

FOCUSED TRAFFIC IMPACT STUDY

Station 215 Mobil Gas Station
2680 S. La Cadena Drive, Colton

Date: October 30, 2018

Prepared For:

Station 215 (Mobil)

2680 S. La Cadena Dr

Colton, CA 92324

Prepared By:

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Focused Traffic Impact Study
for Station 215 Mobil Gas Station
2680 S. La Cadena Drive, Colton



Prepared under the supervision of

A handwritten signature in black ink, appearing to read "Jende Kay Hsu".

Jende Kay Hsu, P.E., T. E.

Lic. # T2285

EXECUTIVE SUMMARY

The Project is located 2680 S. La Cadena Drive in the City of Colton. The proposed developments include constructing a Mobil Gas Station with 12 fueling positions and converting the existing two-story building (former gentlemen's club) to a convenient store (1,686 square feet) on the first floor and offices (1,936 square feet) on the second floor. With considerations of pass-by trips, the project would generate 36 inbound and 33 outbound trips in the AM peak hour, and 27 inbound and 32 outbound trips in the PM peak hour, and 1,019 daily trips.

According to the approved scoping agreement, this study collected traffic data and conducted level of service analysis for four (4) intersections in project vicinity. Study scenario include existing and project opening year conditions, with and without Project. For each of the study scenario, all studied intersections will maintain level of service "B" or better for both AM and PM peak hours. The project does not result in any significant traffic impact, and mitigation measure is not required.

Traffic signals at intersections #2 (I-215 SB/WB Off-Ramp at South Iowa Ave) and #3 (South Iowa Ave. at S. La Cadena Dr) have been installed and completed in year 2017. Traffic signal warrant worksheets are attached in this study confirming that signal warrants are satisfied based on the most recent traffic count data.

The project site provides two right-in-right-way driveways on La Cadena Drive. Subject to review, approval, or denial by the City of Colton, the project proposes the following improvements at project's frontage:

- Extend the existing median island on La Cadena Drive southerly to the intersection at I-215 SB/WB Off-Ramp.
- "RIGH TURN ONLY" signs (R3-5R) should be installed at both driveways facing outbound traffic.

- Allow northbound U turn for passenger cars at the intersection of La Cadena Drive and South Iowa Ave.

The height of shrubs, planting, and other visual obstructions be limited to a maximum height of thirty inches to maintain sufficient corner sight distance of the driveway. The site plan is subject to further review and final approval by the City of Colton.

INTRODUCTION

The purpose of this study is to evaluate traffic impact of the proposed developments located at 2680 S. La Cadena Drive in the City of Colton. Vicinity map is shown in **Exhibit 1**.

The proposed developments include constructing a Mobil Gas Station with 12 fueling positions and converting the existing two-story building (former gentlemen's club) to a convenient store (1,686 square feet) on the first floor and offices (1,936 square feet) on the second floor. The proposed site plan is shown in **Exhibit 2**.

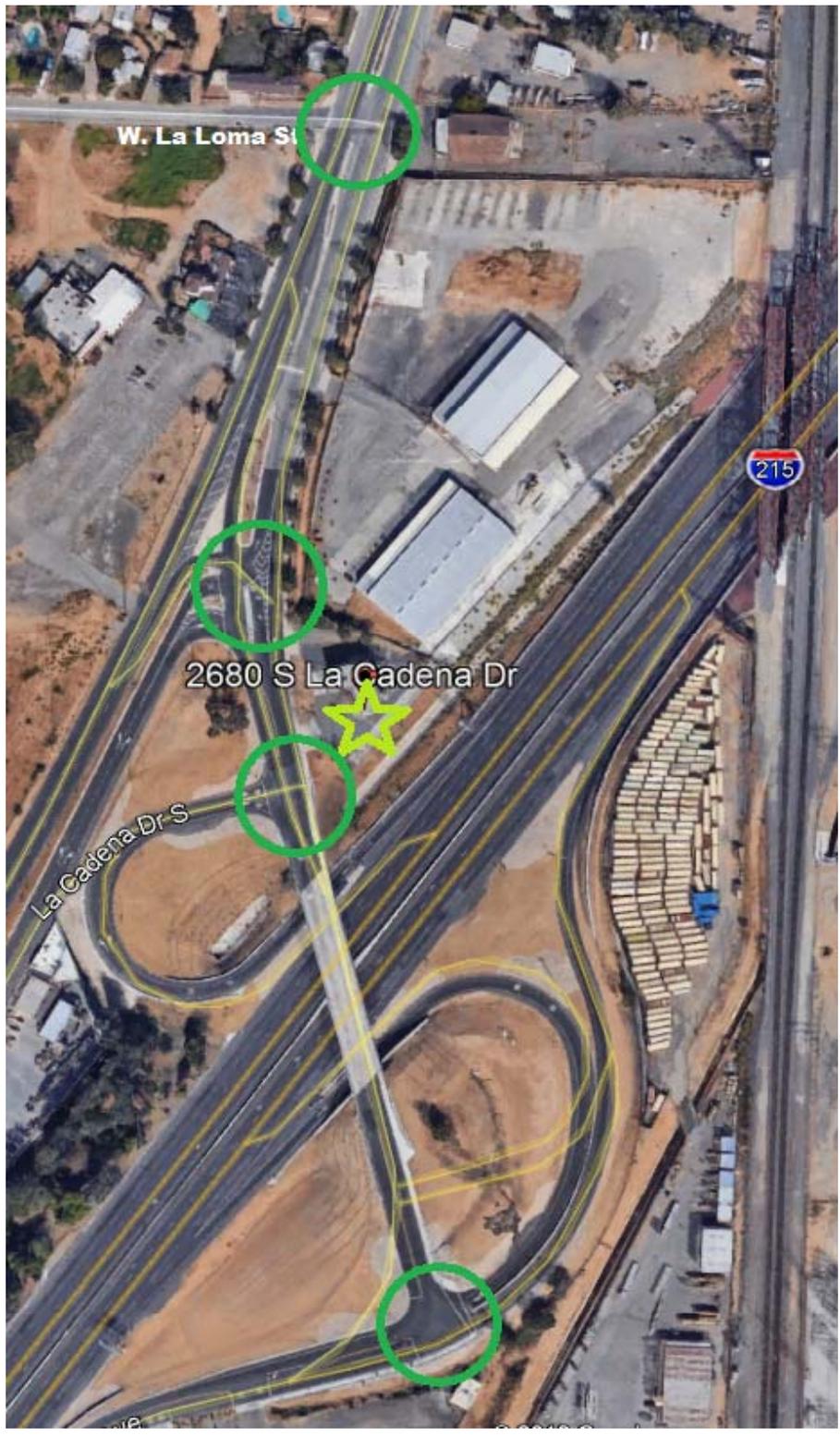


EXHIBIT 1. VICINITY MAP
No Scale

- SCOPE OF WORK / NARRATIVE**
1. CONVERT PORTION OF FIRST LEVEL OF EXISTING BUILDING AS "CONVENIENCE MARKET".
 2. CONVERT SECOND LEVEL OF EXISTING BUILDING FOR SEPARATE "OFFICE TENANCY".
 3. CONSTRUCT NEW FUEL ISLAND CANOPY.
 4. CONSTRUCT NEW FUEL ISLAND CANOPY.
 5. DEMOLISH PORTION OF BUILDING AND EXTERIOR STAIRS.
 6. DEMOLISH PORTION OF BUILDING AND EXTERIOR STAIRS.
- OWNER TO APPLY FOR PACKAGE LIQUOR LICENSE FOR THE CONVENIENCE STORE.
- THE NUMBER OF EMPLOYEES FOR CONVENIENCE STORE WILL BE (3)
- THE OFFICE SPACE WILL BE OCCUPIED BY THE OWNERS OF THE CONVENIENCE STORE (4)
- THE HOURS OF OPERATION FOR THE CONVENIENCE STORE WILL BE (24 HOURS)
- OFFICE WILL OPEN FROM M-F FROM 8:00 TO 5:00

FIRST LEVEL ADDRESS: 2680 S. LA CADENA DR. "UNIT 100"

SECOND LEVEL ADDRESS: 2680 S. LA CADENA DR. "UNIT 200"

NOTE: LANDSCAPING PROVIDED 5,122 S.F. 122,000.00 = 23.07%

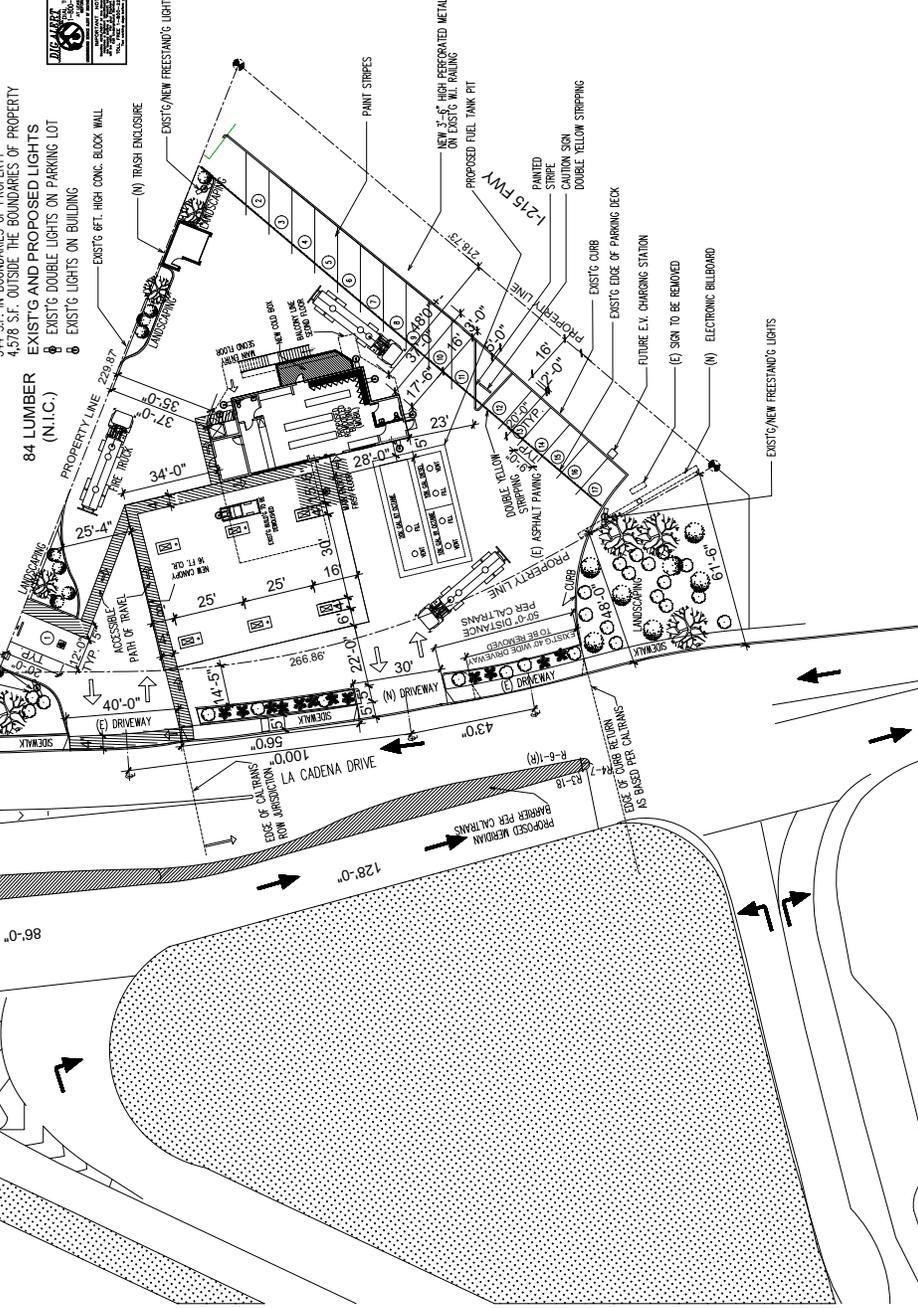
544 S.F. IN BOUNDARIES OF PROPERTY

4,578 S.F. OUTSIDE THE BOUNDARIES OF PROPERTY

EXIST'G AND PROPOSED LIGHTS

EXIST'G DOUBLE LIGHTS ON PARKING LOT

EXIST'G LIGHTS ON BUILDING



SITE PLAN 1"=20'-0"



VICINITY MAP

A.P.N.: 0163-281-31

OWNER: KARAPETIAN VAHE TRUST

USA AUCTIONS 858 ALHAMBRA BLVD #200 ALHAMBRA, CA 91801

130 EAST 9TH STREET UPLAND, CA. 91786

SITE ADDRESS: 1050 S. 6TH STREET COLTON, CA. 92324

LEGAL DESC.: LOT: 4, BLOCK: 80, DISTRICT: 12, ABBREVIATED DESCRIPTION: LOT: 4, BLK: 80, DIST: 12 CITY: COLTON SUBD: RANCHO SAN BERNARDINO RSB PTN LOT 4 BLK 80 DESC AS COM AT INTERSEC TION S U LOT 17 PABLO BELARDE SUB WHITE E U LAND CONVEYED BY DEED RECORDED IN CITY MUNI/TWP: COLTON

TRACT# 0071.07

SEC. SAN BERNARDINO COUNTY

PROPOSED USE: "CONVENIENCE MARKET/GAS STATION WITH SEPARATE OFFICE TENANCY ON SECOND LEVEL"

TYPE OF CONSTRUCTION: VN

OCCUPANCY: B

NON FIRE SPRINKLERED BUILDING

LOT SIZE = 22,000 S.F.

AREA OUTSIDE THE BOUNDARIES OF LOT = 9,611 S.F.

SITE DATA

EXIST'G FIRST FLOOR PLAN	= 2,481 S.F.
EXIST'G FIRST FLOOR TO BE DEMOLISHED	= 840 S.F.
EXIST'G FIRST FLOOR TO REMAIN	= 1,641 S.F.
EXIST'G SECOND FLOOR PLAN	= 2,629 S.F.
EXIST'G SECOND FLOOR TO BE DEMOLISHED	= 940 S.F.
EXIST'G SECOND FLOOR TO REMAIN	= 1,689 S.F.
NEW FIRST FLOOR	= 200 S.F.
PROPOSED FIRST FLOOR NEW & TO REMAIN	= 1,841 S.F.
PROPOSED SECOND FLOOR PLAN TO REMAIN	= 1,689 S.F.
TOTAL FIRST AND SECOND TO REMAIN	= 3,530 S.F.
PROPOSED CANOPY	= 4,551 S.F.

PARKING REQUIRED

CONVENIENCE STORE S.F./250 = 1841 / 250 = 7.36 = 8

OFFICE SF. / 250 = 1689 / 250 = 6.76 = 7

TOTAL REQUIRED 15

TOTAL PROVIDED 17

TOTAL H.C. REQUIRED = 1

TOTAL PROVIDED = 1

MINIMUM PARKING SPACE DIMENSIONS TO BE 9FT. X 20FT.

NOTE: MECHANICAL EQUIPMENT TO BE SCREENED FROM PUBLIC VIEW

DESIGN CRITERIA

A-1-0	PROPOSED SITE PLAN
E-C-1	EXIST'G SITE (TOP) PLAN
A-2-0	EXIST'G/PROPOSED SECOND FLOOR PLAN
A-2-1	EXIST'G/PROPOSED SECOND FLOOR PLAN
A-2-2	EXIST'G FIRST FLOOR PLAN
A-2-3	EXIST'G SECOND FLOOR PLAN
A-2-4	ROOF PLAN
A-1-2	PROPOSED CANOPY ELEVATIONS
A-3-0	NORTH AND SOUTH ELEVATIONS
A-3-1	WEST AND EAST ELEVATIONS
1-1-2	IRRADIATION ANALYSIS
1-1-2	LANDSCAPE MANAGEMENT PLAN
LC-1	PHOTOMETRIC SITE LIGHTING PLAN
1.1 TO 1.4	SIGN DEVELOPMENT PLANS

REVISIONS

BY:	
DATE:	

JONATHAN L. ZANE ARCHITECTURE

JONATHAN L. ZANE, ARCHITECT - CA LIC. #C-11,046

COLTON, CA 92324 (909) 825-7500

DATE

PROJECT

STATION 215 (MOBIL)

LOCATED AT: 2680 S. LA CADENA DR. COLTON, CA. 92324

NOTICE

The design and data indicated by these drawings were created for the use of the particular project and the sole property of Jonathan L. Zane Architects, Inc. No other purpose whatsoever is reproduced without the written consent of Jonathan L. Zane Architects, Inc.

SCALE:

DRAWN:

JOB:

SHEET: A-1.0

EXHIBIT 2. SITE PLAN

STUDY SCENARIOS

This study is prepared in accordance with the "SANBAG CMP Traffic Impact Analysis Report Guidelines". The following scenarios are analyzed for level of service to :

- i. Existing Conditions
- ii. Existing Conditions plus Project
- iii. Opening Year without Project
- iv. Opening Year plus Project

According to the approved scoping agreement, as shown in **Appendix "A"**, the following intersections were included in this study for AM and PM peak hour turning movement counts and level of service (LOS) analysis:

1. S. Iowa Avenue at I-215 NB/EB Ramps
2. S. Iowa Avenue at I-215 SB/WB Off Ramp
3. S. Iowa Avenue at La Cadena Drive
4. La Cadena Drive at La Loma Street

EXISTING CONDITIONS

Project site is situated at 2680 La Cadena Drive in the City of Colton, near the junction of La Cadena Drive and S. Iowa Avenue. La Cadena Drive is an north-south arterial with two lanes in each direction separated by a raised median and left-turn pockets in the project vicinity. The posted speed limit is 50 mph.

S. Iowa Avenue is a north-south undivided roadway with one lane in each direction in the project vicinity. S. Iowa Avenue over crosses Interstate 215 Freeway and connects to NB/EB ramps at the south end and SB/WB off ramp at the north end.

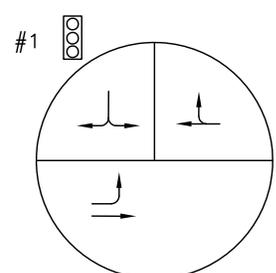
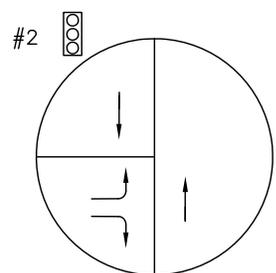
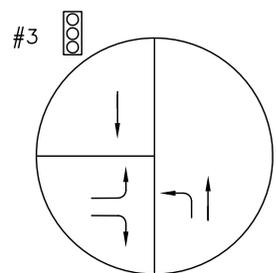
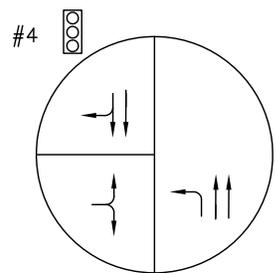
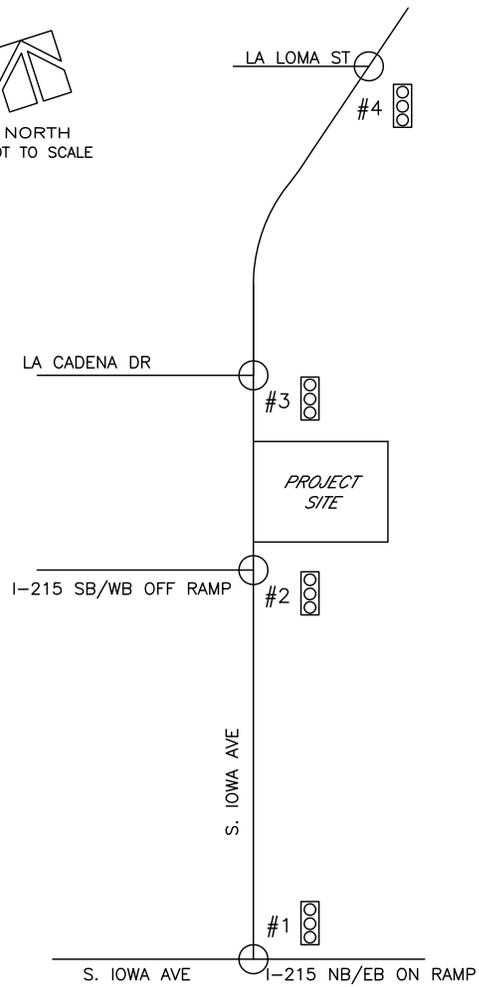
Traffic counts of AM and PM peak hour turning movements were collected on February 20, 2018. Lane configurations and traffic volumes at the study intersections are shown in **Exhibit 3 and 4**, respectively. Complete traffic data can be found in **Appendix "B"**. All study intersections currently operate at LOS "C" or better for both AM and PM peak hours as shown in **Table 1**. The analysis worksheets can be found in **Appendix "C"**.

Table 1. Analysis: Existing Conditions

No.	Intersection	AM		PM	
		LOS	Delay	LOS	Delay
1	S. Iowa Ave at I-215 NB/EB Ramps	B	18.8	C	31.3
2	S. Iowa Ave at I-215 SB/WB Off Ramp	B	17.5	B	14.3
3	S. Iowa Ave at La Cadena Dr	B	16.7	B	13.9
4	La Cadena Dr at La Loma St	B	16.5	A	9.6



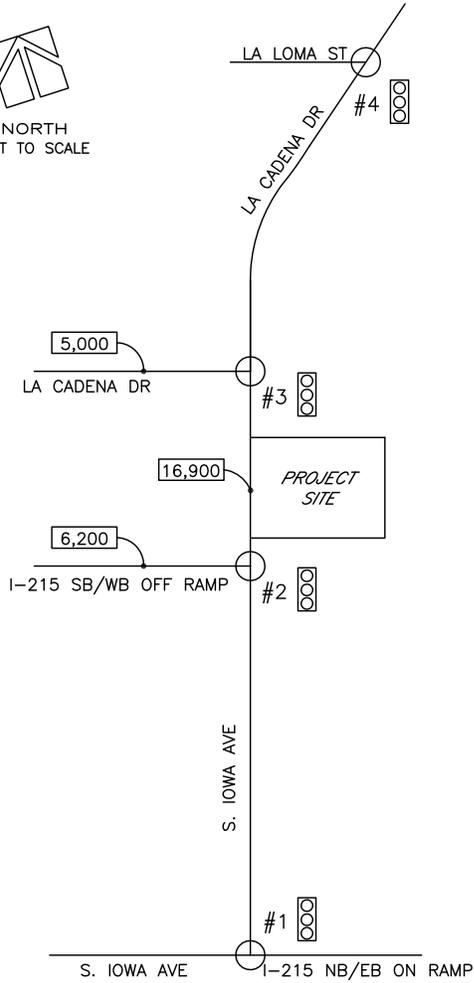
NORTH
NOT TO SCALE



- LEGEND:**
- INTERSECTION
 - TRAFFIC SIGNAL
 - STOP SIGN

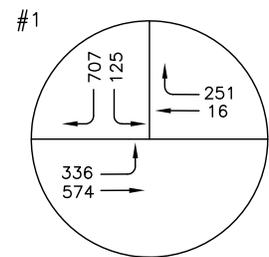
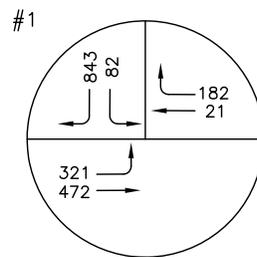
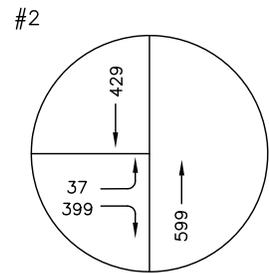
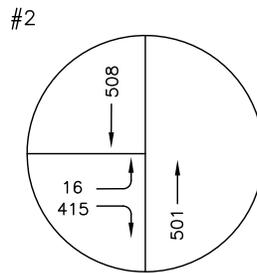
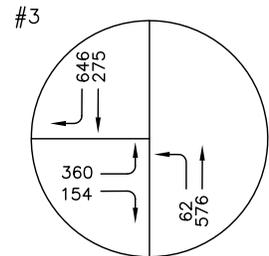
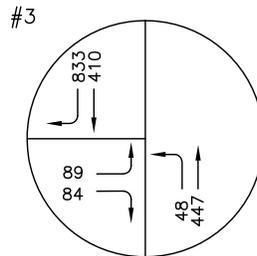
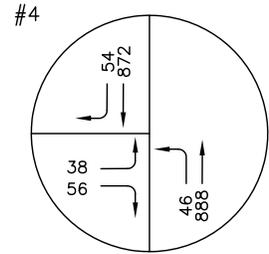
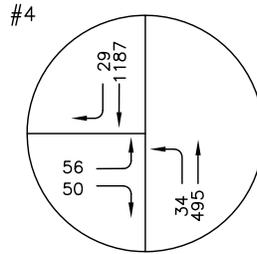
EXISTING LANE CONFIGURATION

Station 215 Mobil Gas Station
2680 S. La Cadena Drive, Colton



AM PEAK HOUR

PM PEAK HOUR



EXISTING YEAR TRAFFIC VOLUMES

Station 215 Mobil Gas Station
2680 S. La Cadena Drive, Colton

TRIP GENERATION

Passenger vehicle trips are estimated using the rates and methodologies outlined in "*Trip Generation*", Tenth Edition, published by the Institute of Transportation Engineers (ITE). Applicable trip generation rates are shown in **Table 3**.

The project trip generation includes consideration of pass-by rates for the proposed uses. The project would generate 36 inbound and 33 outbound trips in the AM peak hour, and 27 inbound and 32 outbound trips in the PM peak hour, and 1,019 daily trips. The projected trips associated with the project are provided in **Table 4**.

TABLE 3. TRIP GENERATION RATE

	LAND USE	ITE CODE	UNITS	AM Peak		PM Peak		DAILY
				IN	OUT	IN	OUT	
Proposed	Gasoline/Service Station with Convenience Market	945	Fueling Positions	6.36	6.11	7.13	6.86	205.36
Proposed	Small Office Building	712	1000 SF	1.59	0.33	0.78	1.67	16.19
Existing	Drinking Place	925	1000 SF	0	0	7.5	3.86	56.8

Source: Institute of Transportation Engineer(ITE), "Trip Generation", Tenth Edition

TABLE 4. PROJECT TRIP GENERATION

	LAND USE	ITE CODE	Quantity	AM Peak		PM Peak		DAILY
				IN	OUT	IN	OUT	
Proposed	Gasoline/Service Station with Convenience Market	945	12	76	73	86	82	2,464
	Pass-By Trip Deduction*		56%	-43	-41	-48	-46	-1,380
Proposed	Small Office Building	712	1.936	3	1	2	3	31
Existing	Drinking Place	925	-1.686	0	0	-13	-7	-96
Total				36	33	27	32	1,019

* Pass-by Trip Deduction Rate per Trip Generation Handbook, Third Edition

TRIP DISTRIBUTION

Trip distribution represents the directional orientation of traffic to and from the proposed project. Directional orientation is largely influenced by the geographical location of the site, among many other factors. The trip distribution pattern for the project is illustrated on **Exhibit 5**.

TRAFFIC ASSIGNMENT

The traffic assignment to and from the site has been based upon the results of trip generation, trip distribution, and access layouts. Due to close proximity of study intersections to the site, the project trips has been applied without pass-by deduction to all three study intersections as a conservative approach. **Exhibit 6** illustrates the traffic assignment of the proposed project.

EXHIBIT 5. TRIP DISTRIBUTION

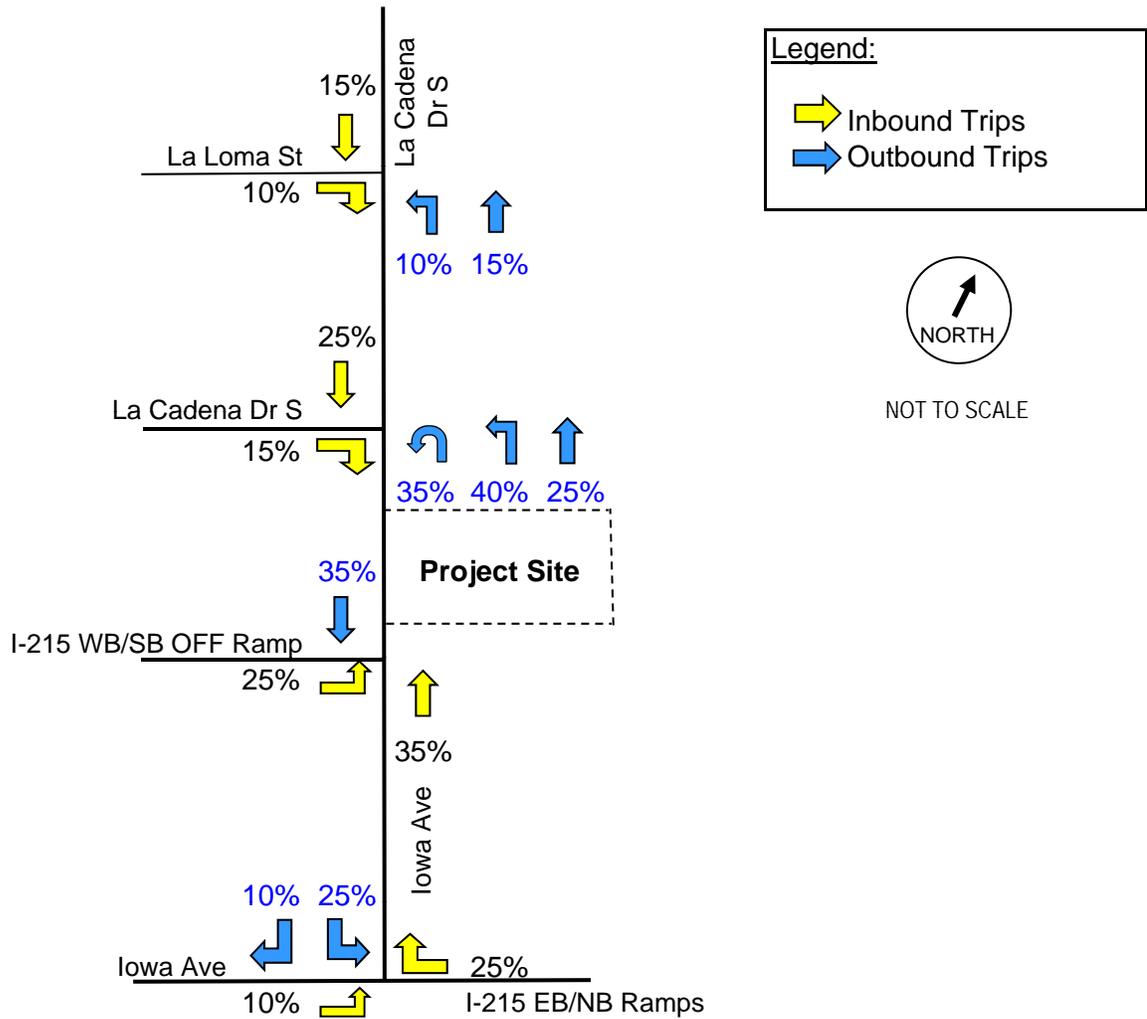
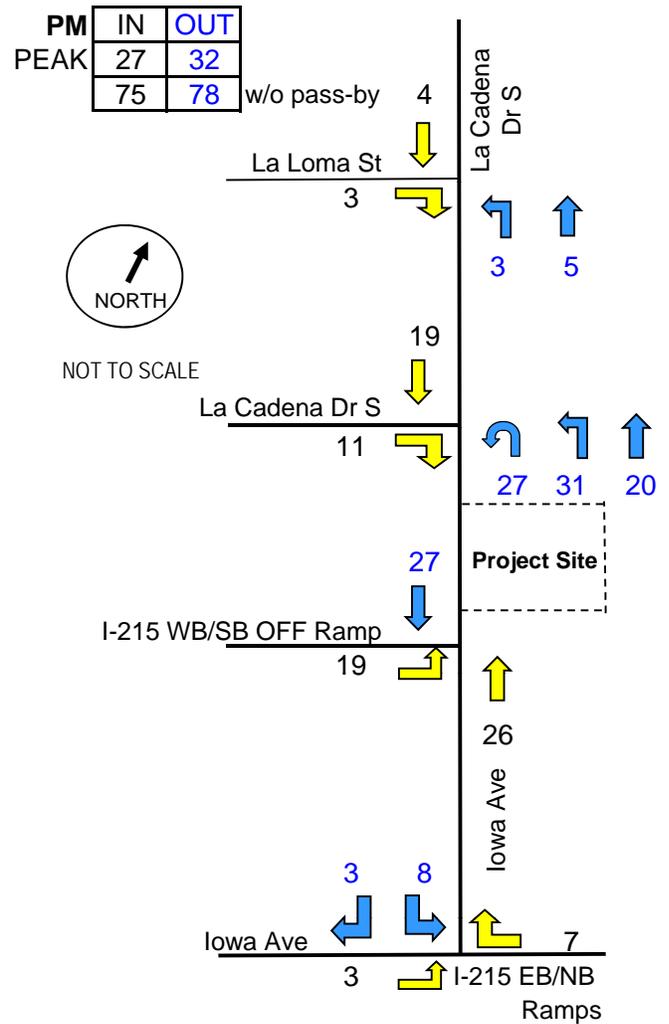
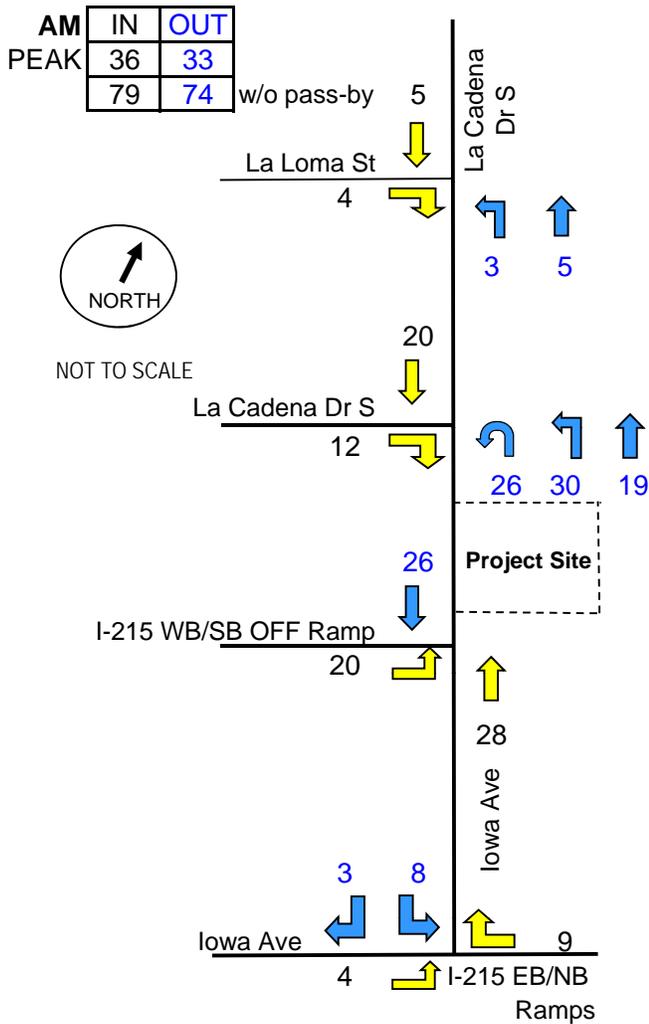


EXHIBIT 6. TRAFFIC ASSIGNMENT



Legend:

-  Inbound Trips
-  Outbound Trips

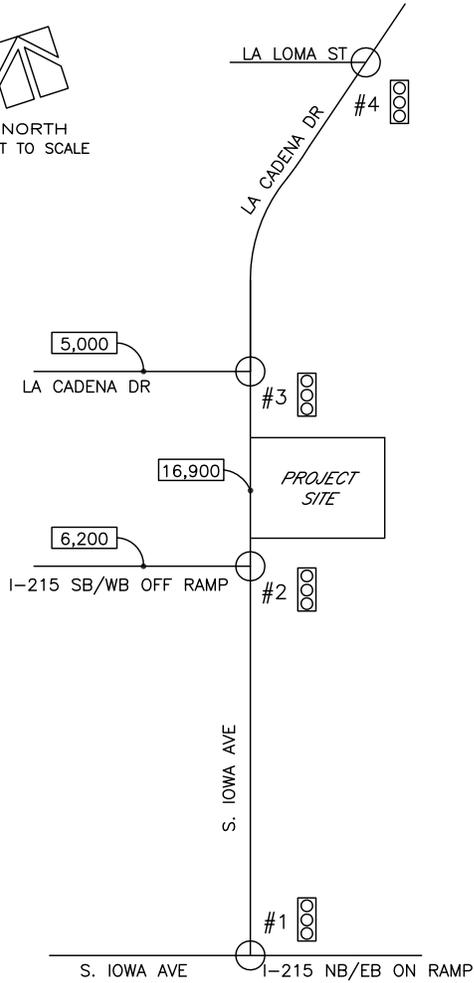
EXISTING CONDITIONS PLUS PROJECT

Traffic volumes of the existing condition plus project traffic are shown in **Exhibits 7**.

The project's level of significance of traffic impact under existing conditions for the AM and PM peak hour are shown in **Table 5**. All studied intersections will maintain level of service "C" or better for the existing conditions plus project.

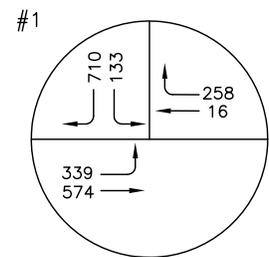
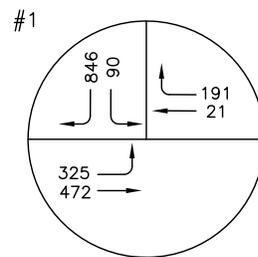
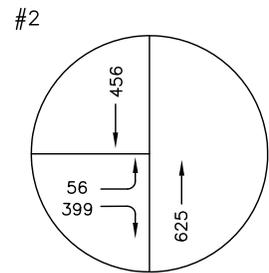
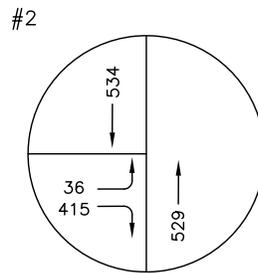
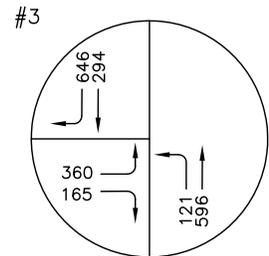
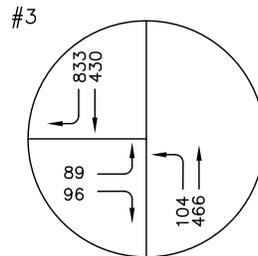
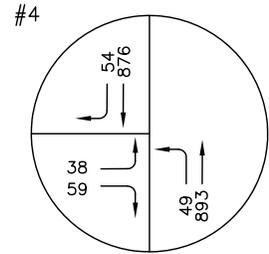
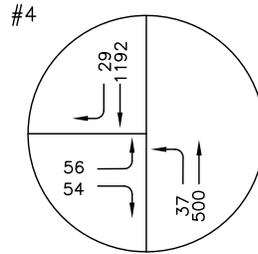
Table 5. Analysis: Existing Conditions Plus Project

No.	Intersection	AM		PM	
		LOS	Delay	LOS	Delay
1	S. Iowa Ave at I-215 NB/EB Ramps	C	27.7	C	33.6
2	S. Iowa Ave at I-215 SB/WB Off Ramp	B	18.2	B	14.6
3	S. Iowa Ave at La Cadena Dr	B	15.3	B	13.8
4	La Cadena Dr at La Loma St	B	16.5	B	13.7



**AM
PEAK HOUR**

**PM
PEAK HOUR**

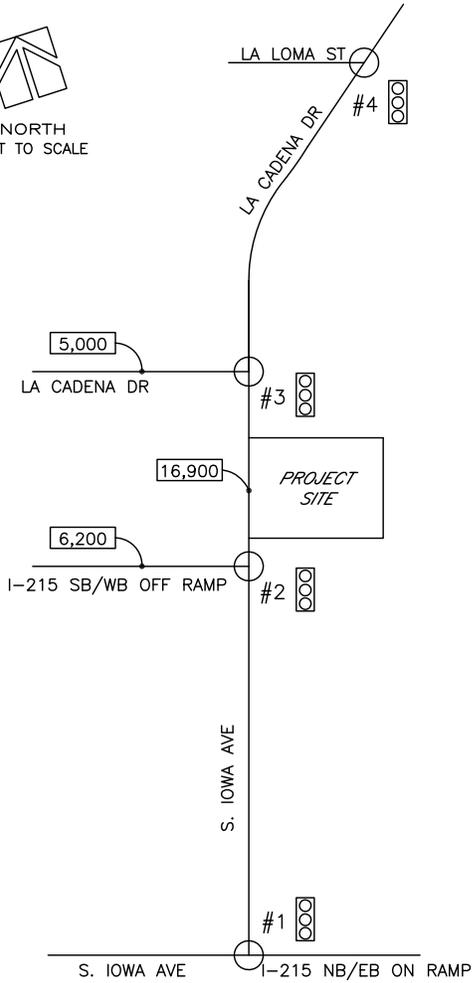


OPENING YEAR CONDITIONS WITHOUT PROJECT

Traffic conditions for year 2020, prior to completion of the proposed development, is estimated by applying an annual growth rate of two percent (2%) over existing traffic counts conditions. Traffic volumes for the opening year plus other developments are illustrated in **Exhibit 8**. All studied intersections will maintain level of service "C" or better for both AM and PM peak hours, except the intersection of Iowa Avenue and I-215 NB/EB Ramps operating at LOS "D", as shown in **Table 6**. The analysis worksheets can be found in **Appendix "C"**.

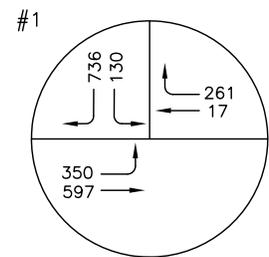
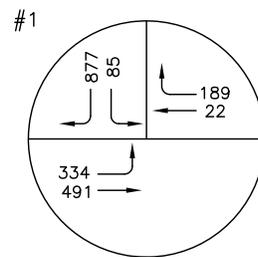
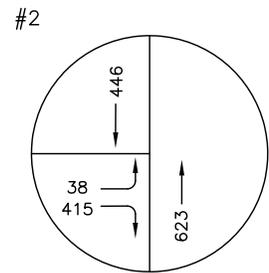
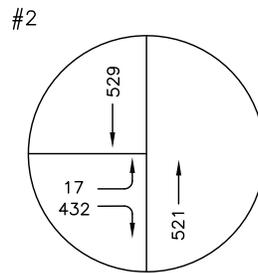
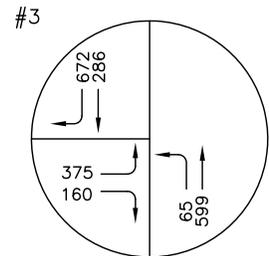
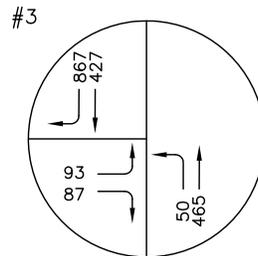
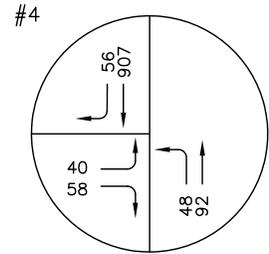
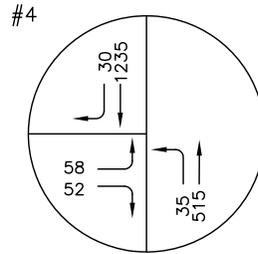
Table 6. Analysis: Opening Year Conditions Without Project

No.	Intersection	AM		PM	
		LOS	Delay	LOS	Delay
1	S. Iowa Ave at I-215 NB/EB Ramps	C	22.8	D	35.2
2	S. Iowa Ave at I-215 SB/WB Off Ramp	B	18.1	B	14.6
3	S. Iowa Ave at La Cadena Dr	B	15.6	B	13.9
4	La Cadena Dr at La Loma St	B	16.5	B	13.7



**AM
PEAK HOUR**

**PM
PEAK HOUR**



Station 215 Mobil Gas Station
2680 S. La Cadena Drive, Colton

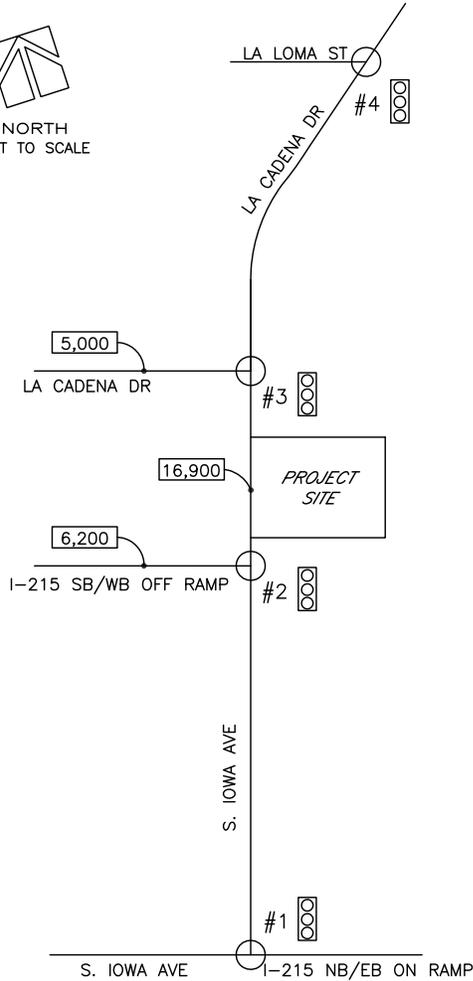
**OPENING YEAR CONDITION
WITHOUT PROJECT**

OPENING YEAR CONDITIONS + PROJECT

Traffic volumes for opening year 2020 after project completion (opening year plus project) are illustrated in **Exhibit 9**. All studied intersections will maintain level of service "C" or better for both AM and PM peak hours, except the intersection of Iowa Avenue and I-215 NB/EB Ramps operating at LOS "D", as shown in **Table 7**.

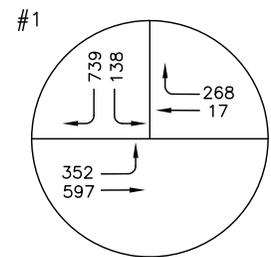
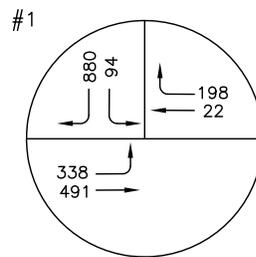
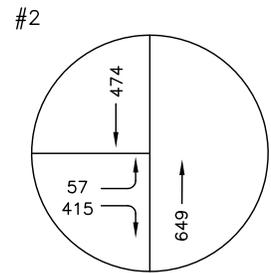
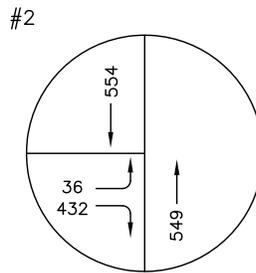
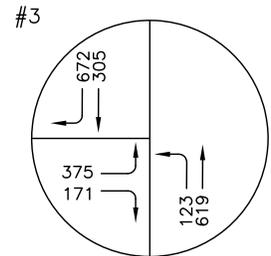
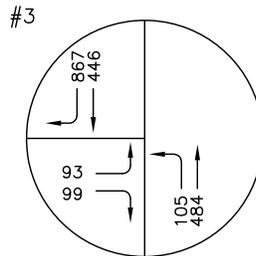
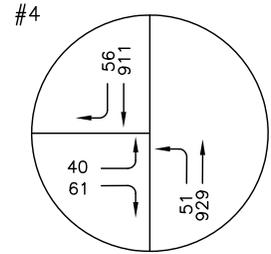
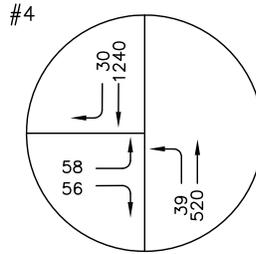
Table 7. Analysis: Opening Year Conditions + Project

No.	Intersection	AM		PM	
		LOS	Delay	LOS	Delay
1	S. Iowa Ave at I-215 NB/EB Ramps	C	34.8	D	39.0
2	S. Iowa Ave at I-215 SB/WB Off Ramp	B	19.7	B	15.3
3	S. Iowa Ave at La Cadena Dr	B	16.3	B	16.1
4	La Cadena Dr at La Loma St	B	16.7	B	13.7



**AM
PEAK HOUR**

**PM
PEAK HOUR**



**OPENING YEAR CONDITIONS
PLUS PROJECT**

Station 215 Mobil Gas Station
2680 S. La Cadena Drive, Colton

THRESHOLD OF SIGNIFICANT IMPACT

In accordance with the Caltrans Guide for the Preparation of Traffic Impact Studies, the criteria for the determination of level of services are shown in **Table 8**.

Table 8. Level of Service

LOS	Control Delay (Sec/Veh)
A	≤ 10
B	> 10 - 20
C	> 20 - 35
D	> 35 - 55
E	> 55 - 80
F	> 80

A significant impact is determined when the addition of project related trips causes peak hour LOS at intersection to degrade to LOS D or worse and the increase of peak hour delay exceeds the following threshold:

Table 9. Significant Impact Threshold

PREPROJECT LOS	PEAK HOUR DELAY INCREASE
D	5.0 seconds
E	2.0 seconds
F	1.0 seconds

The traffic impact of the proposed project based on existing conditions are shown in **Table 10**. The project does not result in a significant impact for any of the study scenario.

Table 10. Project Impact Analysis: Existing Conditions

Intersection	Existing Conditions		Existing Conditions Plus Project		LOS D or Worse	Significant Impact
	LOS	Delay	LOS	Delay		
AM PEAK						
1. S. Iowa Ave at I-215 NB/EB Ramps	B	18.8	C	27.7	No	No
2. S. Iowa Ave at I-215 SB/WB Off Ramp	B	17.5	B	18.1	No	No
3. S. Iowa Ave at La Cadena Dr	B	16.7	B	15.6	No	No
4. La Cadena Dr at La Loma St	B	16.5	B	16.5	No	No
PM PEAK						
1. S. Iowa Ave at I-215 NB/EB Ramps	C	31.3	C	33.6	No	No
2. S. Iowa Ave at I-215 SB/WB Off Ramp	B	14.3	B	14.6	No	No
3. S. Iowa Ave at La Cadena Dr	B	13.9	B	13.9	No	No
4. La Cadena Dr at La Loma St	A	9.6	B	13.7	No	No

The traffic impacts of the proposed project for project opening year are shown in **Table 11**. The project does not result in a significant traffic impact. Mitigation measure is, therefore, not required for the project.

Table 11. Project Impact Analysis: Opening Year

Intersection	Opening Year Conditions		Opening Year Conditions Plus Project		LOS D or Worse	Significant Impact
	LOS	Delay	LOS	Delay		
AM PEAK						
1. S. Iowa Ave at I-215 NB/EB Ramps	C	22.8	C	34.8	No	No
2. S. Iowa Ave at I-215 SB/WB Off Ramp	B	18.4	B	19.7	No	No
3. S. Iowa Ave at La Cadena Dr	B	15.0	B	16.3	No	No
4. La Cadena Dr at La Loma St	B	16.7	B	16.7	No	No
PM PEAK						
1. S. Iowa Ave at I-215 NB/EB Ramps	D	35.2	D	39.0	Yes	No (3.8 <5 sec)
2. S. Iowa Ave at I-215 SB/WB Off Ramp	B	14.9	B	15.3	No	No
3. S. Iowa Ave at La Cadena Dr	B	14.1	B	16.1	No	No
4. La Cadena Dr at La Loma St	B	13.7	B	13.7	No	No

SIGNAL WARRANT ANALYSIS

Traffic signals at intersections #2 (I-215 SB/WB Off-Ramp at South Iowa Ave) and #3 (South Iowa Ave. at S. La Cadena Dr) have been installed and completed in year 2017. Traffic signal warrant worksheets are attached as **Appendix D**, per approved scoping agreement. The results indicate that Warrant 1 - Eight Hour Vehicular Volume (Condition A - Minimum Vehicle Volume) are satisfied for both intersections. This study confirms that traffic signal warrants are satisfied based on the most recent traffic count data.

QUEUING AND STACKING ASSESSMENT

To ensure sufficient queuing storage length is provided for the left/right turn movements at Locations #2 & 3 in the opening year conditions plus project traffic, the study conducted Vehicular Queuing and Stacking Assessments using Synchro software and HCM 2010 Edition methodologies. This study confirms that adequate queuing lengths are provided at the subject intersections. The analysis results can be found in **Appendix E** and are summarized in **Table 12**.

Table 12. Queuing and Stacking Assessment

No.	Intersection	Turning Movement	95th Percentile Queue (ft) AM Peak	95th Percentile Queue (ft) PM Peak	Existing Stacking Length (ft)	Adequate Stacking
2	I-215 SB/WB Off-Ramp at South Iowa Ave	EBL	24	33	250	Yes
		EBR	174	116	250	Yes
3	South Iowa Ave. at La Cadena Dr	EBL	61	183	205	Yes
		EBR	30	32	205	Yes
		NBL	65	46	140	Yes

SITE ACCESS

The project site provides two right-in-right-way driveways on La Cadena Drive. Subject to review, approval, or denial by the City of Colton, the project proposes the following improvements at project's frontage:

- Extend the existing median island on La Cadena Drive southerly to the intersection at I-215 SB/WB Off-Ramp.
- "RIGH TURN ONLY" signs (R3-5R) should be installed at each driveway facing outbound traffic.
- Allow northbound U turn for passenger cars at the intersection of La Cadena Drive and South Iowa Ave.

It is necessary that the height of shrubs, planting, and other visual obstructions be limited to a maximum height of thirty inches to maintain sufficient corner sight distance of the driveway. The site plan is subject to further review and final approval by the City of Colton.

APPENDIX A
SCOPING AGREEMENT

SCOPING AGREEMENT FOR TRAFFIC IMPACT STUDY

This form acknowledges the City of Colton Engineering Division requirements for traffic impact analysis of the following project. The analysis must comply with SANBAG CMP TIA Guidelines, as applicable.

Case No. _____

Related Cases: _____

APN(S): 1167-111-19-0000 _____

Project Name: Station 215 (Mobil Gas Station) Phase 1 _____

Project Address: 2680 S. La Cadena Dr, Colton _____

Project Description: Proposed gas station with 12 fueling positions. Convert existing 2-story building (gentlemen's club) to convenient store and second-floor offices _____

Project Size: convenient store (1,686 SF), second-floor offices (1,936 SF) _____

	Traffic Consultant	Developer
Name:	<u>Kay Hsu, TE (K2 Traffic Engineering)</u>	<u>Tom Fitzroy</u> _____
Address:	<u>1442 Irvine Blvd, Ste 210, Tustin, CA92780</u>	<u>2680 S. La Cadena Dr, Colton, CA92324</u>
Telephone:	<u>714-832-2116</u> _____	<u>626-827-4494</u> _____
e-mail:	<u>khsu@k2traffic.com</u> _____	<u>gendevgroup@yahoo.com</u> _____

A. Technical Methodology

Highway Capacity Manual (HCM) 2010 Edition

B. Trip Generation Source: ITE Trip Generation Manual 10th Edition _____

Current GP Land Use: Gentlemen's Club Proposed Land Use: Gas Station _____

Current Zoning: I-P Proposed Zoning: I-P _____

Current Trip Generation

Proposed Trip Generation

	In	Out	Total	In	Out	Total
AM Trips:	<u>0</u>	<u>0</u>	<u>0</u>	<u>36</u>	<u>33</u>	<u>69</u>
PM Trips:	<u>13</u>	<u>7</u>	<u>20</u>	<u>40</u>	<u>39</u>	<u>79</u>

See attached trip generation table for details (See Exhibit 3)

Traffic impact study to quantify change in project trip generation in comparison with pre-existing uses on project site when fully occupied.

C. Trip Geographic Distribution: To be submitted for approval by city staff. Cite source. Attach exhibit of detailed assignment. (See Exhibit 4)

Trip distribution patterns were estimated by examining the location of the project in relation to the regional roadway network and adjoining uses

D. Scenario Analysis

Project year of completion: 2020

Phase Year(s) n/a

Annual Ambient Growth rate: 2%

City staff to provide cumulative background projects list.

Scenarios:

Existing Conditions

Year of project completion: 1) No Project; 2) With Project.

E. Preliminary Study Intersections: (See SANBAG CMP guidelines or comments from other agencies.)

- 1. South Iowa Ave. I-215 NB/EB Off/On-Ramp
- 2. I-215 SB/WB Off-Ramp at South Iowa Ave.
- 3. South Iowa Ave. at S. La Cadena Ave.
- 4. W. La Loma St. at S. La Cadena Ave.
- 5. _____

- 6. _____
- 7. _____
- 8. _____
- 9. _____
- 10. _____

F. Preliminary Study Roadway Segments: (See SANBAG CMP guidelines or comments from other agencies.)

- 1. _____
- 2. _____
- 3. _____

- 6. _____
- 7. _____
- 8. _____

4. _____
5. _____

9. _____
10. _____

G. Freeways - See SANBAG CMP guidelines. n/a

H. Other Jurisdictional Impacts

Is this project within a one-mile radius of City or County boundaries? Yes No

If so, name of City Jurisdiction: San Bernardino County, Riverside County

I. Site Plan (please attach reduced copy) (See Exhibit 1)

J. Specific issues to be addressed in the Study

Recommended by:



Consultant's Representative

2/5/2018
Date

Approved Scoping Agreement:

City of Colton
Engineering Division

Date

APPENDIX B
TURNING MOVEMENT COUNT DATA

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE:
2/15/18
THURSDAY

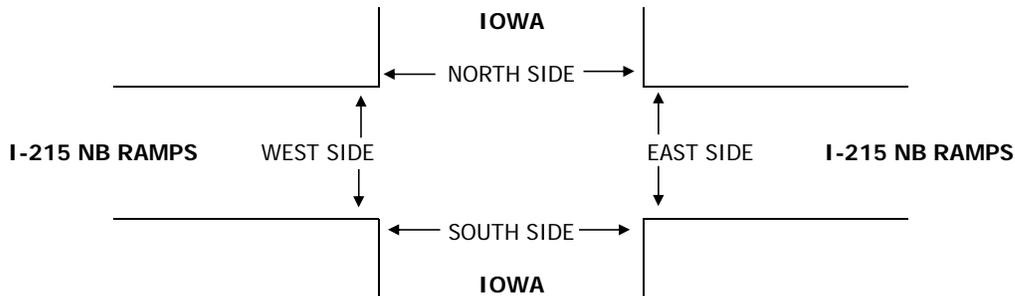
LOCATION: COLTON
NORTH & SOUTH: IOWA
EAST & WEST: I-215 NB RAMPS

PROJECT #:
LOCATION #: 1
CONTROL: SIGNAL

NOTES:	AM		▲	
	PM		N	
	MD	◀ W	S	E ▶
	OTHER		▼	

LANES:	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			TOTAL
	IOWA			IOWA			I-215 NB RAMPS			I-215 NB RAMPS			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
	X	X	X	0.5	X	0.5	1	1	X	X	0.5	0.5	

AM	7:00 AM				13		215	68	106			5	45	452
	7:15 AM				22		232	104	110			4	49	521
	7:30 AM				24		183	85	145			6	40	483
	7:45 AM				23		213	64	111			6	48	465
	8:00 AM				19		187	49	109			4	37	405
	8:15 AM				23		171	34	88			8	38	362
	8:30 AM				18		163	40	90			6	39	356
	8:45 AM				29		135	27	98			9	56	354
	VOLUMES	0	0	0	171	0	1,499	471	857	0	0	48	352	3,398
	APPROACH %	0%	0%	0%	10%	0%	90%	35%	65%	0%	0%	12%	88%	
APP/DEPART	0	/	823	1,670	/	0	1,328	/	1,028	400	/	1,547	0	
BEGIN PEAK HR	7:00 AM													
VOLUMES	0	0	0	82	0	843	321	472	0	0	21	182	1,921	
APPROACH %	0%	0%	0%	9%	0%	91%	40%	60%	0%	0%	10%	90%		
PEAK HR FACTOR	0.000			0.910			0.862			0.940			0.922	
APP/DEPART	0	/	503	925	/	0	793	/	554	203	/	864	0	
PM	4:00 PM				29		156	93	161			4	62	505
	4:15 PM				40		179	74	152			4	63	512
	4:30 PM				38		155	70	120			11	57	451
	4:45 PM				35		167	73	122			2	75	474
	5:00 PM				40		172	63	149			3	72	499
	5:15 PM				29		189	114	138			1	64	535
	5:30 PM				26		172	77	143			4	62	484
	5:45 PM				30		174	82	144			8	53	491
	VOLUMES	0	0	0	267	0	1,364	646	1,129	0	0	37	508	3,951
	APPROACH %	0%	0%	0%	16%	0%	84%	36%	64%	0%	0%	7%	93%	
APP/DEPART	0	/	1,154	1,631	/	0	1,775	/	1,396	545	/	1,401	0	
BEGIN PEAK HR	5:00 PM													
VOLUMES	0	0	0	125	0	707	336	574	0	0	16	251	2,009	
APPROACH %	0%	0%	0%	15%	0%	85%	37%	63%	0%	0%	6%	94%		
PEAK HR FACTOR	0.000			0.954			0.903			0.890			0.939	
APP/DEPART	0	/	587	832	/	0	910	/	699	267	/	723	0	



INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE:
2/15/18
THURSDAY

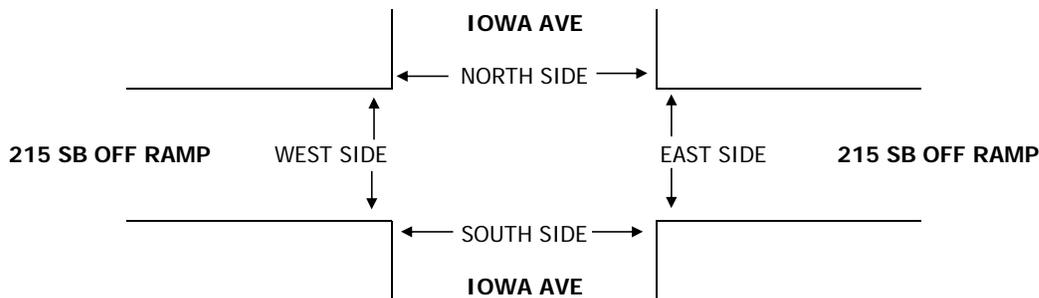
LOCATION: COLTON
NORTH & SOUTH: IOWA AVE
EAST & WEST: 215 SB OFF RAMP

PROJECT #:
LOCATION #: 2
CONTROL: 1 WAY STOP EB

NOTES:	AM PM MD OTHER OTHER	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">◀ W</div> <div style="text-align: center;">▲ N ▼ S</div> <div style="text-align: center;">E ▶</div> </div>
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	NORTHBOUND IOWA AVE			SOUTHBOUND IOWA AVE			EASTBOUND 215 SB OFF RAMP			WESTBOUND 215 SB OFF RAMP			TOTAL
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
LANES:	X	1	X	X	1	X	1	X	1	X	X	X	

AM	7:00 AM		115		138		0		87				340	
	7:15 AM		150		142		7		113				412	
	7:30 AM		126		108		1		100				335	
	7:45 AM		110		120		8		115				353	
	8:00 AM		88		126		8		81				303	
	8:15 AM		72		97		3		96				268	
	8:30 AM		80		87		5		96				268	
	8:45 AM		82		82		7		80				251	
	VOLUMES	0	823	0	0	900	0	39	0	768	0	0	0	2,530
	APPROACH %	0%	100%	0%	0%	100%	0%	5%	0%	95%	0%	0%	0%	
APP/DEPART	823	/	862	900	/	1,668	807	/	0	0	/	0	0	
BEGIN PEAK HR	7:00 AM													
VOLUMES	0	501	0	0	508	0	16	0	415	0	0	0	1,440	
APPROACH %	0%	100%	0%	0%	100%	0%	4%	0%	96%	0%	0%	0%		
PEAK HR FACTOR	0.835			0.894			0.876			0.000			0.874	
APP/DEPART	501	/	517	508	/	923	431	/	0	0	/	0	0	
PM	4:00 PM		152		67		9		124				352	
	4:15 PM		141		108		11		106				366	
	4:30 PM		126		98		7		96				327	
	4:45 PM		145		108		10		92				355	
	5:00 PM		139		119		11		91				360	
	5:15 PM		177		108		7		111				403	
	5:30 PM		138		94		9		105				346	
	5:45 PM		137		91		14		112				354	
	VOLUMES	0	1,155	0	0	793	0	78	0	837	0	0	0	2,863
	APPROACH %	0%	100%	0%	0%	100%	0%	9%	0%	91%	0%	0%	0%	
APP/DEPART	1,155	/	1,233	793	/	1,630	915	/	0	0	/	0	0	
BEGIN PEAK HR	4:45 PM													
VOLUMES	0	599	0	0	429	0	37	0	399	0	0	0	1,464	
APPROACH %	0%	100%	0%	0%	100%	0%	8%	0%	92%	0%	0%	0%		
PEAK HR FACTOR	0.846			0.901			0.924			0.000			0.908	
APP/DEPART	599	/	636	429	/	828	436	/	0	0	/	0	0	



INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE:
2/15/18
THURSDAY

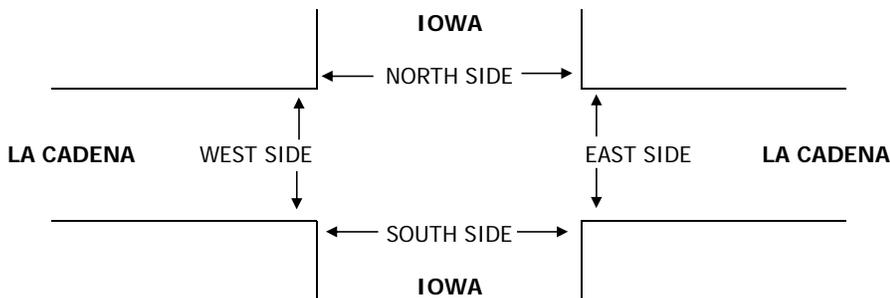
LOCATION:
NORTH & SOUTH: IOWA
EAST & WEST: LA CADENA

PROJECT #:
LOCATION #: 3
CONTROL: STOP EB & NL

NOTES:	AM	PM	MD	OTHER	OTHER	▲ N	E ►
						◀ W	S ▼

LANES:	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			TOTAL
	IOWA			IOWA			LA CADENA			LA CADENA			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
	1	1	X	X	1	2	1	X	1	X	X	X	

AM	7:00 AM	15	102			105	138	19		32				411
	7:15 AM	12	142			107	180	31		34				506
	7:30 AM	10	118			86	209	21		24				468
	7:45 AM	16	100			103	269	19		15				522
	8:00 AM	10	87			114	175	18		11				415
	8:15 AM	12	64			75	118	14		24				307
	8:30 AM	11	72			72	105	18		16				294
	8:45 AM	15	75			66	80	17		16				269
	VOLUMES	101	760	0	0	728	1,274	157	0	172	0	0	0	3,192
	APPROACH %	12%	88%	0%	0%	36%	64%	48%	0%	52%	0%	0%	0%	
APP/DEPART	861	/	917	2,002	/	900	329	/	0	0	/	1,375	0	
BEGIN PEAK HR	7:15 AM													
VOLUMES	48	447	0	0	410	833	89	0	84	0	0	0	1,911	
APPROACH %	10%	90%	0%	0%	33%	67%	51%	0%	49%	0%	0%	0%		
PEAK HR FACTOR	0.804			0.835			0.665			0.000			0.915	
APP/DEPART	495	/	536	1,243	/	494	173	/	0	0	/	881	0	
PM	4:00 PM	19	142			35	157	63		34				450
	4:15 PM	27	123			77	163	64		28				482
	4:30 PM	11	123			51	162	73		46				466
	4:45 PM	10	144			70	164	78		39				505
	5:00 PM	13	140			83	176	79		36				527
	5:15 PM	18	165			62	135	101		47				528
	5:30 PM	21	127			60	171	102		32				513
	5:45 PM	27	124			64	163	82		28				488
	VOLUMES	146	1,088	0	0	502	1,291	642	0	290	0	0	0	3,959
	APPROACH %	12%	88%	0%	0%	28%	72%	69%	0%	31%	0%	0%	0%	
APP/DEPART	1,234	/	1,730	1,793	/	792	932	/	0	0	/	1,437	0	
BEGIN PEAK HR	4:45 PM													
VOLUMES	62	576	0	0	275	646	360	0	154	0	0	0	2,073	
APPROACH %	10%	90%	0%	0%	30%	70%	70%	0%	30%	0%	0%	0%		
PEAK HR FACTOR	0.872			0.889			0.868			0.000			0.982	
APP/DEPART	638	/	936	921	/	429	514	/	0	0	/	708	0	



INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: PACIFIC TRAFFIC DATA SERVICES

DATE:
2/15/18
THURSDAY

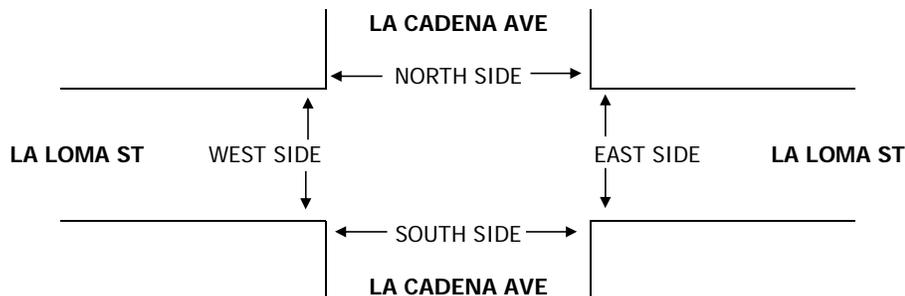
LOCATION:
NORTH & SOUTH: **LA CADENA AVE**
EAST & WEST: **LA LOMA ST**

PROJECT #:
LOCATION #: 4
CONTROL: 1 WAY STOP EB

NOTES:	AM PM MD OTHER OTHER	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">◀ W</div> <div style="text-align: center;">▲ N ▼ S</div> <div style="text-align: center;">E ▶</div> </div>
--------	----------------------------------	--

LANES:	NORTHBOUND LA CADENA AVE			SOUTHBOUND LA CADENA AVE			EASTBOUND LA LOMA ST			WESTBOUND LA LOMA ST			TOTAL
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
	1	2	X	X	2	0	0.5	X	0.5	X	X	X	

AM	NORTHBOUND LA CADENA AVE			SOUTHBOUND LA CADENA AVE			EASTBOUND LA LOMA ST			WESTBOUND LA LOMA ST			TOTAL
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
7:00 AM	3	124			213	3	11		29				383
7:15 AM	11	156			272	4	22		9				474
7:30 AM	8	125			285	8	13		14				453
7:45 AM	8	117			352	8	11		18				514
8:00 AM	7	97			278	9	10		9				410
8:15 AM	3	74			183	2	8		12				282
8:30 AM	5	89			173	6	6		5				284
8:45 AM	6	84			141	3	5		7				246
VOLUMES	51	866	0	0	1,897	43	86	0	103	0	0	0	3,046
APPROACH %	6%	94%	0%	0%	98%	2%	46%	0%	54%	0%	0%	0%	
APP/DEPART	917	/	952	1,940	/	2,000	189	/	0	0	/	94	0
BEGIN PEAK HR	7:15 AM												
VOLUMES	34	495	0	0	1,187	29	56	0	50	0	0	0	1,851
APPROACH %	6%	94%	0%	0%	98%	2%	53%	0%	47%	0%	0%	0%	
PEAK HR FACTOR	0.792			0.844			0.855			0.000			0.900
APP/DEPART	529	/	551	1,216	/	1,237	106	/	0	0	/	63	0
4:00 PM	14	190			185	17	15		7				428
4:15 PM	14	173			232	19	9		9				456
4:30 PM	6	193			204	8	3		8				422
4:45 PM	12	211			226	10	10		11				480
5:00 PM	4	214			246	18	12		11				505
5:15 PM	18	245			184	15	9		19				490
5:30 PM	12	218			216	11	7		15				479
5:45 PM	12	194			210	14	7		13				450
VOLUMES	92	1,638	0	0	1,703	112	72	0	93	0	0	0	3,710
APPROACH %	5%	95%	0%	0%	94%	6%	44%	0%	56%	0%	0%	0%	
APP/DEPART	1,730	/	1,710	1,815	/	1,796	165	/	0	0	/	204	0
BEGIN PEAK HR	4:45 PM												
VOLUMES	46	888	0	0	872	54	38	0	56	0	0	0	1,954
APPROACH %	5%	95%	0%	0%	94%	6%	40%	0%	60%	0%	0%	0%	
PEAK HR FACTOR	0.888			0.877			0.839			0.000			0.967
APP/DEPART	934	/	926	926	/	928	94	/	0	0	/	100	0



TUESDAY - FEBRUARY 20, 2018

CITY: COLTON

PROJECT:

LA CADENA W-O IOWA

Inc.

AM Period	NB	SB	EL	ER	PM Period	NB	SB	EL	ER				
00:00			2	6	12:00			25	16				
00:15			4	7	12:15			42	19				
00:30			2	5	12:30			51	21				
00:45			3	11	8	26	37	12:45	37	155	22	78	233
01:00			0	0	13:00			28	16				
01:15			1	0	13:15			30	23				
01:30			1	0	13:30			28	23				
01:45			0	2	0	0	2	13:45	31	117	24	86	203
02:00			1	1	14:00			33	25				
02:15			3	2	14:15			47	34				
02:30			2	2	14:30			44	31				
02:45			2	8	0	5	13	14:45	58	182	35	125	307
03:00			3	3	15:00			75	45				
03:15			0	0	15:15			49	42				
03:30			1	1	15:30			80	44				
03:45			1	5	3	7	12	15:45	90	294	38	169	463
04:00			3	2	16:00			62	35				
04:15			2	2	16:15			67	25				
04:30			0	1	16:30			70	44				
04:45			2	7	2	7	14	16:45	82	281	45	149	430
05:00			5	4	17:00			85	38				
05:15			2	2	17:15			100	50				
05:30			7	3	17:30			99	30				
05:45			5	19	8	17	36	17:45	79	363	25	143	506
06:00			9	10	18:00			47	23				
06:15			8	7	18:15			30	22				
06:30			8	9	18:30			28	14				
06:45			14	39	14	40	79	18:45	14	119	12	71	190
07:00			20	30	19:00			24	10				
07:15			31	28	19:15			42	15				
07:30			22	27	19:30			81	32				
07:45			22	95	16	101	196	19:45	139	286	47	104	390
08:00			18	10	20:00			116	41				
08:15			15	22	20:15			104	45				
08:30			17	18	20:30			117	50				
08:45			14	64	18	68	132	20:45	112	449	49	185	634
09:00			21	19	21:00			103	51				
09:15			14	14	21:15			78	44				
09:30			21	15	21:30			66	37				
09:45			30	86	19	67	153	21:45	36	283	30	162	445
10:00			25	22	22:00			36	20				
10:15			30	17	22:15			13	7				
10:30			29	29	22:30			17	8				
10:45			37	121	31	99	220	22:45	7	73	8	43	116
11:00			25	19	23:00			6	4				
11:15			23	20	23:15			4	4				
11:30			26	23	23:30			1	2				
11:45			24	98	23	85	183	23:45	2	13	2	12	25

Total Vol. 555 522 **1077** 2615 1327 **3942**

Daily Totals

NB	SB	EB	WB	Combined
		3170	1849	5019

AM

PM

Split %	51.5%	48.5%	21.5%	66.3%	33.7%	78.5%
Peak Hour	11:45	07:00	11:45	19:45	20:15	19:45
Volume	142	101	221	476	195	659
P.H.F.	0.70	0.84	0.77	0.86	0.96	0.89

THURSDAY - FEBRUARY 15, 2018

CITY: COLTON

PROJECT:

215 SB OFF RAMP

Inc.

AM Period	NB	SB	EL	ER	PM Period	NB	SB	EL	ER				
00:00			2	6	12:00			9	58				
00:15			1	11	12:15			8	54				
00:30			0	10	12:30			17	79				
00:45			2	5	6	33	38	12:45	16	50	103	294	344
01:00			0	5	13:00			17	107				
01:15			0	8	13:15			19	99				
01:30			0	12	13:30			21	104				
01:45			0	0	4	29	29	13:45	21	78	112	422	500
02:00			0	6	14:00			13	78				
02:15			0	14	14:15			25	106				
02:30			0	5	14:30			10	88				
02:45			0	0	7	32	32	14:45	9	57	114	386	443
03:00			1	10	15:00			8	102				
03:15			0	8	15:15			11	142				
03:30			2	16	15:30			11	119				
03:45			3	6	13	47	53	15:45	12	42	108	471	513
04:00			2	16	16:00			10	120				
04:15			1	21	16:15			10	109				
04:30			0	40	16:30			8	98				
04:45			1	4	60	137	141	16:45	10	38	89	416	454
05:00			0	22	17:00			9	90				
05:15			4	35	17:15			8	109				
05:30			0	49	17:30			10	110				
05:45			2	6	72	178	184	17:45	13	40	114	423	463
06:00			4	60	18:00			6	109				
06:15			0	69	18:15			13	106				
06:30			4	99	18:30			11	63				
06:45			3	11	106	334	345	18:45	11	41	61	339	380
07:00			1	85	19:00			11	62				
07:15			6	110	19:15			13	42				
07:30			2	103	19:30			0	33				
07:45			7	16	113	411	427	19:45	3	27	37	174	201
08:00			9	80	20:00			12	44				
08:15			4	94	20:15			11	34				
08:30			4	89	20:30			7	27				
08:45			7	24	75	338	362	20:45	1	31	34	139	170
09:00			4	50	21:00			5	24				
09:15			11	51	21:15			5	22				
09:30			8	61	21:30			6	30				
09:45			3	26	74	236	262	21:45	9	25	25	101	126
10:00			4	58	22:00			7	19				
10:15			10	54	22:15			7	15				
10:30			8	79	22:30			2	14				
10:45			4	26	103	294	320	22:45	4	20	11	59	79
11:00			8	50	23:00			6	10				
11:15			8	51	23:15			3	10				
11:30			9	61	23:30			4	13				
11:45			17	42	74	236	278	23:45	2	15	10	43	58

Total Vol. 166 2305 **2471** 464 3267 **3731**

Daily Totals

NB	SB	EB	WB	Combined
		630	5572	6202

AM

PM

Split %	6.7%	93.3%	39.8%	12.4%	87.6%	60.2%
Peak Hour	11:45	07:00	07:15	13:30	15:15	15:15
Volume	51	411	430	80	489	533
P.H.F.	0.75	0.91	0.90	0.80	0.86	0.87

TUESDAY - FEBRUARY 20, 2018

CITY: COLTON

PROJECT:

IOWA at 215SB OFF RAMP

					Inc.						
AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB		
00:00	27	12			12:00	84	52				
00:15	23	9			12:15	128	53				
00:30	26	8			12:30	105	60				
00:45	14	90	12	41	131	12:45	106	423	57	222	645
01:00	16	4			13:00	124	59				
01:15	11	1			13:15	123	66				
01:30	16	6			13:30	115	66				
01:45	9	52	9	20	72	13:45	124	486	67	258	744
02:00	18	6			14:00	134	59				
02:15	14	7			14:15	121	105				
02:30	13	2			14:30	164	85				
02:45	13	58	5	20	78	14:45	122	541	78	327	868
03:00	11	3			15:00	170	98				
03:15	9	5			15:15	166	99				
03:30	16	10			15:30	141	108				
03:45	21	57	14	32	89	15:45	150	627	108	413	1040
04:00	24	7			16:00	155	72				
04:15	20	16			16:15	138	103				
04:30	24	19			16:30	123	101				
04:45	39	107	34	76	183	16:45	151	567	114	390	957
05:00	52	19			17:00	138	117				
05:15	63	24			17:15	181	107				
05:30	89	43			17:30	133	95				
05:45	96	300	64	150	450	17:45	135	587	85	404	991
06:00	62	42			18:00	118	86				
06:15	80	50			18:15	125	77				
06:30	81	50			18:30	142	62				
06:45	128	351	88	230	581	18:45	104	489	42	267	756
07:00	119	135			19:00	173	49				
07:15	148	136			19:15	213	61				
07:30	122	109			19:30	245	69				
07:45	114	503	135	515	1018	19:45	253	884	82	261	1145
08:00	90	113			20:00	262	67				
08:15	70	101			20:15	248	65				
08:30	83	81			20:30	237	61				
08:45	76	319	85	380	699	20:45	252	999	67	260	1259
09:00	86	61			21:00	245	63				
09:15	93	39			21:15	255	67				
09:30	180	47			21:30	243	58				
09:45	231	590	52	199	789	21:45	231	974	47	235	1209
10:00	217	59			22:00	233	36				
10:15	220	55			22:15	153	24				
10:30	264	66			22:30	179	22				
10:45	261	962	69	249	1211	22:45	92	657	14	96	753
11:00	198	45			23:00	40	12				
11:15	241	52			23:15	38	10				
11:30	227	64			23:30	19	5				
11:45	199	865	66	227	1092	23:45	22	119	8	35	154

Total Vol.	4254	2139			6393		7353	3168			10521
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					Daily Totals				
					NB	SB	EB	WB	Combined
					11607	5307			16914

AM					PM					
Split %	66.5%	33.5%			37.8%		69.9%	30.1%		62.2%

Peak Hour	10:30	07:00			10:00		19:30	16:30			19:30
Volume	964	515			1211		1008	439			1291
P.H.F.	0.91	0.95			0.92		0.98	0.94			0.96

APPENDIX C
LEVEL OF SERVICE ANALYSIS

Timings

1: Iowa Ave & I-215 NB/EB Ramps

04/09/2018

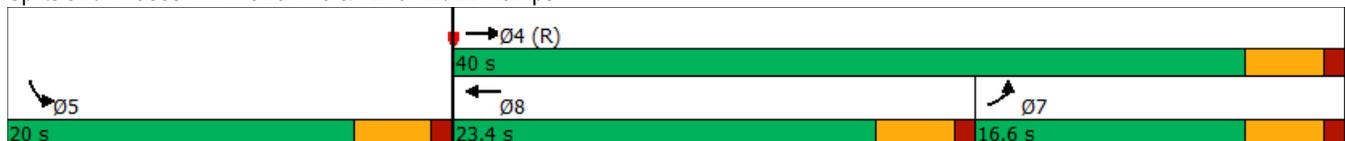


Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	321	472	21	82
Future Volume (vph)	321	472	21	82
Turn Type	Prot	NA	NA	Prot
Protected Phases	7	4	8	5
Permitted Phases				
Detector Phase	7	4	8	5
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	20.0
Total Split (s)	16.6	40.0	23.4	20.0
Total Split (%)	27.7%	66.7%	39.0%	33.3%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	Max	C-Max	None	None
Act Effct Green (s)	23.3	35.5	7.7	15.5
Actuated g/C Ratio	0.39	0.59	0.13	0.26
v/c Ratio	0.51	0.47	0.58	0.97
Control Delay	18.2	8.6	11.8	25.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	18.2	8.6	11.8	25.7
LOS	B	A	B	C
Approach Delay		12.5	11.8	25.7
Approach LOS		B	B	C

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 52 (87%), Referenced to phase 4:EBT, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 18.8
 Intersection Capacity Utilization 98.0%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service F

Splits and Phases: 1: Iowa Ave & I-215 NB/EB Ramps



HCM 2010 Signalized Intersection Summary

2: Iowa Ave & I-215 SB/WB Off Ramp

03/02/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	16	415	0	501	508	0		
Future Volume (veh/h)	16	415	0	501	508	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	0	1863	1863	0		
Adj Flow Rate, veh/h	18	477	0	576	584	0		
Adj No. of Lanes	1	1	0	1	1	0		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87		
Percent Heavy Veh, %	2	2	0	2	2	0		
Cap, veh/h	876	782	0	664	664	0		
Arrive On Green	0.49	0.49	0.00	0.36	0.71	0.00		
Sat Flow, veh/h	1774	1583	0	1863	1863	0		
Grp Volume(v), veh/h	18	477	0	576	584	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	0	1863	1863	0		
Q Serve(g_s), s	0.3	13.1	0.0	17.3	14.5	0.0		
Cycle Q Clear(g_c), s	0.3	13.1	0.0	17.3	14.5	0.0		
Prop In Lane	1.00	1.00	0.00			0.00		
Lane Grp Cap(c), veh/h	876	782	0	664	664	0		
V/C Ratio(X)	0.02	0.61	0.00	0.87	0.88	0.00		
Avail Cap(c_a), veh/h	876	782	0	854	854	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00		
Upstream Filter(I)	1.00	1.00	0.00	0.85	0.59	0.00		
Uniform Delay (d), s/veh	7.8	11.0	0.0	18.0	7.6	0.0		
Incr Delay (d2), s/veh	0.0	3.5	0.0	6.7	5.4	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.2	6.5	0.0	10.0	7.8	0.0		
LnGrp Delay(d),s/veh	7.8	14.5	0.0	24.7	13.1	0.0		
LnGrp LOS	A	B		C	B			
Approach Vol, veh/h	495			576	584			
Approach Delay, s/veh	14.3			24.7	13.1			
Approach LOS	B			C	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		25.9		34.1		25.9		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		27.5		23.5		27.5		
Max Q Clear Time (g_c+I1), s		19.3		15.1		16.5		
Green Ext Time (p_c), s		2.1		1.2		2.5		
Intersection Summary								
HCM 2010 Ctrl Delay			17.5					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary

3: Iowa Ave & La Cadena Ave

03/02/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	89	84	48	447	508	0		
Future Volume (veh/h)	89	84	48	447	508	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	0		
Adj Flow Rate, veh/h	97	91	52	486	552	0		
Adj No. of Lanes	1	1	1	1	1	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	0		
Cap, veh/h	694	620	86	854	625	0		
Arrive On Green	0.39	0.39	0.10	0.92	0.34	0.00		
Sat Flow, veh/h	1774	1583	1774	1863	1863	0		
Grp Volume(v), veh/h	97	91	52	486	552	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	0		
Q Serve(g_s), s	2.1	2.2	1.7	2.7	16.8	0.0		
Cycle Q Clear(g_c), s	2.1	2.2	1.7	2.7	16.8	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	694	620	86	854	625	0		
V/C Ratio(X)	0.14	0.15	0.61	0.57	0.88	0.00		
Avail Cap(c_a), veh/h	694	620	192	1071	730	0		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	0.55	0.55	1.00	0.00		
Uniform Delay (d), s/veh	11.8	11.8	26.6	1.5	18.8	0.0		
Incr Delay (d2), s/veh	0.4	0.5	3.8	0.3	11.1	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.1	2.5	0.9	1.2	10.5	0.0		
LnGrp Delay(d),s/veh	12.2	12.3	30.3	1.8	30.0	0.0		
LnGrp LOS	B	B	C	A	C			
Approach Vol, veh/h	188			538	552			
Approach Delay, s/veh	12.2			4.5	30.0			
Approach LOS	B			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		32.0		28.0	7.4	24.6		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		34.5		16.5	6.5	23.5		
Max Q Clear Time (g_c+I1), s		4.7		4.2	3.7	18.8		
Green Ext Time (p_c), s		2.8		0.4	0.0	1.3		
Intersection Summary								
HCM 2010 Ctrl Delay			16.7					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary

4: La Cadena Ave & La Loma St

03/02/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations				 	 			
Traffic Volume (veh/h)	56	50	34	495	1187	29		
Future Volume (veh/h)	56	50	34	495	1187	29		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1900		
Adj Flow Rate, veh/h	62	56	38	550	1319	32		
Adj No. of Lanes	1	0	1	2	2	0		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	2	0	2	2	2	2		
Cap, veh/h	0	0	69	2000	1593	39		
Arrive On Green	0.28	0.28	0.04	0.57	0.45	0.45		
Sat Flow, veh/h	0	0	1774	3632	3625	86		
Grp Volume(v), veh/h	0	0	38	550	661	690		
Grp Sat Flow(s),veh/h/ln	0	0	1774	1770	1770	1848		
Q Serve(g_s), s	0.0	0.0	1.3	4.8	19.6	19.7		
Cycle Q Clear(g_c), s	0.0	0.0	1.3	4.8	19.6	19.7		
Prop In Lane	0.00	0.00	1.00			0.05		
Lane Grp Cap(c), veh/h	0	0	69	2000	798	833		
V/C Ratio(X)	0.00	0.00	0.55	0.28	0.83	0.83		
Avail Cap(c_a), veh/h	0	0	169	2448	923	964		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	0.0	28.3	6.7	14.4	14.4		
Incr Delay (d2), s/veh	0.0	0.0	6.6	0.1	5.6	5.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.7	2.3	10.8	11.2		
LnGrp Delay(d),s/veh	0.0	0.0	34.9	6.8	20.0	19.9		
LnGrp LOS			C	A	C	B		
Approach Vol, veh/h	0			588	1351			
Approach Delay, s/veh	0.0			8.6	19.9			
Approach LOS				A	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		38.4		21.6	6.8	31.6		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		41.5		9.5	5.7	31.3		
Max Q Clear Time (g_c+I1), s		6.8		0.0	3.3	21.7		
Green Ext Time (p_c), s		3.5		0.0	0.0	5.4		
Intersection Summary								
HCM 2010 Ctrl Delay			16.5					
HCM 2010 LOS			B					

Timings

1: Iowa Ave & I-215 NB/EB Ramps

04/09/2018



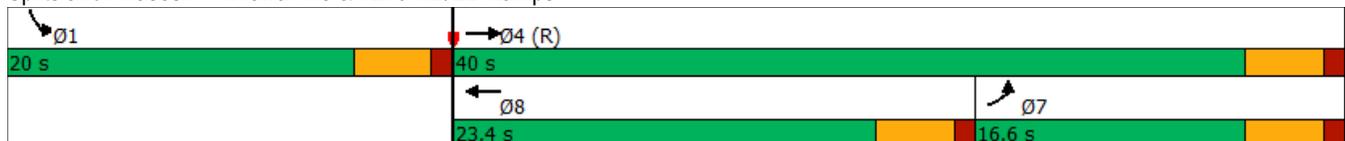
Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	325	472	21	90
Future Volume (vph)	325	472	21	90
Turn Type	Prot	NA	NA	Prot
Protected Phases	7	4	8	1
Permitted Phases				
Detector Phase	7	4	8	1
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5
Total Split (s)	16.6	40.0	23.4	20.0
Total Split (%)	27.7%	66.7%	39.0%	33.3%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	Max	C-Max	None	None
Act Effct Green (s)	23.2	35.5	7.8	15.5
Actuated g/C Ratio	0.39	0.59	0.13	0.26
v/c Ratio	0.52	0.47	0.59	1.04
Control Delay	18.4	8.6	11.8	44.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	18.4	8.6	11.8	44.1
LOS	B	A	B	D
Approach Delay		12.6	11.8	44.1
Approach LOS		B	B	D

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 52 (87%), Referenced to phase 4:EBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.04
 Intersection Signal Delay: 27.7
 Intersection Capacity Utilization 99.4%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service F

Splits and Phases: 1: Iowa Ave & I-215 NB/EB Ramps



HCM 2010 Signalized Intersection Summary
 2: Iowa Ave & I-215 SB/WB Off Ramp

03/13/2018

									
Movement	EBL	EBR	NBL	NBT	SBT	SBR			
Lane Configurations									
Traffic Volume (veh/h)	36	415	0	529	534	0			
Future Volume (veh/h)	36	415	0	529	534	0			
Number	7	14	5	2	6	16			
Initial Q (Qb), veh	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	0	1863	1863	0			
Adj Flow Rate, veh/h	41	477	0	608	614	0			
Adj No. of Lanes	1	1	0	1	1	0			
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87			
Percent Heavy Veh, %	2	2	0	2	2	0			
Cap, veh/h	848	757	0	693	693	0			
Arrive On Green	0.48	0.48	0.00	0.37	0.74	0.00			
Sat Flow, veh/h	1774	1583	0	1863	1863	0			
Grp Volume(v), veh/h	41	477	0	608	614	0			
Grp Sat Flow(s),veh/h/ln	1774	1583	0	1863	1863	0			
Q Serve(g_s), s	0.7	13.5	0.0	18.3	14.9	0.0			
Cycle Q Clear(g_c), s	0.7	13.5	0.0	18.3	14.9	0.0			
Prop In Lane	1.00	1.00	0.00			0.00			
Lane Grp Cap(c), veh/h	848	757	0	693	693	0			
V/C Ratio(X)	0.05	0.63	0.00	0.88	0.89	0.00			
Avail Cap(c_a), veh/h	848	757	0	854	854	0			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.85	0.71	0.00			
Uniform Delay (d), s/veh	8.4	11.7	0.0	17.6	6.7	0.0			
Incr Delay (d2), s/veh	0.1	4.0	0.0	7.6	7.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.4	6.7	0.0	10.8	8.2	0.0			
LnGrp Delay(d),s/veh	8.5	15.7	0.0	25.2	13.8	0.0			
LnGrp LOS	A	B		C	B				
Approach Vol, veh/h	518			608	614				
Approach Delay, s/veh	15.1			25.2	13.8				
Approach LOS	B			C	B				
Timer	1	2	3	4	5	6	7	8	
Assigned Phs	2		4		6				
Phs Duration (G+Y+Rc), s	26.8		33.2		26.8				
Change Period (Y+Rc), s	4.5		4.5		4.5				
Max Green Setting (Gmax), s	27.5		23.5		27.5				
Max Q Clear Time (g_c+I1), s	20.3		15.5		16.9				
Green Ext Time (p_c), s	2.1		1.2		2.6				
Intersection Summary									
HCM 2010 Ctrl Delay	18.1								
HCM 2010 LOS	B								

HCM 2010 Signalized Intersection Summary
 3: Iowa Ave & La Cadena Ave

03/13/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	89	96	104	466	430	0		
Future Volume (veh/h)	89	96	104	466	430	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	0		
Adj Flow Rate, veh/h	97	104	113	507	467	0		
Adj No. of Lanes	1	1	1	1	1	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	0		
Cap, veh/h	710	634	143	838	548	0		
Arrive On Green	0.40	0.40	0.16	0.90	0.29	0.00		
Sat Flow, veh/h	1774	1583	1774	1863	1863	0		
Grp Volume(v), veh/h	97	104	113	507	467	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	0		
Q Serve(g_s), s	2.1	2.5	3.7	3.6	14.2	0.0		
Cycle Q Clear(g_c), s	2.1	2.5	3.7	3.6	14.2	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	710	634	143	838	548	0		
V/C Ratio(X)	0.14	0.16	0.79	0.61	0.85	0.00		
Avail Cap(c_a), veh/h	710	634	192	1071	730	0		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	0.55	0.55	1.00	0.00		
Uniform Delay (d), s/veh	11.4	11.5	24.7	1.8	19.9	0.0		
Incr Delay (d2), s/veh	0.4	0.6	8.6	0.4	7.4	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.1	2.8	2.1	1.5	8.4	0.0		
LnGrp Delay(d),s/veh	11.8	12.1	33.3	2.2	27.4	0.0		
LnGrp LOS	B	B	C	A	C			
Approach Vol, veh/h	201			620	467			
Approach Delay, s/veh	12.0			7.9	27.4			
Approach LOS	B			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	2		4		5	6		
Phs Duration (G+Y+Rc), s	31.5		28.5		9.3	22.2		
Change Period (Y+Rc), s	4.5		4.5		4.5	4.5		
Max Green Setting (Gmax), s	34.5		16.5		6.5	23.5		
Max Q Clear Time (g_c+I1), s	5.6		4.5		5.7	16.2		
Green Ext Time (p_c), s	2.9		0.4		0.0	1.5		
Intersection Summary								
HCM 2010 Ctrl Delay			15.6					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
4: La Cadena Ave & La Loma St

03/13/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations				 	 			
Traffic Volume (veh/h)	56	54	37	500	1192	29		
Future Volume (veh/h)	56	54	37	500	1192	29		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1900		
Adj Flow Rate, veh/h	62	60	41	556	1324	32		
Adj No. of Lanes	1	0	1	2	2	0		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	2	0	2	2	2	2		
Cap, veh/h	0	0	73	2011	1597	39		
Arrive On Green	0.28	0.28	0.04	0.57	0.45	0.45		
Sat Flow, veh/h	0	0	1774	3632	3625	85		
Grp Volume(v), veh/h	0	0	41	556	663	693		
Grp Sat Flow(s),veh/h/ln	0	0	1774	1770	1770	1848		
Q Serve(g_s), s	0.0	0.0	1.4	4.8	19.7	19.7		
Cycle Q Clear(g_c), s	0.0	0.0	1.4	4.8	19.7	19.7		
Prop In Lane	0.00	0.00	1.00			0.05		
Lane Grp Cap(c), veh/h	0	0	73	2011	800	835		
V/C Ratio(X)	0.00	0.00	0.56	0.28	0.83	0.83		
Avail Cap(c_a), veh/h	0	0	169	2448	923	964		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	0.0	28.2	6.6	14.4	14.4		
Incr Delay (d2), s/veh	0.0	0.0	6.6	0.1	5.7	5.5		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.8	2.3	10.8	11.3		
LnGrp Delay(d),s/veh	0.0	0.0	34.8	6.7	20.1	19.9		
LnGrp LOS			C	A	C	B		
Approach Vol, veh/h	0			597	1356			
Approach Delay, s/veh	0.0			8.6	20.0			
Approach LOS				A	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		38.6		21.4	7.0	31.6		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		41.5		9.5	5.7	31.3		
Max Q Clear Time (g_c+I1), s		6.8		0.0	3.4	21.7		
Green Ext Time (p_c), s		3.5		0.0	0.0	5.4		
Intersection Summary								
HCM 2010 Ctrl Delay			16.5					
HCM 2010 LOS			B					

Timings

1: Iowa Ave & I-215 NB/EB Ramps

04/09/2018

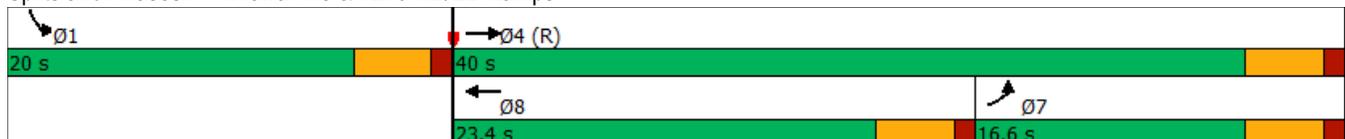


Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	334	491	22	85
Future Volume (vph)	334	491	22	85
Turn Type	Prot	NA	NA	Prot
Protected Phases	7	4	8	1
Permitted Phases				
Detector Phase	7	4	8	1
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5
Total Split (s)	16.6	40.0	23.4	20.0
Total Split (%)	27.7%	66.7%	39.0%	33.3%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	Max	C-Max	None	None
Act Effct Green (s)	23.2	35.5	7.8	15.5
Actuated g/C Ratio	0.39	0.59	0.13	0.26
v/c Ratio	0.53	0.48	0.59	1.00
Control Delay	18.8	8.9	11.9	33.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	18.8	8.9	11.9	33.7
LOS	B	A	B	C
Approach Delay		12.9	11.9	33.7
Approach LOS		B	B	C

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 52 (87%), Referenced to phase 4:EBT, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.00
 Intersection Signal Delay: 22.8
 Intersection Capacity Utilization 101.5%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service G

Splits and Phases: 1: Iowa Ave & I-215 NB/EB Ramps



HCM 2010 Signalized Intersection Summary

2: Iowa Ave & I-215 SB/WB Off Ramp

03/02/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	17	432	0	521	529	0		
Future Volume (veh/h)	17	432	0	521	529	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	0	1863	1863	0		
Adj Flow Rate, veh/h	20	497	0	599	608	0		
Adj No. of Lanes	1	1	0	1	1	0		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87		
Percent Heavy Veh, %	2	2	0	2	2	0		
Cap, veh/h	856	764	0	685	685	0		
Arrive On Green	0.48	0.48	0.00	0.37	0.74	0.00		
Sat Flow, veh/h	1774	1583	0	1863	1863	0		
Grp Volume(v), veh/h	20	497	0	599	608	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	0	1863	1863	0		
Q Serve(g_s), s	0.4	14.2	0.0	18.0	14.9	0.0		
Cycle Q Clear(g_c), s	0.4	14.2	0.0	18.0	14.9	0.0		
Prop In Lane	1.00	1.00	0.00			0.00		
Lane Grp Cap(c), veh/h	856	764	0	685	685	0		
V/C Ratio(X)	0.02	0.65	0.00	0.87	0.89	0.00		
Avail Cap(c_a), veh/h	856	764	0	854	854	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00		
Upstream Filter(I)	1.00	1.00	0.00	0.83	0.72	0.00		
Uniform Delay (d), s/veh	8.1	11.7	0.0	17.7	7.0	0.0		
Incr Delay (d2), s/veh	0.1	4.3	0.0	7.2	7.2	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.2	7.0	0.0	10.5	8.4	0.0		
LnGrp Delay(d),s/veh	8.2	16.0	0.0	24.9	14.2	0.0		
LnGrp LOS	A	B		C	B			
Approach Vol, veh/h	517			599	608			
Approach Delay, s/veh	15.7			24.9	14.2			
Approach LOS	B			C	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		26.6		33.4		26.6		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		27.5		23.5		27.5		
Max Q Clear Time (g_c+I1), s		20.0		16.2		16.9		
Green Ext Time (p_c), s		2.1		1.2		2.6		
Intersection Summary								
HCM 2010 Ctrl Delay			18.4					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
 3: Iowa Ave & La Cadena Ave

03/02/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	93	87	50	465	427	0		
Future Volume (veh/h)	93	87	50	465	427	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	0		
Adj Flow Rate, veh/h	101	95	54	505	464	0		
Adj No. of Lanes	1	1	1	1	1	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	0		
Cap, veh/h	768	685	88	777	545	0		
Arrive On Green	0.43	0.43	0.10	0.83	0.29	0.00		
Sat Flow, veh/h	1774	1583	1774	1863	1863	0		
Grp Volume(v), veh/h	101	95	54	505	464	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	0		
Q Serve(g_s), s	2.1	2.2	1.8	5.9	14.1	0.0		
Cycle Q Clear(g_c), s	2.1	2.2	1.8	5.9	14.1	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	768	685	88	777	545	0		
V/C Ratio(X)	0.13	0.14	0.62	0.65	0.85	0.00		
Avail Cap(c_a), veh/h	768	685	192	1071	730	0		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	0.53	0.53	1.00	0.00		
Uniform Delay (d), s/veh	10.2	10.3	26.5	3.4	20.0	0.0		
Incr Delay (d2), s/veh	0.4	0.4	3.7	0.5	7.3	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.1	2.5	0.9	2.6	8.3	0.0		
LnGrp Delay(d),s/veh	10.6	10.7	30.2	3.9	27.3	0.0		
LnGrp LOS	B	B	C	A	C			
Approach Vol, veh/h	196			559	464			
Approach Delay, s/veh	10.6			6.4	27.3			
Approach LOS	B			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		29.5		30.5	7.5	22.1		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		34.5		16.5	6.5	23.5		
Max Q Clear Time (g_c+I1), s		7.9		4.2	3.8	16.1		
Green Ext Time (p_c), s		2.9		0.4	0.0	1.5		
Intersection Summary								
HCM 2010 Ctrl Delay			15.0					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary

4: La Cadena Ave & La Loma St

03/02/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations				 	 			
Traffic Volume (veh/h)	58	52	35	515	1235	30		
Future Volume (veh/h)	58	52	35	515	1235	30		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1900		
Adj Flow Rate, veh/h	64	58	39	572	1372	33		
Adj No. of Lanes	1	0	1	2	2	0		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	2	0	2	2	2	2		
Cap, veh/h	0	0	71	2044	1634	39		
Arrive On Green	0.27	0.27	0.04	0.58	0.46	0.46		
Sat Flow, veh/h	0	0	1774	3632	3626	85		
Grp Volume(v), veh/h	0	0	39	572	687	718		
Grp Sat Flow(s),veh/h/ln	0	0	1774	1770	1770	1848		
Q Serve(g_s), s	0.0	0.0	1.3	4.9	20.5	20.5		
Cycle Q Clear(g_c), s	0.0	0.0	1.3	4.9	20.5	20.5		
Prop In Lane	0.00	0.00	1.00			0.05		
Lane Grp Cap(c), veh/h	0	0	71	2044	819	855		
V/C Ratio(X)	0.00	0.00	0.55	0.28	0.84	0.84		
Avail Cap(c_a), veh/h	0	0	169	2448	923	964		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	0.0	28.3	6.4	14.2	14.2		
Incr Delay (d2), s/veh	0.0	0.0	6.6	0.1	6.3	6.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.8	2.4	11.4	11.8		
LnGrp Delay(d),s/veh	0.0	0.0	34.8	6.5	20.5	20.3		
LnGrp LOS			C	A	C	C		
Approach Vol, veh/h	0			611	1405			
Approach Delay, s/veh	0.0			8.3	20.4			
Approach LOS				A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		39.1		20.9	6.9	32.3		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		41.5		9.5	5.7	31.3		
Max Q Clear Time (g_c+I1), s		6.9		0.0	3.3	22.5		
Green Ext Time (p_c), s		3.6		0.0	0.0	5.3		
Intersection Summary								
HCM 2010 Ctrl Delay			16.7					
HCM 2010 LOS			B					

Timings

1: Iowa Ave & I-215 NB/EB Ramps

04/09/2018

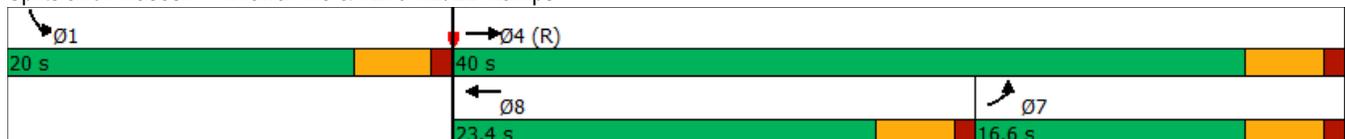


Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	338	491	22	94
Future Volume (vph)	338	491	22	94
Turn Type	Prot	NA	NA	Prot
Protected Phases	7	4	8	1
Permitted Phases				
Detector Phase	7	4	8	1
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5
Total Split (s)	16.6	40.0	23.4	20.0
Total Split (%)	27.7%	66.7%	39.0%	33.3%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	Max	C-Max	None	None
Act Effct Green (s)	23.2	35.5	7.8	15.5
Actuated g/C Ratio	0.39	0.59	0.13	0.26
v/c Ratio	0.54	0.48	0.60	1.08
Control Delay	19.2	8.9	11.8	58.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.2	8.9	11.8	58.6
LOS	B	A	B	E
Approach Delay		13.1	11.8	58.6
Approach LOS		B	B	E

Intersection Summary

Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 52 (87%), Referenced to phase 4:EBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.08
 Intersection Signal Delay: 34.8
 Intersection Capacity Utilization 102.9%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service G

Splits and Phases: 1: Iowa Ave & I-215 NB/EB Ramps



HCM 2010 Signalized Intersection Summary
 2: Iowa Ave & I-215 SB/WB Off Ramp

03/13/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	36	432	0	549	554	0		
Future Volume (veh/h)	36	432	0	549	554	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	0	1863	1863	0		
Adj Flow Rate, veh/h	41	497	0	631	637	0		
Adj No. of Lanes	1	1	0	1	1	0		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87		
Percent Heavy Veh, %	2	2	0	2	2	0		
Cap, veh/h	829	740	0	713	713	0		
Arrive On Green	0.47	0.47	0.00	0.38	0.77	0.00		
Sat Flow, veh/h	1774	1583	0	1863	1863	0		
Grp Volume(v), veh/h	41	497	0	631	637	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	0	1863	1863	0		
Q Serve(g_s), s	0.8	14.6	0.0	19.0	15.2	0.0		
Cycle Q Clear(g_c), s	0.8	14.6	0.0	19.0	15.2	0.0		
Prop In Lane	1.00	1.00	0.00			0.00		
Lane Grp Cap(c), veh/h	829	740	0	713	713	0		
V/C Ratio(X)	0.05	0.67	0.00	0.88	0.89	0.00		
Avail Cap(c_a), veh/h	829	740	0	854	854	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00		
Upstream Filter(I)	1.00	1.00	0.00	0.83	1.00	0.00		
Uniform Delay (d), s/veh	8.7	12.4	0.0	17.3	6.1	0.0		
Incr Delay (d2), s/veh	0.1	4.8	0.0	8.2	10.4	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.4	7.3	0.0	11.3	9.1	0.0		
LnGrp Delay(d),s/veh	8.8	17.2	0.0	25.5	16.6	0.0		
LnGrp LOS	A	B		C	B			
Approach Vol, veh/h	538			631	637			
Approach Delay, s/veh	16.6			25.5	16.6			
Approach LOS	B			C	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	2		4		6			
Phs Duration (G+Y+Rc), s	27.5		32.5		27.5			
Change Period (Y+Rc), s	4.5		4.5		4.5			
Max Green Setting (Gmax), s	27.5		23.5		27.5			
Max Q Clear Time (g_c+I1), s	21.0		16.6		17.2			
Green Ext Time (p_c), s	2.0		1.2		2.7			
Intersection Summary								
HCM 2010 Ctrl Delay			19.7					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
 3: Iowa Ave & La Cadena Ave

03/13/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	93	99	105	484	446	0		
Future Volume (veh/h)	93	99	105	484	446	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	0		
Adj Flow Rate, veh/h	101	108	114	526	485	0		
Adj No. of Lanes	1	1	1	1	1	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	0		
Cap, veh/h	693	618	144	856	565	0		
Arrive On Green	0.39	0.39	0.16	0.92	0.30	0.00		
Sat Flow, veh/h	1774	1583	1774	1863	1863	0		
Grp Volume(v), veh/h	101	108	114	526	485	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	0		
Q Serve(g_s), s	2.2	2.7	3.7	3.2	14.7	0.0		
Cycle Q Clear(g_c), s	2.2	2.7	3.7	3.2	14.7	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	693	618	144	856	565	0		
V/C Ratio(X)	0.15	0.17	0.79	0.61	0.86	0.00		
Avail Cap(c_a), veh/h	693	618	192	1071	730	0		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	11.8	12.0	24.6	1.4	19.7	0.0		
Incr Delay (d2), s/veh	0.4	0.6	14.9	0.7	8.1	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.2	3.0	2.4	1.3	8.8	0.0		
LnGrp Delay(d),s/veh	12.3	12.6	39.5	2.2	27.8	0.0		
LnGrp LOS	B	B	D	A	C			
Approach Vol, veh/h	209			640	485			
Approach Delay, s/veh	12.4			8.8	27.8			
Approach LOS	B			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	2		4		5	6		
Phs Duration (G+Y+Rc), s	32.1		27.9		9.4	22.7		
Change Period (Y+Rc), s	4.5		4.5		4.5	4.5		
Max Green Setting (Gmax), s	34.5		16.5		6.5	23.5		
Max Q Clear Time (g_c+I1), s	5.2		4.7		5.7	16.7		
Green Ext Time (p_c), s	3.1		0.4		0.0	1.5		
Intersection Summary								
HCM 2010 Ctrl Delay			16.3					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
 4: La Cadena Ave & La Loma St

03/13/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations				 	 			
Traffic Volume (veh/h)	58	56	39	520	1240	30		
Future Volume (veh/h)	58	56	39	520	1240	30		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1900		
Adj Flow Rate, veh/h	64	62	43	578	1378	33		
Adj No. of Lanes	1	0	1	2	2	0		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	2	0	2	2	2	2		
Cap, veh/h	0	0	76	2058	1639	39		
Arrive On Green	0.27	0.27	0.04	0.58	0.46	0.46		
Sat Flow, veh/h	0	0	1774	3632	3626	85		
Grp Volume(v), veh/h	0	0	43	578	690	721		
Grp Sat Flow(s),veh/h/ln	0	0	1774	1770	1770	1848		
Q Serve(g_s), s	0.0	0.0	1.4	4.9	20.5	20.6		
Cycle Q Clear(g_c), s	0.0	0.0	1.4	4.9	20.5	20.6		
Prop In Lane	0.00	0.00	1.00			0.05		
Lane Grp Cap(c), veh/h	0	0	76	2058	821	857		
V/C Ratio(X)	0.00	0.00	0.57	0.28	0.84	0.84		
Avail Cap(c_a), veh/h	0	0	169	2448	923	964		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	0.0	28.2	6.3	14.1	14.1		
Incr Delay (d2), s/veh	0.0	0.0	6.6	0.1	6.4	6.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.8	2.3	11.4	11.9		
LnGrp Delay(d),s/veh	0.0	0.0	34.7	6.4	20.5	20.4		
LnGrp LOS			C	A	C	C		
Approach Vol, veh/h	0			621	1411			
Approach Delay, s/veh	0.0			8.3	20.4			
Approach LOS				A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		39.4		20.6	7.1	32.3		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		41.5		9.5	5.7	31.3		
Max Q Clear Time (g_c+I1), s		6.9		0.0	3.4	22.6		
Green Ext Time (p_c), s		3.7		0.0	0.0	5.2		
Intersection Summary								
HCM 2010 Ctrl Delay			16.7					
HCM 2010 LOS			B					

Timings

1: Iowa Ave & I-215 NB/EB Ramps

04/09/2018



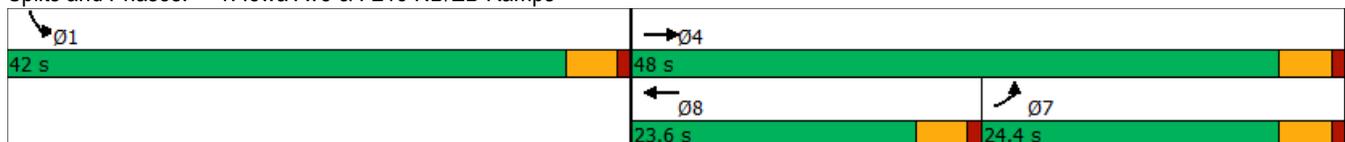
Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	336	574	16	125
Future Volume (vph)	336	574	16	125
Turn Type	Prot	NA	NA	Prot
Protected Phases	7	4	8	1
Permitted Phases				
Detector Phase	7	4	8	1
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5
Total Split (s)	24.4	48.0	23.6	42.0
Total Split (%)	27.1%	53.3%	26.2%	46.7%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	Max	Max	None	None
Act Effct Green (s)	30.4	43.5	8.6	36.6
Actuated g/C Ratio	0.34	0.49	0.10	0.41
v/c Ratio	0.59	0.67	0.71	0.98
Control Delay	31.0	22.2	16.6	42.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	31.0	22.2	16.6	42.3
LOS	C	C	B	D
Approach Delay		25.4	16.6	42.3
Approach LOS		C	B	D

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 89.1
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.98
 Intersection Signal Delay: 31.3
 Intersection Capacity Utilization 96.8%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service F

Splits and Phases: 1: Iowa Ave & I-215 NB/EB Ramps



HCM 2010 Signalized Intersection Summary

2: Iowa Ave & I-215 SB/WB Off Ramp

03/02/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	37	399	0	599	429	0		
Future Volume (veh/h)	37	399	0	599	429	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	0	1863	1863	0		
Adj Flow Rate, veh/h	41	438	0	658	471	0		
Adj No. of Lanes	1	1	0	1	1	0		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91		
Percent Heavy Veh, %	2	2	0	2	2	0		
Cap, veh/h	735	656	0	756	756	0		
Arrive On Green	0.41	0.41	0.00	0.41	0.81	0.00		
Sat Flow, veh/h	1774	1583	0	1863	1863	0		
Grp Volume(v), veh/h	41	438	0	658	471	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	0	1863	1863	0		
Q Serve(g_s), s	0.7	11.2	0.0	16.2	4.8	0.0		
Cycle Q Clear(g_c), s	0.7	11.2	0.0	16.2	4.8	0.0		
Prop In Lane	1.00	1.00	0.00			0.00		
Lane Grp Cap(c), veh/h	735	656	0	756	756	0		
V/C Ratio(X)	0.06	0.67	0.00	0.87	0.62	0.00		
Avail Cap(c_a), veh/h	735	656	0	913	913	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00		
Upstream Filter(I)	1.00	1.00	0.00	0.78	0.92	0.00		
Uniform Delay (d), s/veh	8.8	11.9	0.0	13.7	3.3	0.0		
Incr Delay (d2), s/veh	0.1	5.3	0.0	6.3	0.9	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.4	5.8	0.0	9.6	2.3	0.0		
LnGrp Delay(d),s/veh	8.9	17.2	0.0	20.0	4.1	0.0		
LnGrp LOS	A	B		B	A			
Approach Vol, veh/h	479			658	471			
Approach Delay, s/veh	16.5			20.0	4.1			
Approach LOS	B			B	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		24.8		25.2		24.8		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		24.5		16.5		24.5		
Max Q Clear Time (g_c+I1), s		18.2		13.2		6.8		
Green Ext Time (p_c), s		2.0		0.6		2.4		
Intersection Summary								
HCM 2010 Ctrl Delay			14.3					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
 3: Iowa Ave & La Cadena Ave

03/02/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	360	154	62	576	275	0		
Future Volume (veh/h)	360	154	62	576	275	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	0		
Adj Flow Rate, veh/h	367	157	63	588	281	0		
Adj No. of Lanes	1	1	1	1	1	0		
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98		
Percent Heavy Veh, %	2	2	2	2	2	0		
Cap, veh/h	837	747	109	649	366	0		
Arrive On Green	0.47	0.47	0.12	0.70	0.20	0.00		
Sat Flow, veh/h	1774	1583	1774	1863	1863	0		
Grp Volume(v), veh/h	367	157	63	588	281	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	0		
Q Serve(g_s), s	6.9	2.9	1.7	13.0	7.1	0.0		
Cycle Q Clear(g_c), s	6.9	2.9	1.7	13.0	7.1	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	837	747	109	649	366	0		
V/C Ratio(X)	0.44	0.21	0.58	0.91	0.77	0.00		
Avail Cap(c_a), veh/h	837	747	177	931	577	0		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	0.55	0.55	0.93	0.00		
Uniform Delay (d), s/veh	8.8	7.7	21.3	6.9	19.0	0.0		
Incr Delay (d2), s/veh	1.7	0.6	2.6	5.5	3.2	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	3.8	3.4	0.9	6.9	4.0	0.0		
LnGrp Delay(d),s/veh	10.5	8.4	23.9	12.4	22.2	0.0		
LnGrp LOS	B	A	C	B	C			
Approach Vol, veh/h	524			651	281			
Approach Delay, s/veh	9.8			13.5	22.2			
Approach LOS	A			B	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		21.9		28.1	7.6	14.3		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		25.0		16.0	5.0	15.5		
Max Q Clear Time (g_c+I1), s		15.0		8.9	3.7	9.1		
Green Ext Time (p_c), s		2.4		1.0	0.0	0.7		
Intersection Summary								
HCM 2010 Ctrl Delay			13.9					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
4: La Cadena Ave & La Loma St

03/02/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations				 	 			
Traffic Volume (veh/h)	38	56	46	888	872	54		
Future Volume (veh/h)	38	56	46	888	872	54		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1900		
Adj Flow Rate, veh/h	39	58	47	915	899	56		
Adj No. of Lanes	1	0	1	2	2	0		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97		
Percent Heavy Veh, %	2	0	2	2	2	2		
Cap, veh/h	0	0	85	1723	1181	74		
Arrive On Green	0.33	0.33	0.10	0.97	0.35	0.35		
Sat Flow, veh/h	0	0	1774	3632	3477	211		
Grp Volume(v), veh/h	0	0	47	915	470	485		
Grp Sat Flow(s),veh/h/ln	0	0	1774	1770	1770	1826		
Q Serve(g_s), s	0.0	0.0	1.3	0.7	11.8	11.8		
Cycle Q Clear(g_c), s	0.0	0.0	1.3	0.7	11.8	11.8		
Prop In Lane	0.00	0.00	1.00			0.12		
Lane Grp Cap(c), veh/h	0	0	85	1723	617	637		
V/C Ratio(X)	0.00	0.00	0.55	0.53	0.76	0.76		
Avail Cap(c_a), veh/h	0	0	209	2371	818	843		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(I)	0.00	0.00	0.70	0.70	1.00	1.00		
Uniform Delay (d), s/veh	0.0	0.0	22.1	0.3	14.4	14.4		
Incr Delay (d2), s/veh	0.0	0.0	3.9	0.2	3.0	2.9		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.7	0.3	6.3	6.4		
LnGrp Delay(d),s/veh	0.0	0.0	26.0	0.5	17.5	17.4		
LnGrp LOS			C	A	B	B		
Approach Vol, veh/h	0			962	955			
Approach Delay, s/veh	0.0			1.8	17.4			
Approach LOS				A	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		28.8		21.2	6.9	21.9		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		33.5		7.5	5.9	23.1		
Max Q Clear Time (g_c+I1), s		2.7		0.0	3.3	13.8		
Green Ext Time (p_c), s		6.4		0.0	0.0	3.7		
Intersection Summary								
HCM 2010 Ctrl Delay			9.6					
HCM 2010 LOS			A					

Timings

1: Iowa Ave & I-215 NB/EB Ramps

04/09/2018



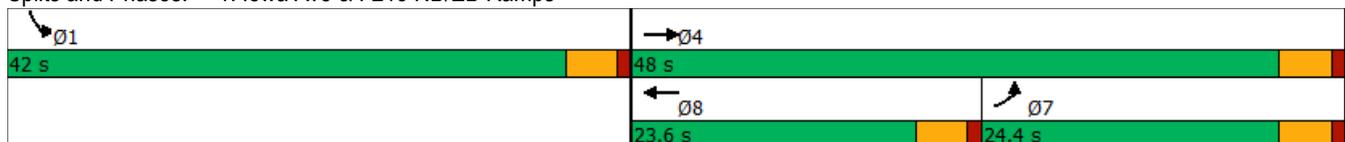
Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	339	574	16	133
Future Volume (vph)	339	574	16	133
Turn Type	Prot	NA	NA	Prot
Protected Phases	7	4	8	1
Permitted Phases				
Detector Phase	7	4	8	1
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5
Total Split (s)	24.4	48.0	23.6	42.0
Total Split (%)	27.1%	53.3%	26.2%	46.7%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	Max	Max	None	None
Act Effct Green (s)	30.4	43.5	8.6	37.5
Actuated g/C Ratio	0.34	0.48	0.10	0.42
v/c Ratio	0.60	0.68	0.72	1.00
Control Delay	31.6	22.6	16.7	47.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	31.6	22.6	16.7	47.4
LOS	C	C	B	D
Approach Delay		26.0	16.7	47.4
Approach LOS		C	B	D

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 1.00
 Intersection Signal Delay: 33.6
 Intersection Capacity Utilization 98.0%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service F

Splits and Phases: 1: Iowa Ave & I-215 NB/EB Ramps



HCM 2010 Signalized Intersection Summary

2: Iowa Ave & I-215 SB/WB Off Ramp

03/13/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	56	399	0	625	456	0		
Future Volume (veh/h)	56	399	0	625	456	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	0	1863	1863	0		
Adj Flow Rate, veh/h	62	438	0	687	501	0		
Adj No. of Lanes	1	1	0	1	1	0		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91		
Percent Heavy Veh, %	2	2	0	2	2	0		
Cap, veh/h	712	635	0	780	780	0		
Arrive On Green	0.40	0.40	0.00	0.42	0.84	0.00		
Sat Flow, veh/h	1774	1583	0	1863	1863	0		
Grp Volume(v), veh/h	62	438	0	687	501	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	0	1863	1863	0		
Q Serve(g_s), s	1.1	11.5	0.0	17.0	4.7	0.0		
Cycle Q Clear(g_c), s	1.1	11.5	0.0	17.0	4.7	0.0		
Prop In Lane	1.00	1.00	0.00			0.00		
Lane Grp Cap(c), veh/h	712	635	0	780	780	0		
V/C Ratio(X)	0.09	0.69	0.00	0.88	0.64	0.00		
Avail Cap(c_a), veh/h	712	635	0	913	913	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00		
Upstream Filter(I)	1.00	1.00	0.00	0.76	0.89	0.00		
Uniform Delay (d), s/veh	9.3	12.4	0.0	13.4	2.7	0.0		
Incr Delay (d2), s/veh	0.2	6.0	0.0	7.0	1.1	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.6	6.1	0.0	10.1	2.2	0.0		
LnGrp Delay(d),s/veh	9.5	18.4	0.0	20.4	3.8	0.0		
LnGrp LOS	A	B		C	A			
Approach Vol, veh/h	500			687	501			
Approach Delay, s/veh	17.3			20.4	3.8			
Approach LOS	B			C	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		25.4		24.6		25.4		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		24.5		16.5		24.5		
Max Q Clear Time (g_c+I1), s		19.0		13.5		6.7		
Green Ext Time (p_c), s		2.0		0.6		2.6		
Intersection Summary								
HCM 2010 Ctrl Delay			14.6					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
 3: Iowa Ave & La Cadena Ave

03/13/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	360	165	121	596	294	0		
Future Volume (veh/h)	360	165	121	596	294	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	0		
Adj Flow Rate, veh/h	367	168	123	608	300	0		
Adj No. of Lanes	1	1	1	1	1	0		
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98		
Percent Heavy Veh, %	2	2	2	2	2	0		
Cap, veh/h	774	691	155	715	385	0		
Arrive On Green	0.44	0.44	0.17	0.77	0.21	0.00		
Sat Flow, veh/h	1774	1583	1774	1863	1863	0		
Grp Volume(v), veh/h	367	168	123	608	300	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	0		
Q Serve(g_s), s	7.4	3.3	3.3	10.9	7.6	0.0		
Cycle Q Clear(g_c), s	7.4	3.3	3.3	10.9	7.6	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	774	691	155	715	385	0		
V/C Ratio(X)	0.47	0.24	0.80	0.85	0.78	0.00		
Avail Cap(c_a), veh/h	774	691	177	931	577	0		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	0.55	0.55	1.00	0.00		
Uniform Delay (d), s/veh	10.0	8.9	20.2	4.8	18.8	0.0		
Incr Delay (d2), s/veh	2.1	0.8	11.5	3.4	3.9	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.0	3.8	2.1	5.4	4.3	0.0		
LnGrp Delay(d),s/veh	12.1	9.7	31.7	8.3	22.7	0.0		
LnGrp LOS	B	A	C	A	C			
Approach Vol, veh/h	535			731	300			
Approach Delay, s/veh	11.4			12.2	22.7			
Approach LOS	B			B	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		23.7		26.3	8.9	14.8		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		25.0		16.0	5.0	15.5		
Max Q Clear Time (g_c+I1), s		12.9		9.4	5.3	9.6		
Green Ext Time (p_c), s		2.8		1.0	0.0	0.7		
Intersection Summary								
HCM 2010 Ctrl Delay			13.9					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
4: La Cadena Ave & La Loma St

03/13/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations				 	 			
Traffic Volume (veh/h)	38	59	49	893	876	54		
Future Volume (veh/h)	38	59	49	893	876	54		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1900		
Adj Flow Rate, veh/h	39	61	51	921	903	56		
Adj No. of Lanes	1	0	1	2	2	0		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97		
Percent Heavy Veh, %	2	0	2	2	2	2		
Cap, veh/h	0	0	90	1736	1184	73		
Arrive On Green	0.33	0.33	0.05	0.49	0.35	0.35		
Sat Flow, veh/h	0	0	1774	3632	3478	210		
Grp Volume(v), veh/h	0	0	51	921	472	487		
Grp Sat Flow(s),veh/h/ln	0	0	1774	1770	1770	1826		
Q Serve(g_s), s	0.0	0.0	1.4	9.0	11.8	11.8		
Cycle Q Clear(g_c), s	0.0	0.0	1.4	9.0	11.8	11.8		
Prop In Lane	0.00	0.00	1.00			0.11		
Lane Grp Cap(c), veh/h	0	0	90	1736	619	639		
V/C Ratio(X)	0.00	0.00	0.57	0.53	0.76	0.76		
Avail Cap(c_a), veh/h	0	0	209	2371	818	843		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	0.0	23.2	8.8	14.4	14.4		
Incr Delay (d2), s/veh	0.0	0.0	5.5	0.3	3.1	3.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.8	4.4	6.3	6.5		
LnGrp Delay(d),s/veh	0.0	0.0	28.7	9.0	17.5	17.4		
LnGrp LOS			C	A	B	B		
Approach Vol, veh/h	0			972	959			
Approach Delay, s/veh	0.0			10.1	17.4			
Approach LOS				B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		29.0		21.0	7.0	22.0		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		33.5		7.5	5.9	23.1		
Max Q Clear Time (g_c+I1), s		11.0		0.0	3.4	13.8		
Green Ext Time (p_c), s		6.0		0.0	0.0	3.7		
Intersection Summary								
HCM 2010 Ctrl Delay			13.7					
HCM 2010 LOS			B					

Timings

1: Iowa Ave & I-215 NB/EB Ramps

04/09/2018

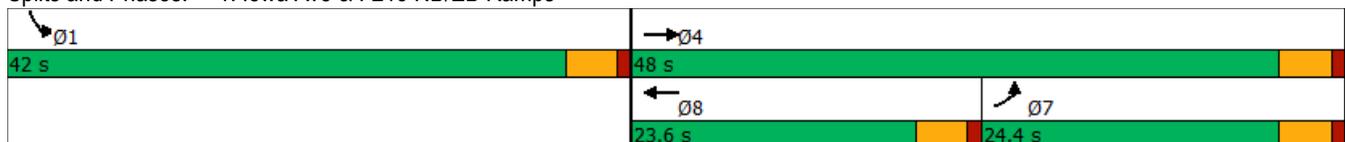


Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	350	597	17	130
Future Volume (vph)	350	597	17	130
Turn Type	Prot	NA	NA	Prot
Protected Phases	7	4	8	1
Permitted Phases				
Detector Phase	7	4	8	1
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5
Total Split (s)	24.4	48.0	23.6	42.0
Total Split (%)	27.1%	53.3%	26.2%	46.7%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	Max	Max	None	None
Act Effct Green (s)	30.3	43.5	8.7	37.5
Actuated g/C Ratio	0.34	0.48	0.10	0.42
v/c Ratio	0.63	0.71	0.73	1.01
Control Delay	32.4	23.5	16.8	50.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	32.4	23.5	16.8	50.2
LOS	C	C	B	D
Approach Delay		26.8	16.8	50.2
Approach LOS		C	B	D

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 35.2
 Intersection Capacity Utilization 100.3%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service G

Splits and Phases: 1: Iowa Ave & I-215 NB/EB Ramps



HCM 2010 Signalized Intersection Summary
 2: Iowa Ave & I-215 SB/WB Off Ramp

03/02/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	38	415	0	623	446	0		
Future Volume (veh/h)	38	415	0	623	446	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	0	1863	1863	0		
Adj Flow Rate, veh/h	42	456	0	685	490	0		
Adj No. of Lanes	1	1	0	1	1	0		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91		
Percent Heavy Veh, %	2	2	0	2	2	0		
Cap, veh/h	713	637	0	779	779	0		
Arrive On Green	0.40	0.40	0.00	0.42	0.84	0.00		
Sat Flow, veh/h	1774	1583	0	1863	1863	0		
Grp Volume(v), veh/h	42	456	0	685	490	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	0	1863	1863	0		
Q Serve(g_s), s	0.7	12.1	0.0	16.9	4.6	0.0		
Cycle Q Clear(g_c), s	0.7	12.1	0.0	16.9	4.6	0.0		
Prop In Lane	1.00	1.00	0.00			0.00		
Lane Grp Cap(c), veh/h	713	637	0	779	779	0		
V/C Ratio(X)	0.06	0.72	0.00	0.88	0.63	0.00		
Avail Cap(c_a), veh/h	713	637	0	913	913	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00		
Upstream Filter(I)	1.00	1.00	0.00	0.74	0.92	0.00		
Uniform Delay (d), s/veh	9.2	12.6	0.0	13.4	2.8	0.0		
Incr Delay (d2), s/veh	0.2	6.8	0.0	6.8	1.0	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.4	6.4	0.0	10.0	2.1	0.0		
LnGrp Delay(d),s/veh	9.3	19.3	0.0	20.2	3.7	0.0		
LnGrp LOS	A	B		C	A			
Approach Vol, veh/h	498			685	490			
Approach Delay, s/veh	18.5			20.2	3.7			
Approach LOS	B			C	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		25.4		24.6		25.4		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		24.5		16.5		24.5		
Max Q Clear Time (g_c+I1), s		18.9		14.1		6.6		
Green Ext Time (p_c), s		2.0		0.5		2.5		
Intersection Summary								
HCM 2010 Ctrl Delay			14.9					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
 3: Iowa Ave & La Cadena Ave

03/02/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	375	160	65	599	286	0		
Future Volume (veh/h)	375	160	65	599	286	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	0		
Adj Flow Rate, veh/h	383	163	66	611	292	0		
Adj No. of Lanes	1	1	1	1	1	0		
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98		
Percent Heavy Veh, %	2	2	2	2	2	0		
Cap, veh/h	818	730	117	668	377	0		
Arrive On Green	0.46	0.46	0.13	0.72	0.20	0.00		
Sat Flow, veh/h	1774	1583	1774	1863	1863	0		
Grp Volume(v), veh/h	383	163	66	611	292	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	0		
Q Serve(g_s), s	7.4	3.1	1.7	13.5	7.4	0.0		
Cycle Q Clear(g_c), s	7.4	3.1	1.7	13.5	7.4	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	818	730	117	668	377	0		
V/C Ratio(X)	0.47	0.22	0.56	0.91	0.77	0.00		
Avail Cap(c_a), veh/h	818	730	177	931	577	0		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	0.53	0.53	1.00	0.00		
Uniform Delay (d), s/veh	9.3	8.1	21.0	6.4	18.9	0.0		
Incr Delay (d2), s/veh	1.9	0.7	2.2	6.0	3.6	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.1	3.6	0.9	7.2	4.2	0.0		
LnGrp Delay(d),s/veh	11.2	8.8	23.2	12.5	22.4	0.0		
LnGrp LOS	B	A	C	B	C			
Approach Vol, veh/h	546			677	292			
Approach Delay, s/veh	10.5			13.5	22.4			
Approach LOS	B			B	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		22.4		27.6	7.8	14.6		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		25.0		16.0	5.0	15.5		
Max Q Clear Time (g_c+I1), s		15.5		9.4	3.7	9.4		
Green Ext Time (p_c), s		2.5		1.0	0.0	0.7		
Intersection Summary								
HCM 2010 Ctrl Delay			14.1					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary

4: La Cadena Ave & La Loma St

03/02/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations				 	 			
Traffic Volume (veh/h)	40	58	48	924	907	56		
Future Volume (veh/h)	40	58	48	924	907	56		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1900		
Adj Flow Rate, veh/h	41	60	49	953	935	58		
Adj No. of Lanes	1	0	1	2	2	0		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97		
Percent Heavy Veh, %	2	0	2	2	2	2		
Cap, veh/h	0	0	88	1763	1214	75		
Arrive On Green	0.32	0.32	0.05	0.50	0.36	0.36		
Sat Flow, veh/h	0	0	1774	3632	3478	210		
Grp Volume(v), veh/h	0	0	49	953	489	504		
Grp Sat Flow(s),veh/h/ln	0	0	1774	1770	1770	1826		
Q Serve(g_s), s	0.0	0.0	1.4	9.2	12.2	12.2		
Cycle Q Clear(g_c), s	0.0	0.0	1.4	9.2	12.2	12.2		
Prop In Lane	0.00	0.00	1.00			0.12		
Lane Grp Cap(c), veh/h	0	0	88	1763	635	655		
V/C Ratio(X)	0.00	0.00	0.56	0.54	0.77	0.77		
Avail Cap(c_a), veh/h	0	0	209	2371	818	843		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	0.0	23.2	8.6	14.2	14.2		
Incr Delay (d2), s/veh	0.0	0.0	5.5	0.3	3.4	3.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.8	4.4	6.4	6.6		
LnGrp Delay(d),s/veh	0.0	0.0	28.7	8.9	17.6	17.5		
LnGrp LOS			C	A	B	B		
Approach Vol, veh/h	0			1002	993			
Approach Delay, s/veh	0.0			9.8	17.5			
Approach LOS				A	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		29.4		20.6	7.0	22.4		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		33.5		7.5	5.9	23.1		
Max Q Clear Time (g_c+I1), s		11.2		0.0	3.4	14.2		
Green Ext Time (p_c), s		6.2		0.0	0.0	3.7		
Intersection Summary								
HCM 2010 Ctrl Delay			13.7					
HCM 2010 LOS			B					

Timings

1: Iowa Ave & I-215 NB/EB Ramps

04/09/2018



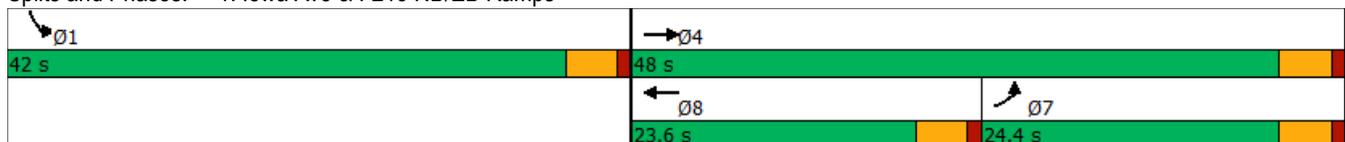
Lane Group	EBL	EBT	WBT	SBL
Lane Configurations				
Traffic Volume (vph)	352	597	17	138
Future Volume (vph)	352	597	17	138
Turn Type	Prot	NA	NA	Prot
Protected Phases	7	4	8	1
Permitted Phases				
Detector Phase	7	4	8	1
Switch Phase				
Minimum Initial (s)	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	9.5
Total Split (s)	24.4	48.0	23.6	42.0
Total Split (%)	27.1%	53.3%	26.2%	46.7%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	Max	Max	None	None
Act Effct Green (s)	30.2	43.5	8.8	37.5
Actuated g/C Ratio	0.34	0.48	0.10	0.42
v/c Ratio	0.63	0.71	0.73	1.04
Control Delay	32.6	23.5	16.8	59.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	32.6	23.5	16.8	59.2
LOS	C	C	B	E
Approach Delay		26.9	16.8	59.2
Approach LOS		C	B	E

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 90
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 1.04
 Intersection Signal Delay: 39.0
 Intersection Capacity Utilization 101.5%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service G

Splits and Phases: 1: Iowa Ave & I-215 NB/EB Ramps



HCM 2010 Signalized Intersection Summary

2: Iowa Ave & I-215 SB/WB Off Ramp

03/13/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	57	415	0	649	474	0		
Future Volume (veh/h)	57	415	0	649	474	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	0	1863	1863	0		
Adj Flow Rate, veh/h	63	456	0	713	521	0		
Adj No. of Lanes	1	1	0	1	1	0		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91		
Percent Heavy Veh, %	2	2	0	2	2	0		
Cap, veh/h	691	617	0	802	802	0		
Arrive On Green	0.39	0.39	0.00	0.43	0.86	0.00		
Sat Flow, veh/h	1774	1583	0	1863	1863	0		
Grp Volume(v), veh/h	63	456	0	713	521	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	0	1863	1863	0		
Q Serve(g_s), s	1.1	12.3	0.0	17.7	4.4	0.0		
Cycle Q Clear(g_c), s	1.1	12.3	0.0	17.7	4.4	0.0		
Prop In Lane	1.00	1.00	0.00			0.00		
Lane Grp Cap(c), veh/h	691	617	0	802	802	0		
V/C Ratio(X)	0.09	0.74	0.00	0.89	0.65	0.00		
Avail Cap(c_a), veh/h	691	617	0	913	913	0		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	1.00		
Upstream Filter(I)	1.00	1.00	0.00	0.74	1.00	0.00		
Uniform Delay (d), s/veh	9.7	13.1	0.0	13.1	2.3	0.0		
Incr Delay (d2), s/veh	0.3	7.8	0.0	7.6	1.4	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.6	6.6	0.0	10.6	2.0	0.0		
LnGrp Delay(d),s/veh	9.9	20.8	0.0	20.7	3.6	0.0		
LnGrp LOS	A	C		C	A			
Approach Vol, veh/h	519			713	521			
Approach Delay, s/veh	19.5			20.7	3.6			
Approach LOS	B			C	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		26.0		24.0		26.0		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		24.5		16.5		24.5		
Max Q Clear Time (g_c+I1), s		19.7		14.3		6.4		
Green Ext Time (p_c), s		1.9		0.5		2.7		
Intersection Summary								
HCM 2010 Ctrl Delay			15.3					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
 3: Iowa Ave & La Cadena Ave

03/13/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	375	171	123	619	305	0		
Future Volume (veh/h)	375	171	123	619	305	0		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	0		
Adj Flow Rate, veh/h	383	174	126	632	311	0		
Adj No. of Lanes	1	1	1	1	1	0		
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98		
Percent Heavy Veh, %	2	2	2	2	2	0		
Cap, veh/h	760	678	158	730	396	0		
Arrive On Green	0.43	0.43	0.18	0.78	0.21	0.00		
Sat Flow, veh/h	1774	1583	1774	1863	1863	0		
Grp Volume(v), veh/h	383	174	126	632	311	0		
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	0		
Q Serve(g_s), s	7.9	3.5	3.4	11.4	7.9	0.0		
Cycle Q Clear(g_c), s	7.9	3.5	3.4	11.4	7.9	0.0		
Prop In Lane	1.00	1.00	1.00			0.00		
Lane Grp Cap(c), veh/h	760	678	158	730	396	0		
V/C Ratio(X)	0.50	0.26	0.80	0.87	0.79	0.00		
Avail Cap(c_a), veh/h	760	678	177	931	577	0		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	10.4	9.2	20.1	4.5	18.6	0.0		
Incr Delay (d2), s/veh	2.4	0.9	19.9	7.1	4.4	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.3	3.9	2.5	6.3	4.5	0.0		
LnGrp Delay(d),s/veh	12.8	10.1	40.0	11.6	23.0	0.0		
LnGrp LOS	B	B	D	B	C			
Approach Vol, veh/h	557			758	311			
Approach Delay, s/veh	12.0			16.3	23.0			
Approach LOS	B			B	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	2		4		5	6		
Phs Duration (G+Y+Rc), s	24.1		25.9		9.0	15.1		
Change Period (Y+Rc), s	4.5		4.5		4.5	4.5		
Max Green Setting (Gmax), s	25.0		16.0		5.0	15.5		
Max Q Clear Time (g_c+I1), s	13.4		9.9		5.4	9.9		
Green Ext Time (p_c), s	2.9		1.0		0.0	0.7		
Intersection Summary								
HCM 2010 Ctrl Delay			16.1					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
4: La Cadena Ave & La Loma St

03/13/2018

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations				 	 			
Traffic Volume (veh/h)	40	61	51	929	911	56		
Future Volume (veh/h)	40	61	51	929	911	56		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1900		
Adj Flow Rate, veh/h	41	63	53	958	939	58		
Adj No. of Lanes	1	0	1	2	2	0		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97		
Percent Heavy Veh, %	2	0	2	2	2	2		
Cap, veh/h	0	0	92	1776	1218	75		
Arrive On Green	0.32	0.32	0.05	0.50	0.36	0.36		
Sat Flow, veh/h	0	0	1774	3632	3479	209		
Grp Volume(v), veh/h	0	0	53	958	491	506		
Grp Sat Flow(s),veh/h/ln	0	0	1774	1770	1770	1826		
Q Serve(g_s), s	0.0	0.0	1.5	9.2	12.3	12.3		
Cycle Q Clear(g_c), s	0.0	0.0	1.5	9.2	12.3	12.3		
Prop In Lane	0.00	0.00	1.00			0.11		
Lane Grp Cap(c), veh/h	0	0	92	1776	637	657		
V/C Ratio(X)	0.00	0.00	0.57	0.54	0.77	0.77		
Avail Cap(c_a), veh/h	0	0	209	2371	818	844		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	0.0	0.0	23.2	8.5	14.2	14.2		
Incr Delay (d2), s/veh	0.0	0.0	5.5	0.3	3.4	3.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.8	4.5	6.6	6.8		
LnGrp Delay(d),s/veh	0.0	0.0	28.7	8.8	17.6	17.5		
LnGrp LOS			C	A	B	B		
Approach Vol, veh/h	0			1011	997			
Approach Delay, s/veh	0.0			9.8	17.6			
Approach LOS				A	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		29.6		20.4	7.1	22.5		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		33.5		7.5	5.9	23.1		
Max Q Clear Time (g_c+I1), s		11.2		0.0	3.5	14.3		
Green Ext Time (p_c), s		6.2		0.0	0.0	3.7		
Intersection Summary								
HCM 2010 Ctrl Delay			13.7					
HCM 2010 LOS			B					

APPENDIX D
SIGNAL WARRANT ANALYSIS

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 1 of 5)

COUNT DATE 2/20/2018

CALC F.L. DATE 3/13/2018
 CHK K.H. DATE 3/13/2018

DIST _____ CO _____ RTE _____ PM _____

Major St: S. Iowa Ave Critical Approach Speed 50 mph
 Minor St: I-215 SB/WB Off Ramp Critical Approach Speed 35 mph

Speed limit or critical speed on major street traffic > 40 mph..... or } **RURAL (R)**
 In built up area of isolated community of < 10,000 population..... } **URBAN (U)**

WARRANT 1 - Eight Hour Vehicular Volume SATISFIED YES NO
 (Condition A or Condition B or combination of A and B must be satisfied)

Condition A - Minimum Vehicle Volume 100% SATISFIED YES NO
 80% SATISFIED YES NO

APPROACH LANES	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)																
	U		R		U		R										
	1				2 or More				0700	0800	0900	1000	1100	1200	1300	1400	Hour
Both Approaches Major Street	500 (400)	350 (280)	600 (480)	420 (336)	1018	699	789	1211	1092	645	744	868					
Highest Approach Minor Street	150 (120)	105 (84)	200 (160)	140 (112)	427	362	262	320	278	344	500	443					

Condition B - Interruption of Continuous Traffic 100% SATISFIED YES NO
 80% SATISFIED YES NO

APPROACH LANES	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)																	
	U		R		U		R											
	1				2 or More													
Both Approaches Major Street	750 (600)	525 (420)	900 (720)	630 (504)														Hour
Highest Approach Minor Street	75 (60)	53 (42)	100 (80)	70 (56)														

Combination of Conditions A & B SATISFIED YES NO

REQUIREMENT	CONDITION	✓	FULFILLED
TWO CONDITIONS SATISFIED 80%	A. MINIMUM VEHICULAR VOLUME		Yes <input type="checkbox"/> No <input type="checkbox"/>
	AND, B. INTERRUPTION OF CONTINUOUS TRAFFIC		
AND, AN ADEQUATE TRIAL OF OTHER ALTERNATIVES THAT COULD CAUSE LESS DELAY AND INCONVENIENCE TO TRAFFIC HAS FAILED TO SOLVE THE TRAFFIC PROBLEMS			Yes <input type="checkbox"/> No <input type="checkbox"/>

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

TUESDAY - FEBRUARY 20, 2018

CITY: COLTON

PROJECT:

IOWA at 215SB OFF RAMP

					Inc.						
AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB		
00:00	27	12			12:00	84	52				
00:15	23	9			12:15	128	53				
00:30	26	8			12:30	105	60				
00:45	14	90	12	41	131	12:45	106	423	57	222	645
01:00	16	4			13:00	124	59				
01:15	11	1			13:15	123	66				
01:30	16	6			13:30	115	66				
01:45	9	52	9	20	72	13:45	124	486	67	258	744
02:00	18	6			14:00	134	59				
02:15	14	7			14:15	121	105				
02:30	13	2			14:30	164	85				
02:45	13	58	5	20	78	14:45	122	541	78	327	868
03:00	11	3			15:00	170	98				
03:15	9	5			15:15	166	99				
03:30	16	10			15:30	141	108				
03:45	21	57	14	32	89	15:45	150	627	108	413	1040
04:00	24	7			16:00	155	72				
04:15	20	16			16:15	138	103				
04:30	24	19			16:30	123	101				
04:45	39	107	34	76	183	16:45	151	567	114	390	957
05:00	52	19			17:00	138	117				
05:15	63	24			17:15	181	107				
05:30	89	43			17:30	133	95				
05:45	96	300	64	150	450	17:45	135	587	85	404	991
06:00	62	42			18:00	118	86				
06:15	80	50			18:15	125	77				
06:30	81	50			18:30	142	62				
06:45	128	351	88	230	581	18:45	104	489	42	267	756
07:00	119	135			19:00	173	49				
07:15	148	136			19:15	213	61				
07:30	122	109			19:30	245	69				
07:45	114	503	135	515	1018	19:45	253	884	82	261	1145
08:00	90	113			20:00	262	67				
08:15	70	101			20:15	248	65				
08:30	83	81			20:30	237	61				
08:45	76	319	85	380	699	20:45	252	999	67	260	1259
09:00	86	61			21:00	245	63				
09:15	93	39			21:15	255	67				
09:30	180	47			21:30	243	58				
09:45	231	590	52	199	789	21:45	231	974	47	235	1209
10:00	217	59			22:00	233	36				
10:15	220	55			22:15	153	24				
10:30	264	66			22:30	179	22				
10:45	261	962	69	249	1211	22:45	92	657	14	96	753
11:00	198	45			23:00	40	12				
11:15	241	52			23:15	38	10				
11:30	227	64			23:30	19	5				
11:45	199	865	66	227	1092	23:45	22	119	8	35	154

Total Vol.	4254	2139			6393		7353	3168			10521
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					Daily Totals				
					NB	SB	EB	WB	Combined
					11607	5307			16914

AM					PM					
Split %	66.5%	33.5%			37.8%		69.9%	30.1%		62.2%

Peak Hour	10:30	07:00			10:00		19:30	16:30			19:30
Volume	964	515			1211		1008	439			1291
P.H.F.	0.91	0.95			0.92		0.98	0.94			0.96

THURSDAY - FEBRUARY 15, 2018

CITY: COLTON

PROJECT:

215 SB OFF RAMP

Inc.

AM Period	NB	SB	EL	ER	PM Period	NB	SB	EL	ER				
00:00			2	6	12:00			9	58				
00:15			1	11	12:15			8	54				
00:30			0	10	12:30			17	79				
00:45			2	5	6	33	38	12:45	16	50	103	294	344
01:00			0	5	13:00			17	107				
01:15			0	8	13:15			19	99				
01:30			0	12	13:30			21	104				
01:45			0	0	4	29	29	13:45	21	78	112	422	500
02:00			0	6	14:00			13	78				
02:15			0	14	14:15			25	106				
02:30			0	5	14:30			10	88				
02:45			0	0	7	32	32	14:45	9	57	114	386	443
03:00			1	10	15:00			8	102				
03:15			0	8	15:15			11	142				
03:30			2	16	15:30			11	119				
03:45			3	6	13	47	53	15:45	12	42	108	471	513
04:00			2	16	16:00			10	120				
04:15			1	21	16:15			10	109				
04:30			0	40	16:30			8	98				
04:45			1	4	60	137	141	16:45	10	38	89	416	454
05:00			0	22	17:00			9	90				
05:15			4	35	17:15			8	109				
05:30			0	49	17:30			10	110				
05:45			2	6	72	178	184	17:45	13	40	114	423	463
06:00			4	60	18:00			6	109				
06:15			0	69	18:15			13	106				
06:30			4	99	18:30			11	63				
06:45			3	11	106	334	345	18:45	11	41	61	339	380
07:00			1	85	19:00			11	62				
07:15			6	110	19:15			13	42				
07:30			2	103	19:30			0	33				
07:45			7	16	113	411	427	19:45	3	27	37	174	201
08:00			9	80	20:00			12	44				
08:15			4	94	20:15			11	34				
08:30			4	89	20:30			7	27				
08:45			7	24	75	338	362	20:45	1	31	34	139	170
09:00			4	50	21:00			5	24				
09:15			11	51	21:15			5	22				
09:30			8	61	21:30			6	30				
09:45			3	26	74	236	262	21:45	9	25	25	101	126
10:00			4	58	22:00			7	19				
10:15			10	54	22:15			7	15				
10:30			8	79	22:30			2	14				
10:45			4	26	103	294	320	22:45	4	20	11	59	79
11:00			8	50	23:00			6	10				
11:15			8	51	23:15			3	10				
11:30			9	61	23:30			4	13				
11:45			17	42	74	236	278	23:45	2	15	10	43	58

Total Vol.			166	2305	2471			464	3267	3731
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	AM		PM		Combined	
	NB	SB	EB	WB		
Split %	6.7%	93.3%	39.8%	12.4%	87.6%	60.2%
Peak Hour	11:45	07:00	07:15	13:30	15:15	15:15
Volume	51	411	430	80	489	533
P.H.F.	0.75	0.91	0.90	0.80	0.86	0.87

Figure 4C-101 (CA). Traffic Signal Warrants Worksheet (Sheet 1 of 5)

COUNT DATE 2/20/2018

CALC F.L. DATE 3/13/2018
 CHK K.H. DATE 3/13/2018

DIST _____ CO _____ RTE _____ PM _____

Major St: S. Iowa Ave Critical Approach Speed 50 mph
 Minor St: La Cadena Ave Critical Approach Speed 40 mph

Speed limit or critical speed on major street traffic > 40 mph..... }
 or } **RURAL (R)**
 In built up area of isolated community of < 10,000 population..... }
 URBAN (U)

WARRANT 1 - Eight Hour Vehicular Volume SATISFIED YES NO
 (Condition A or Condition B or combination of A and B must be satisfied)

Condition A - Minimum Vehicle Volume 100% SATISFIED YES NO
 80% SATISFIED YES NO

APPROACH LANES	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)												
	U	R	U	R									
	1		2 or More		1200	1400	1500	1600	1700	1900	2000	2100	Hour
Both Approaches Major Street	500 (400)	350 (280)	600 (480)	420 (336)	589	839	1053	827	891	1089	1160	1161	
Highest Approach Minor Street	150 (120)	105 (84)	200 (160)	140 (112)	233	307	463	430	506	390	634	445	

Condition B - Interruption of Continuous Traffic 100% SATISFIED YES NO
 80% SATISFIED YES NO

APPROACH LANES	MINIMUM REQUIREMENTS (80% SHOWN IN BRACKETS)												
	U	R	U	R									
	1		2 or More										
Both Approaches Major Street	750 (600)	525 (420)	900 (720)	630 (504)									Hour
Highest Approach Minor Street	75 (60)	53 (42)	100 (80)	70 (56)									

Combination of Conditions A & B SATISFIED YES NO

REQUIREMENT	CONDITION	✓	FULFILLED
TWO CONDITIONS SATISFIED 80%	A. MINIMUM VEHICULAR VOLUME		Yes <input type="checkbox"/> No <input type="checkbox"/>
	AND, B. INTERRUPTION OF CONTINUOUS TRAFFIC		
AND, AN ADEQUATE TRIAL OF OTHER ALTERNATIVES THAT COULD CAUSE LESS DELAY AND INCONVENIENCE TO TRAFFIC HAS FAILED TO SOLVE THE TRAFFIC PROBLEMS			Yes <input type="checkbox"/> No <input type="checkbox"/>

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

TUESDAY - FEBRUARY 20, 2018

CITY: COLTON

PROJECT:

LA CADENA W-O IOWA

Inc.

AM Period	NB	SB	EL	ER	PM Period	NB	SB	EL	ER				
00:00			2	6	12:00			25	16				
00:15			4	7	12:15			42	19				
00:30			2	5	12:30			51	21				
00:45			3	11	8	26	37	12:45	37	155	22	78	233
01:00			0	0	13:00			28	16				
01:15			1	0	13:15			30	23				
01:30			1	0	13:30			28	23				
01:45			0	2	0	0	2	13:45	31	117	24	86	203
02:00			1	1	14:00			33	25				
02:15			3	2	14:15			47	34				
02:30			2	2	14:30			44	31				
02:45			2	8	0	5	13	14:45	58	182	35	125	307
03:00			3	3	15:00			75	45				
03:15			0	0	15:15			49	42				
03:30			1	1	15:30			80	44				
03:45			1	5	3	7	12	15:45	90	294	38	169	463
04:00			3	2	16:00			62	35				
04:15			2	2	16:15			67	25				
04:30			0	1	16:30			70	44				
04:45			2	7	2	7	14	16:45	82	281	45	149	430
05:00			5	4	17:00			85	38				
05:15			2	2	17:15			100	50				
05:30			7	3	17:30			99	30				
05:45			5	19	8	17	36	17:45	79	363	25	143	506
06:00			9	10	18:00			47	23				
06:15			8	7	18:15			30	22				
06:30			8	9	18:30			28	14				
06:45			14	39	14	40	79	18:45	14	119	12	71	190
07:00			20	30	19:00			24	10				
07:15			31	28	19:15			42	15				
07:30			22	27	19:30			81	32				
07:45			22	95	16	101	196	19:45	139	286	47	104	390
08:00			18	10	20:00			116	41				
08:15			15	22	20:15			104	45				
08:30			17	18	20:30			117	50				
08:45			14	64	18	68	132	20:45	112	449	49	185	634
09:00			21	19	21:00			103	51				
09:15			14	14	21:15			78	44				
09:30			21	15	21:30			66	37				
09:45			30	86	19	67	153	21:45	36	283	30	162	445
10:00			25	22	22:00			36	20				
10:15			30	17	22:15			13	7				
10:30			29	29	22:30			17	8				
10:45			37	121	31	99	220	22:45	7	73	8	43	116
11:00			25	19	23:00			6	4				
11:15			23	20	23:15			4	4				
11:30			26	23	23:30			1	2				
11:45			24	98	23	85	183	23:45	2	13	2	12	25

Total Vol. 555 522 **1077** 2615 1327 **3942**

	AM			PM		
	NB	SB	Combined	NB	SB	Combined
Split %	51.5%	48.5%	21.5%	66.3%	33.7%	78.5%
Peak Hour	11:45	07:00	11:45	19:45	20:15	19:45
Volume	142	101	221	476	195	659
P.H.F.	0.70	0.84	0.77	0.86	0.96	0.89

APPENDIX E
QUEUING AND STACKING ASSESSMENT

Queues

2: Iowa Ave & I-215 SB/WB Off Ramp

03/13/2018

				
Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	41	497	631	637
v/c Ratio	0.05	0.62	0.83	0.84
Control Delay	11.4	13.1	16.7	14.9
Queue Delay	0.0	0.0	0.0	0.2
Total Delay	11.4	13.1	16.7	15.1
Queue Length 50th (ft)	9	85	68	42
Queue Length 95th (ft)	24	174	103	81
Internal Link Dist (ft)	165		727	1
Turn Bay Length (ft)				
Base Capacity (vph)	781	797	853	853
Starvation Cap Reductn	0	0	0	14
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.05	0.62	0.74	0.76
Intersection Summary				

Queues

3: Iowa Ave & La Cadena Ave

03/13/2018



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	101	108	114	526	485
v/c Ratio	0.16	0.17	0.53	0.57	0.78
Control Delay	17.4	5.1	27.5	4.2	21.9
Queue Delay	0.0	0.0	0.0	1.3	0.2
Total Delay	17.4	5.1	27.5	5.5	22.0
Queue Length 50th (ft)	28	0	41	17	153
Queue Length 95th (ft)	61	30	m65	m28	117
Internal Link Dist (ft)	191			109	252
Turn Bay Length (ft)			100		
Base Capacity (vph)	624	628	217	1071	729
Starvation Cap Reductn	0	0	0	332	0
Spillback Cap Reductn	0	1	0	0	18
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.16	0.17	0.53	0.71	0.68

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Queues

2: Iowa Ave & I-215 SB/WB Off Ramp

03/13/2018



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	63	456	713	521
v/c Ratio	0.10	0.60	0.85	0.62
Control Delay	12.1	9.8	23.4	7.6
Queue Delay	0.0	0.0	0.2	0.8
Total Delay	12.1	9.8	23.6	8.4
Queue Length 50th (ft)	13	40	157	36
Queue Length 95th (ft)	33	116	#333	76
Internal Link Dist (ft)	165		727	1
Turn Bay Length (ft)				
Base Capacity (vph)	650	754	912	912
Starvation Cap Reductn	0	0	0	156
Spillback Cap Reductn	0	0	16	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.10	0.60	0.80	0.69

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

3: Iowa Ave & La Cadena Ave

03/13/2018



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	383	174	126	632	311
v/c Ratio	0.60	0.25	0.57	0.74	0.59
Control Delay	19.4	3.8	26.0	7.5	14.2
Queue Delay	0.0	0.0	0.0	1.0	0.1
Total Delay	19.4	3.8	26.0	8.5	14.2
Queue Length 50th (ft)	95	0	33	28	81
Queue Length 95th (ft)	#183	32	m#46	m40	32
Internal Link Dist (ft)	191			130	226
Turn Bay Length (ft)			100		
Base Capacity (vph)	643	686	223	931	577
Starvation Cap Reductn	0	0	0	115	0
Spillback Cap Reductn	0	0	0	0	9
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.60	0.25	0.57	0.77	0.55

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↑		↘	↑
Traffic Vol, veh/h	0	7	491	47	32	497
Future Vol, veh/h	0	7	491	47	32	497
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	60	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	8	534	51	35	540

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	-	560	0	0	585
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218
Pot Cap-1 Maneuver	0	528	-	-	990
Stage 1	0	-	-	-	-
Stage 2	0	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	-	528	-	-	990
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	528	990
HCM Lane V/C Ratio	-	-	0.014	0.035
HCM Control Delay (s)	-	-	11.9	8.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0	0.1

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↑		↘	↑
Traffic Vol, veh/h	0	8	617	45	30	416
Future Vol, veh/h	0	8	617	45	30	416
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	60	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	9	671	49	33	452

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	-	696	0	0	720
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218
Pot Cap-1 Maneuver	0	442	-	-	882
Stage 1	0	-	-	-	-
Stage 2	0	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	-	442	-	-	882
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.3	0	0.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	442	882
HCM Lane V/C Ratio	-	-	0.02	0.037
HCM Control Delay (s)	-	-	13.3	9.2
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1