor Lane / Major Mvmt

	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1488	-	-	-	899
HCM Control Delay, s	7.421	0	-	-	9.1
HCM Lane V/C Ratio	0.00	-	-	-	0.01
HCM Lane LOS	A	A	-	-	A
HCM 95th-tile Q, veh	0.0	-	-	-	0.0

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection

Intersection Delay, s/veh 1.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	32	102	95	4	3	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.64	0.92	0.92	0.33	0.38	0.25
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	50	111	103	12	8	4
Number of Lanes	0	1	1	0	1	0

Major/Minor

	Major 1	Major 2				
Conflicting Flow All	115	0	-	0	320	109
Stage 1	-	-	-	-	109	-
Stage 2	-	-	-	-	211	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1474	-	-	-	673	945
Stage 1	-	-	-	-	916	-
Stage 2	-	-	-	-	824	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1474	-	-	-	649	945
Mov Capacity-2 Maneuver	-	-	-	-	649	-
Stage 1	-	-	-	-	916	-
Stage 2	-	-	-	-	794	-

Approach

	EB	WB	SB
HCM Control Delay, s	2.3	0	10
HCM LOS	-	-	B

Minor Lane / Major Mvmt

	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1474	-	-	-	725
HCM Control Delay, s	7.528	0	-	-	10
HCM Lane V/C Ratio	0.03	-	-	-	0.02
HCM Lane LOS	A	A	-	-	B
HCM 95th-tile Q, veh	0.1	-	-	-	0.1

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Appendix B

Site Plan

Appendix C

Intersection Volume Development Worksheets

Intersection Volume Development Worksheet
US 17-92 & Magnolia Rd

	Magnolia Road Westbound			US 17-92 Northbound			US 17-92 Southbound			
Movement	Left	Thru	Right	U-Turn	Thru	Right	U-Turn	Left	Thru	Right
TMC	30	n/a	77	14	2004	55	21	82	1804	n/a
Seasonal Factor	0.97	n/a	0.97	0.97	0.97	0.97	0.97	0.97	0.97	n/a
Existing Volume (2014)	29	n/a	75	14	1944	53	20	80	1750	n/a
Project Assignment	36%	n/a	5%	0%	12%	33%	0%	45%	0%	n/a
Direction	out	n/a	out	n/a	in	in	n/a	in	n/a	n/a
Project Trips	8	n/a	1	0	5	14	0	19	0	n/a
Buildout Volume (2014)	37	n/a	76	14	1949	67	20	99	1750	n/a

Intersection Volume Development Worksheet
US 17-92 & Enzian Driveway

	Enzian Driveway Westbound			US 17-92 Northbound			US 17-92 Southbound		
Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
TMC	n/a	n/a	8	n/a	2097	5	n/a	1907	n/a
Seasonal Factor	n/a	n/a	0.97	n/a	0.97	0.97	n/a	0.97	n/a
Existing Volume (2014)	n/a	n/a	8	n/a	2034	5	n/a	1850	n/a
Project Assignment	n/a	n/a	36%	n/a	5%	12%	n/a	45%	n/a
Direction	n/a	n/a	out	n/a	in + out	in	n/a	in	n/a
Project Trips	n/a	n/a	8	n/a	3	5	n/a	19	n/a
Buildout Volume (2014)	n/a	n/a	16	n/a	2037	10	n/a	1869	n/a

Intersection Volume Development Worksheet Magnolia Road & Enzian West Driveway									
	Magnolia Road Eastbound			Magnolia Road Westbound			West Driveway Southbound		
Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
TMC	1	136	n/a	n/a	99	0	2	n/a	8
Seasonal Factor	0.97	0.97	n/a	n/a	0.97	0.97	0.97	n/a	0.97
Existing Volume (2014)	1	132	n/a	n/a	96	0	2	n/a	8
Project Assignment	2%	76%	n/a	n/a	5%	0%	9%	n/a	36%
Direction	in	in	n/a	n/a	out	in	out	n/a	out
Project Trips	1	32	n/a	n/a	1	0	2	n/a	8
Buildout Volume (2014)	2	164	n/a	n/a	97	0	4	n/a	16

Intersection Volume Development Worksheet Magnolia Road & Enzian East Driveway									
	Magnolia Road Eastbound			Magnolia Road Westbound			East Driveway Southbound		
Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
TMC	33	0	n/a	n/a	0	4	3	n/a	1
Seasonal Factor	0.97	0.97	n/a	n/a	0.97	0.97	0.97	n/a	0.97
Existing Volume (2014)	32	102	n/a	n/a	95	4	3	n/a	1
Project Assignment	76%	9%	n/a	n/a	0%	10%	14%	n/a	5%
Direction	in	out	n/a	n/a	n/a	in	out	n/a	out
Project Trips	32	2	n/a	n/a	0	4	3	n/a	1
Buildout Volume (2014)	64	104	n/a	n/a	95	8	6	n/a	2

Appendix D

Buildout Synchro Reports

Lanes, Volumes, Timings
3: US 17-92 & Magnolia Rd

Enzian Theater Expansion
Buildout PM Peak



Lane Group	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Lane Configurations								
Volume (vph)	37	76	14	1949	67	20	99	1750
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0		175	
Storage Lanes	1	0	1		0		1	
Taper Length (ft)	25		25				25	
Satd. Flow (prot)	1691	0	1805	5102	0	0	1790	5136
Flt Permitted	0.980		0.109				0.051	
Satd. Flow (perm)	1691	0	207	5102	0	0	96	5136
Right Turn on Red		Yes			Yes			
Satd. Flow (RTOR)	28			10				
Link Speed (mph)	15			40				40
Link Distance (ft)	179			652				248
Travel Time (s)	8.1			11.1				4.2
Peak Hour Factor	0.58	0.80	0.70	0.90	0.60	0.66	0.71	0.95
Heavy Vehicles (%)	0%	2%	0%	1%	0%	0%	1%	1%
Adj. Flow (vph)	64	95	20	2166	112	30	139	1842
Shared Lane Traffic (%)								
Lane Group Flow (vph)	159	0	20	2278	0	0	169	1842
Turn Type	NA		pm+pt	NA		pm+pt	pm+pt	NA
Protected Phases	4		1	6		5	5	2
Permitted Phases			6			2	2	
Detector Phase	4		1	6		5	5	2
Switch Phase								
Minimum Initial (s)	7.0		5.0	15.0		5.0	5.0	15.0
Minimum Split (s)	12.4		11.4	22.4		11.4	11.4	22.4
Total Split (s)	23.0		13.0	161.0		26.0	26.0	174.0
Total Split (%)	11.0%		6.2%	76.7%		12.4%	12.4%	82.9%
Maximum Green (s)	17.6		6.6	154.6		19.6	19.6	167.6
Yellow Time (s)	3.4		4.4	4.4		4.4	4.4	4.4
All-Red Time (s)	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
Total Lost Time (s)	5.4		6.4	6.4			6.4	6.4
Lead/Lag			Lead	Lag		Lead	Lead	Lag
Lead-Lag Optimize?			Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	4.0		3.0	4.0		3.0	3.0	4.0
Recall Mode	None		None	C-Max		None	None	C-Max
Act Effect Green (s)	17.6		164.6	158.8			180.6	173.2
Actuated g/C Ratio	0.08		0.78	0.76			0.86	0.82
v/c Ratio	0.95		0.10	0.59			0.82	0.43
Control Delay	133.0		4.1	12.3			71.6	5.7
Queue Delay	0.0		0.0	0.0			0.0	0.0
Total Delay	133.0		4.1	12.3			71.6	5.7
LOS	F		A	B			E	A
Approach Delay	133.0			12.2				11.2
Approach LOS	F			B				B

Intersection Summary

Area Type: Other

Lanes, Volumes, Timings
 3: US 17-92 & Magnolia Rd

Cycle Length: 210
 Actuated Cycle Length: 210
 Offset: 108 (51%), Referenced to phase 2:SBTL and 6:NBTU, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 16.1
 Intersection LOS: B
 Intersection Capacity Utilization 67.6%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 3: US 17-92 & Magnolia Rd

 φ1 13 s	 φ2 (R) 174 s	 φ4 23 s
 φ5 26 s	 φ6 (R) 161 s	

Intersection

Intersection Delay, s/veh 0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	16	2037	10	0	1869
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None
Storage Length	0	0		0	0	
Median Width	0		12			12
Grade, %	0%		0%			0%
Peak Hour Factor	0.92	0.67	0.92	0.42	0.92	0.92
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	0	24	2214	24	0	2032
Number of Lanes	0	1	3	0	0	3

Major/Minor

			Major 1		Major 2	
Conflicting Flow All	3039	1119	0	0	2238	0
Stage 1	2226	-	-	-	-	-
Stage 2	813	-	-	-	-	-
Follow-up Headway	3.8	3.9	-	-	3.1	-
Pot Capacity-1 Maneuver	26	175	-	-	97	-
Stage 1	42	-	-	-	-	-
Stage 2	364	-	-	-	-	-
Time blocked-Platoon, %	0	0	-	-	0	-
Mov Capacity-1 Maneuver	26	175	-	-	97	-
Mov Capacity-2 Maneuver	26	-	-	-	-	-
Stage 1	42	-	-	-	-	-
Stage 2	364	-	-	-	-	-

Approach

	WB	NB	SB
HCM Control Delay, s	28.8	0	0
HCM LOS	D	-	-

Minor Lane / Major Mvmt

	NBT	NBR	WBLn1	SBL	SBT
Cap, veh/h	-	-	175	97	-
HCM Control Delay, s	-	-	28.8	0	-
HCM Lane V/C Ratio	-	-	0.14	-	-
HCM Lane LOS	-	-	D	A	-
HCM 95th-tile Q, veh	-	-	0.5	0.0	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection

Intersection Delay, s/veh 0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	2	164	97	0	4	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	178	105	0	4	17
Number of Lanes	0	1	1	0	1	0

Major/Minor

	Major 1		Major 2			
Conflicting Flow All	105	0	-	0	288	105
Stage 1	-	-	-	-	105	-
Stage 2	-	-	-	-	183	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1486	-	-	-	702	949
Stage 1	-	-	-	-	919	-
Stage 2	-	-	-	-	848	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1486	-	-	-	701	949
Mov Capacity-2 Maneuver	-	-	-	-	701	-
Stage 1	-	-	-	-	919	-
Stage 2	-	-	-	-	847	-

Approach

	EB	WB	SB
HCM Control Delay, s	0.1	0	9.2
HCM LOS	-	-	A

Minor Lane / Major Mvmt

	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1486	-	-	-	886
HCM Control Delay, s	7.426	0	-	-	9.2
HCM Lane V/C Ratio	0.00	-	-	-	0.03
HCM Lane LOS	A	A	-	-	A
HCM 95th-tile Q, veh	0.0	-	-	-	0.1

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection

Intersection Delay, s/veh 2.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	64	104	95	8	6	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.64	0.92	0.92	0.33	0.38	0.25
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	100	113	103	24	16	8
Number of Lanes	0	1	1	0	1	0

Major/Minor

	Major 1		Major 2			
Conflicting Flow All	128	0	-	0	428	115
Stage 1	-	-	-	-	115	-
Stage 2	-	-	-	-	313	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1458	-	-	-	584	937
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	741	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1458	-	-	-	541	937
Mov Capacity-2 Maneuver	-	-	-	-	541	-
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	687	-

Approach

	EB	WB	SB
HCM Control Delay, s	3.6	0	10.9
HCM LOS	-	-	B

Minor Lane / Major Mvmt

	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1458	-	-	-	631
HCM Control Delay, s	7.651	0	-	-	10.9
HCM Lane V/C Ratio	0.07	-	-	-	0.04
HCM Lane LOS	A	A	-	-	B
HCM 95th-tile Q, veh	0.2	-	-	-	0.1

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined