RaceTrac, SR 113, Cartersville

Bartow County

Signal Warrant Analysis

September 25, 2018

RaceTrac, SR 113, Cartersville

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Jacobs Engineering Inc.

Ten 10th Street, NW, Suite 1400
Atlanta, Georgia 30309
United States
T +1.404.978.7600
F +1.404.978.7660
www.jacobs.com

Contents

Tables

Appendices

STUDY LOCATION

The study intersection is located on SR 113 (E Main Street) at Canyon Parkway in Bartow County. The study intersection is approximately 1,800 feet of the existing signalized intersection of SR 113 (E Main Street) at I-75 NB Ramps. A location map is shown in Figure 1.

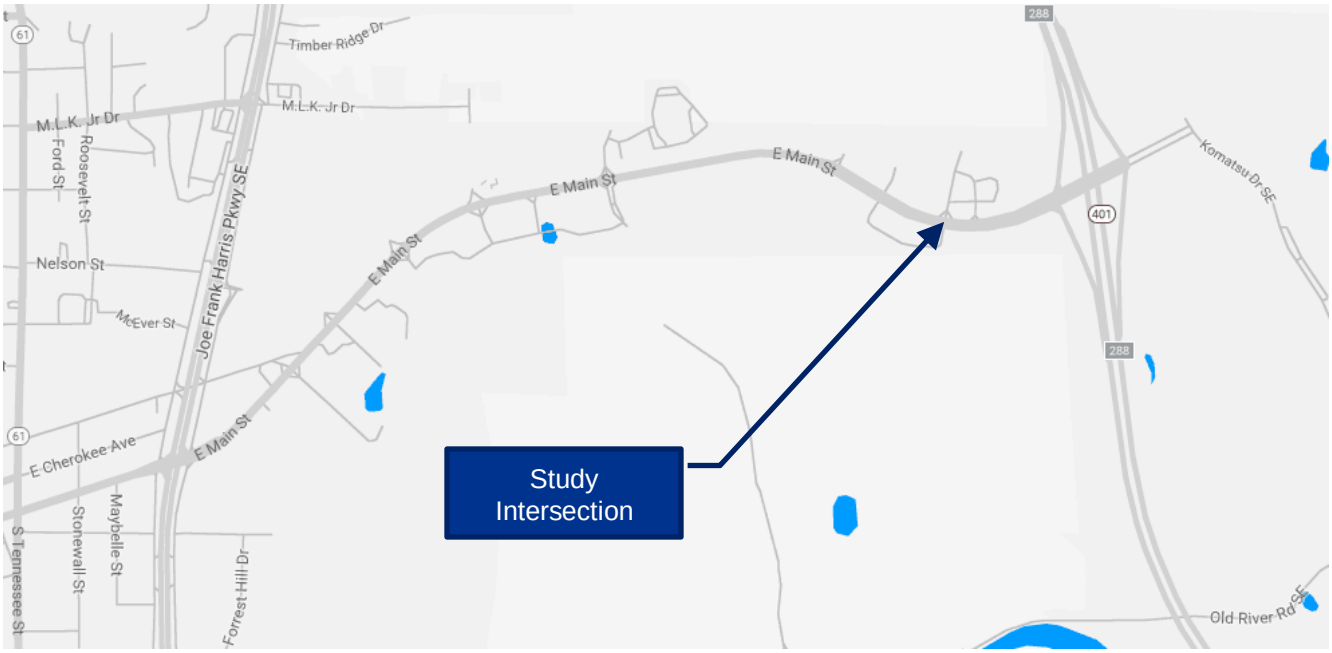


Figure 1 : Study Location, SR 113 (E Main Street) at Canyon Parkway

COUNTY

The study intersection is located in Bartow County.

REQUESTED BY

RaceTrac Petroleum has requested this traffic engineering study.

REASON FOR INVESTIGATION

The purpose of this study is to determine if future traffic volumes at the intersection of SR 113 (E Main Street) at Canyon Parkway will satisfy the Manual of Uniform Traffic Control Devices (MUTCD) signal warrants for installation of a traffic signal after construction of a proposed RaceTrac fuel center.

EXISTING LANE GEOMETRY

SR 113 (E Main Street) is an east-west, four-lane, divided roadway with left turn bays. Canyon Parkway (the north leg / southbound approach) has two entering lanes and two exiting lanes and serves as an access point to an existing Hotel, Subway restaurant, McDonald's fast-food restaurant, and Shell fuel center. The south leg / northbound approach, has one entering and one exiting lane and serves as an access point to an Exxon fuel center.

Figure 2 : Existing Geometry, SR 113 (E Main Street) at Canyon Parkway

EXISTING TRAFFIC CONTROL

The study location is currently a four leg intersection with the side street approaches (Canyon Parkway and Exxon driveway) being stop-controlled while SR 113 (E Main Street) remains free flow.

VEHICULAR VOLUMES

The GDOT AADT traffic counts on SR 113 (E Main Street) show a daily traffic volume of 19,936 vehicles per day west of the intersection. Turning movement volumes were counted between 6am-7pm to evaluate the existing traffic demands at the study intersection. These counts are shown in Table 1.

Table 1 : Existing Traffic Volumes (SR 113 at Canyon Pkwy)

Approach	NORTHBOUND Exxon Drwy			SOUTHBOUND Canyon Parkway			EASTBOUND SR 113 (E Main Street)			WESTBOUND SR 113 (E Main Street)		
Time / Movement	L	T	R	L	T	R	L	T	R	L	T	R
6:00 am - 7:00 am	7	4	27	40	0	39	29	336	1	16	358	3
7:00 am - 8:00 am	4	3	30	53	0	63	51	479	0	20	681	6
8:00 am - 9:00 am	4	0	26	47	1	52	48	424	0	16	608	9
9:00 am - 10:00 am	3	3	26	36	1	36	34	388	1	18	522	7
10:00 am - 11:00 am	1	0	20	30	0	25	30	451	1	16	491	7
11:00 am - 12:00 Noon	4	0	19	31	0	21	32	430	0	17	623	11
12:00 am - 1:00 pm	7	0	30	36	0	34	51	605	0	35	647	19
1:00 pm - 2:00 pm	5	4	29	29	1	44	36	639	0	23	654	8
2:00 pm - 3:00 pm	3	0	30	32	1	27	39	619	2	23	702	8
3:00 pm - 4:00 pm	2	1	47	25	2	32	26	630	1	30	769	11
4:00 pm - 5:00 pm	4	3	36	30	2	30	43	750	2	26	878	13
5:00 pm - 6:00 pm	4	1	47	30	0	37	27	849	2	26	978	10
6:00 pm - 7:00 pm	6	1	38	26	2	22	32	651	3	30	744	9

VEHICULAR SPEEDS

SR 113 (E Main Street) has a posted speed limit of 45 mph in the vicinity of the study intersection. Canyon Parkway has a posted speed limit of 35 mph.

PEDESTRIAN ACTIVITY

There are sidewalks located along north and south sides of SR 113 (E Main Street) west of Canyon Parkway, but no sidewalks exist to the east of Canyon Parkway (approaching the I-75 interchange).

PARKING

No parking is allowed on SR 113 (E Main Street) in the vicinity of the study intersection.

EXISITNG DELAY ANALYSIS

Existing intersection delay was calculated using the AM and PM peak hour volumes and Synchro software (HCM 2010 methodology). Results of the existing capacity analysis are shown below in Table 2.

Table 2 : Existing Intersection Delay

Intersection		AM Peak Hour		PM Peak Hour	
		LOS	Delay	LOS (Delay)	v/c Ratio
1	**SR 113 (E Main Street) at Canyon Parkway**				
	-Eastbound Approach (SR 113)	A	1.1	A	0.4
	-Westbound Approach (SR 113)	A	0.1	A	0.2
	-Northbound Left (Exxon Drwy)	D	34.9	F	61.6
	-Southbound Left (Canyon Pkwy)	F	77.9	F	124.9

The results of the existing intersection analysis indicate that both side-street left turn movements are currently operating at level-of-service “F” in the AM and/or PM peak hours.

ADJACENT SIGNALIZED INTERSECTIONS

There are presently three signalized intersections within a one-mile radius of the study intersection. A graphic showing the location of the adjacent signalized intersections is included in the Appendix B.

SIGHT DISTANCE

Sight distances for traffic making left turns from the side street approaches should be evaluated based on topographic information and / or onsite observations. The AASHTO sight distance requirement for a left turn onto a 45 mph roadway while crossing two lanes of traffic and 20-foot median is 585 feet. The sight distances observed in the field were 650-700 feet looking left (east) and over 800 feet looking right (west) from the north leg. Sight distances from the south leg were observed to be greater than 800 feet in either direction.

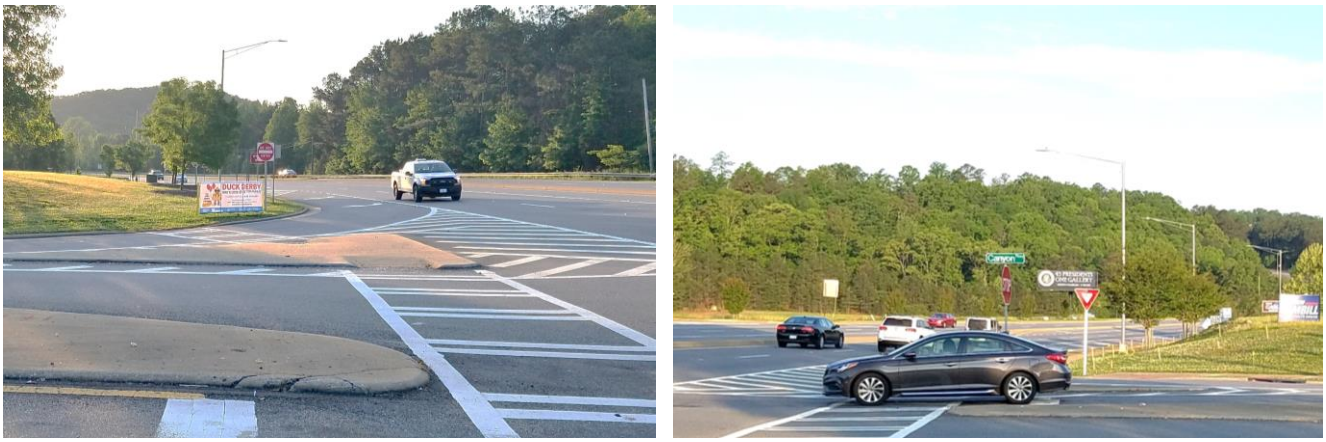


Figure 3 : North Leg (Canyon Parkway) – looking east (left); looking west (right)

SITE INFORMATION AND TRIP GENERATION

A proposed RaceTrac fuel center is planned in the northwest corner of the intersection. The site would have full access to SR 113 (E Main Street) via the existing median opening at Canyon Parkway and a new right-in / right-out access on SR 113 (E Main Street), west of Canyon Parkway.

Figure 4 : Site Location and Site Plan

Trip generation estimates were based on the rates and equations published in the 9th edition of the Institute of Transportation Engineers (ITE) Trip Generation report. This reference contains traffic volume count data collected at similar facilities nationwide. Based on data provided in the second edition of the ITE Trip Generation Handbook, a pass-by reduction of 62% (AM) and 56% (PM) was applied. The calculated trip generation for the site is shown in Table 3. A site plan is included in the Appendix A.

Table 3 : Trip Generation

Segment Info		AM Peak Hour			PM Peak Hour			24-Hour
Land Use	Size	Enter	Exit	Total	Enter	Exit	Total	Two-Way
Gasoline/Service Station with Convenience Market	16 fuel positions	81	82	163	108	108	216	2,604

24-hour traffic volumes that have been calculated using the ITE Trip Generation Manual were distributed hourly to the turning movements at the study intersection. The hourly site traffic was determined from historic data collected at similar sites and is shown in Table 4.

Table 4 : Hourly Distribution of Site Traffic

TIME	Proportion of 24 Hr Traffic		TOTAL TRIPS		
	Enter %	Exit %	Total Enter	Total Exit	Total
6:00 am - 7:00 am	5.1	5.4	66	70	136
7:00 am - 8:00 am	7.1	7.4	93	97	190
8:00 am - 9:00 am	5.8	6.4	76	83	159
9:00 am - 10:00 am	5.0	5.4	65	70	135
10:00 am - 11:00 am	4.6	4.7	60	61	121
11:00 am - 12:00 Noon	4.6	4.5	60	59	119
12:00 am - 1:00 pm	4.8	5.2	62	68	130
1:00 pm - 2:00 pm	6.0	5.0	79	65	144
2:00 pm - 3:00 pm	5.0	5.2	65	68	133
3:00 pm - 4:00 pm	6.5	6.6	84	86	170
4:00 pm - 5:00 pm	6.3	5.4	82	70	152
5:00 pm - 6:00 pm	6.6	6.9	86	90	176
6:00 pm - 7:00 pm	6.6	6.7	86	87	173
TOTAL	74.0	74.8	964	974	1,938

A distribution of trips to the proposed development to/from all directions was developed based on existing entering and exiting volumes at the intersection, which indicates that travel patterns for new trips will emulate the following distribution:

- 65% to/from the east (SR 113)
- 35% to/from the west (SR 113)

Because the site has multiple access points, not all of the generated traffic will enter and exit the site from the study intersection. Table 5 shows the proportions and volumes of the development's traffic that will pass through the study intersection.

Table 5 : New Site Generated Traffic Volumes (SR 113 at Canyon Parkway)

Approach	NORTHBOUND Exxon Drwy			SOUTHBOUND Canyon Parkway			EASTBOUND SR 113 (E Main Street)			WESTBOUND SR 113 (E Main Street)		
% of Total Entering Traffic	-	-	-	-	-	-	35%	-	-	-	20%	45%
% of Total Exiting Traffic	-	-	-	65%	-	20%	-	-	-	-	-	-
Time / Movement	L	T	R	L	T	R	L	T	R	L	T	R
6:00 am - 7:00 am	0	0	0	46	0	14	23	0	0	0	13	30
7:00 am - 8:00 am	0	0	0	63	0	19	33	0	0	0	19	42
8:00 am - 9:00 am	0	0	0	54	0	17	27	0	0	0	15	34
9:00 am - 10:00 am	0	0	0	46	0	14	23	0	0	0	13	29
10:00 am - 11:00 am	0	0	0	40	0	12	21	0	0	0	12	27
11:00 am - 12:00 Noon	0	0	0	38	0	12	21	0	0	0	12	27
12:00 am - 1:00 pm	0	0	0	44	0	14	22	0	0	0	12	28
1:00 pm - 2:00 pm	0	0	0	42	0	13	28	0	0	0	16	36
2:00 pm - 3:00 pm	0	0	0	44	0	14	23	0	0	0	13	29
3:00 pm - 4:00 pm	0	0	0	56	0	17	29	0	0	0	17	38
4:00 pm - 5:00 pm	0	0	0	46	0	14	29	0	0	0	16	37
5:00 pm - 6:00 pm	0	0	0	59	0	18	30	0	0	0	17	39
6:00 pm - 7:00 pm	0	0	0	57	0	17	30	0	0	0	17	39
TOTAL	0	0	0	635	0	195	339	0	0	0	192	435

WARRANT ANALYSIS

The posted speed limit on SR 113 (E Main Street) is 45 mph. A signal warrant analysis was performed using a main street approach speed of 45 mph with the intersection geometry of a multi-lane main street and a single-lane side street. A northbound and southbound right-turn reduction of 100% was applied for the side street to account for any right turners that may arrive at the intersection and turn right without waiting for a gap in the mainline through traffic. Table 6 shows the future traffic volumes at the intersection, which are a combination of the existing (Table 1) and site generated (Table 5) traffic volumes.

Table 6 : Future Traffic Volumes (SR 113 at Canyon Parkway)

Approach	NORTHBOUND Exxon Drwy			SOUTHBOUND Canyon Parkway			EASTBOUND SR 113 (E Main Street)			WESTBOUND SR 113 (E Main Street)		
Time / Movement	L	T	R	L	T	R	L	T	R	L	T	R
6:00 am - 7:00 am	7	4	27	86	0	53	52	336	1	16	371	33
7:00 am - 8:00 am	4	3	30	116	0	82	84	479	0	20	700	48
8:00 am - 9:00 am	4	0	26	101	1	69	75	424	0	16	623	43
9:00 am - 10:00 am	3	3	26	82	1	50	57	388	1	18	535	36
10:00 am - 11:00 am	1	0	20	70	0	37	51	451	1	16	503	34
11:00 am - 12:00 Noon	4	0	19	69	0	33	53	430	0	17	635	38
12:00 am - 1:00 pm	7	0	30	80	0	48	73	605	0	35	659	47
1:00 pm - 2:00 pm	5	4	29	71	1	57	64	639	0	23	670	44
2:00 pm - 3:00 pm	3	0	30	76	1	41	62	619	2	23	715	37
3:00 pm - 4:00 pm	2	1	47	81	2	49	55	630	1	30	786	49
4:00 pm - 5:00 pm	4	3	36	76	2	44	72	750	2	26	894	50
5:00 pm - 6:00 pm	4	1	47	89	0	55	57	849	2	26	995	49
6:00 pm - 7:00 pm	6	1	38	83	2	39	62	651	3	30	761	48

Future traffic volumes shown in Table 5 were used in the signal warrant analyses. The results of the signal warrant analysis for future condition indicated that signal warrants 1, 2, and 3 will be satisfied for the 100% standard. A detailed copy of the signal warrant analysis is included in Appendix D.

FUTURE DELAY ANALYSIS

A future capacity analysis was performed at the intersection of SR 113 (E Main Street) at Canyon Parkway. The methodology used for evaluating traffic operations at the intersection is based on the criteria set forth in the Transportation Research Board's Highway Capacity Manual (HCM 2010). Synchro Software, which emulates the HCM methodology, was used for conducting the analysis. The future intersection capacity analysis is shown in Table 7 for the unsignalized and signalized conditions.

Table 7 : Future Intersection Delay

	Intersection	AM Peak Hour		PM Peak Hour	
		LOS	Delay	LOS (Delay)	v/c Ratio
NO SIGNAL	**SR 113 (E Main Street) at Canyon Parkway**				
	-Eastbound Approach (SR 113)	A	1.7	A	0.9
	-Westbound Approach (SR 113)	A	0.1	A	0.1
	-Northbound Left (Exxon Drwy)	E	36.6	F	77.5
	-Southbound Left (Canyon Pkwy)	F	204.2	F	*
SIGNAL	**SR 113 (E Main Street) at Canyon Parkway**	**Overall: B**	**12.4**	**Overall: B**	**12.8**
	-Eastbound Approach (SR 113)	B	12.3	B	13.1
	-Westbound Approach (SR 113)	B	11.7	B	11.6
	-Northbound Approach (Exxon Drwy)	B	16.6	B	18.4
	-Southbound Approach (Canyon Pkwy)	B	18.4	C	20.5

* Volume exceeds capacity (delays over 300 seconds)

As shown in Table 7, after the installation of a traffic signal, the intersection will operate at LOS B in the AM and PM peak hours. In addition to the signal installation, the following improvements are recommended:

1) Based on the product of the eastbound left turns and opposing through volumes, a lagging only flashing yellow arrow is recommended for traffic turning left from SR 113 (E Main Street).

INTERSECTION CONTROL EVALUATION (ICE)

As the intersection of SR 113 (E Main Street) at Canyon Parkway is being evaluated for installation of a traffic signal and is located on a state route, an ICE analysis is required. As outlined in GDOT Policy 4A-5, the purpose of ICE is to provide traceability, transparency, consistency and accountability when identifying and selecting an intersection control solution that both meets he project purpose and reflects the overall best value in terms of specific performance-based criteria. An ICE is required for any intersection improvement (e.g., a new intersection, an intersection modification, widening/reconstruction or corridor project, or work accomplished through a driveway or encroachment permit that affects an intersection) where the intersection is on a state route or designed / constructed using state funding.

The ICE process consists of two distinct stages. Stage 1 serves as a screening effort meant to eliminate non-competitive options and identify which alternatives merit further considerations based on their practical feasibility. The following additional alternatives were investigated in the ICE Stage 1 screening, determined to be non-competitive or infeasible options for the following reasons, and not selected for further evaluation in ICE Stage 2:

- **Roundabout:** The roundabout alternative was considered, but ultimately removed due to the following:
  - Based on the traffic volumes, the GDOT roundabout analysis is not required since SR 113 (E Main Street) carries over 90% of the traffic through the intersection.
  - A multi-lane roundabout would not be feasible within the right-of-way. Because this is a privately funded improvement, the acquisition of property outside of the developer's frontage (imminent domain) is not possible.
- **RCUT (stop control):** The RCUT alternative was considered, but ultimately removed due to the following:
  - Because of median spacing and limited access limitations, a downstream U-turn for eastbound traffic would likely need to occur at the adjacent unsignalized interchange ramp, 1150 feet east.
  - The desirable right-of-way widths needed to accommodate downstream U-turns for large trucks without allowing vehicles to encroach on curbs or shoulders may not be feasible within the existing right-of-way. Because this is a privately funded improvement, the acquisition of property outside of the developer's frontage (imminent domain) is not possible.

Stage 2 further evaluates the alternatives identified in Stage 1 (inclusive of safety, operations, cost, environmental impacts and project support) in order to support the selection of a preferred alternative that may be advanced to detailed design.

- **Conventional (Minor Stop):** SR 113 (E Main Street) at Canyon Parkway is currently a four-leg intersection with stop-controlled minor approaches. As this is the No-Build condition, it was selected for evaluation in ICE Stage 2.
- **Traffic Signal:** Because a signal was found to be warranted under MUTCD criteria, a traffic signal with left turn bays on all approaches was selected for evaluation in ICE Stage 2.

The ICE process resulted in **Traffic Signal** being selected as the intersection control for the Build conditions. The full Stage 1 screening Stage 2 ranking results are documented in Appendix I.

CONCLUSIONS AND RECOMMENDATIONS

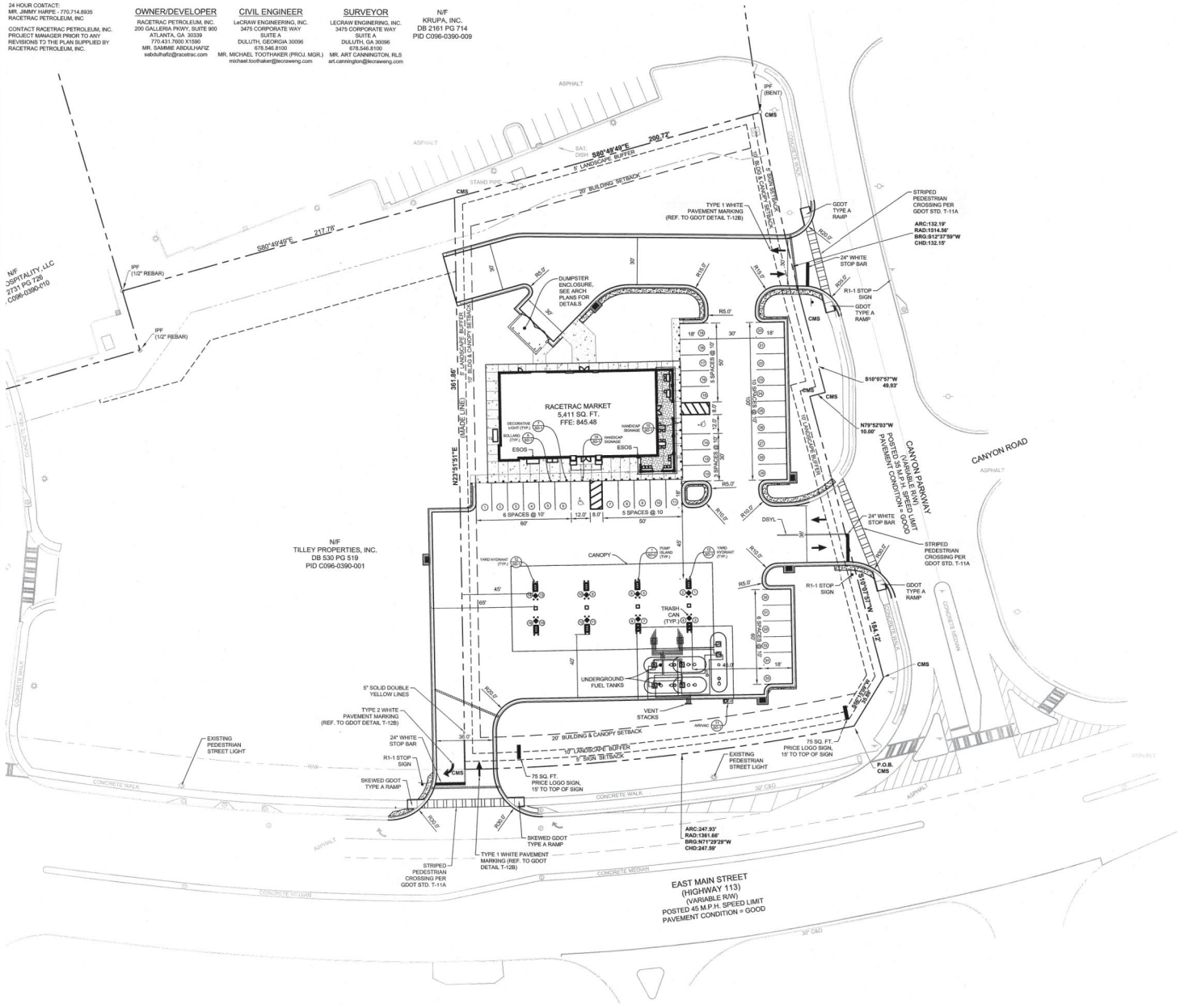
The results of the signal warrant analysis indicate that, after the future traffic volumes at the intersection of SR 113 (E Main Street) at Canyon Parkway will meet the MUTCD warrants 1, 2, and 3 for the 100% standard after the construction of the proposed development. Based on the projected traffic volumes and the results of an Intersection Control Evaluation (ICE), a traffic signal installation is recommended at this intersection.

PREPARED BY: _____ DATE: _____
Jacobs Engineering Group

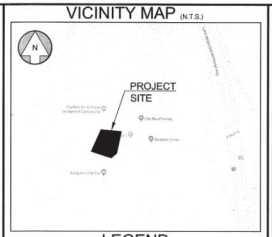
RECOMMENDED BY: _____ DATE: _____
District Traffic Engineer

RECOMMENDED BY: _____ DATE: _____
State Traffic Engineer

Appendix A. Site Plan



VICINITY MAP (N.T.S.)



LEGEND

- INDICATES EXISTING ELEVATIONS
- PROPOSED FINISHED GRADES
- SPOT ELEVATION AT FINISHED GRADE
- INDICATES TOP OF STRUCTURE; INDICATES FLOW LINE ELEVATION
- MATCH EXISTING GRADE
- 1 1/2" WATER LINE TO EXISTING SERVICE OR WELL
- 1" WATER LINE FOR IRRIGATION
- 4" SANITARY SEWER LINE TO EXISTING SANITARY SEWER MANHOLE OR SEPTIC TANK
- BURIED ELECTRICAL SERVICE FROM NEAREST EXISTING UTILITY POLE
- TELEPHONE SERVICE FROM NEAREST TELEPHONE POLE RUN UNDERGROUND IN CONDUIT
- CONCRETE CURB (SEE SHEET SD-1)
- DISPENSER NUMBER
- DISPENSER PRODUCT I.D.
- PROPOSED PUBLIC TELEPHONE (SEE SHEET SD-1)
- WEATHERPROOF ELECTRICAL OUTLET
- E.S.O.S. EMERGENCY SHUT OFF SWITCH
- AREA LIGHT LOCATION (SEE SHEET SD-4 FOR DETAILS)
- STREET LIGHT LOCATION (SEE SHEET SD-4 FOR DETAILS)
- SPIDER LIGHTS (WHERE APPLICABLE)
- REVISION INDICATOR
- H.P. HIGH POINT
- INDICATES PROPOSED 8" CONCRETE AREA
- PROPOSED AIR/WATER STAND. (SEE SHEET SD-1)
- B.P. BUMPER POST (SEE SHEET SD-1)
- T.O.I. ELEVATION AT TOP OF ISLAND.
- EXISTING ELEMENTS
- PROPOSED ELEMENTS
- P.P. POWER POLE
- M.H. MANHOLE
- S.S. SANITARY SEWER
- S.P.M.H. SUBMERGED PUMP MANHOLE
- D.I. DROP INLET
- TPF TREE PROTECTION FENCE
- LOD LIMITS OF DISTURBANCE
- T.W. TOP OF WALL
- B.W. BOTTOM OF WALL
- H.P. HIGH POINT
- P.B. PIPE BEND

SITE SUMMARY

SITE AREA	
SITE AREA:	2.03 ACRES (88,505 S.F.)
IMPERVIOUS AREA:	57,600 SF (65.1%)
PERVIOUS AREA (GREENSPACE):	30,905 SF (34.9%)
ZONING CLASSIFICATION	
JURISDICTION:	CITY OF CARTERSVILLE
ZONING:	G-C
ADJACENT ZONING:	G-C
BUILDING SETBACKS	
FRONT:	20'
SIDE:	10'
REAR:	20'
BUILDING SUMMARY	
BUILDING AREA:	5,411 S.F.
BUILDING COVERAGE:	6.1%
PARKING SUMMARY	
PARKING REQ.:	1 SPACES / PUMP
	16 SPACES
PARKING PROV.:	1 SPACES / 146 S.F.
	37 SPACES (INCLUDES 2 ADA SPACES)
STANDARD STALL DIMENSIONS:	10' x 18'
MIN. DRIVE WIDTH:	24'

GENERAL SITE NOTES:

1. ALL DIMENSIONS ARE TO THE EDGE OF PAVEMENT UNLESS SPECIFIED OTHERWISE.
2. ALL NEW CURB AND GUTTER IN ROW TO BE 24" OR 30" GDOT 9032B "TYPE 7", UNLESS OTHERWISE INDICATED. CURB AND GUTTER ON SITE TO BE 24" ROLL CURB WITH GUTTER PER DETAIL ON SHT SD-1.
3. ALL LAND DISTURBANCE TO BE STABILIZED WITH VEGETATION UPON COMPLETION OF DEMOLITION.
4. ALL TREES SHALL HAVE PROPER PROTECTION DURING CONSTRUCTION UNLESS APPROVED PLANS INDICATE OTHERWISE.
5. BOUNDARY & TOPOGRAPHIC SURVEY BY LECRAW ENGINERING, INC., DATED JANUARY 10, 2018. ELEVATION DATUM IS NAVD 88.
6. THIS PROPERTY DOES NOT LIE WITHIN THE FLOOD PLAIN, AS SHOWN ON THE SURVEY BY LECRAW ENGINERING, INC., DATED JANUARY 10, 2018 AND ON THE FEMA FIRM MAP NUMBER 13121C0366F DATED SEPTEMBER 18, 2013.
7. 1 HANDICAP SPACE IS REQUIRED TO BE VAN ACCESSIBLE WITH A MINIMUM 96" WIDE ACCESS AISLE.
8. ACCESSIBLE PARKING AREAS, INCLUDING AISLES, SHALL SLOPE NO MORE THAN 2% IN ANY DIRECTION.
9. 8" CONCRETE TO BE USED OVER TANK PIT AND DUMPSTER.
10. THERE ARE NO KNOWN STREAMS, LAKES, OR WETLANDS LOCATED ON THE SITE.

811 Know what's below. Call before you dig.

NO.	REVISIONS	BY	DATE

PREPARED IN THE OFFICE OF:
LECRAW ENGINEERING
3475 CORPORATE WAY - SUITE A
DULUTH, GEORGIA 30096
(O) 678.546.8100 (F) 770.441.0266
WWW.LECRAWENGINEERING.COM

GEORGIA REGISTERED PROFESSIONAL ENGINEER 3/26/18 MARK S. LECRAW

RaceTrac.

RACETRAC PETROLEUM, INC.
200 GALLERIA PKWY, SUITE 900
ATLANTA, GA 30339
(770) 431-7600

SITE PLAN

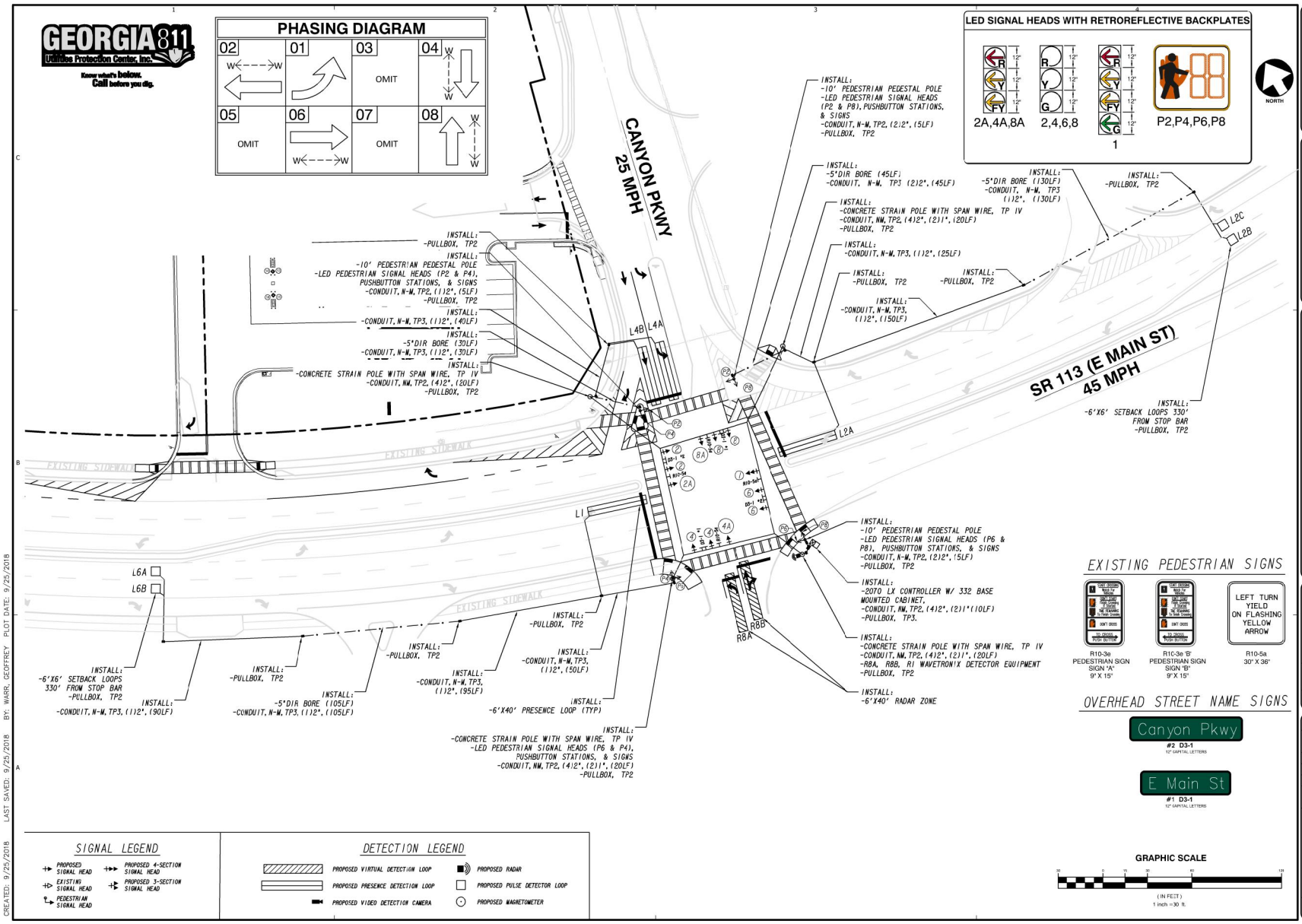
RACETRAC MARKET

SITE: E MAIN ST & CANYON PKWY, CARTERSVILLE, BARTOW COUNTY, GEORGIA
LAND LOT 390, 4TH DISTRICT, 3RD SECTION; PARCEL: C096-0390-001

SCALE:	1" = 30'
DRAWN:	MAT
DATE:	03/26/2018
JOB NO.	005031

C-1.1

SHEET NO. | REV.



GEORGIA811
Utilities Protection Center, Inc.
Know what's below. Call before you dig.

JACOBS
Jacobs Engineering Group
46 Liberty Industrial Blvd.
McDonough, Georgia 30253
Ph: 678.432.7900

ACCESS IMPROVEMENTS / SIGNAL DESIGN

FOR

RACETRAC PETROLEUM INC
3225 Cumberland Blvd, Suite 100
Atlanta, GA 30339

LOCATED IN LAND LOT 390, 4TH DISTRICT, 3RD SECTION, BARTOW COUNTY, GEORGIA

REV	DATE	REVISION DESCRIPTION
1	09-25-18	LAGGING LEFT PHASE

THIS LINE ____ IS ONE INCH LONG WHEN PLOTTED FULL SCALE

THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE APPLICABLE OR GOVERNING TECHNICAL SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS.

PROJECT NO: EGXL0300
DATE: 07-23-2018
DWG NAME: EGXL0300 RACETRAC CARTERSVILLE 09-25-18.DWG

DRAWN:	CHECKED:	SCALE:
KRW	GKW	1" - 30'

SHEET TITLE

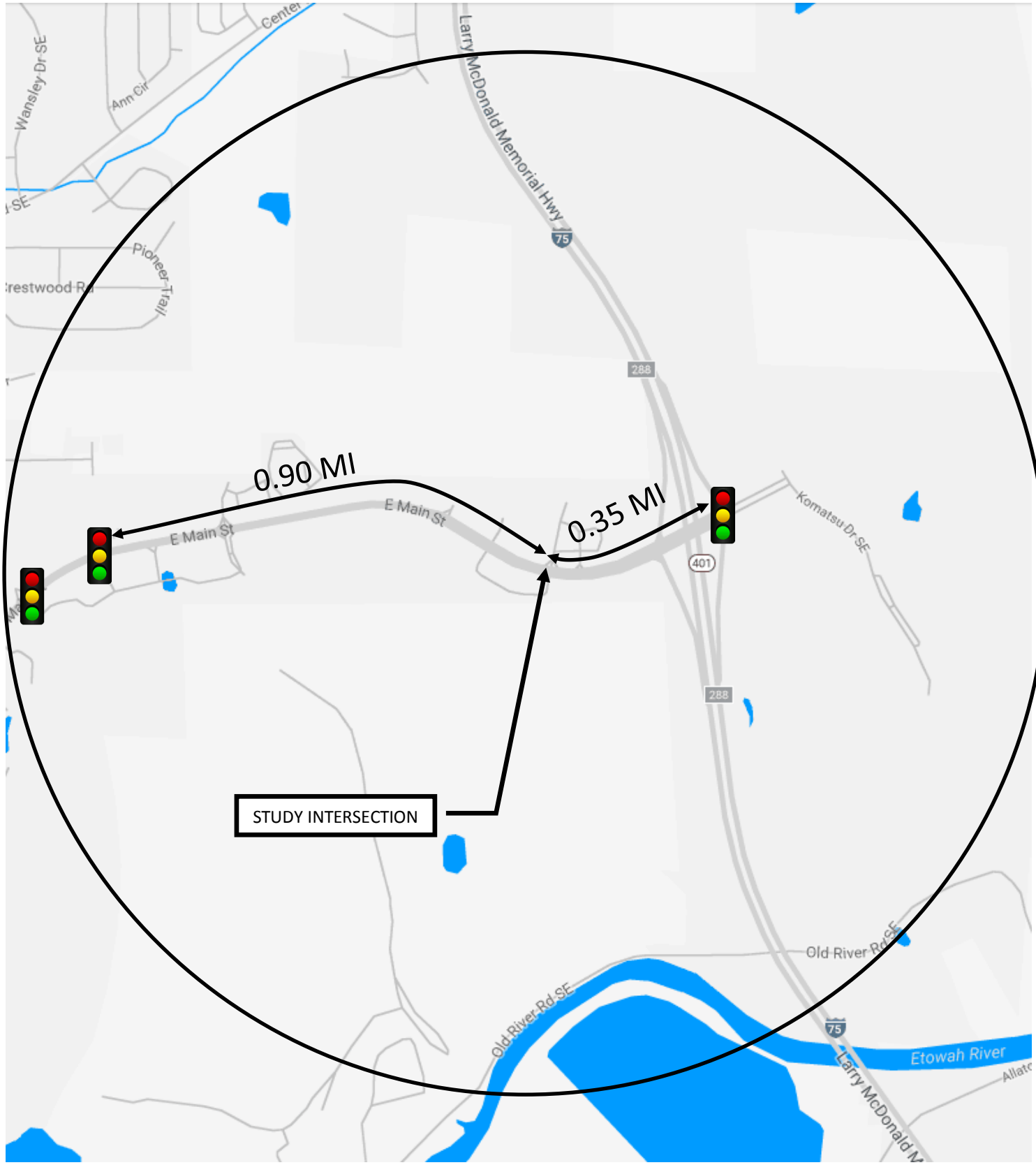
SIGNAL PLAN

SHEET TS1

CREATED: 9/25/2018 LAST SAVED: 9/25/2018 BY: WARR, GEOFFREY PLOT DATE: 9/25/2018

Appendix B. Adjacent Signalized Intersections

ADJACENT INTERSECTIONS WITHIN 1 MILE



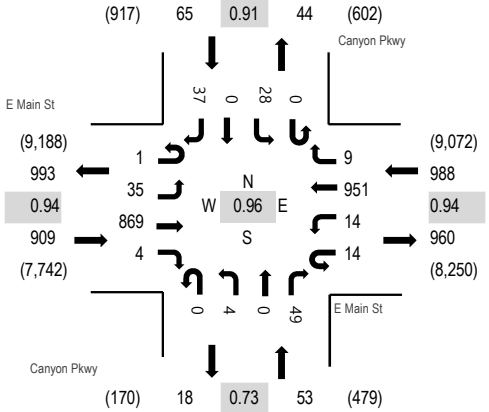
Appendix C. Traffic Count Data

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

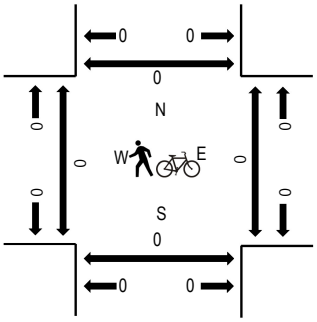
Location: 1 Canyon Pkwy & E Main St AM
Date: Thursday, May 10, 2018
Peak Hour: 04:45 PM - 05:45 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	E Main St Eastbound				E Main St Westbound				Canyon Pkwy Northbound				Canyon Pkwy Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
6:00 AM	1	6	73	0	0	2	59	1	0	0	2	5	0	7	0	4	160	860	0	0	0	0
6:15 AM	0	4	89	0	0	2	75	0	0	4	2	6	0	10	0	8	200	964	0	0	0	0
6:30 AM	0	11	78	0	3	4	108	0	0	1	0	10	0	13	0	10	238	1,102	0	0	0	0
6:45 AM	0	7	96	1	2	3	116	2	0	2	0	6	0	10	0	17	262	1,267	0	0	0	0
7:00 AM	0	10	104	0	2	3	110	1	0	1	0	11	0	9	0	13	264	1,390	0	0	0	0
7:15 AM	0	8	137	0	1	6	151	2	0	1	0	5	0	12	0	15	338	1,425	0	0	0	0
7:30 AM	1	14	127	0	3	0	217	0	0	0	2	7	0	11	0	21	403	1,438	0	0	0	0
7:45 AM	1	17	111	0	0	5	203	3	0	2	1	7	0	21	0	14	385	1,329	0	0	0	0
8:00 AM	0	13	103	0	1	1	145	2	0	1	0	5	0	13	1	14	299	1,235	0	0	0	0
8:15 AM	0	14	126	0	2	1	165	4	0	1	0	6	0	12	0	20	351	1,173	0	0	0	0
8:30 AM	2	10	98	0	2	4	147	2	1	1	0	5	0	10	0	12	294	1,098	0	0	0	0
8:45 AM	2	7	97	0	2	3	151	1	0	0	0	10	0	12	0	6	291	1,088	0	0	0	0
9:00 AM	0	10	90	0	3	0	106	0	0	0	2	3	0	11	0	12	237	1,075	0	0	0	0
9:15 AM	0	11	103	0	1	3	129	1	0	0	0	8	0	13	1	6	276	1,092	0	0	0	0
9:30 AM	0	6	101	0	3	2	145	6	0	2	0	5	0	5	0	9	284	1,081	0	0	4	0
9:45 AM	0	7	94	1	3	3	142	0	0	1	1	10	0	7	0	9	278	1,060	0	0	1	0
10:00 AM	0	6	115	0	4	1	107	2	0	0	0	6	0	6	0	7	254	1,072	0	0	0	0
10:15 AM	1	10	122	0	2	0	113	0	0	0	0	5	0	7	0	5	265	1,091	0	0	0	0
10:30 AM	0	5	110	0	1	2	127	3	0	0	0	5	0	6	0	4	263	1,128	0	0	0	0
10:45 AM	0	8	104	1	5	1	144	2	0	1	0	4	0	11	0	9	290	1,160	0	0	0	0
11:00 AM	0	8	93	0	1	0	150	3	0	0	0	4	0	7	0	7	273	1,188	0	0	0	0
11:15 AM	0	9	119	0	5	1	147	3	0	1	0	5	0	6	0	6	302	1,220	0	0	0	0
11:30 AM	0	6	109	0	2	3	155	2	0	2	0	5	0	9	0	2	295	1,297	0	0	0	0
11:45 AM	0	9	109	0	2	3	171	3	0	1	0	5	0	9	0	6	318	1,382	0	0	0	0
12:00 PM	1	12	125	0	4	0	137	7	0	0	0	6	0	5	0	8	305	1,464	0	0	0	0
12:15 PM	0	10	150	0	6	7	174	5	0	2	0	8	0	9	0	8	379	1,525	0	0	0	0
12:30 PM	0	14	161	0	2	2	169	4	0	2	0	6	0	10	0	10	380	1,518	0	0	0	0
12:45 PM	2	12	169	0	8	6	167	3	0	3	0	10	0	12	0	8	400	1,504	0	0	0	0
1:00 PM	0	14	146	0	1	3	159	2	0	2	3	8	0	15	1	12	366	1,472	0	0	0	0
1:15 PM	1	8	170	0	4	1	158	3	0	0	1	10	0	4	0	12	372	1,470	0	0	0	0
1:30 PM	0	7	162	0	6	3	170	1	0	1	0	4	0	5	0	7	366	1,494	0	0	0	0
1:45 PM	0	6	161	0	2	3	167	2	0	2	0	7	0	5	0	13	368	1,488	0	0	0	0
2:00 PM	0	10	170	1	3	1	158	2	0	0	0	3	0	9	0	7	364	1,486	0	0	0	0
2:15 PM	0	12	158	0	5	5	189	1	0	2	0	6	0	7	0	11	396	1,505	0	0	0	0
2:30 PM	1	7	142	1	1	3	179	2	0	1	0	11	0	7	0	5	360	1,481	0	0	0	0

2:45 PM	0	9	149	0	4	1	176	3	0	0	0	10	0	9	1	4	366	1,523	0	0	0	0
3:00 PM	0	6	156	0	1	3	184	4	0	0	1	8	0	8	1	11	383	1,576	0	0	0	0
3:15 PM	0	4	151	1	2	5	188	2	0	0	0	7	0	4	0	8	372	1,598	0	0	0	0
3:30 PM	0	7	170	0	11	4	173	2	0	1	0	21	0	6	0	7	402	1,688	0	0	0	0
3:45 PM	0	9	153	0	3	1	224	3	0	1	0	11	0	7	1	6	419	1,735	0	0	0	0
4:00 PM	0	10	180	0	6	1	170	4	0	1	1	15	0	7	1	9	405	1,817	0	0	0	0
4:15 PM	0	8	175	0	1	4	245	3	0	3	1	9	0	7	1	5	462	1,899	0	0	0	0
4:30 PM	1	8	182	0	3	2	231	3	0	0	1	3	1	5	0	9	449	1,964	0	0	0	0
4:45 PM	0	16	213	2	4	5	232	3	0	0	0	9	0	10	0	7	501	2,015	0	0	0	0
5:00 PM	0	4	214	1	3	3	220	3	0	3	0	15	0	8	0	13	487	2,011	0	0	0	0
5:15 PM	0	5	235	1	5	6	251	1	0	1	0	13	0	5	0	4	527	1,965	0	0	0	0
5:30 PM	1	10	207	0	2	0	248	2	0	0	0	12	0	5	0	13	500	1,832	0	0	0	0
5:45 PM	1	6	193	0	3	4	259	4	0	0	1	7	0	12	0	7	497	1,727	0	0	0	0
6:00 PM	1	10	207	0	2	3	193	2	0	1	0	13	0	6	0	3	441	1,564	0	0	0	0
6:15 PM	0	8	140	2	3	3	209	2	0	1	1	11	0	6	1	7	394		0	0	0	0
6:30 PM	0	7	152	0	3	11	200	2	0	1	0	5	0	7	0	7	395		0	0	0	0
6:45 PM	1	5	152	1	2	3	142	3	0	3	0	9	0	7	1	5	334		0	0	0	0

Peak Rolling Hour Flow Rates

	Eastbound				Westbound				Northbound				Southbound				
Vehicle Type	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	23	0	0	1	13	0	0	0	0	2	0	0	0	0	39
Lights	1	35	836	4	14	12	923	8	0	4	0	45	0	28	0	36	1,946
Mediums	0	0	10	0	0	1	15	1	0	0	0	2	0	0	0	1	30
Total	1	35	869	4	14	14	951	9	0	4	0	49	0	28	0	37	2,015

Appendix D. Warrant Analysis Sheets (100% Standard)

JACOBS ENGINEERING

SIGNAL WARRANT ANALYSIS SUMMARY REPORT:
SR 113 (E Main Street) @ Canyon Parkway

Project Number :	Project Number	Report Date :	May 22, 2018
Analyst :	GKW	Counts Date :	May 10, 2018
Major Street :	SR 113 (E Main Street)		
Minor Street :	Canyon Parkway		
Speed on Major Street :	45		
Lanes @ Intersection :	Major Street - 2		
	Minor Street - 1		

WARRANT 1, EIGHT-HOUR VEHICULAR VOLUME **100% Thresholds**

WARRANT 1 **SATISFIED**

STANDARD 1	**SATISFIED**	CONDITION A	0	HOURS
		CONDITION B	9	HOURS
STANDARD 2	**NOT SATISFIED**	CONDITION A	0	HOURS
		CONDITION B	13	HOURS

WARRANT 2, FOUR-HOUR VEHICULAR VOLUME **100% Thresholds**

WARRANT 2	**SATISFIED**	4	HOURS

WARRANT 3, PEAK HOUR VEHICULAR VOLUME **100% Thresholds**

WARRANT 3	**SATISFIED**		
STANDARD A	**SATISFIED**	6	VEHICLE HOURS
STANDARD B	**NOT SATISFIED**	0	HOURS

WARRANT 4, PEDESTRIAN VOLUME **100% Thresholds**

WARRANT 4	**NOT EVALUATED**		
STANDARD A	**NOT SATISFIED**	0	HOURS
STANDARD B	**NOT SATISFIED**	0	HOURS

WARRANT 5, SCHOOL CROSSING

WARRANT 5 **NOT EVALUATED**

WARRANT 6, COORDINATED SIGNAL SYSTEM

WARRANT 6 **NOT EVALUATED**

WARRANT 7, CRASH EXPERIENCE

WARRANT 7 **NOT EVALUATED**

WARRANT 8, ROADWAY NETWORK

WARRANT 8 **NOT EVALUATED**

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

WARRANT 9 **NOT EVALUATED**

JACOBS ENGINEERING

SIGNAL WARRANT ANALYSIS DETAILED REPORT:
SR 113 (E Main Street) @ Canyon Parkway

Analyst : GKW
Major Street : SR 113 (E Main Street)
Minor Street : Canyon Parkway
Speed on Major Street : 45

Report Date : May 22, 2018
Counts Date : May 10, 2018
Lanes @ Intersection : Major Street - 2
Minor Street - 1

24-HOUR TRAFFIC VOLUME

TABLE 1

Time	Minor Street Northbound				Minor Street Southbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 100 % RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 100% RT Turn Reduction
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	38	27	71	11	139	53	38	86
7:00 AM	37	30	81	7	198	82	41	116
8:00 AM	30	26	87	4	171	69	40	102
9:00 AM	32	26	81	6	133	50	38	83
10:00 AM	21	20	95	1	107	37	35	70
11:00 AM	23	19	83	4	102	33	32	69
12:00 PM	37	30	81	7	128	48	38	80
1:00 PM	38	29	76	9	129	57	44	72
2:00 PM	33	30	91	3	118	41	35	77
3:00 PM	50	47	94	3	132	49	37	83
4:00 PM	43	36	84	7	122	44	36	78
5:00 PM	52	47	90	5	144	55	38	89
6:00 PM	45	38	84	7	124	39	31	85
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0

Total		74		1090

JACOBS ENGINEERING

24-HOUR TRAFFIC VOLUME

TABLE 2

Time	Major Street				Major Street			
	Eastbound				Westbound			
24 Hours	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction	Total Approach Volume	Right Turn	% Right Turn	With 0% RT Turn Reduction
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	389	1	0	389	420	33	8	420
7:00 AM	563	0	0	563	768	48	6	768
8:00 AM	499	0	0	499	682	43	6	682
9:00 AM	446	1	0	446	589	36	6	589
10:00 AM	503	1	0	503	553	34	6	553
11:00 AM	483	0	0	483	690	38	6	690
12:00 PM	678	0	0	678	741	47	6	741
1:00 PM	703	0	0	703	737	44	6	737
2:00 PM	683	2	0	683	775	37	5	775
3:00 PM	686	1	0	686	865	49	6	865
4:00 PM	824	2	0	824	970	50	5	970
5:00 PM	908	2	0	908	1070	49	5	1070
6:00 PM	716	3	0	716	839	48	6	839
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0

Total		8081		9699

JACOBS ENGINEERING

WARRANT ANALYSIS RESULTS - SR 113 (E Main Street) @ Canyon Parkway

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME (100% Thresholds)

WARRANT 1* SATISFIED

STANDARD 1	SATISFIED	CONDITION A	0	HOURS
		CONDITION B	9	HOURS
STANDARD 2	NOT SATISFIED	CONDITION A	0	HOURS
		CONDITION B	13	HOURS

24-HOUR TRAFFIC VOLUME EVALUATION

TABLE 3

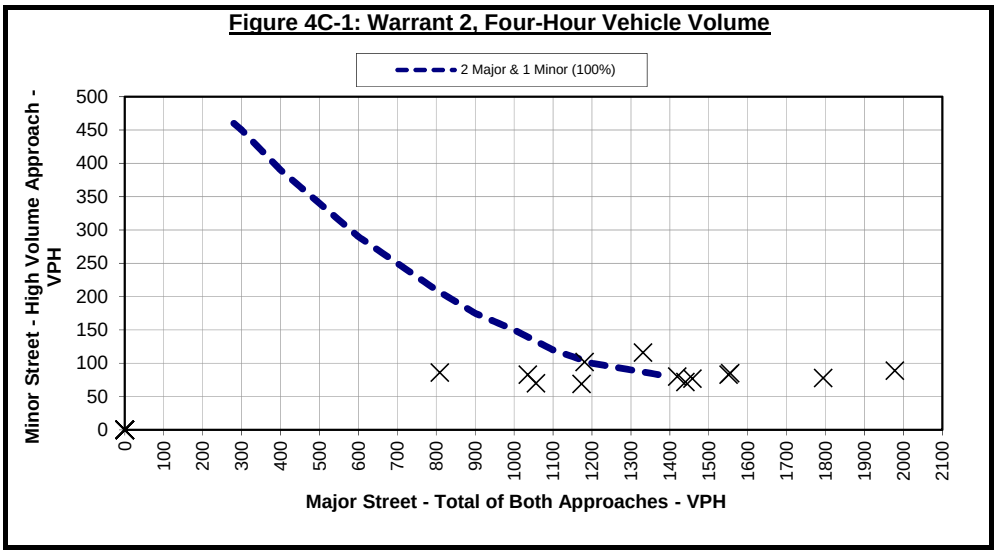
HOUR OF DAY	MAJOR ST TOTAL OF BOTH APPROACHES	MINOR ST HIGH VOLUME APPROACH	WARRANT 1			
			STANDARD 1		STANDARD 2	
			CONDITION A	CONDITION B	CONDITION A	CONDITION B
12:00 AM	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0
6:00 AM	809	86	MAJOR	MINOR	MAJOR	BOTH
7:00 AM	1331	116	MAJOR	BOTH	MAJOR	BOTH
8:00 AM	1181	102	MAJOR	BOTH	MAJOR	BOTH
9:00 AM	1035	83	MAJOR	BOTH	MAJOR	BOTH
10:00 AM	1056	70	MAJOR	MAJOR	MAJOR	BOTH
11:00 AM	1173	69	MAJOR	MAJOR	MAJOR	BOTH
12:00 PM	1419	80	MAJOR	BOTH	MAJOR	BOTH
1:00 PM	1440	72	MAJOR	MAJOR	MAJOR	BOTH
2:00 PM	1458	77	MAJOR	BOTH	MAJOR	BOTH
3:00 PM	1551	83	MAJOR	BOTH	MAJOR	BOTH
4:00 PM	1794	78	MAJOR	BOTH	MAJOR	BOTH
5:00 PM	1978	89	MAJOR	BOTH	MAJOR	BOTH
6:00 PM	1555	85	MAJOR	BOTH	MAJOR	BOTH
7:00 PM	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0
TOTAL	17780	1090				

CRITERIA**		STANDARD 1 - 100%		STANDARD 2 - 80%	
		CONDITION A	CONDITION B	CONDITION A	CONDITION B
	MAJOR ST	600	900	480	720
	MINOR ST	150	75	120	60
NO. OF HOURS MET		0	9	0	13

JACOBS ENGINEERING

WARRANT 2, FOUR-HOUR VEHICULAR VOLUME **(100% Thresholds)**

WARRANT 2* SATISFIED 4 HOURS



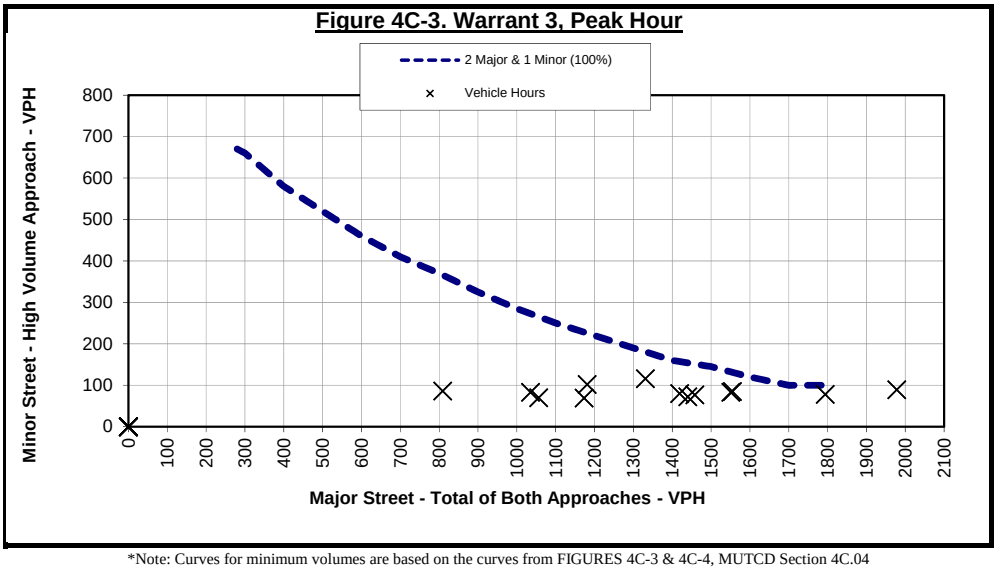
*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-1 & 4C-2, MUTCD Section 4C.04

WARRANT 3, PEAK HOUR **(100% Thresholds)**

STANDARD A SATISFIED 6 VEHICLE HOURS

114	Peak Hour Minor-Street Volume
197	Average Minor-Street Delay (seconds)
1	Number of Approach Lanes (Minor Street)

STANDARD B* SATISFIED 0 HOURS



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-3 & 4C-4, MUTCD Section 4C.04

JACOBS ENGINEERING

WARRANT 4, PEDESTRIAN VOLUME **(100% Thresholds)**

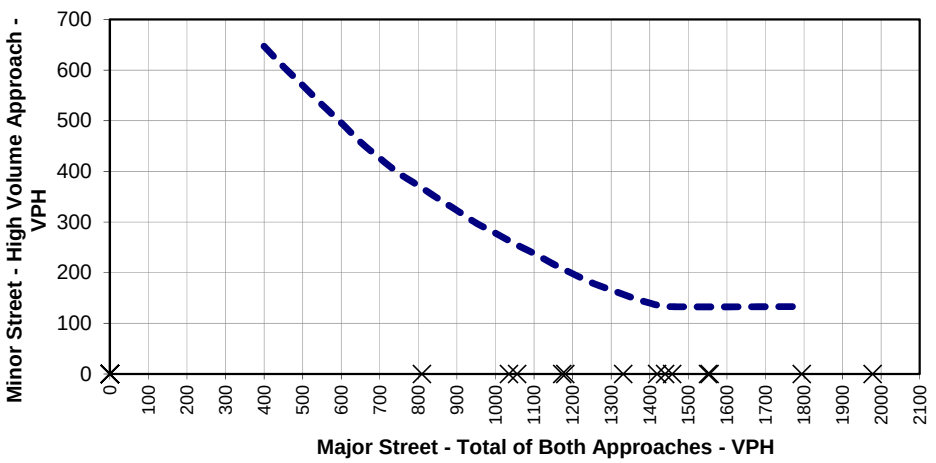
STANDARD A* NOT SATISFIED 0 HOURS

Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume

*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-5 & 4C-6, MUTCD Section 4C.06

STANDARD B* NOT SATISFIED 0 HOURS

Figure 4C-7. Warrant 4, Pedestrian Peak Hour



*Note: Curves for minimum volumes are based on the curves from FIGURES 4C-7 & 4C-8, MUTCD Section 4C.06

WARRANT 5, SCHOOL CROSSING

WARRANT 5 NOT EVALUATED

WARRANT 6, COORDINATED SIGNAL SYSTEM

WARRANT 6 NOT EVALUATED

WARRANT 7, CRASH EXPERIENCE

WARRANT 7 NOT EVALUATED

WARRANT 8, ROADWAY NETWORK

WARRANT 8 NOT EVALUATED

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

WARRANT 9 NOT EVALUATED

Appendix E. Existing Intersection Analysis

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	467	0	7	730	9	4	3	25	57	1	69
Future Vol, veh/h	58	467	0	7	730	9	4	3	25	57	1	69
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	Yield	-	-	Yield	-	-	Yield
Storage Length	235	-	-	235	-	150	-	-	50	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	86	86	86	80	80	80	91	91	91
Heavy Vehicles, %	1	4	0	14	3	0	0	0	12	8	0	0
Mvmt Flow	62	502	0	8	849	10	5	4	31	63	1	76

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	849	0	0	502	0	0	1068	1492	251	1243	1492	424
Stage 1	-	-	-	-	-	-	627	627	-	865	865	-
Stage 2	-	-	-	-	-	-	441	865	-	378	627	-
Critical Hdwy	4.12	-	-	4.38	-	-	7.5	6.5	7.14	7.66	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.66	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.66	5.5	-
Follow-up Hdwy	2.21	-	-	2.34	-	-	3.5	4	3.42	3.58	4	3.3
Pot Cap-1 Maneuver	791	-	-	979	-	-	179	125	719	124	125	584
Stage 1	-	-	-	-	-	-	443	479	-	303	374	-
Stage 2	-	-	-	-	-	-	570	374	-	599	479	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	791	-	-	979	-	-	144	114	719	108	114	584
Mov Cap-2 Maneuver	-	-	-	-	-	-	144	114	-	108	114	-
Stage 1	-	-	-	-	-	-	408	441	-	279	371	-
Stage 2	-	-	-	-	-	-	490	371	-	524	441	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	0.1	15.6	42.2
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	129	719	791	-	-	979	-	-	108	584
HCM Lane V/C Ratio	0.068	0.043	0.079	-	-	0.008	-	-	0.59	0.13
HCM Control Delay (s)	34.9	10.2	9.9	-	-	8.7	-	-	77.9	12.1
HCM Lane LOS	D	B	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0.2	0.1	0.3	-	-	0	-	-	2.9	0.4

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	35	869	4	14	951	9	4	0	49	28	0	37
Future Vol, veh/h	35	869	4	14	951	9	4	0	49	28	0	37
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	Yield	-	-	Yield	-	-	Yield
Storage Length	235	-	-	235	-	150	-	-	50	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	74	74	74	77	77	77
Heavy Vehicles, %	0	3	0	14	2	11	0	0	8	0	0	2
Mvmt Flow	37	924	4	15	1012	10	5	0	66	36	0	48

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1012	0	0	924	0	0	1535	2040	462	1578	2040	506
Stage 1	-	-	-	-	-	-	999	999	-	1041	1041	-
Stage 2	-	-	-	-	-	-	536	1041	-	537	999	-
Critical Hdwy	4.1	-	-	4.38	-	-	7.5	6.5	7.06	7.5	6.5	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.34	-	-	3.5	4	3.38	3.5	4	3.32
Pot Cap-1 Maneuver	693	-	-	665	-	-	81	57	531	75	57	512
Stage 1	-	-	-	-	-	-	265	324	-	250	310	-
Stage 2	-	-	-	-	-	-	501	310	-	501	324	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	693	-	-	665	-	-	69	53	531	62	53	512
Mov Cap-2 Maneuver	-	-	-	-	-	-	69	53	-	62	53	-
Stage 1	-	-	-	-	-	-	251	307	-	237	303	-
Stage 2	-	-	-	-	-	-	444	303	-	415	307	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.2	16.4	61.1
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	69	531	693	-	-	665	-	-	62	512
HCM Lane V/C Ratio	0.078	0.125	0.054	-	-	0.022	-	-	0.587	0.094
HCM Control Delay (s)	61.6	12.7	10.5	-	-	10.5	-	-	124.9	12.8
HCM Lane LOS	F	B	B	-	-	B	-	-	F	B
HCM 95th %tile Q(veh)	0.2	0.4	0.2	-	-	0.1	-	-	2.4	0.3

Appendix F. Future Intersection Analysis (No Signal)

Intersection	
Int Delay, s/veh	14.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	90	446	0	7	712	47	4	3	25	98	1	89
Future Vol, veh/h	90	446	0	7	712	47	4	3	25	98	1	89
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	Yield	-	-	Yield	-	-	Yield
Storage Length	235	-	-	235	-	150	-	-	50	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	86	86	86	80	80	80	91	91	91
Heavy Vehicles, %	1	4	0	14	3	0	0	0	12	8	0	0
Mvmt Flow	97	480	0	8	828	55	5	4	31	108	1	98

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	828	0	0	480	0	0	1104	1517	240	1279	1517	414
Stage 1	-	-	-	-	-	-	673	673	-	844	844	-
Stage 2	-	-	-	-	-	-	431	844	-	435	673	-
Critical Hdwy	4.12	-	-	4.38	-	-	7.5	6.5	7.14	7.66	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.66	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.66	5.5	-
Follow-up Hdwy	2.21	-	-	2.34	-	-	3.5	4	3.42	3.58	4	3.3
Pot Cap-1 Maneuver	806	-	-	999	-	-	168	120	731	117	120	593
Stage 1	-	-	-	-	-	-	416	457	-	312	382	-
Stage 2	-	-	-	-	-	-	578	382	-	554	457	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	806	-	-	999	-	-	126	105	731	~ 98	105	593
Mov Cap-2 Maneuver	-	-	-	-	-	-	126	105	-	~ 98	105	-
Stage 1	-	-	-	-	-	-	366	402	-	274	379	-
Stage 2	-	-	-	-	-	-	477	379	-	462	402	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.7	0.1	16.3	113.4
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	116	731	806	-	-	999	-	-	98	593
HCM Lane V/C Ratio	0.075	0.043	0.12	-	-	0.008	-	-	1.11	0.165
HCM Control Delay (s)	38.6	10.1	10.1	-	-	8.6	-	-	204.2	12.3
HCM Lane LOS	E	B	B	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0.2	0.1	0.4	-	-	0	-	-	7.1	0.6

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	36.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	81	840	4	14	936	55	4	0	49	88	0	61
Future Vol, veh/h	81	840	4	14	936	55	4	0	49	88	0	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	Yield	-	-	Yield	-	-	Yield
Storage Length	235	-	-	235	-	150	-	-	50	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	74	74	74	77	77	77
Heavy Vehicles, %	0	3	0	14	2	11	0	0	8	0	0	2
Mvmt Flow	86	894	4	15	996	59	5	0	66	114	0	79

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	996	0	0	894	0	0	1594	2092	447	1645	2092	498
Stage 1	-	-	-	-	-	-	1066	1066	-	1026	1026	-
Stage 2	-	-	-	-	-	-	528	1026	-	619	1066	-
Critical Hdwy	4.1	-	-	4.38	-	-	7.5	6.5	7.06	7.5	6.5	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.34	-	-	3.5	4	3.38	3.5	4	3.32
Pot Cap-1 Maneuver	703	-	-	684	-	-	73	53	543	~ 67	53	518
Stage 1	-	-	-	-	-	-	241	301	-	255	315	-
Stage 2	-	-	-	-	-	-	507	315	-	448	301	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	703	-	-	684	-	-	55	45	543	~ 52	45	518
Mov Cap-2 Maneuver	-	-	-	-	-	-	55	45	-	~ 52	45	-
Stage 1	-	-	-	-	-	-	212	264	-	224	308	-
Stage 2	-	-	-	-	-	-	420	308	-	345	264	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	0.1	17.4	$ 430.3
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	55	543	703	-	-	684	-	-	52	518
HCM Lane V/C Ratio	0.098	0.122	0.123	-	-	0.022	-	-	2.198	0.153
HCM Control Delay (s)	77.5	12.5	10.8	-	-	10.4	-	-	$ 719.4	13.2
HCM Lane LOS	F	B	B	-	-	B	-	-	F	B
HCM 95th %tile Q(veh)	0.3	0.4	0.4	-	-	0.1	-	-	11.5	0.5

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Appendix G. Future Intersection Analysis (With Signal)

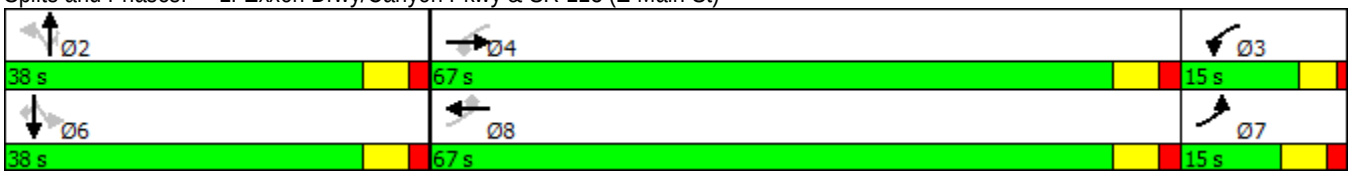
Timings
1: Exxon Drwy/Canyon Pkwy & SR 113 (E Main St)

05/22/2018

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	90	446	7	712	47	4	3	25	98	1	89
Future Volume (vph)	90	446	7	712	47	4	3	25	98	1	89
Turn Type	D.P+P	NA	D.P+P	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4	3	8			2			6	
Permitted Phases	8		4		8	2		2	6		6
Detector Phase	7	4	3	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	5.0	15.0	5.0	15.0	15.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	28.0	9.5	28.0	28.0	38.0	38.0	38.0	38.0	38.0	38.0
Total Split (s)	15.0	67.0	15.0	67.0	67.0	38.0	38.0	38.0	38.0	38.0	38.0
Total Split (%)	12.5%	55.8%	12.5%	55.8%	55.8%	31.7%	31.7%	31.7%	31.7%	31.7%	31.7%
Yellow Time (s)	4.0	4.0	3.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	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
Total Lost Time (s)	6.0	6.0	4.5	6.0	6.0		6.0	6.0		6.0	6.0
Lead/Lag	Lag	Lead	Lag	Lead	Lead						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	None	None	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 53.4
Natural Cycle: 80
Control Type: Actuated-Uncoordinated

Splits and Phases: 1: Exxon Drwy/Canyon Pkwy & SR 113 (E Main St)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	446	0	7	712	47	4	3	25	98	1	89
Future Volume (veh/h)	90	446	0	7	712	47	4	3	25	98	1	89
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1827	1900	1667	1845	1900	1900	1900	1696	1900	1760	1900
Adj Flow Rate, veh/h	97	480	0	8	828	0	5	4	0	108	1	0
Adj No. of Lanes	1	2	1	1	2	1	0	1	1	0	1	1
Peak Hour Factor	0.93	0.93	0.93	0.86	0.86	0.86	0.80	0.80	0.80	0.91	0.91	0.91
Percent Heavy Veh, %	1	4	0	14	3	0	0	0	12	0	0	0
Cap, veh/h	400	1174	546	538	1323	610	226	143	199	345	2	223
Arrive On Green	0.08	0.34	0.00	0.12	0.38	0.00	0.14	0.14	0.00	0.14	0.14	0.00
Sat Flow, veh/h	1792	3471	1615	1587	3505	1615	722	1032	1442	1325	18	1615
Grp Volume(v), veh/h	97	480	0	8	828	0	9	0	0	109	0	0
Grp Sat Flow(s),veh/h/ln	1792	1736	1615	1587	1752	1615	1754	0	1442	1343	0	1615
Q Serve(g_s), s	0.0	4.7	0.0	0.0	8.5	0.0	0.0	0.0	0.0	3.2	0.0	0.0
Cycle Q Clear(g_c), s	0.0	4.7	0.0	0.0	8.5	0.0	0.2	0.0	0.0	3.4	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.56		1.00	0.99		1.00
Lane Grp Cap(c), veh/h	400	1174	546	538	1323	610	369	0	199	347	0	223
V/C Ratio(X)	0.24	0.41	0.00	0.01	0.63	0.00	0.02	0.00	0.00	0.31	0.00	0.00
Avail Cap(c_a), veh/h	623	4773	2221	727	4819	2221	1309	0	1040	1124	0	1165
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	15.6	11.3	0.0	9.5	11.3	0.0	16.6	0.0	0.0	17.9	0.0	0.0
Incr Delay (d2), s/veh	0.3	0.2	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	2.2	0.0	0.1	4.1	0.0	0.1	0.0	0.0	1.3	0.0	0.0
LnGrp Delay(d),s/veh	15.9	11.5	0.0	9.5	11.7	0.0	16.6	0.0	0.0	18.4	0.0	0.0
LnGrp LOS	B	B		A	B		B			B		
Approach Vol, veh/h		577			836			9			109	
Approach Delay, s/veh		12.3			11.7			16.6			18.4	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.1	11.2	21.0		12.1	9.5	22.7
Change Period (Y+Rc), s		6.0	6.0	* 6		6.0	6.0	6.0
Max Green Setting (Gmax), s		32.0	10.5	* 61		32.0	9.0	61.0
Max Q Clear Time (g_c+I1), s		2.2	2.0	6.7		5.4	2.0	10.5
Green Ext Time (p_c), s		0.6	0.1	3.2		0.6	0.1	6.2

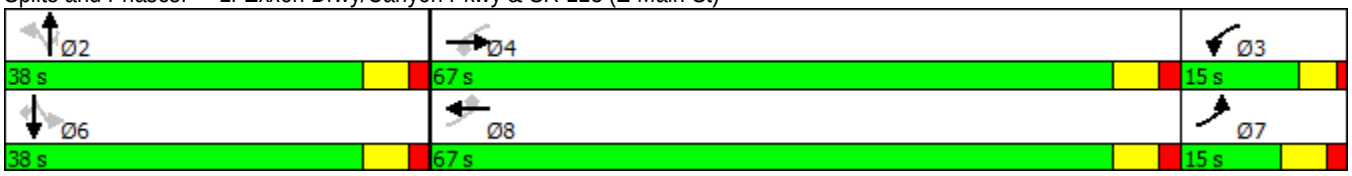
Intersection Summary	
HCM 2010 Ctrl Delay	12.4
HCM 2010 LOS	B

Notes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	840	4	14	936	55	4	0	49	88	0	61
Future Volume (vph)	81	840	4	14	936	55	4	0	49	88	0	61
Turn Type	D.P+P	NA	Perm	D.P+P	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	8		4	4		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	15.0	15.0	5.0	15.0	15.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	11.0	28.0	28.0	9.5	28.0	28.0	38.0	38.0	38.0	38.0	38.0	38.0
Total Split (s)	15.0	67.0	67.0	15.0	67.0	67.0	38.0	38.0	38.0	38.0	38.0	38.0
Total Split (%)	12.5%	55.8%	55.8%	12.5%	55.8%	55.8%	31.7%	31.7%	31.7%	31.7%	31.7%	31.7%
Yellow Time (s)	4.0	4.0	4.0	3.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	1.0	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
Total Lost Time (s)	6.0	6.0	6.0	4.5	6.0	6.0		6.0	6.0		6.0	6.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 54.5
Natural Cycle: 80
Control Type: Actuated-Uncoordinated

Splits and Phases: 1: Exxon Drwy/Canyon Pkwy & SR 113 (E Main St)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	81	840	4	14	936	55	4	0	49	88	0	61
Future Volume (veh/h)	81	840	4	14	936	55	4	0	49	88	0	61
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1845	1900	1667	1863	1712	1900	1900	1759	1900	1900	1863
Adj Flow Rate, veh/h	86	894	0	15	996	0	5	0	0	114	0	0
Adj No. of Lanes	1	2	1	1	2	1	0	1	1	0	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.74	0.74	0.74	0.77	0.77	0.77
Percent Heavy Veh, %	0	3	0	14	2	11	0	0	8	0	0	2
Cap, veh/h	371	1369	631	421	1517	624	364	0	196	338	0	208
Arrive On Green	0.07	0.39	0.00	0.11	0.43	0.00	0.13	0.00	0.00	0.13	0.00	0.00
Sat Flow, veh/h	1810	3505	1615	1587	3539	1455	1648	0	1495	1447	0	1583
Grp Volume(v), veh/h	86	894	0	15	996	0	5	0	0	114	0	0
Grp Sat Flow(s),veh/h/ln	1810	1752	1615	1587	1770	1455	1648	0	1495	1447	0	1583
Q Serve(g_s), s	0.0	10.2	0.0	0.0	10.9	0.0	0.0	0.0	0.0	3.5	0.0	0.0
Cycle Q Clear(g_c), s	0.0	10.2	0.0	0.0	10.9	0.0	0.1	0.0	0.0	3.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	371	1369	631	421	1517	624	364	0	196	338	0	208
V/C Ratio(X)	0.23	0.65	0.00	0.04	0.66	0.00	0.01	0.00	0.00	0.34	0.00	0.00
Avail Cap(c_a), veh/h	578	4388	2022	591	4431	1822	1121	0	982	1094	0	1040
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	16.7	12.1	0.0	12.6	11.1	0.0	18.4	0.0	0.0	19.9	0.0	0.0
Incr Delay (d2), s/veh	0.3	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	4.9	0.0	0.1	5.4	0.0	0.1	0.0	0.0	1.5	0.0	0.0
LnGrp Delay(d),s/veh	17.0	12.7	0.0	12.6	11.6	0.0	18.4	0.0	0.0	20.5	0.0	0.0
LnGrp LOS	B	B		B	B		B			C		
Approach Vol, veh/h		980			1011			5			114	
Approach Delay, s/veh		13.1			11.6			18.4			20.5	
Approach LOS		B			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		12.4	11.3	25.0		12.4	9.4	26.9
Change Period (Y+Rc), s		6.0	6.0	* 6		6.0	6.0	6.0
Max Green Setting (Gmax), s		32.0	10.5	* 61		32.0	9.0	61.0
Max Q Clear Time (g_c+I1), s		2.1	2.0	12.2		5.6	2.0	12.9
Green Ext Time (p_c), s		0.6	0.1	6.9		0.6	0.1	8.0

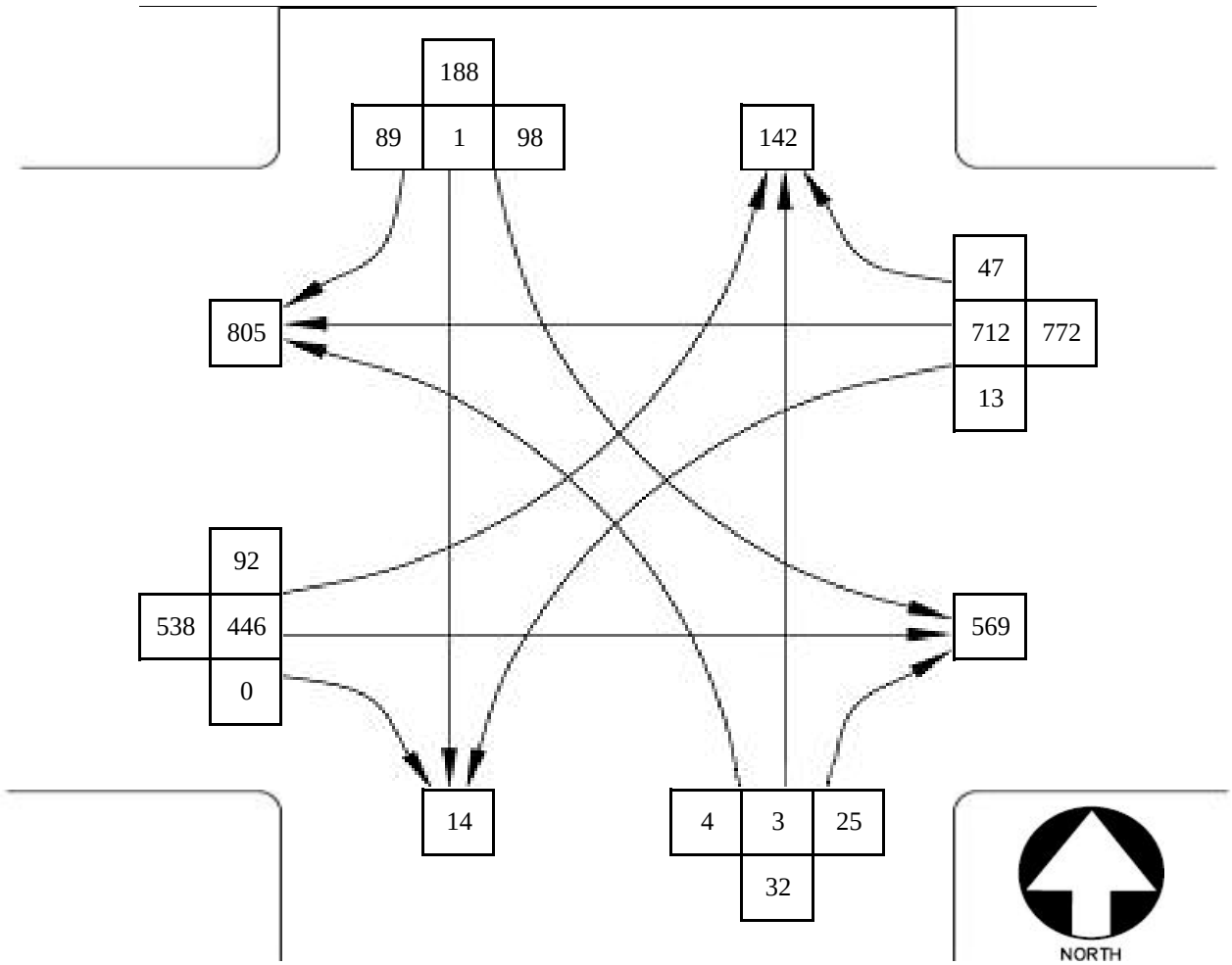
Intersection Summary	
HCM 2010 Ctrl Delay	12.8
HCM 2010 LOS	B

Notes

Appendix H. Left Turn Analysis AM and PM

Future Traffic Count Summary Sheet

Peak Hour Count (AM)

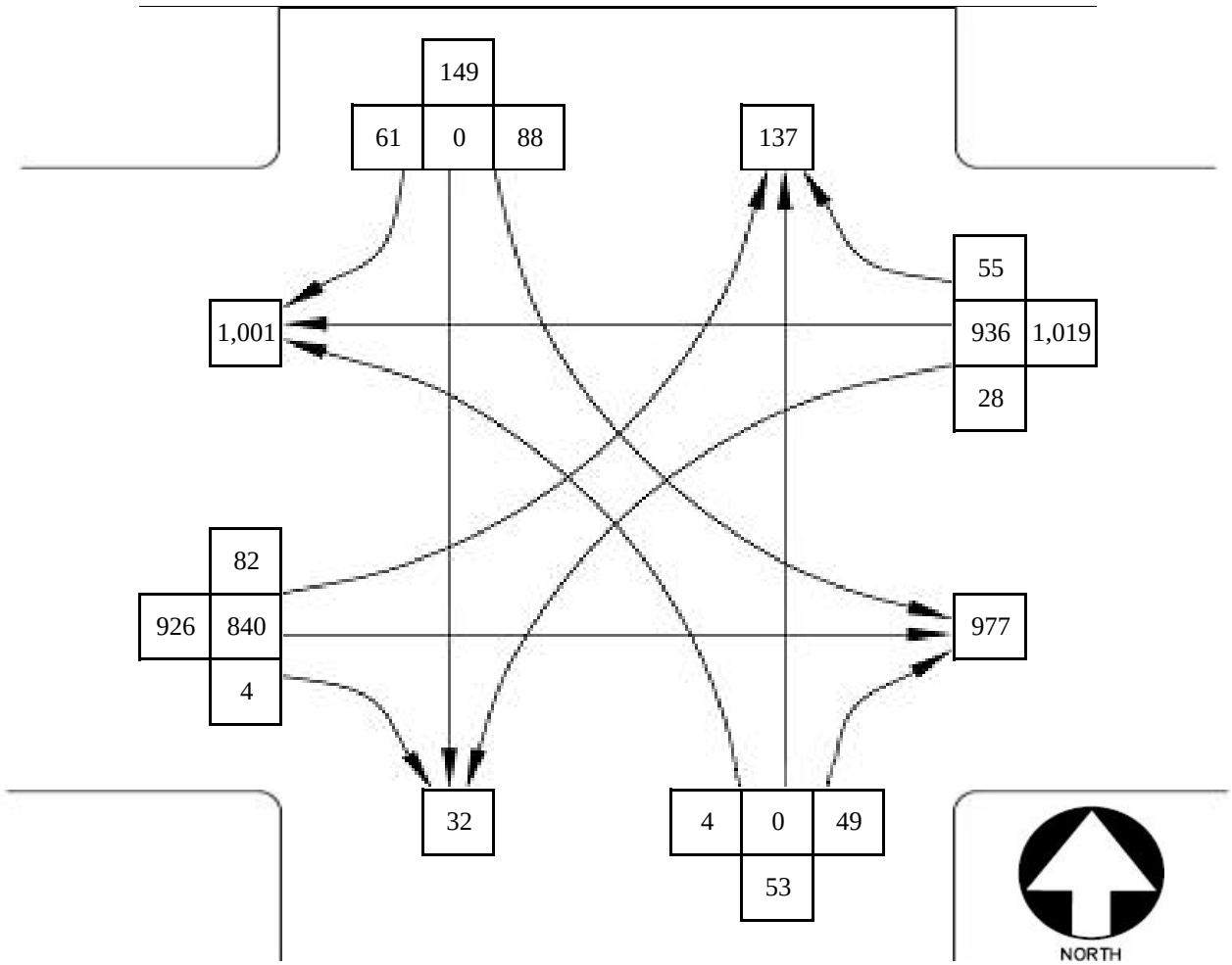


Conflicting Movements	Through Volume (V_o)	Left Turn Volume (V_{lt})	Opposing Lanes (N_o)	Cross-Product ($V_o \times V_{lt} \div N_o$)	Cross-Product Warrant?	Peak Volume Warrant?
NBL & SBT	1	4	1	4	NO	NO
SBL & NBT	3	98	1	294	NO	FYA lag only
EBL & WBT	712	92	2	32,752	NO	FYA lag only
WBL & EBT	446	13	2	2,899	NO	NO

LEFT TURN CRITERIA - AM PEAK HOUR

Future Traffic Count Summary Sheet

Peak Hour Count (PM)



Conflicting Movements	Through Volume (V_o)	Left Turn Volume (V_{lt})	Opposing Lanes (N_o)	Cross-Product ($V_o \times V_{lt} \div N_o$)	Cross-Product Warrant?	Peak Volume Warrant?
NBL & SBT	0	4	1	0	NO	NO
SBL & NBT	0	88	1	0	NO	FYA lag only
EBL & WBT	936	82	2	38,376	NO	FYA lag only
WBL & EBT	840	28	2	11,760	NO	NO

LEFT TURN CRITERIA - PM PEAK HOUR

Appendix I. ICE Documentation

GDOT ICE STAGE 1: SCREENING DECISION RECORD

ICE Version 2.13 | Revised 03/12/2018

GDOT PI #	N/A
Project Location:	SR 113 @ Canyon Pkwy
Prepared by:	Jacobs
Analyst:	GKW
Date:	6/4/2018

Answer "Yes" or "No" to each policy question for each control type to identify which alternatives should be evaluated in the Stage 2 Decision Record; enter justification in the rightmost column

Note: Up to 5 alternatives may be selected and evaluated; Use this ICE Stage 1 to screen 5 or fewer alternatives to evaluate in Stage 2

	Intersection Alternative (see "Intersections" tab for detailed description of intersection/interchange type)	1. Does alternative address the project need in a balanced manner and in scale with the project?	2. Does alternative improve safety performance in terms of reducing severe crashes?	3. Does alternative incorporate safety, convenience and accessibility for pedestrians and/or bicyclists?	4. Does alternative improve (or preserve) traffic operations (congestion, delay, reliability, etc.)?	5. Does alternative appear feasible given the site characteristics, constrains & location context?	6. Does alternative appear feasible with respect to other project factors?	7. Overall feasible alternative (select alternative for further evaluation in Stage 2)?	Screening Decision Justification:
Unsignalized Intersections	Conventional (Minor Stop)	No	No	No	Yes	Yes	Yes	Yes	Existing Condition
	Conventional (All-Way Stop)	No	No	No	No	No	No	No	N/A - multilane highway
	Mini Roundabout	No	No	No	No	No	No	No	N/A - multilane highway
	Single Lane Roundabout	No	No	No	No	No	No	No	N/A - multilane highway
	Multilane Roundabout	No	Yes	No	No	No	No	No	Does not meet 90/10 rule. Also not feasible within ROW.
	RCUT (stop control)	No	No	No	No	No	No	No	N/A - Existing median opening. Also would push U-turns to interchange.
	RIRO w/down stream U-Turn	No	No	No	No	No	No	No	N/A - Existing median opening. Also would push U-turns to interchange.
	High-T (unsignalized)	No	No	No	No	No	No	No	N/A - existing four-leg intersection
	Offset-T Intersections	No	No	No	No	No	No	No	N/A - insufficient spacing
	Diamond Interch (Stop Control)	No	No	No	No	No	No	No	N/A - Not interchange
	Diamond Interch (RAB Control)	No	No	No	No	No	No	No	N/A - Not interchange
	No LT Lane Improvements No RT Lane Improvements No Median Improvements	No	No	No	No	No	No	No	All turn bays present.
	Other Unsignalized (provide description):	No	No	No	No	No	No	No	N/A
Signalized Intersections	Traffic Signal	Yes	No	Yes	Yes	Yes	Yes	Yes	Potential solution to evaluate
	Median U-Turn (Indirect Left)	No	No	No	No	No	No	No	N/A - existing median opening
	RCUT (signalized)	No	No	No	No	No	No	No	N/A - existing median opening
	Displaced Left Turn (CFI)	No	No	No	No	No	No	No	N/A - not feasible at this location
	Continuous Green-T	No	No	No	No	No	No	No	N/A - four-leg intersection
	Jughandle	No	No	No	No	No	No	No	N/A - Not interchange
	Quadrant Roadway	No	No	No	No	No	No	No	N/A - not feasible at this location
	Diamond Interch (Signal Control)	No	No	No	No	No	No	No	N/A - Not interchange
	Diverging Diamond	No	No	No	No	No	No	No	N/A - Not interchange
	Single Point Interchange	No	No	No	No	No	No	No	N/A - Not interchange
	No LT Lane Improvements No RT Lane Improvements No Median Improvements	No	No	No	No	No	No	No	All turns present.
	Other Signalized (provide description):	No	No	No	No	No	No	No	N/A

= Intersection type selected for more detailed analysis in Stage 2 Alternative Selection Decision Record

GDOT ICE STAGE 2: ALTERNATIVE SELECTION DECISION RECORD

ICE Version 2.13 | Revised 03/12/2018

GDOT PI # (or N/A): N/A
County: Bartow
Project Location: SR 113 @ Canyon Pkwy
Existing Intersection Control: Conventional (Minor Stop)

GDOT District: 6 - Cartersville
Area Type: Suburb/Transition

Date: 6/4/2018
Agency/Firm: Jacobs
Analyst: GKW
Type of Analysis: Conventional Non-Safety Funded Project

Opening / Design Year Traffic Operations

Intersection meets signal/AWS warrants?	Meets Signal Warrants	
Traffic Analysis Measure of Effectiveness	Intersection Delay	
Traffic Analysis Software Used	Synchro 9	
Analysis Time Period	AM Peak Hr	PM Peak Hr
2020 Opening Yr No-Build Peak Hr Intersection Delay	112.3 sec	381.3 sec
2020 Opening Yr No-Build Peak Hr Intersection V/C	0.66	1.22
2040 Design Yr No-Build Peak Hr Intersection Delay	112.3 sec	381.3 sec
2040 Design Yr No-Build Peak Hr Intersection V/C ratio	0.66	1.22

Complete Streets Warrants Met?
- ☐ PEDESTRIANS
- ☐ BICYCLES
- ☐ TRANSIT

Crash Data: Enter 5 most recent years of intersection crash data	Crash Severity: PDO	Injury Crash*	Fatal Crash*	
Crash Type: Angle	6	1	0	54%
Head-On	0	0	0	0%
Rear End	5	0	0	38%
Sideswipe - same	0	1	0	8%
Sideswipe - opposite	0	0	0	0%
Not Collision w/Motor Veh	0	0	0	0%
TOTALS:	11	2	0	13

* Number of crashes resulting in injuries / fatalities, not number of persons

Alternatives Analysis:	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
Proposed Control Type/Improvement:	Conventional (Minor Stop)	Traffic Signal			
Project Cost: (From CostEst Worksheet)	*Additional description here*	*Add LT bays (2) on Minor ST*			
Construction Cost	$0	$157,000			
ROW Cost	$0	$0			
Environmental Cost	$0	$0			
Reimbursable Utility Cost	$0	$7,000			
Design & Contingency Cost	$0	$55,000			
Cost Adjustment (justification req'd)	0%	0%			
Total Cost	$0	$219,000			
Traffic Operations:					
Traffic Analysis Software Used	Synchro 9	Synchro 9			
Analysis Period	AM Peak Hr / PM Peak Hr	AM Peak Hr / PM Peak Hr			
2040 Design Yr Build Intersection Delay	112.3 sec / 381.3 sec	12.4 sec / 12.8 sec			
2040 Design Yr Build Intersection V/C	0.66 / 1.22	0.45 / 0.57			
Safety Analysis:					
Predefined CRF: PDO	0%	39%			
Predefined CRF: Fatal/Inj	0%	40%			
Predefined CRF Source:	N/A	FHWA Clearinghouse #s 7982 / 7984			
User Defined CRF: PDO					
User Defined CRF: Fatal/Inj					
User Defined CRF Source (write in if applicable):					
Environmental Impacts:[1]					
Historic District/Property	None	None			
Archaeology Resources	None	None			
Graveyard	None	None			
Stream	None	None			
Underground Tank/Hazmat	None	None			
Park Land	None	None			
EJ Community	None	None			
Wooded Area	None	None			
Wetland	None	None			
Stakeholder Posture:	*Note: If environmental impact is significant (**RED**), provide justification impact won't jeopardize project delivery using "Env" worksheet*				
	[1] *Environmental impacts are only preliminary estimates; detailed environmental impact documentation will be included with project concept report*				
Local Community Support	Unknown	Unknown			
GDOT Support	Unknown	Unknown			
Final ICE Stage 2 Score:	4.9	6.5			
Rank of Control Type Alternatives:	2	1			

Note: Stage 2 score is not given (shown as "-") if signal or AWS is selected as control type but respective warrants are not met

Provide additional comments and/or explain any unique analysis inputs, or results (as necessary): Stop-controlled delays and v/c ratios were calculated from the weighted SB approach delays and v/c ratios. Signalized delays and v/c ratios are reported for the overall intersection. See signal warrant analysis documentation for more detailed information.

GDOT ICE TOOL: COST ESTIMATING AID

ICE Version 2.13 | Revised 03/12/2018

Project Information

Location:	SR 113 @ Canyon Pkwy	County:	Bartow	Date:	6/4/2018
GDOT PI # (or N/A):	N/A	Area Type:	Suburb/Transition	Agency/Firm:	Jacobs
Existing Intersection Control:	Conventional (Minor Stop)	GDOT District:	6 - Cartersville	Analyst:	GKW
Type of Analysis:	Conventional Non-Safety Funded Project			Major Street Direction:	East/West

Table 1: Existing Conditions

	EB SR 113			WB SR 113			NB Canyon Pkwy			SB Canyon Pkwy		
Movement	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn
Number of Lanes	1	2	1	1	2	1	0	1	1	0	1	1
Lane Widths*	0'	0'	0'	0'	0'	0'	0'	0'	0'	0'	0'	0'
Bay Length**	0'		0'	0'		0'	0'		0'	0'		0'
Median Width		20'			20'			0'			0'	
Right-of-Way	120'						80'					

Table 2: Proposed Conditions

	Conventional (Minor Stop)	Traffic Signal	N/A	N/A	N/A
Proposed Pavement Type	None	Mill & Overlay	F.D. Asphalt	F.D. Asphalt	F.D. Asphalt
Reimbursable Utility:	Moderate	Moderate	Moderate	Moderate	Moderate
# of Driveway(s) Impacted	0	2	0	0	0
Modify/Replace Traffic Signal	0	1	0	0	0
Lighting Poles (ea)	0	0	0	0	0
Flashing Beacons (ea)	0	0	0	0	0
RFB/PHB Ped Crossings (ea)	0	0	0	0	0
New/Replace Sidewalks (LF)	0'	200'	0'	0'	0'
New/Replace Cross Drains (LF)	0'	0'	0'	0'	0'
New/Replace Guardrail (LF)	0'	0'	0'	0'	0'
New Retaining Wall (LF)	0'	0'	0'	0'	0'
Bridge:New/Widen/Replace (sqft)	0	0	0	0	0
Add'l ROW/Easements/Demolition	$0	$0	$0	$0	$0

Site Context

Topography:	Rolling
Traffic Mgmt Plan:	Maintain Traffic
Project Size:	Single Intersection

Cost Multipliers

Grading Complete:	20%
Reimbursable Utility:	5%
Traffic Control:	20%
Project Size:	0%
Prelim Engineering:	15%
Project Contingency:	20%

Intersections

Signal Poles	Strain Pole
Design Vehicle	WB-67
Existing Interchange?	No

Roundabouts

Inscribed DIA - Mini	80
Inscribed DIA - Single	140
Inscribed DIA - Multi	200
Circulating Lane Width	18

ROW Costs

Prevalent ROW Type:	Mixed (Average)
ROW Cost/Acre:	$105,000
ROW Multiplier:	1.6

Table 3: Control Type Cost Breakdown

Pay Item	Per Ln Mi Unit Cost	Unit Cost	Conventional (Minor Stop) Quantity	Conventional (Minor Stop) Cost	Traffic Signal Quantity	Traffic Signal Cost	N/A Quantity	N/A Cost	N/A Quantity	N/A Cost	N/A Quantity	N/A Cost
New Construction (Base & Pave)	$500K/LM	$9.47/sqft	0	$0	0	$0						
Roadway Mill and Overlay	$64K/LM	$1.21/sqft	0	$0	30,000	$36,364						
Urban C&G/Drainage - both sides	441-6720	$19.08/LF	0	$0	500	$9,540						
Rural Typ Drainage - both sides	$150K/LM	$2.84/LF	0	$0	0	$0						
Concrete Island (sqyd)	n/a	$51.58/syd	0	$0	0	$0						
Median Landscaping	$100K/LM	$1.89/LF	0	$0	0	$0						
Typical Driveways Impacted (ea)	n/a	$7,500 ea	0	$0	2	$15,000						
Typical E&S Control Temp/Perm	$150K/LM	$34.09/LF	0	$0	250	$8,523						
Roundabout Truck Apron (sqft)	n/a	$10.25/sqft	0	$0	0	$0						
Signing & Marking	$0	$22.73/LF	0	$0	250	$5,683						
Flashing Beacon (ea)	n/a	$20,000 ea	0	$0	0	$0						
New Traffic Signal (Strain Poles)	674-1000	$73,030ea	0	$0	1	$73,030						
Lighting (per pole)	n/a	$5,607 ea	0	$0	0	$0						
Signalized Ped Crossings (ea)	n/a	$19,637 ea	0	$0	0	$0						
6' Sidewalk (LF)	n/a	$49.23/LF	0	$0	200	$9,846						
New/replace cross drains (LF)	n/a	$41.31/LF	0	$0	0	$0						
Typical Guardrail (LF)	n/a	$65.56/LF	0	$0	0	$0						
Retaining Wall (LF)	n/a	$808.52/LF	0	$0	0	$0						
Bridge widen/replace (SF)	n/a	$210/sqft	0	$0	0	$0						
Env Costs (from Stage 2 impacts)	n/a	n/a	0	$0	0	$0						
Grading Complete - 20%	n/a	n/a		$0		$0						
Traffic Control - 20%	n/a	n/a		$0		$0						
Reimbrusable Utility	n/a	n/a		$0		$7,899						
Preliminary Engineering - 15%	n/a	n/a		$0		$23,698						
Contigency - 20%	n/a	n/a		$0		$31,597						
ROW Cost/Acre: Mixed (Average)	n/a	$105,000ac		$0		$0						
Add'l ROW / Displacement / Demo	n/a	n/a		$0		$0						
ROW Multiplier - 1.6	n/a	n/a		$0		$0						
Project Scale Reduction - 0.0%	n/a	n/a		$0		$0						
Grand Total Costs				$0		$221,000						

Table 4: Assumption Adjustments/Quantity Overrides

Alternative Evaluated	Assumptions:	Pavement	Calculated ROW (ac)	User Override*	Calculated Pavement	User Override*	Major ST Const Limits	User Override*	Minor ST Const Limits	User Override*
Conventional (Minor Stop)	N/A	None	0.00	0.0	0	0.0	70	0.0	50	0.0
Traffic Signal	Pave/Overlay Intersection	Mill & Overlay	0.00	0.0	8,000	30,000.0	50	0.0	1,000	200.0

	Main Line		Side Street		TOTAL
	EB	WB	NB	SB	
Existing DHV	909	988	53	65	2,015
		1,897		118	2,015
	94%		6%		100%
K Factor*	9.02%	9.02%	9.02%	9.02%	-
Existing ADT	10,075	10,950	600	725	22,350
		21,025		1,325	22,350
	94%		6%		100%

*K Factor Based on GDOT Count Station 0150201

	Main Line		Side Street		TOTAL
	EB	WB	NB	SB	
Build DHV	926	1019	53	149	2,147
	1945		202		2,147
	91%		9%		100%
K Factor*	9.02%	9.02%	9.02%	9.02%	-
Build ADT	10,275	11,300	600	1,650	23,825
		21,575		2,250	23,825
	91%		9%		100%

*K Factor Based on GDOT Count Station 0150201