

APPENDIX A
SCOPING AGREEMENT

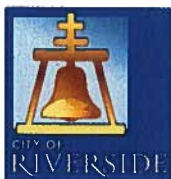


Exhibit B

SCOPING AGREEMENT FOR TRAFFIC IMPACT STUDY

This letter acknowledges the City of Riverside Public Works Traffic Engineering Division requirements for traffic impact analysis of the following project. The analysis must follow the City Traffic Impact Analysis Preparation Guide dated January 2016.

Case No. _____
Related Cases - _____
SP No. _____
EIR No. _____
GPA No. _____
CZ No. _____
Project Name: Marlborough Industrial Complex
Project Location: Eastern terminus of Marlborough Ave/Southern terminus of Research Park Dr
Project Description: Warehousing Facility

	<u>Consultant</u>	<u>Developer</u>
Name:	<u>Rick Engineering Company</u>	<u>Guthrie Companies</u>
Address:	<u>1770 Iowa Avenue, Suite 100</u> <u>Riverside, CA 92507</u>	<u>1451 Research Park Drive, Suite 200</u> <u>Riverside, CA 92507</u>
Telephone:	<u>951-782-0707</u>	<u>951-784-7238</u>

A. Trip Generation Source: ITE Trip Generation Manual, most recent edition

Existing Land Use	<u>Industrial District</u>	Proposed Land Use	<u>Industrial District</u>
Existing Zoning	<u>Manufacturing Park (MP)</u>	Proposed Zoning	<u>Manufacturing Park (MP)</u>
Total Daily Trips			

	In	Out	Total
AM Trips	<u>216</u>	<u>58</u>	<u>274</u>
PM Trips	<u>105</u>	<u>230</u>	<u>335</u>

Internal Trip ☐ Yes ☒ No (N/A % Trip Discount)
Allowance
Pass-By Trip Allowance ☐ Yes ☒ No (N/A % Trip Discount)
(Attach additional sheet if this is a multi-use site with a breakdown of trips generated)

B. Trip Geographic Distribution: N 5 % S 24 % E 2 % W 69 %
(See attached exhibit for detailed assignment)

C. Background Traffic

Project Completion Year: 2018 Annual Ambient Growth Rate: 2 %
Other area projects to be included: See attachment B/Cumulative projects provided by City

Please contact Planning Division or use the most recently provided data

Model/Forecast methodology if required _____

D. Build-out Studies: Does this project require a Build-out Study per TIA Guidelines Section 7.2?

☐ Yes ☒ No

E. Study intersections: (NOTE: Subject to revision after other projects, trip generation and distribution are determined, or comments from other agencies.)

1. Refer to Attachment 'A'

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

F. Study Roadway Segments (For Build-out Studies):

1. Refer to Attachment 'A'

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

G. Other Jurisdictional Impacts

Is this project within any other Agency's Sphere of Influence or one-mile radius of boundaries? ☒ Yes ☐ No

If so, name of Jurisdiction: CALTRANS

H. Site Plan (please attach a legible 11'X17' copy)

I. Specific issues to be addressed in the Study (in addition to the standard analysis described in the Guideline) (To be filled out by Public Works Traffic Department)

Recommended by:

Jesus Cruz
Consultant's Representative

06/07/2017

Date

Scoping Agreement Submitted on

Date

Scoping Agreement Resubmitted on

Date

Approved Scoping Agreement:

City of Riverside
Traffic Engineering Division

Date

Exhibit G



TRAFFIC STUDY SUBMITTAL FORM

CASE #

APN# 257-030-042,
257-060-002

Related Cases:
(If Applicable)

FAST TRACK AUTHORIZATION:
(If Applicable)

DATE: 06/07/2017

APPLICANT'S

NAME/ADDRESS/PHONE NUMBER:

Guthrie Companies

1451 Research Park Drive, Suite 200

Riverside, CA 92507

951-784-7238

APPLICANT CONSULTANT

NAME/ADDRESS/PHONE NUMBER:

Rick Engineering Company

1770 Iowa Avenue, Suite 100

Riverside, CA 92507

951-782-0707

PROJECT NAME: Marlborough Industrial Complex

LAND USE: Industrial District

PROJECT LOCATION: Eastern terminus of Marlborough Ave/Southern Terminus of Research Park Dr

SECTION(S): _____ **TOWNSHIP:** ___ N/S **RANGE:** ___ E/W

SUPERVISORIAL DISTRICT: _____ **ROAD BOOK PAGE/GRID:** _____

THOMAS BROS PAGE/GRID: _____

NEAREST MAJOR INTERSECTION: Iowa Avenue / Marlborough Avenue

FOR DEPARTMENT USE ONLY

STAFF ASSIGNED: _____

CASE NUMBER: _____

PWTR NUMBER: _____

FEE RECEIPT NUMBER: _____

E. Study Intersections

1. Columbia Avenue at Primer Street (signalized)
2. Interchange Street at W La Cadena Drive/I-215 SB Ramps (unsignalized)
3. E La Cadena Drive at I-215 NB Ramps (unsignalized)
4. Columbia Avenue at E La Cadena Drive (signalized)
5. Columbia Avenue at Chicago Avenue (signalized)
6. Columbia Avenue at Iowa Avenue (signalized)
7. Columbia Avenue at Northgate Street (unsignalized)
8. Columbia Avenue at Research Park Drive (unsignalized)
9. Palmyrita Avenue at Michigan Avenue (unsignalized)
10. Marlborough Avenue at Chicago Avenue (unsignalized)
11. Marlborough Avenue at Atlanta Avenue (unsignalized)
12. Marlborough Avenue at Iowa Avenue (signalized)
13. Marlborough Avenue at Rustin Avenue (unsignalized)
14. Marlborough Avenue at Northgate Street (unsignalized)

F. Study Roadway Segments

1. Columbia Avenue, between Primer Street and I-215
2. Columbia Avenue, between E La Cadena Drive and Chicago Avenue
3. Columbia Avenue, between Chicago Avenue and Iowa Avenue
4. Columbia Avenue, between Iowa Avenue and Northgate Street
5. Columbia Avenue, between Research Park Drive and Michigan Avenue
6. Michigan Avenue, between Columbia Avenue and Palmyrita Avenue
7. Marlborough Avenue, between Chicago Avenue and Atlanta Avenue
8. Marlborough Avenue, between Atlanta Avenue and Iowa Avenue
9. Marlborough Avenue, between Iowa Avenue and Rustin Avenue
10. Marlborough Avenue, between Rustin Avenue and Northgate Street
11. Chicago Avenue, between Marlborough Avenue and Columbia Avenue
12. Iowa Avenue, between Marlborough Avenue and Columbia Avenue
13. Northgate Street, between Marlborough Avenue and Columbia Avenue
14. Research Park Drive, south of Columbia Avenue



RICK
ENGINEERING COMPANY

EXHIBIT A
STUDY LOCATIONS

MARLBOROUGH INDUSTRIAL PROJECT

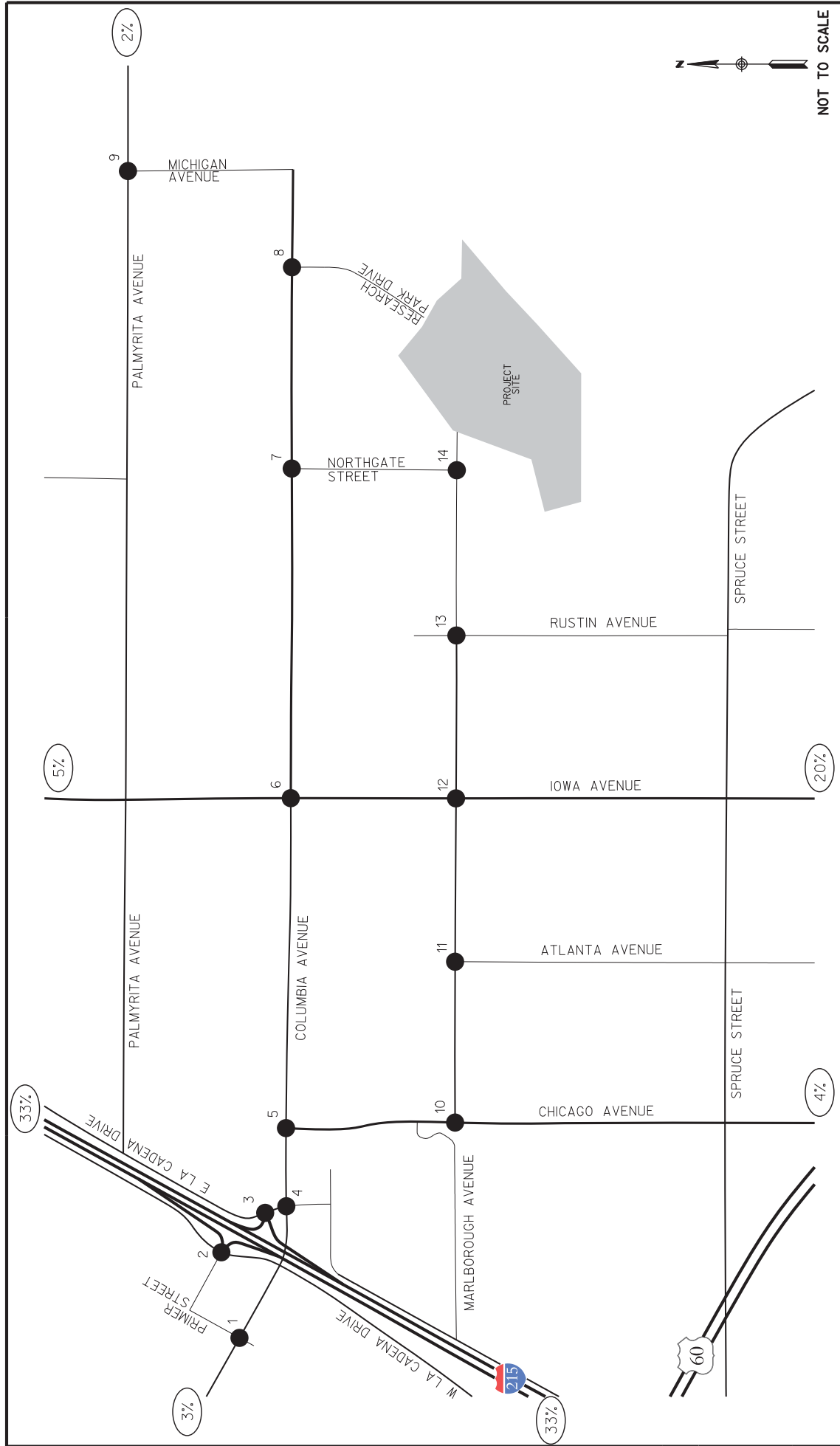
Exhibit 9 - CEQA Documents

TABLE A
MARLBOROUGH INDUSTRIAL COMPLEX
PROJECT TRIP GENERATION SUMMARY

Land Use	Quantity	Rate	ADT	AM Peak Hour						PM Peak Hour							
				% of ADT	In : Out		Volumes		% of ADT	In : Out		Volumes					
					Split	In	Out	Total		Split	In	Out	Total				
Manufacturing	339,510 SF	0.0038 / KSF	1,297	19%	78%	:	22%	197	55	252	19%	36%	:	64%	90	159	249
General Office	6,820 SF	0.0251 / KSF	171	13%	86%	:	14%	19	3	22	50%	17%	:	83%	15	71	86
TOTAL			1,468					216	58	274					105	230	335

-Source: ITE Trip Generation Manual 9th Edition, 2012.

-Per the Truck Trip Generation Study, *City of Fontana* , for the Manufacturing Category, 38.8% of the project trips calculated are to represent truck traffic generated by the project.



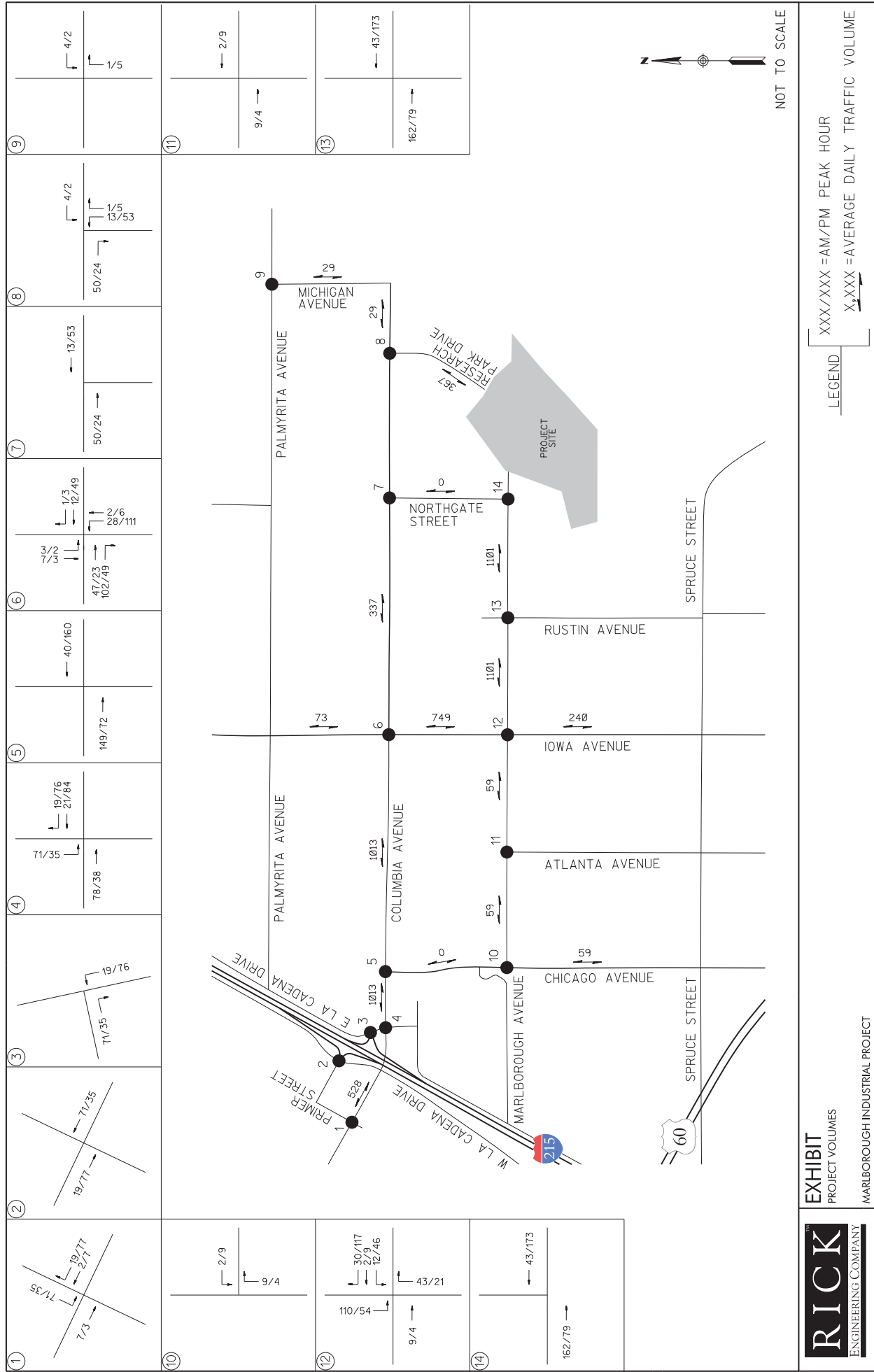
NOT TO SCALE

EXHIBIT 6
PROJECT TRIP DISTRIBUTION

MARLBOROUGH INDUSTRIAL PROJECT



Exhibit 9 - CEQA Documents



1. Total Vehicle Trip Generation

$$T = 3.88(x) - 20.70$$

$$T = 1297$$

GFA = 339.5 KSF
MANUFACTURING

2. Total Vehicle Mix

	Passenger Veh	2 axle	3 axle	4 axle	Total
%	61.2%	6.1%	12.7%	19.9%	100%
Trips	794	80	165	258	1297

3. Enter/Exit Split (50/50)

Total Vehicle	
Enter	Exit
649	648

Heavy Vehicle	
Enter	Exit
252	251

4. AM Peak

$$T = 0.83(x) - 21.52$$

$$T = 252$$

Enter (78%)	Exit (22%)
197	55

PM Peak

$$T = 0.78(x) - 15.97$$

$$T = 249$$

ENTER (36%)	Exit (64%)
90	159

	Passenger Veh	2 axle	3 axle	4 axle	Total
AM	154	16	32	50	252
PM	152	15	32	50	249

AM Peak

Enter	Exit
76	22

PM PEAK

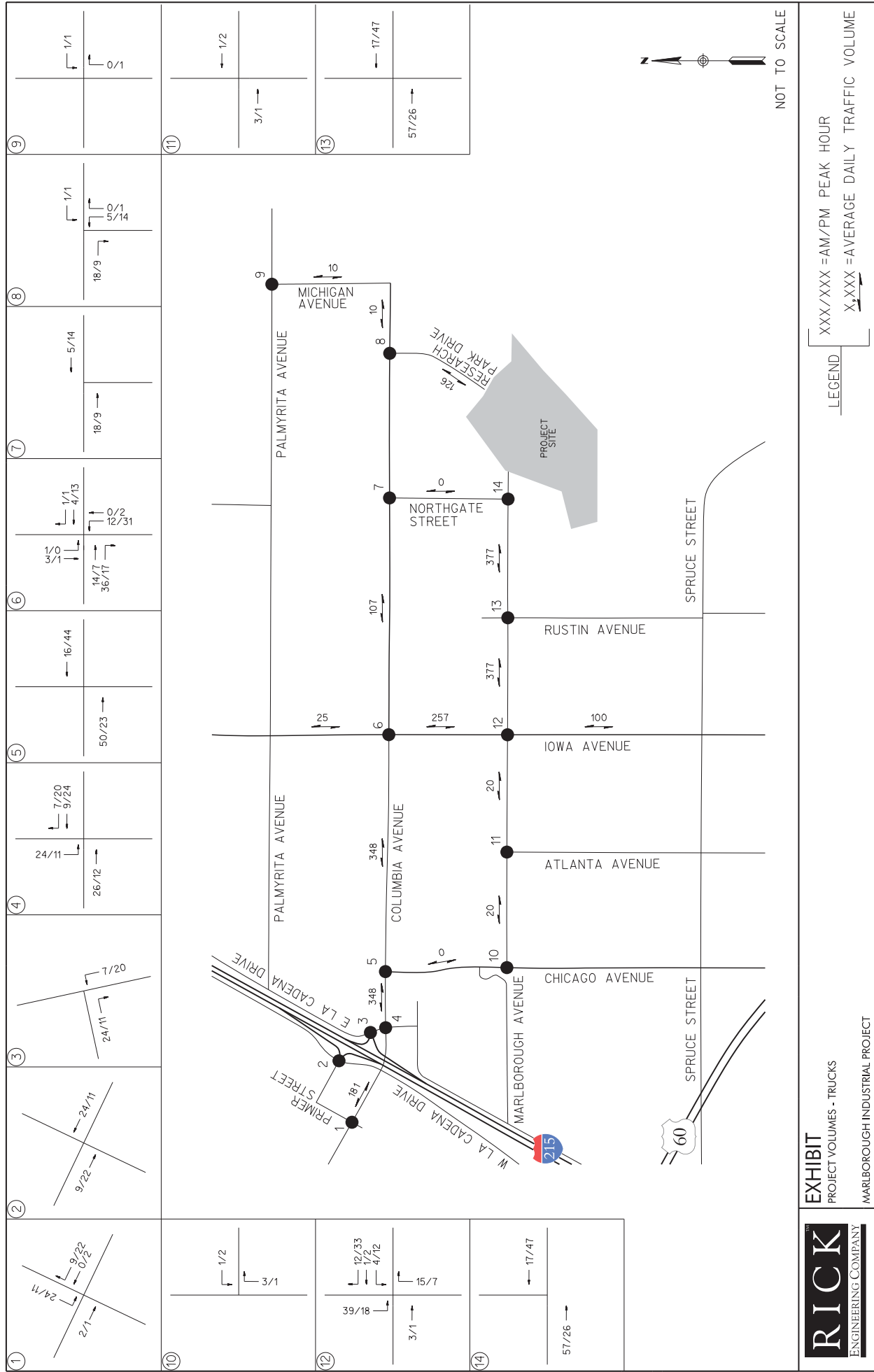
Enter	Exit
35	62



TRIP GENERATION ANALYSIS BY LAND USE CATEGORY (Cont'd)

Classification: Heavy Industrial

Recommended Large Truck Mix (%)							
Lge 2 Ax	3 Axle	4+ Axle	Total				
11.1	36.0	53.0	100.0				
Pass Veh	Lge 2 Ax	3 Axle	4+ Axle	Total			
61.2	6.1	12.7	19.9	100.0			
Site Entering & Exiting							
a.m.				p.m.			
Total Enter	Total Exit	Large Truck Enter	Large Truck Exit	Total Enter	Total Exit	Large Truck Enter	Large Truck Exit
65.60	34.40	50.85	49.15	43.02	56.98	58.82	41.18
Street Entering & Exiting							
a.m.				p.m.			
Total Enter	Total Exit	Large Truck Enter	Large Truck Exit	Total Enter	Total Exit	Large Truck Enter	Large Truck Exit
69.39	30.61	47.69	52.31	28.42	71.58	55.56	44.44



EXHIBIT

PROJECT VOLUMES - TRUCKS

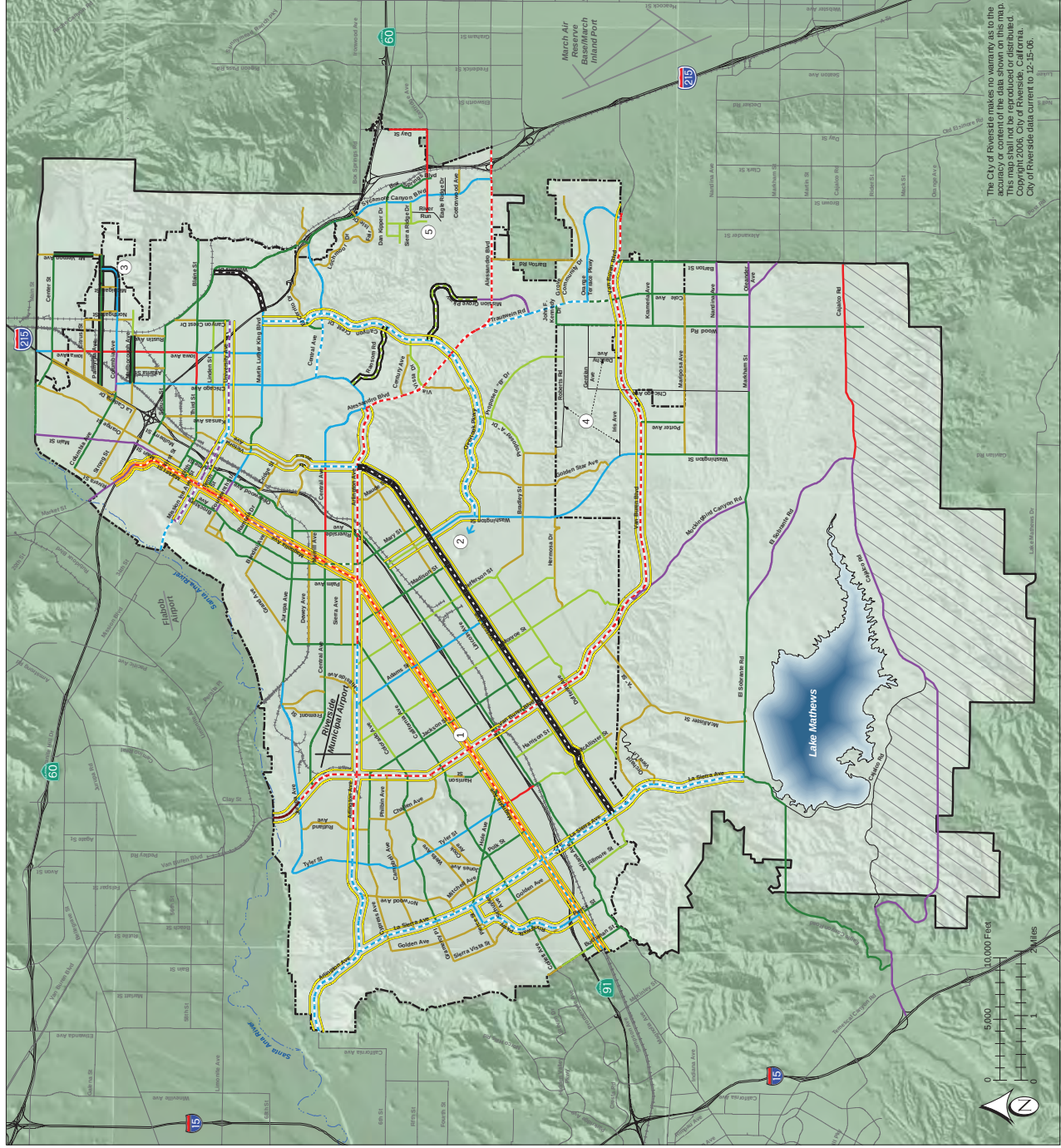
MARLBOROUGH INDUSTRIAL PROJECT



Attachment B
Cumulative Projects
(provided by City)

1. **P16-0316 (DR) – 925-975 Marlborough Avenue** (Northgate Industrial Park) – 62,000 square feet of warehouse/industrial; under construction. Building Permits issued 1/10/17.
2. **P16-0620 (MCUP) & P16-0621 (DR) – NEC Stacy Court & Paige Drive** –Minor Conditional Use Permit and Design Review to facilitate construction of a 3,008 square foot vehicle repair facility. Entitlements submitted September 2016; incomplete.
3. **P16-0731 (PM), P16-0732 (DR) & P16-0733 (GD) – 1080 Marlborough Avenue** – 1) Parcel Map (PM-37238) to subdivide a 4.05 acre parcel into five parcels; 2) Design Review of a plot plan and building elevations for the construction of five warehouse buildings ranging in size from 10,000 to 13,850 square feet in size; and 3) Grading Exception to allow a retaining wall to exceed the maximum height required by the Grading Code. Entitlements approved March 2017.

APPENDIX B
CITY OF RIVERSIDE CIRCULATION ELEMENT



LEGEND

- 66 FT LOCAL 2 LANES *
- 66 FT COLLECTOR 2 LANES
- 80 FT COLLECTOR 2 LANES
- 88 FT ARTERIAL 4 LANES
- 100 FT ARTERIAL 4 LANES
- 110 FT ARTERIAL 4 LANES
- 120 FT ARTERIAL 6 LANES
- 144 FT ARTERIAL 8 LANES

SCENIC BOULEVARD
REQUIRES SPECIAL LANDSCAPING.
ADDITIONAL RIGHT-OF-WAY MAY BE REQUIRED.

SPECIAL BOULEVARD
WIDE BUFFER ZONE OF
VARIABLE GEOMETRIC DESIGN

SPECIAL BOULEVARD
VARIABLE WIDTHS AND DESIGN. CONTACT PUBLIC WORKS
FOR DETAIL. SEE OBJECTIVE CCM-3 AND POLICIES CCM-3.1
THROUGH CCM-3.5.

PARKWAYS
FOR INFORMATION ON PARKWAYS SEE
LAND USE ELEMENT.

CETAP CORRIDOR AREA
CORRIDOR OPTIONS SUBJECT TO SPECIAL STUDY.

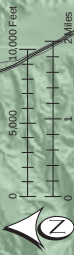
RIVERSIDE CITY BOUNDARY
RIVERSIDE PROPOSED SPHERE
OF INFLUENCE

NOTE:

- * LOCAL STREETS ARE NOT SHOWN ON THIS
PLAN EXCEPT WHERE NEEDED FOR CLARITY.
- ① MAGNOLIA AVENUE SHALL BE A SPECIAL BLVD. WITH
4 LANES EASTERLY OF HARRISON STREET.
- ② OVERLOOK PARKWAY SHALL BE A 2-LANE
110-FOOT ARTERIAL WITH A WIDE MEDIAN PARKWAY.
THE ALIGNMENT OF OVERLOOK PARKWAY WESTERLY
OF WASHINGTON IS NOT YET DETERMINED PENDING
PREPARATION OF SPECIFIC PLAN LEVEL STUDY.
- ③ COLUMBIA AVENUE IS SHOWN BY HUNTER BUSINESS
PARK SPECIFIC PLAN AS A 134-FOOT ARTERIAL
ACTUAL STREET WIDTH, DUE TO RAILROAD
OVERCROSSING, WILL BE DETERMINED BY
PUBLIC WORKS.
- ④ THESE STREETS SHALL BE 66-FOOT LOCAL
ROADWAYS SERVING AS ALTERNATE ROUTES.
- ⑤ THE STREETS IN SYCAMORE CANYON
BUSINESS PARK SPECIFIC PLAN VARY IN SIZE.
SEE THE SPECIFIC PLAN FOR DETAILS.

SOURCE: CITY OF RIVERSIDE

**Figure CCM-4
MASTER PLAN
OF ROADWAYS**



The City of Riverside makes no warranty as to the
accuracy or completeness of the data used in this map.
This map is for informational purposes only.
Copyright 2005, City of Riverside, California.
City of Riverside data current to 12-15-06.

APPENDIX C
TRAFFIC VOLUME COUNTS

Project #: 17-1219-001

TMC SUMMARY OF Primer St. & Columbia Ave.

Primer St.

Columbia Ave.

APPROACH LANES			
TOTAL	257	0	500
PM	153	0	240
MD			
AM	104	0	260

N



Columbia Ave.

TOTAL	AM	MD	PM
334	155		179
1212	474		738
0	0		0

CONTROL
Signal

AM	MD	PM	TOTAL
381		589	970
335		341	676
0		0	0

Primer St.

TOTAL	0	0	0
PM			
MD			
AM	0	0	0

LOCATION #: 17-1219-001

TURNING MOVEMENT COUNT

Primer St. & Columbia Ave.
(Intersection Name)

THURSDAY **05/18/17**
Day Date

COUNT PERIODS		
AM	700AM	- 900AM
NOON		-
PM	400PM	- 600PM

AM PEAK HOUR

700 AM

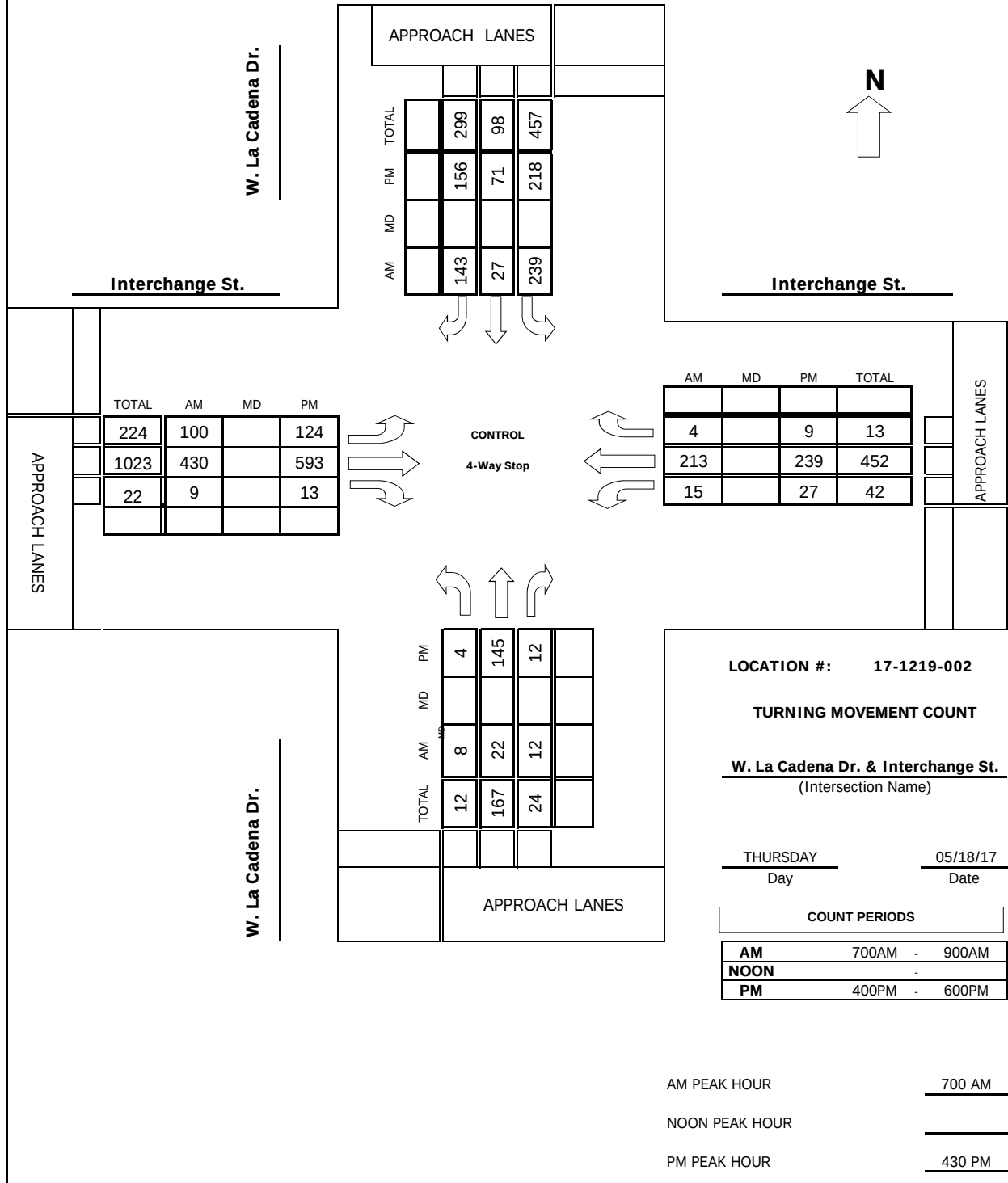
NOON PEAK HOUR

PM PEAK HOUR

430 PM

Project #: 17-1219-002

TMC SUMMARY OF W. La Cadena Dr. & Interchange St.



Project #: 17-1219-003

TMC SUMMARY OF E. La Cadena Dr. & I-215 NB Ramps

E. La Cadena Dr.

I-215 NB Ramps

N


APPROACH LANES			
	AM	MD	PM
TOTAL	13	33	46
	114	179	293
	0	0	0

AM	MD	PM	TOTAL
0	0	0	0
0	0	0	0
0	0	0	0

CONTROL
1-Way Stop
EB

TOTAL	AM	MD	PM
262	183		79
0	0		0
822	542		280

TOTAL	AM	MD	PM
952	342	610	115
188	73	0	0
0	0	0	0

LOCATION #: 17-1219-003

TURNING MOVEMENT COUNT

E. La Cadena Dr. & I-215 NB Ramps
(Intersection Name)

THURSDAY
Day

05/18/17
Date

COUNT PERIODS

AM	700AM - 900AM
NOON	-
PM	400PM - 600PM

AM PEAK HOUR

745 AM

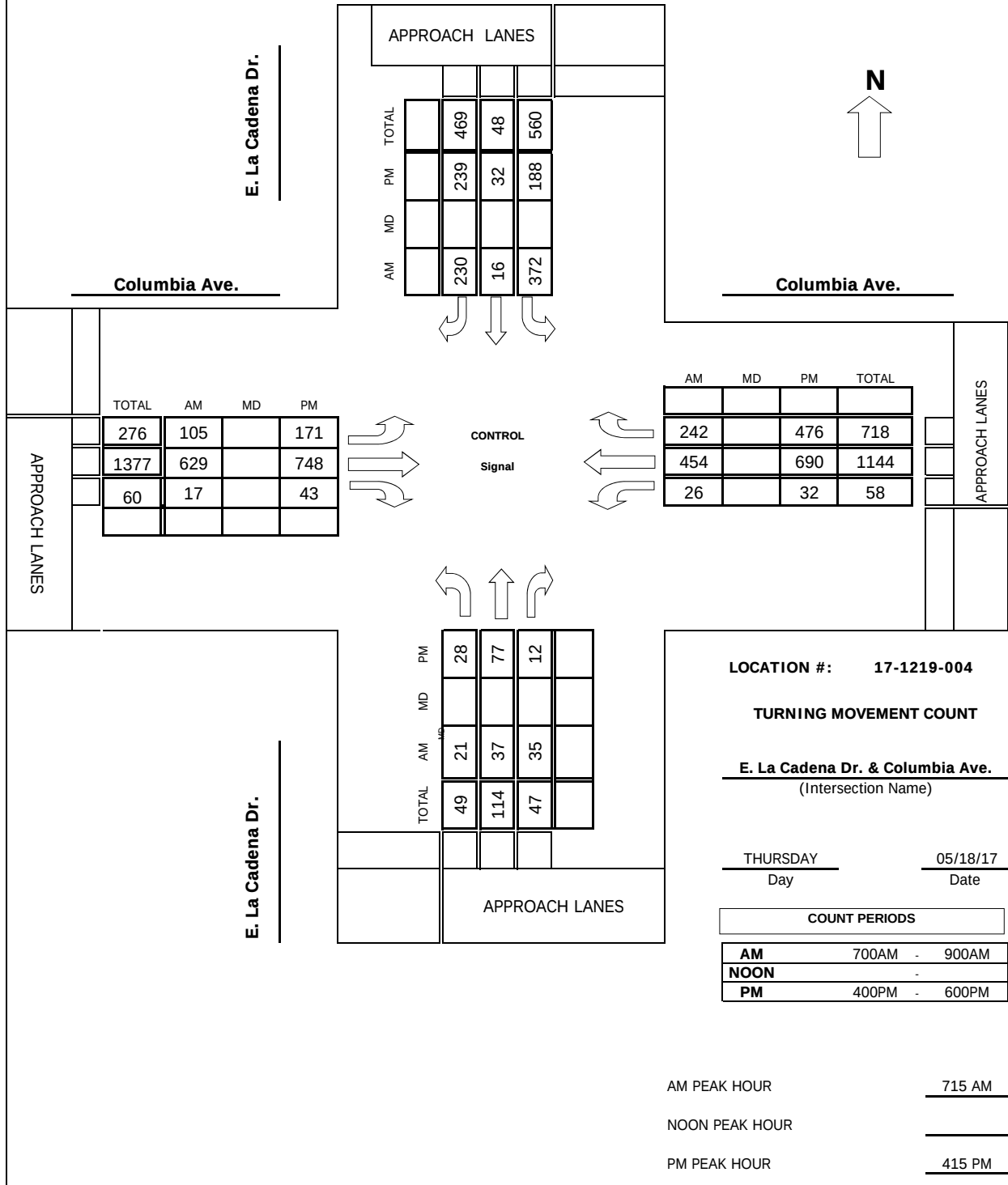
NOON PEAK HOUR

PM PEAK HOUR

415 PM

Project #: 17-1219-004

TMC SUMMARY OF E. La Cadena Dr. & Columbia Ave.



Project #: 17-1219-005

TMC SUMMARY OF Chicago Ave. & Columbia Ave.

Chicago Ave.

Columbia Ave.

APPROACH LANES

TOTAL	53	35	14
PM	32	28	8
MD			
AM	21	7	6

N



Columbia Ave.

APPROACH LANES

TOTAL	AM	MD	PM
13	3		10
996	606		390
984	433		551

CONTROL
Signal

AM	MD	PM	TOTAL
3		4	7
373		687	1060
21		60	81

APPROACH LANES

Chicago Ave.

APPROACH LANES

PM	499	12
MD		
AM	329	10
TOTAL	828	22

APPROACH LANES

LOCATION #: **17-1219-005**

TURNING MOVEMENT COUNT

Chicago Ave. & Columbia Ave.
(Intersection Name)

THURSDAY
Day

05/18/17
Date

COUNT PERIODS		
AM	700AM	- 900AM
NOON		-
PM	400PM	- 600PM

AM PEAK HOUR

700 AM

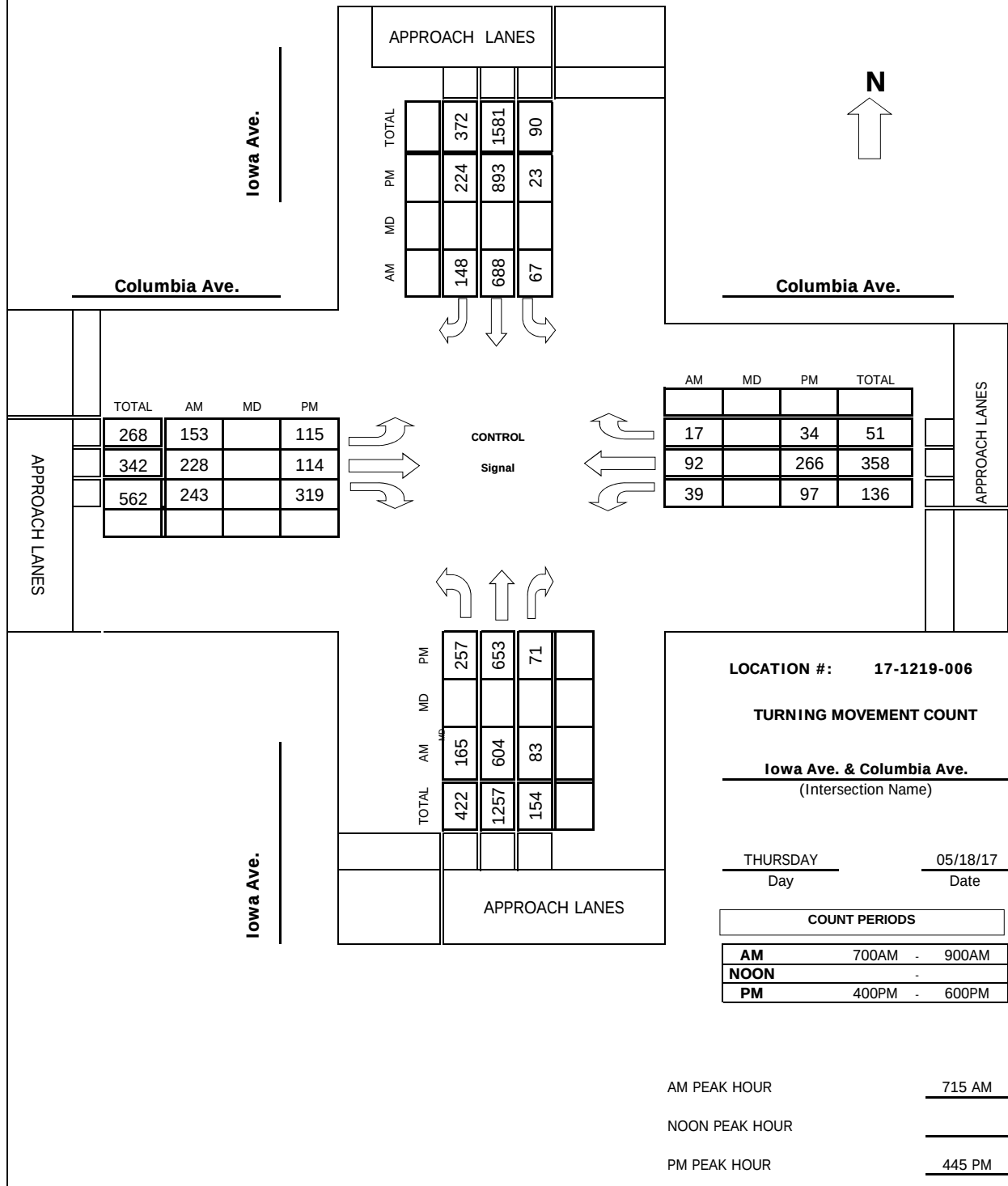
NOON PEAK HOUR

PM PEAK HOUR

415 PM

Project #: 17-1219-006

TMC SUMMARY OF Iowa Ave. & Columbia Ave.



Project #: 17-1219-007

TMC SUMMARY OF Northgate St. & Columbia Ave.

Northgate St.

APPROACH LANES

TOTAL	0	0	0
PM	0	0	0
MD			
AM	0	0	0

N
↑

Columbia Ave.

Columbia Ave.

APPROACH LANES

TOTAL	0	0	0
AM	453	285	168
MD	63	47	16
PM			

CONTROL
3-Way Stop

AM	MD	PM	TOTAL
0		0	0
128		312	440
26		12	38

APPROACH LANES

Northgate St.

APPROACH LANES

TOTAL	81	0	21
AM	10	0	9
MD			
PM	71	0	12

LOCATION #: 17-1219-007

TURNING MOVEMENT COUNT

Northgate St. & Columbia Ave.
(Intersection Name)

THURSDAY
Day

05/18/17
Date

COUNT PERIODS		
AM	700AM	- 900AM
NOON		-
PM	400PM	- 600PM

AM PEAK HOUR

800 AM

NOON PEAK HOUR

PM PEAK HOUR

445 PM

Project #: 17-1219-008

TMC SUMMARY OF Research Park Dr. & Columbia Ave.

Research Park Dr

Columbia Ave.

APPROACH LANES

TOTAL	0	0	0
PM	0	0	0
MD			
AM	0	0	0

N



Columbia Ave.

APPROACH LANES

TOTAL	0	0	0
AM	340	124	216
MD	147	124	23
PM			

CONTROL
1-Way Stop
NB

APPROACH LANES

AM	0		0	0
MD	171		222	393
PM	18		4	22
TOTAL				

Research Park Dr.

APPROACH LANES

TOTAL	127	0	19
AM	15	0	3
MD			
PM	112	0	16

LOCATION #: 17-1219-008

TURNING MOVEMENT COUNT

Research Park Dr. & Columbia Ave.
(Intersection Name)

THURSDAY
Day

05/18/17
Date

COUNT PERIODS		
AM	700AM	- 900AM
NOON		-
PM	400PM	- 600PM

AM PEAK HOUR

700 AM

NOON PEAK HOUR

PM PEAK HOUR

445 PM

Project #: 17-1219-009

TMC SUMMARY OF Michigan Ave. & Palmyrita Ave.

Michigan Ave.

Palmyrita Ave.

APPROACH LANES

TOTAL		7	10
PM	2	9	6
MD			
AM	5	1	0

N



Palmyrita Ave.

APPROACH LANES

TOTAL	AM	MD	PM
13	8		5
184	60		124
7	3		4

CONTROL

2-Way Stop

NB & SB

APPROACH LANES

AM	MD	PM	TOTAL
1		0	1
152		108	260
186		145	331

Michigan Ave.

APPROACH LANES

TOTAL	AM	MD	PM
6	6	3	109
6	9	332	

APPROACH LANES

LOCATION #: 17-1219-009

TURNING MOVEMENT COUNT

Michigan Ave. & Palmyrita Ave.
(Intersection Name)

THURSDAY **05/18/17**
Day Date

COUNT PERIODS

AM	700AM	-	900AM
NOON		-	
PM	400PM	-	600PM

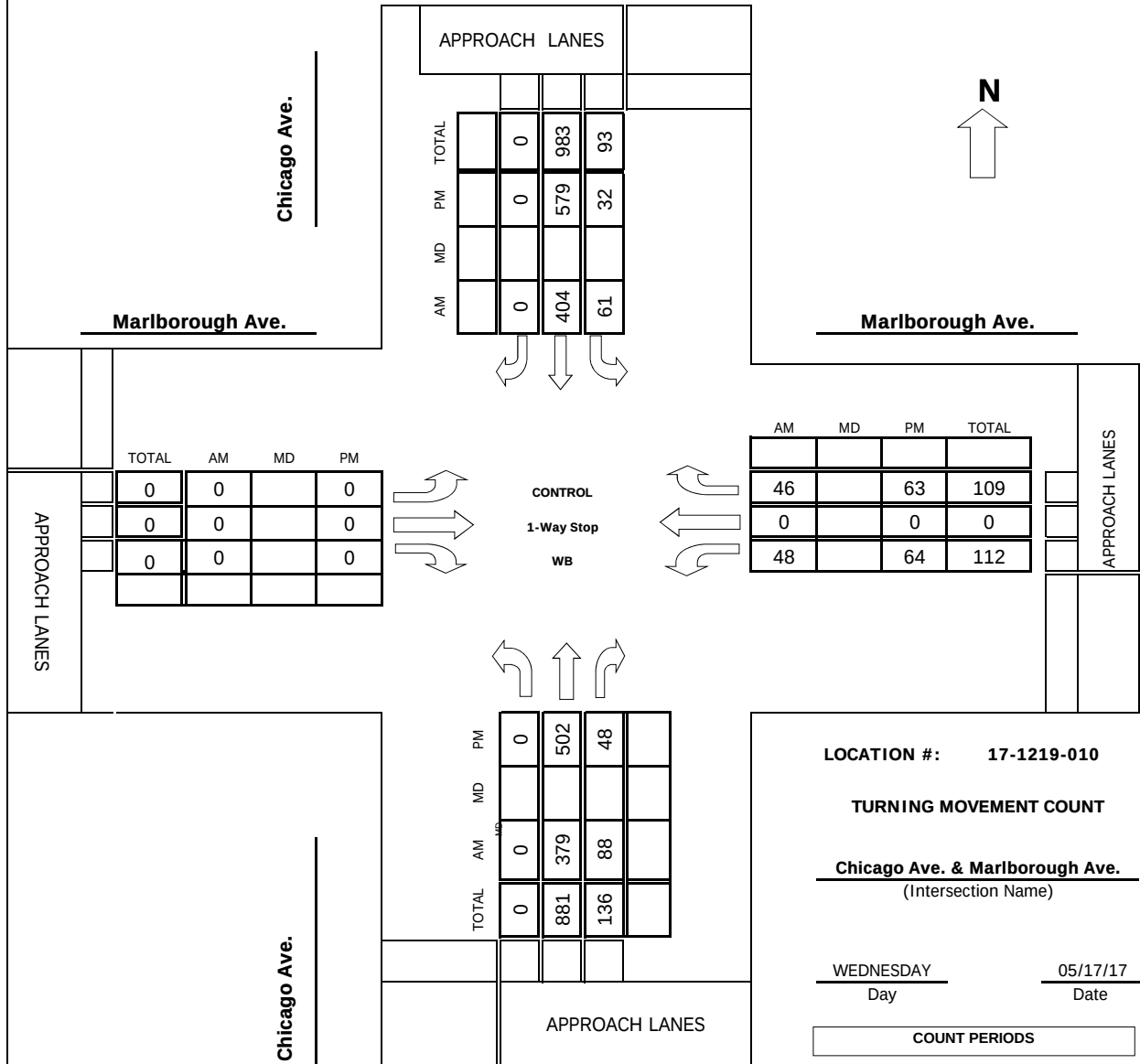
AM PEAK HOUR 700 AM

NOON PEAK HOUR

PM PEAK HOUR 445 PM

Project #: 17-1219-010

TMC SUMMARY OF Chicago Ave. & Marlborough Ave.



LOCATION #: 17-1219-010

TURNING MOVEMENT COUNT

Chicago Ave. & Marlborough Ave.
(Intersection Name)

WEDNESDAY **05/17/17**
Day Date

COUNT PERIODS

AM	700AM	-	900AM
NOON		-	
PM	400PM	-	600PM

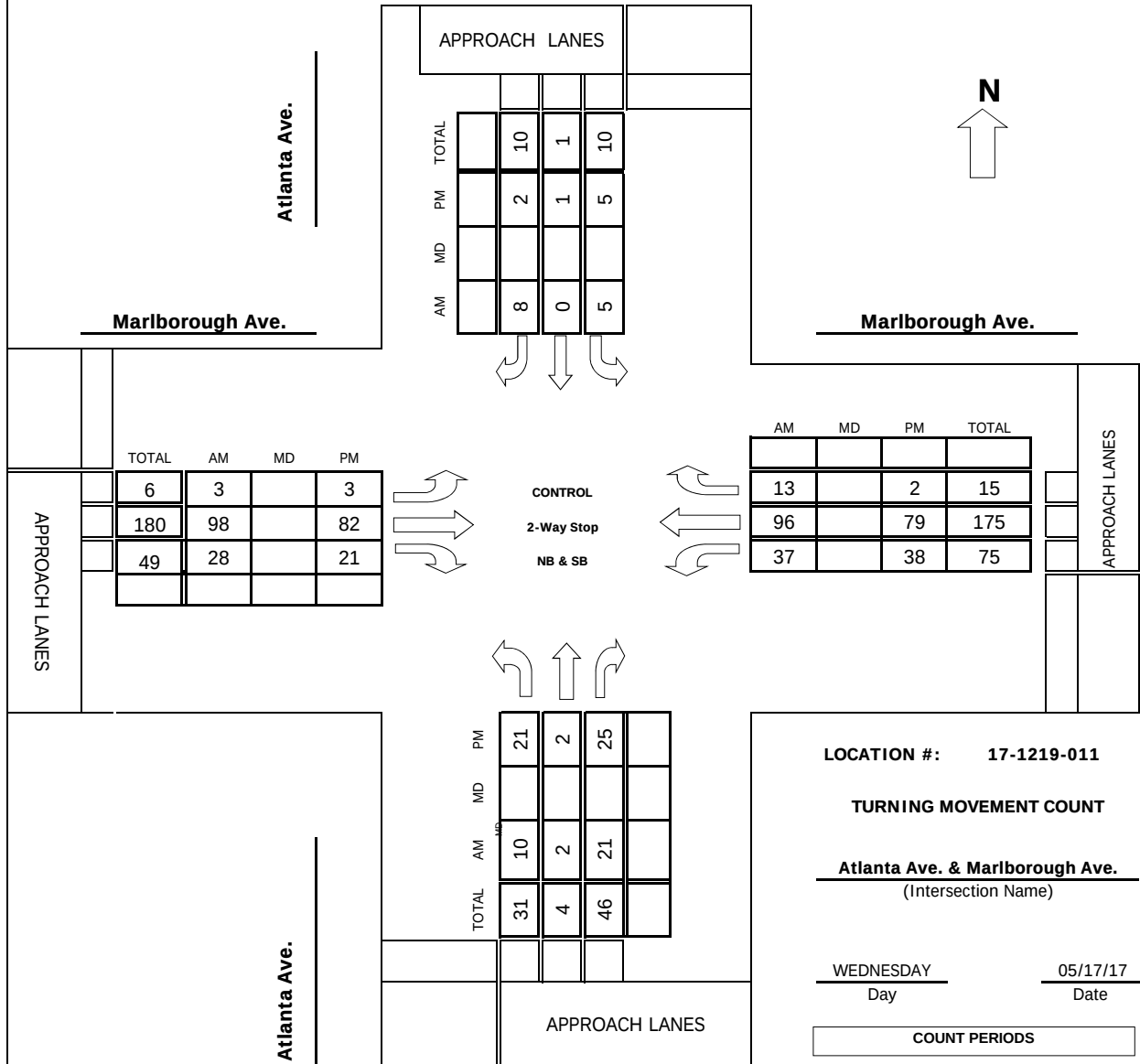
AM PEAK HOUR 730 AM

NOON PEAK HOUR

PM PEAK HOUR 400 PM

Project #: 17-1219-011

TMC SUMMARY OF Atlanta Ave. & Marlborough Ave.



LOCATION #: **17-1219-011**

TURNING MOVEMENT COUNT

Atlanta Ave. & Marlborough Ave.
(Intersection Name)

WEDNESDAY 05/17/17
Day Date

COUNT PERIODS

AM	700AM	-	900AM
NOON		-	
PM	400PM	-	600PM

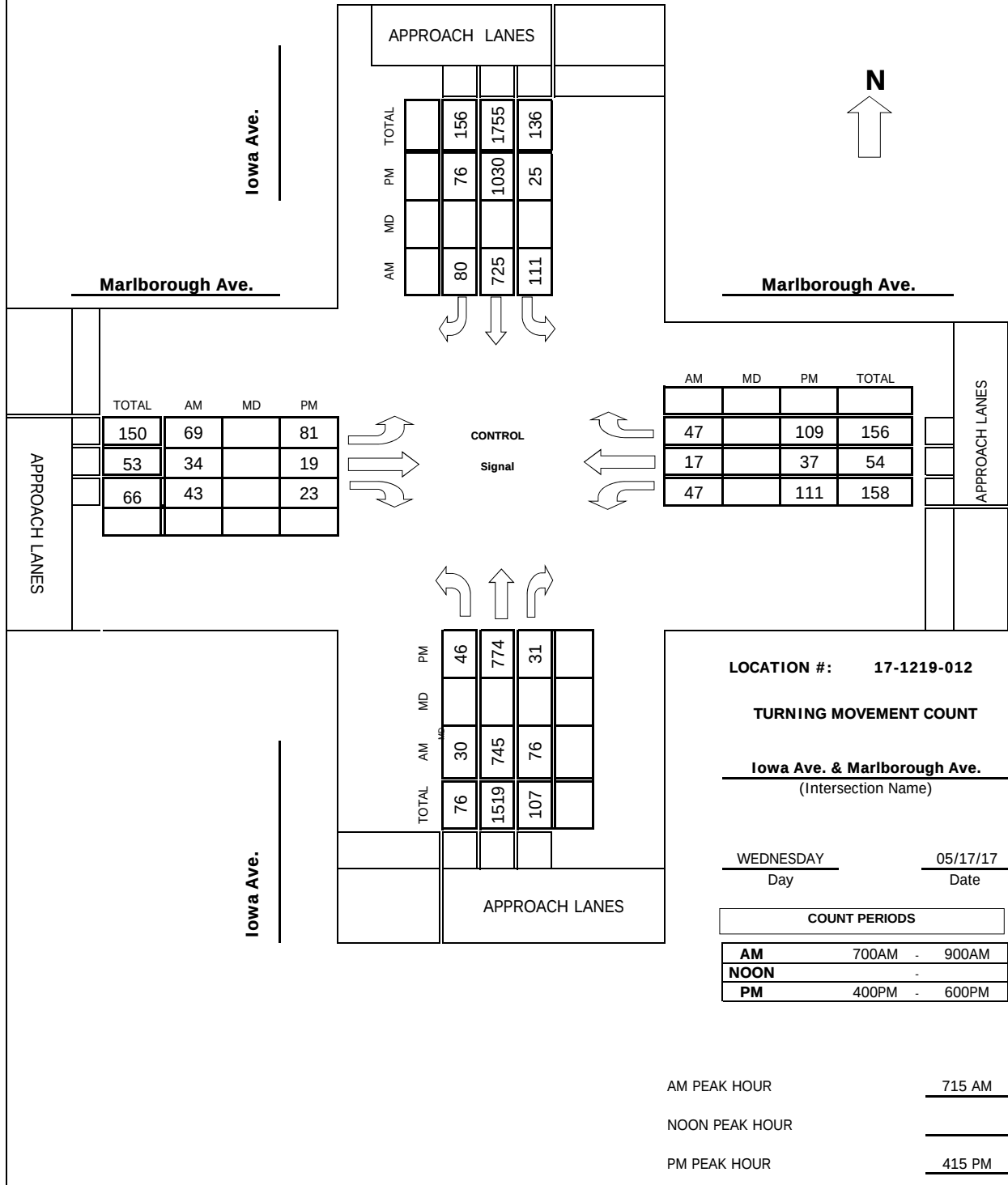
AM PEAK HOUR 745 AM

NOON PEAK HOUR

PM PEAK HOUR 415 PM

Project #: 17-1219-012

TMC SUMMARY OF Iowa Ave. & Marlborough Ave.



Project #: 17-1219-013

TMC SUMMARY OF Rustin Ave. & Marlborough Ave.

Rustin Ave.

Marlborough Ave.

APPROACH LANES

TOTAL		3	3
PM		2	3
MD			
AM	1	0	0

N



Marlborough Ave.

APPROACH LANES

TOTAL	AM	MD	PM
3	2		1
120	66		54
97	44		53

CONTROL
2-Way Stop
NB & SB

APPROACH LANES

AM	MD	PM	TOTAL
0		0	0
50		65	115
88		157	245

Rustin Ave.

APPROACH LANES

TOTAL	AM	MD	PM
102	67		35
3	1		2
263	159		104

APPROACH LANES

LOCATION #: 17-1219-013

TURNING MOVEMENT COUNT

Rustin Ave. & Marlborough Ave.
(Intersection Name)

WEDNESDAY 05/17/17
Day Date

COUNT PERIODS

AM	700AM - 900AM
NOON	-
PM	400PM - 600PM

AM PEAK HOUR

700 AM

NOON PEAK HOUR

PM PEAK HOUR

415 PM

Project #: 17-1219-014

TMC SUMMARY OF Northgate St. & Marlborough Ave.

Northgate St.

APPROACH LANES

TOTAL	390	0	8
PM	243	0	2
MD			
AM	147	0	6

N
↑

Marlborough Ave.

APPROACH LANES

TOTAL	338	198	140
PM	70	49	21
MD			
AM	0	0	0

Marlborough Ave.

APPROACH LANES

TOTAL	0	0	0
PM			
MD			
AM	0	0	0

CONTROL
1-Way Stop
SB

APPROACH LANES

AM	3		8
MD	23	33	56
PM	0	0	0

Northgate St.

APPROACH LANES

TOTAL	0	0	0
PM			
MD			
AM	0	0	0

APPROACH LANES

LOCATION #: 17-1219-014

TURNING MOVEMENT COUNT

Northgate St. & Marlborough Ave.
(Intersection Name)

THURSDAY
Day

05/18/17
Date

COUNT PERIODS		
AM	700AM	- 900AM
NOON		-
PM	400PM	- 600PM

AM PEAK HOUR

NOON PEAK HOUR

PM PEAK HOUR

700 AM

445 PM

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Thursday, May 18, 2017

City: Riverside

Project #: 17-1219-001

Location: Columbia Ave. btwn. Primer St. & I-215

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00			19	29	12:00			133	163
00:15			20	33	12:15			131	177
00:30			21	30	12:30			138	163
00:45			14	74	12:45			154	556
01:00			16	28	13:00			151	187
01:15			13	24	13:15			155	185
01:30			9	21	13:30			185	189
01:45			11	49	13:45			196	687
02:00			16	19	14:00			166	222
02:15			22	16	14:15			161	309
02:30			20	20	14:30			154	285
02:45			24	82	14:45			185	666
03:00			19	28	15:00			214	263
03:15			25	24	15:15			185	214
03:30			55	29	15:30			166	258
03:45			41	140	15:45			196	761
04:00			22	26	16:00			213	166
04:15			50	25	16:15			215	220
04:30			133	54	16:30			233	229
04:45			99	304	16:45			247	908
05:00			90	50	17:00			258	253
05:15			122	54	17:15			240	193
05:30			101	41	17:30			250	175
05:45			103	416	17:45			194	942
06:00			104	45	18:00			187	159
06:15			108	89	18:15			185	163
06:30			128	99	18:30			141	131
06:45			133	473	18:45			104	617
07:00			138	172	19:00			95	122
07:15			169	174	19:15			96	104
07:30			229	158	19:30			70	74
07:45			198	734	19:45			75	336
08:00			134	156	20:00			64	50
08:15			136	158	20:15			51	59
08:30			141	167	20:30			52	60
08:45			148	559	20:45			28	195
09:00			99	131	21:00			24	58
09:15			84	126	21:15			26	54
09:30			97	128	21:30			33	74
09:45			108	388	21:45			30	113
10:00			100	154	22:00			35	54
10:15			109	147	22:15			54	41
10:30			99	141	22:30			41	42
10:45			96	404	22:45			42	172
11:00			90	152	23:00			28	24
11:15			98	187	23:15			24	29
11:30			84	185	23:30			26	30
11:45			85	357	23:45			20	98

Total Vol. 3980 4289 **8269** 6051 6748 **12799**

GPS Coordinates:

GPS Coordinates:				Daily Totals				
				NB	SB	EB	WB	Combined
						10031	11037	21068
AM				PM				
Split %	48.1%	51.9%	39.2%			47.3%	52.7%	60.8%
Peak Hour	07:00	11:15	07:00			16:45	14:15	16:15
Volume	734	731	1450			995	1099	1910
P.H.E.	0.80	0.93	0.88			0.96	0.89	0.93

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Thursday, May 18, 2017

City: Riverside

Project #: 17-1219-002

Location: Columbia Ave. btwn. E. La Cadena Dr. & Chicago Ave.

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00			18	29	12:00			136	169
00:15			23	21	12:15			139	179
00:30			18	14	12:30			164	167
00:45			13	72	12:45			161	600
01:00			15	14	13:00			158	185
01:15			12	12	13:15			174	200
01:30			11	17	13:30			219	193
01:45			12	50	13:45			179	730
02:00			15	9	14:00			178	246
02:15			12	18	14:15			177	331
02:30			28	15	14:30			199	274
02:45			21	76	14:45			212	766
03:00			21	22	15:00			186	269
03:15			36	21	15:15			212	214
03:30			56	21	15:30			191	278
03:45			39	152	15:45			208	797
04:00			29	26	16:00			216	247
04:15			61	58	16:15			217	273
04:30			129	43	16:30			239	287
04:45			101	320	16:45			243	915
05:00			99	49	17:00			252	337
05:15			120	57	17:15			232	239
05:30			179	66	17:30			251	242
05:45			180	578	17:45			183	918
06:00			139	91	18:00			220	173
06:15			150	112	18:15			171	133
06:30			227	111	18:30			113	142
06:45			246	762	18:45			99	603
07:00			204	176	19:00			70	111
07:15			253	189	19:15			78	80
07:30			308	129	19:30			95	82
07:45			277	1042	19:45			62	305
08:00			196	166	20:00			59	76
08:15			199	163	20:15			68	104
08:30			206	160	20:30			65	61
08:45			209	810	20:45			50	242
09:00			180	158	21:00			63	77
09:15			185	148	21:15			58	70
09:30			140	123	21:30			48	60
09:45			155	660	21:45			49	218
10:00			115	115	22:00			55	56
10:15			154	144	22:15			36	65
10:30			145	131	22:30			29	50
10:45			137	551	22:45			28	148
11:00			152	196	23:00			18	50
11:15			154	205	23:15			11	25
11:30			163	172	23:30			29	27
11:45			154	623	23:45			24	82

Total Vol.	5696	4380	10076	6324	7544	13868

GPS Coordinates:

Daily Totals

NB	SB	EB	WB	Combined
		12020	11924	23944

AM

PM

Split %	56.5%	43.5%	42.1%	45.6%	54.4%	57.9%
Peak Hour	07:00	11:00	07:00	16:45	16:15	16:15
Volume	1042	760	1765	978	1218	2169
P.H.F.	0.85	0.93	0.87	0.97	0.90	0.92

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Thursday, May 18, 2017

City: Riverside

Project #: 17-1219-003

Location: Columbia Ave. btwn. Chicago Ave. & Iowa Ave.

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00			18	15	12:00			91	127
00:15			15	17	12:15			86	122
00:30			12	12	12:30			124	100
00:45			10	55	12:45			110	411
01:00			18	9	13:00			111	84
01:15			10	10	13:15			133	176
01:30			6	9	13:30			126	136
01:45			13	47	13:45			109	479
02:00			12	9	14:00			108	128
02:15			10	12	14:15			109	183
02:30			21	10	14:30			118	158
02:45			20	63	14:45			115	450
03:00			17	21	15:00			106	164
03:15			24	17	15:15			130	170
03:30			47	19	15:30			106	137
03:45			30	118	15:45			108	450
04:00			17	16	16:00			93	144
04:15			51	41	16:15			128	173
04:30			97	35	16:30			112	137
04:45			62	227	16:45			126	459
05:00			56	41	17:00			150	198
05:15			67	45	17:15			157	192
05:30			106	48	17:30			115	151
05:45			120	349	17:45			89	511
06:00			110	61	18:00			117	97
06:15			108	69	18:15			89	75
06:30			166	58	18:30			82	58
06:45			193	577	18:45			66	354
07:00			132	112	19:00			49	70
07:15			129	107	19:15			33	53
07:30			189	96	19:30			62	51
07:45			173	623	19:45			41	185
08:00			133	99	20:00			37	41
08:15			109	100	20:15			29	52
08:30			145	103	20:30			37	32
08:45			136	523	20:45			25	128
09:00			138	85	21:00			35	35
09:15			115	78	21:15			46	55
09:30			91	87	21:30			30	37
09:45			99	443	21:45			40	151
10:00			65	78	22:00			41	27
10:15			100	78	22:15			29	39
10:30			111	98	22:30			19	24
10:45			97	373	22:45			20	109
11:00			101	143	23:00			12	41
11:15			106	147	23:15			11	13
11:30			90	130	23:30			21	13
11:45			113	410	23:45			11	55

Total Vol.	3808	2862	6670	3742	4666	8408

GPS Coordinates:

Daily Totals

NB	SB	EB	WB	Combined
		7550	7528	15078

AM

PM

Split %	57.1%	42.9%	44.2 %	44.5%	55.5%	55.8 %
Peak Hour	06:45	11:00	06:45	16:45	16:45	16:45
Volume	643	551	1047	548	747	1295
P.H.F.	0.83	0.94	0.92	0.87	0.91	0.93

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Thursday, May 18, 2017

City: Riverside

Project #: 17-1219-005

Location: Columbia Ave. btwn. Research Park Dr. & Michigan Ave.

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00			3	0	12:00			18	13
00:15			1	1	12:15			30	22
00:30			0	0	12:30			32	21
00:45			2	6	12:45			28	108
01:00			1	1	13:00			27	15
01:15			2	0	13:15			27	35
01:30			2	0	13:30			19	19
01:45			2	7	13:45			18	91
02:00			1	0	14:00			21	23
02:15			1	0	14:15			21	51
02:30			1	1	14:30			33	37
02:45			3	6	14:45			27	102
03:00			5	2	15:00			40	30
03:15			7	2	15:15			35	23
03:30			4	2	15:30			36	29
03:45			8	24	15:45			44	155
04:00			7	4	16:00			47	32
04:15			16	6	16:15			37	31
04:30			24	7	16:30			48	25
04:45			11	58	16:45			59	191
05:00			16	4	17:00			67	42
05:15			25	5	17:15			58	87
05:30			39	5	17:30			48	56
05:45			10	90	17:45			27	200
06:00			21	8	18:00			21	12
06:15			37	18	18:15			21	18
06:30			55	37	18:30			19	19
06:45			47	160	18:45			14	75
07:00			34	40	19:00			8	12
07:15			23	52	19:15			7	10
07:30			37	56	19:30			12	9
07:45			33	127	19:45			11	38
08:00			30	20	20:00			7	6
08:15			29	21	20:15			3	10
08:30			25	16	20:30			9	3
08:45			45	129	20:45			9	28
09:00			38	11	21:00			7	2
09:15			22	15	21:15			14	4
09:30			16	13	21:30			10	1
09:45			13	89	21:45			8	39
10:00			14	12	22:00			4	2
10:15			19	9	22:15			4	5
10:30			15	6	22:30			6	1
10:45			18	66	22:45			5	19
11:00			23	21	23:00			6	3
11:15			22	15	23:15			1	2
11:30			22	24	23:30			1	0
11:45			22	89	23:45			1	9

Total Vol. 851 607 **1458** 1055 908 **1963**

GPS Coordinates:

Daily Totals

NB	SB	EB	WB	Combined
		1906	1515	3421

AM

PM

Split %	58.4%	41.6%	42.6%	53.7%	46.3%	57.4%
Peak Hour	06:15	07:00	07:00	16:30	16:45	16:45
Volume	173	189	316	232	226	458
P.H.F.	0.79	0.84	0.85	0.87	0.65	0.79

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Thursday, May 18, 2017

City: Riverside

Project #: 17-1219-006

Location: Michigan Ave. btwn. Columbia Ave. & Palmyrita Ave.

AM Period	NB		SB		EB		WB		PM Period	NB		SB		EB		WB	
00:00	2		3						12:00	20		16					
00:15	2		1						12:15	22		19					
00:30	0		0						12:30	26		22					
00:45	0	4	0	4			8		12:45	31	99	15	72			171	
01:00	2		1						13:00	27		13					
01:15	1		1						13:15	25		35					
01:30	2		0						13:30	20		17					
01:45	3	8	2	4			12		13:45	18	90	16	81			171	
02:00	1		0						14:00	13		13					
02:15	2		1						14:15	26		53					
02:30	0		1						14:30	27		38					
02:45	0	3	0	2			5		14:45	22	88	23	127			215	
03:00	4		2						15:00	37		31					
03:15	6		2						15:15	33		20					
03:30	4		1						15:30	34		25					
03:45	6	20	5	10			30		15:45	34	138	48	124			262	
04:00	7		5						16:00	52		26					
04:15	13		7						16:15	39		31					
04:30	20		4						16:30	46		31					
04:45	14	54	8	24			78		16:45	56	193	27	115			308	
05:00	15		2						17:00	68		50					
05:15	20		5						17:15	50		40					
05:30	23		7						17:30	55		41					
05:45	21	79	7	21			100		17:45	40	213	25	156			369	
06:00	17		9						18:00	26		16					
06:15	22		17						18:15	18		13					
06:30	24		25						18:30	25		23					
06:45	29	92	26	77			169		18:45	17	86	13	65			151	
07:00	29		29						19:00	8		12					
07:15	22		51						19:15	5		11					
07:30	32		53						19:30	11		8					
07:45	35	118	57	190			308		19:45	11	35	4	35			70	
08:00	27		20						20:00	10		7					
08:15	33		21						20:15	4		6					
08:30	23		14						20:30	9		6					
08:45	32	115	17	72			187		20:45	8	31	9	28			59	
09:00	42		18						21:00	6		2					
09:15	37		19						21:15	10		0					
09:30	10		10						21:30	13		5					
09:45	19	108	9	56			164		21:45	8	37	1	8			45	
10:00	11		11						22:00	7		3					
10:15	15		7						22:15	5		4					
10:30	15		8						22:30	3		2					
10:45	14	55	18	44			99		22:45	6	21	3	12			33	
11:00	23		20						23:00	5		5					
11:15	20		20						23:15	3		1					
11:30	22		17						23:30	0		1					
11:45	20	85	39	96			181		23:45	2	10	1	8			18	

Total Vol.	741	600	1341	1041	831	1872

GPS Coordinates:

Daily Totals

NB	SB	EB	WB	Combined
1782	1431			3213

AM

Split %	55.3%	44.7%	41.7 %
Peak Hour	08:30	07:00	07:00
Volume	134	190	308
P.H.F.	0.80	0.83	0.84

PM

Split %	55.6%	44.4%	58.3 %
Peak Hour	16:45	16:45	16:45
Volume	229	158	387
P.H.F.	0.84	0.79	0.82

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Wednesday, May 17, 2017

City: Riverside

Project #: 17-1219-007

Location: Marlborough Ave. btwn. Chicago Ave. & Atlanta Ave.

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00			0	1	12:00			34	21
00:15			0	1	12:15			31	30
00:30			0	2	12:30			30	28
00:45			0	0	12:45			28	123
01:00			1	3	13:00			32	37
01:15			1	0	13:15			18	22
01:30			1	0	13:30			28	29
01:45			0	3	13:45			14	92
02:00			0	0	14:00			38	29
02:15			0	3	14:15			25	22
02:30			0	3	14:30			27	39
02:45			0	0	14:45			19	109
03:00			1	0	15:00			36	38
03:15			3	1	15:15			19	32
03:30			2	2	15:30			42	26
03:45			10	16	15:45			36	133
04:00			2	6	16:00			20	27
04:15			8	5	16:15			17	28
04:30			9	1	16:30			27	24
04:45			27	46	16:45			25	89
05:00			11	5	17:00			37	28
05:15			1	8	17:15			20	18
05:30			25	14	17:30			27	17
05:45			38	75	17:45			22	106
06:00			15	11	18:00			17	16
06:15			16	9	18:15			20	22
06:30			19	6	18:30			15	17
06:45			19	69	18:45			19	71
07:00			18	14	19:00			10	7
07:15			26	26	19:15			8	13
07:30			24	25	19:30			9	18
07:45			39	107	19:45			9	36
08:00			32	22	20:00			11	27
08:15			23	26	20:15			7	13
08:30			35	32	20:30			7	6
08:45			31	121	20:45			4	29
09:00			26	17	21:00			13	8
09:15			26	18	21:15			6	10
09:30			28	19	21:30			8	19
09:45			28	108	21:45			9	36
10:00			23	33	22:00			1	7
10:15			24	20	22:15			2	7
10:30			25	22	22:30			3	7
10:45			19	91	22:45			2	8
11:00			25	30	23:00			1	10
11:15			19	13	23:15			2	1
11:30			26	8	23:30			4	2
11:45			26	96	23:45			2	9

Total Vol. 732 561 **1293** 841 908 **1749**

GPS Coordinates:

Daily Totals

NB	SB	EB	WB	Combined
		1573	1469	3042

AM

PM

Split %	56.6%	43.4%	42.5%	48.1%	51.9%	57.5%
Peak Hour	07:45	07:45	07:45	15:00	14:30	15:00
Volume	129	114	243	133	139	261
P.H.F.	0.83	0.84	0.83	0.79	0.89	0.88

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Wednesday, May 17, 2017

City: Riverside

Project #: 17-1219-008

Location: Marlborough Ave. btwn. Atlanta Ave. & Iowa Ave.

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00			0	2	12:00			26	17
00:15			0	1	12:15			26	33
00:30			0	2	12:30			27	29
00:45			0	0	12:45			29	108
01:00			1	3	13:00			32	33
01:15			1	1	13:15			20	24
01:30			1	1	13:30			30	39
01:45			0	3	13:45			16	98
02:00			0	0	14:00			40	43
02:15			1	4	14:15			25	26
02:30			0	3	14:30			25	43
02:45			0	1	14:45			24	114
03:00			1	1	15:00			36	41
03:15			1	3	15:15			24	32
03:30			0	2	15:30			43	32
03:45			4	6	15:45			39	142
04:00			2	6	16:00			18	26
04:15			3	6	16:15			20	33
04:30			2	4	16:30			25	30
04:45			4	11	16:45			27	90
05:00			2	8	17:00			40	30
05:15			2	10	17:15			27	20
05:30			15	22	17:30			38	17
05:45			14	33	17:45			28	133
06:00			12	16	18:00			23	11
06:15			13	13	18:15			16	18
06:30			16	11	18:30			14	12
06:45			12	53	18:45			14	67
07:00			18	16	19:00			9	9
07:15			19	31	19:15			7	8
07:30			22	25	19:30			9	15
07:45			47	106	19:45			5	30
08:00			28	23	20:00			9	21
08:15			25	41	20:15			10	12
08:30			24	40	20:30			8	4
08:45			31	108	20:45			9	36
09:00			23	26	21:00			18	6
09:15			22	20	21:15			7	8
09:30			22	24	21:30			9	15
09:45			20	87	21:45			8	42
10:00			25	30	22:00			1	6
10:15			18	13	22:15			2	7
10:30			21	19	22:30			4	8
10:45			31	95	22:45			2	9
11:00			22	26	23:00			1	9
11:15			18	20	23:15			0	1
11:30			27	12	23:30			4	1
11:45			20	87	23:45			2	7

Total Vol. 590 676 **1266** 876 936 **1812**

GPS Coordinates:

Daily Totals

NB	SB	EB	WB	Combined
		1466	1612	3078

AM

PM

Split %	46.6%	53.4%	41.1%	48.3%	51.7%	58.9%
Peak Hour	07:45	07:45	07:45	15:00	13:45	15:00
Volume	124	146	270	142	150	284
P.H.F.	0.66	0.87	0.76	0.83	0.87	0.92

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Wednesday, May 17, 2017

City: Riverside

Project #: 17-1219-009

Location: Marlborough Ave. btwn. Iowa Ave. & Rustin Ave.

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00			0	0	12:00			28	26
00:15			0	0	12:15			19	14
00:30			0	2	12:30			22	14
00:45			0	0	12:45			18	87
01:00			0	0	13:00			21	13
01:15			0	0	13:15			22	24
01:30			1	0	13:30			13	21
01:45			0	1	13:45			10	66
02:00			1	1	14:00			4	16
02:15			1	0	14:15			13	46
02:30			3	4	14:30			13	46
02:45			1	6	14:45			16	46
03:00			1	2	15:00			20	17
03:15			0	0	15:15			16	33
03:30			0	1	15:30			17	29
03:45			2	3	15:45			25	78
04:00			1	3	16:00			18	23
04:15			2	2	16:15			25	32
04:30			2	2	16:30			17	28
04:45			7	12	16:45			39	99
05:00			9	5	17:00			27	21
05:15			11	3	17:15			15	21
05:30			19	15	17:30			10	13
05:45			16	55	17:45			9	61
06:00			20	12	18:00			8	12
06:15			13	16	18:15			10	9
06:30			12	28	18:30			5	9
06:45			14	59	18:45			9	32
07:00			24	25	19:00			0	9
07:15			28	33	19:15			7	7
07:30			37	28	19:30			3	3
07:45			23	112	19:45			2	12
08:00			26	22	20:00			2	7
08:15			23	24	20:15			2	2
08:30			15	18	20:30			4	2
08:45			12	76	20:45			4	12
09:00			9	10	21:00			8	7
09:15			17	17	21:15			3	4
09:30			11	17	21:30			1	5
09:45			14	51	21:45			2	14
10:00			15	18	22:00			1	2
10:15			12	15	22:15			2	3
10:30			22	18	22:30			0	3
10:45			16	65	22:45			1	4
11:00			24	32	23:00			2	1
11:15			20	24	23:15			0	2
11:30			18	29	23:30			1	1
11:45			21	83	23:45			3	6

Total Vol. 523 595 **1118** 517 706 **1223**

GPS Coordinates:

Daily Totals

NB	SB	EB	WB	Combined
		1040	1301	2341

AM

PM

Split %	46.8%	53.2%	47.8%	42.3%	57.7%	52.2%
Peak Hour	07:15	07:00	07:00	16:15	14:15	15:30
Volume	114	118	230	108	134	210
P.H.F.	0.77	0.89	0.88	0.69	0.73	0.80

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Wednesday, May 17, 2017

City: Riverside

Project #: 17-1219-010

Location: Marlborough Ave. btwn. Rustin Ave. & Northgate St.

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00			0	0	12:00			38	29
00:15			0	0	12:15			34	26
00:30			3	3	12:30			27	27
00:45			2	5	12:45			27	126
01:00			4	2	13:00			33	16
01:15			1	0	13:15			34	32
01:30			1	1	13:30			28	29
01:45			0	6	13:45			15	110
02:00			1	2	14:00			16	34
02:15			1	1	14:15			33	88
02:30			3	8	14:30			28	59
02:45			2	7	14:45			27	104
03:00			1	2	15:00			36	44
03:15			2	0	15:15			33	71
03:30			3	1	15:30			25	66
03:45			2	8	15:45			26	120
04:00			2	1	16:00			27	48
04:15			3	2	16:15			32	61
04:30			6	3	16:30			37	59
04:45			7	18	16:45			37	133
05:00			15	2	17:00			55	45
05:15			29	6	17:15			26	46
05:30			37	7	17:30			21	39
05:45			29	110	17:45			18	120
06:00			42	12	18:00			5	18
06:15			38	8	18:15			15	19
06:30			54	18	18:30			8	13
06:45			54	188	18:45			13	41
07:00			46	27	19:00			7	16
07:15			57	42	19:15			9	17
07:30			63	35	19:30			7	13
07:45			59	225	19:45			7	30
08:00			44	22	20:00			7	11
08:15			41	16	20:15			5	5
08:30			42	22	20:30			7	4
08:45			30	157	20:45			2	21
09:00			18	22	21:00			8	11
09:15			27	24	21:15			5	6
09:30			18	19	21:30			4	6
09:45			26	89	21:45			1	18
10:00			26	18	22:00			2	3
10:15			20	32	22:15			2	7
10:30			34	19	22:30			2	3
10:45			26	106	22:45			1	7
11:00			26	28	23:00			4	4
11:15			28	37	23:15			0	3
11:30			36	39	23:30			5	2
11:45			32	122	23:45			3	12

Total Vol.	1041	674	1715	842	1292	2134

GPS Coordinates:

Daily Totals

NB	SB	EB	WB	Combined
		1883	1966	3849

AM

PM

Split %	60.7%	39.3%	44.6 %	39.5%	60.5%	55.4 %
Peak Hour	07:00	11:15	07:00	16:15	14:15	16:15
Volume	225	149	363	161	247	383
P.H.F.	0.89	0.85	0.92	0.73	0.70	0.96

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Thursday, May 18, 2017

City: Riverside

Project #: 17-1219-011

Location: Chicago Ave. btwn. Marlborough Ave. & Columbia Ave.

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00	13	3			12:00	79	83		
00:15	3	9			12:15	93	67		
00:30	6	3			12:30	79	76		
00:45	1	23	3	18	12:45	80	331	70	296
01:00	2	4			13:00	99	65		
01:15	3	4			13:15	91	123		
01:30	8	6			13:30	92	125		
01:45	4	17	3	17	13:45	93	375	95	408
02:00	2	2			14:00	147	96		
02:15	4	3			14:15	156	91		
02:30	4	6			14:30	121	101		
02:45	3	13	2	13	14:45	103	527	119	407
03:00	3	3			15:00	139	115		
03:15	2	6			15:15	72	116		
03:30	2	7			15:30	141	116		
03:45	10	17	11	27	15:45	131	483	131	478
04:00	7	11			16:00	104	150		
04:15	18	9			16:15	118	145		
04:30	25	21			16:30	151	147		
04:45	26	76	45	86	16:45	151	524	159	601
05:00	19	35			17:00	173	188		
05:15	22	47			17:15	78	126		
05:30	41	67			17:30	103	161		
05:45	30	112	63	212	17:45	81	435	110	585
06:00	34	34			18:00	75	129		
06:15	41	46			18:15	76	94		
06:30	70	83			18:30	88	65		
06:45	74	219	84	247	18:45	51	290	54	342
07:00	76	78			19:00	46	26		
07:15	98	120			19:15	37	52		
07:30	83	143			19:30	42	40		
07:45	131	388	120	461	19:45	57	182	26	144
08:00	90	79			20:00	41	28		
08:15	90	101			20:15	55	45		
08:30	74	88			20:30	32	36		
08:45	74	328	80	348	20:45	47	175	26	135
09:00	91	61			21:00	44	24		
09:15	66	76			21:15	23	27		
09:30	74	68			21:30	23	27		
09:45	56	287	72	277	21:45	10	100	18	96
10:00	52	57			22:00	30	13		
10:15	63	60			22:15	50	17		
10:30	61	58			22:30	31	18		
10:45	82	258	64	239	22:45	12	123	7	55
11:00	75	71			23:00	12	11		
11:15	77	82			23:15	10	3		
11:30	66	92			23:30	16	8		
11:45	78	296	64	309	23:45	18	56	10	32

Total Vol.	2034	2254	4288	3601	3579	7180

GPS Coordinates:

				Daily Totals		
				NB	SB	EB
				5635	5833	11468

AM				PM		
Split %	47.4%	52.6%	37.4%	50.2%	49.8%	62.6%
Peak Hour	07:15	07:15	07:15	16:15	16:15	16:15
Volume	402	462	864	593	639	1232
P.H.F.	0.77	0.81	0.86	0.86	0.85	0.85

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Thursday, May 18, 2017

City: Riverside

Project #: 17-1219-012

Location: Iowa Ave. btwn. Marlborough Ave. & Columbia Ave.

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00	7	21			12:00	126	160		
00:15	14	20			12:15	149	180		
00:30	10	16			12:30	151	162		
00:45	11	42	21	78	12:45	189	615	176	678
01:00	22	7			13:00	171	174		
01:15	6	10			13:15	210	258		
01:30	9	8			13:30	193	213		
01:45	12	49	10	35	13:45	144	718	204	849
02:00	10	19			14:00	191	234		
02:15	5	22			14:15	188	222		
02:30	8	22			14:30	176	238		
02:45	13	36	18	81	14:45	129	684	277	971
03:00	21	18			15:00	189	230		
03:15	25	7			15:15	187	265		
03:30	37	18			15:30	192	290		
03:45	35	118	16	59	15:45	190	758	295	1080
04:00	32	17			16:00	214	216		
04:15	56	20			16:15	202	299		
04:30	66	41			16:30	184	257		
04:45	61	215	37	115	16:45	244	844	337	1109
05:00	56	33			17:00	235	323		
05:15	72	42			17:15	278	339		
05:30	85	72			17:30	224	310		
05:45	101	314	72	219	17:45	160	897	260	1232
06:00	101	66			18:00	163	252		
06:15	133	102			18:15	137	200		
06:30	170	126			18:30	101	190		
06:45	175	579	154	448	18:45	127	528	168	810
07:00	182	175			19:00	86	160		
07:15	193	229			19:15	98	152		
07:30	222	304			19:30	82	137		
07:45	243	840	257	965	19:45	60	326	100	549
08:00	194	180			20:00	64	74		
08:15	194	175			20:15	57	91		
08:30	177	134			20:30	51	56		
08:45	168	733	140	629	20:45	62	234	58	279
09:00	137	134			21:00	50	61		
09:15	133	115			21:15	58	80		
09:30	115	106			21:30	44	46		
09:45	92	477	131	486	21:45	47	199	49	236
10:00	99	109			22:00	51	39		
10:15	82	118			22:15	39	47		
10:30	107	115			22:30	49	42		
10:45	104	392	121	463	22:45	33	172	49	177
11:00	130	175			23:00	24	44		
11:15	114	186			23:15	27	24		
11:30	120	187			23:30	19	31		
11:45	142	506	196	744	23:45	17	87	14	113

Total Vol. 4301 4322 **8623** 6062 8083 **14145**

GPS Coordinates:

Daily Totals

NB	SB	EB	WB	Combined
10363	12405			22768

AM

Split %	49.9%	50.1%	37.9%
Peak Hour	07:30	07:15	07:15
Volume	853	970	1822
P.H.F.	0.88	0.80	0.87

PM

42.9%	57.1%	62.1%
16:45	16:45	16:45
981	1309	2290
0.88	0.97	0.93

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Thursday, May 18, 2017

City: Riverside

Project #: 17-1219-013

Location: Northgate St. btwn. Marlborough Ave. & Columbia Ave.

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00	1	3			12:00	18	26		
00:15	1	1			12:15	25	21		
00:30	1	0			12:30	29	24		
00:45	1	4	2	6	12:45	30	102	24	95
01:00	0	1			13:00	19	18		
01:15	0	1			13:15	37	28		
01:30	1	1			13:30	19	22		
01:45	2	3	1	4	13:45	22	97	24	92
02:00	1	0			14:00	11	25		
02:15	1	0			14:15	19	41		
02:30	0	1			14:30	20	27		
02:45	1	3	2	3	14:45	15	65	34	127
03:00	0	0			15:00	24	46		
03:15	1	1			15:15	24	57		
03:30	2	1			15:30	23	51		
03:45	4	7	0	2	15:45	28	99	65	219
04:00	2	0			16:00	33	58		
04:15	2	3			16:15	22	58		
04:30	4	2			16:30	26	40		
04:45	6	14	6	11	16:45	33	114	64	220
05:00	14	1			17:00	46	64		
05:15	13	6			17:15	42	52		
05:30	31	8			17:30	24	65		
05:45	31	89	12	27	17:45	22	134	41	222
06:00	27	7			18:00	13	18		
06:15	33	14			18:15	14	21		
06:30	32	19			18:30	11	25		
06:45	82	174	23	63	18:45	9	47	15	79
07:00	54	21			19:00	8	12		
07:15	49	47			19:15	4	14		
07:30	44	44			19:30	3	7		
07:45	54	201	41	153	19:45	8	23	12	45
08:00	49	15			20:00	5	9		
08:15	44	14			20:15	7	8		
08:30	36	12			20:30	5	5		
08:45	25	154	13	54	20:45	5	22	8	30
09:00	18	17			21:00	2	5		
09:15	22	21			21:15	5	2		
09:30	13	8			21:30	5	3		
09:45	12	65	8	54	21:45	4	16	4	14
10:00	16	8			22:00	1	3		
10:15	18	14			22:15	3	2		
10:30	13	12			22:30	2	3		
10:45	13	60	21	55	22:45	6	12	2	10
11:00	16	29			23:00	3	3		
11:15	23	35			23:15	1	0		
11:30	24	20			23:30	3	2		
11:45	26	89	35	119	23:45	1	8	2	7

Total Vol.	863	551	1414	739	1160	1899

GPS Coordinates:

Daily Totals

NB	SB	EB	WB	Combined
1602	1711			3313

AM

Split %	61.0%	39.0%	42.7 %
Peak Hour	06:45	07:00	06:45
Volume	229	153	364
P.H.F.	0.70	0.81	0.87

PM

38.9%	61.1%	57.3 %
16:30	16:45	16:45
147	245	390
0.80	0.94	0.89

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745

Volumes for: Thursday, May 18, 2017

City: Riverside

Project #: 17-1219-014

Location: Research Park Dr. south of Columbia Ave.

AM Period	NB	SB	EB	WB	PM Period	NB	SB	EB	WB
00:00	0	1			12:00	16	18		
00:15	1	1			12:15	15	23		
00:30	0	0			12:30	19	22		
00:45	0	1	0	2	12:45	10	60	19	82
01:00	0	2			13:00	9	20		
01:15	0	0			13:15	13	13		
01:30	0	0			13:30	10	10		
01:45	1	1	0	2	13:45	29	61	11	54
02:00	2	0			14:00	12	5		
02:15	1	2			14:15	18	8		
02:30	1	0			14:30	22	14		
02:45	0	4	0	2	14:45	40	92	4	31
03:00	0	0			15:00	28	2		
03:15	1	0			15:15	42	4		
03:30	0	1			15:30	19	5		
03:45	0	1	0	1	15:45	38	127	5	16
04:00	1	3			16:00	31	4		
04:15	0	2			16:15	39	10		
04:30	1	9			16:30	25	2		
04:45	0	2	11	25	16:45	61	156	8	24
05:00	0	3			17:00	32	9		
05:15	1	8			17:15	24	7		
05:30	2	27			17:30	11	3		
05:45	6	9	18	56	17:45	14	81	3	22
06:00	0	9			18:00	14	12		
06:15	2	12			18:15	9	9		
06:30	3	36			18:30	5	10		
06:45	3	8	57	114	18:45	5	33	13	44
07:00	4	27			19:00	1	3		
07:15	5	30			19:15	0	5		
07:30	5	46			19:30	4	2		
07:45	4	18	39	142	19:45	10	15	2	12
08:00	5	26			20:00	4	4		
08:15	4	23			20:15	5	1		
08:30	2	25			20:30	5	1		
08:45	3	14	11	85	20:45	5	19	1	7
09:00	6	16			21:00	11	0		
09:15	4	13			21:15	19	1		
09:30	3	13			21:30	1	2		
09:45	11	24	6	48	21:45	5	36	2	5
10:00	11	12			22:00	3	0		
10:15	8	8			22:15	0	0		
10:30	9	10			22:30	1	0		
10:45	12	40	12	42	22:45	0	4	2	2
11:00	23	16			23:00	0	0		
11:15	28	21			23:15	0	0		
11:30	22	10			23:30	1	0		
11:45	28	101	17	64	23:45	1	2	0	0

Total Vol. 223 583 **806** 686 299 **985**

GPS Coordinates:

Daily Totals

NB	SB	EB	WB	Combined
909	882			1791

AM

PM

Split %	27.7%	72.3%	45.0%	69.6%	30.4%	55.0%
Peak Hour	11:00	06:45	06:45	16:15	12:15	16:15
Volume	101	160	177	157	84	186
P.H.F.	0.90	0.70	0.74	0.64	0.91	0.67

INTERSECTION	DIRECTION	RAW EXISTING VOLUMES						ADJUSTMENTS						FINAL EXISTING VOLUMES					
		Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm
1. Columbia Avenue / Primer Street	Sb	104	153	0	0	260	240							104	153	0	0	260	240
	Wb	381	589	335	341	0	0				27			381	589	335	368	0	0
	Nb	0	0	0	0	0	0							0	0	0	0	0	0
	Eb	0	0	474	738	155	179			17				0	0	491	738	155	179
2. West La Cadena Drive / I-215 SB Ramps / Interchange Drive	Sb	143	156	27	71	239	218							143	156	27	71	239	218
	Wb	4	9	213	239	15	27							4	9	213	239	15	27
	Nb	12	12	22	145	8	4							12	12	22	145	8	4
	Eb	9	13	430	593	100	124		14		14			9	27	430	607	100	124
3. East La Cadena Drive / I-215 NB Ramps	Sb	13	33	114	179	0	0							13	33	114	179	0	0
	Wb	0	0	0	0	0	0							0	0	0	0	0	0
	Nb	0	0	73	115	342	610				9			0	0	73	124	342	610
	Eb	542	280	0	0	183	79							542	280	0	0	183	79
4. Columbia Avenue / East La Cadena Drive	Sb	230	239	16	32	372	188							230	239	16	32	410	188
	Wb	242	476	454	690	26	32	15	10	11				257	486	465	690	26	32
	Nb	35	12	37	77	21	28			16				35	12	53	77	21	28
	Eb	17	43	629	748	105	171				16			17	43	629	764	105	171
5. Columbia Avenue / Chicago Avenue	Sb	21	32	7	28	6	8							21	32	7	28	6	8
	Wb	3	4	373	687	21	60			20				3	4	393	687	21	60
	Nb	49	82	10	12	329	499							49	82	10	12	329	499
	Eb	433	551	606	390	3	10	14		18				447	551	624	390	3	10
6. Columbia Avenue / Iowa Avenue	Sb	148	224	688	893	67	23							148	224	688	893	67	23
	Wb	17	34	92	266	39	97							17	34	92	266	39	97
	Nb	83	71	604	653	165	257							83	71	604	653	165	257
	Eb	243	319	228	114	153	115	25				25		268	319	228	114	178	115
7. Columbia Avenue / Northgate Street	Sb	0	0	0	0	0	0							0	0	0	0	0	0
	Wb	0	0	128	312	26	12							0	0	128	312	26	12
	Nb	9	12	0	0	10	71							9	12	0	0	10	71
	Eb	47	16	285	168	0	0							47	16	285	168	0	0
8. Columbia Avenue / Research Park Drive	Sb	0	0	0	0	0	0							0	0	0	0	0	0
	Wb	0	0	171	222	18	4							0	0	171	222	18	4
	Nb	3	16	0	0	15	112							3	16	0	0	15	112
	Eb	124	23	124	216	0	0							124	23	124	216	0	0
9. Palmyrita Avenue / Michigan Avenue	Sb	5	2	1	9	0	6							5	2	1	9	0	6
	Wb	1	0	152	108	186	145							1	0	152	108	186	145
	Nb	109	223	3	6	6	0							109	223	3	6	6	0
	Eb	3	4	60	124	8	5							3	4	60	124	8	5
10. Marlborough Avenue / Chicago Avenue	Sb	0	0	404	579	61	32							0	0	404	579	61	32
	Wb	46	63	0	0	48	64							46	63	0	0	48	64
	Nb	88	48	379	502	0	0							88	48	379	502	0	0
	Eb	0	0	0	0	0	0							0	0	0	0	0	0
11. Marlborough Avenue / Atlanta Avenue	Sb	8	2	0	1	5	5							8	2	0	1	5	5
	Wb	13	2	96	79	37	38							13	2	96	79	37	38
	Nb	21	25	2	2	10	21							21	25	2	2	10	21
	Eb	28	21	98	82	3	3							28	21	98	82	3	3
12. Marlborough Avenue / Iowa Avenue	Sb	80	76	725	1030	111	25			50	150		25	80	76	775	1180	111	50
	Wb	47	109	17	37	47	111							47	109	17	37	47	111
	Nb	76	31	745	774	30	46							76	31	745	774	30	46
	Eb	43	23	34	19	69	81							43	23	34	19	69	81
13. Marlborough Avenue / Rustin Avenue	Sb	1	2	0	3	0	3							1	2	0	3	0	3
	Wb	0	0	50	65	88	157			32	54			0	0	82	119	88	157
	Nb	159	104	1	2	67	35							159	104	1	2	67	35
	Eb	44	53	66	54	2	1			22				44	53	88	54	2	1
14. Marlborough Avenue / Northgate Street	Sb	147	243	0	0	6	2							147	243	0	0	6	2
	Wb	3	5	23	33	0	0							3	5	23	33	0	0
	Nb	0	0	0	0	0	0							0	0	0	0	0	0
	Eb	0	0	49	21	198	140							0	0	49	21	198	140

APPENDIX D
INTERSECTION CALCULATION SHEETS

EXISTING

HCM 2010 Signalized Intersection Summary
1: Columbia Ave & Primer St

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	155	491	0	0	335	381	0	0	0	260	0	104
Future Volume (veh/h)	155	491	0	0	335	381	0	0	0	260	0	104
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	204	646	0	0	399	0	0	0	0	190	114	108
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	1	1	0
Peak Hour Factor	0.76	0.76	0.76	0.84	0.84	0.84	0.92	0.92	0.92	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	238	2627	0	80	1975	0	0	304	0	370	144	136
Arrive On Green	0.27	1.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.16	0.16	0.16
Sat Flow, veh/h	1774	3632	0	781	3632	0	0	1863	0	1774	881	835
Grp Volume(v), veh/h	204	646	0	0	399	0	0	0	0	190	0	222
Grp Sat Flow(s),veh/h/ln	1774	1770	0	781	1770	0	0	1863	0	1774	0	1715
Q Serve(g_s), s	9.8	0.0	0.0	0.0	5.1	0.0	0.0	0.0	0.0	9.0	0.0	11.2
Cycle Q Clear(g_c), s	9.8	0.0	0.0	0.0	5.1	0.0	0.0	0.0	0.0	9.0	0.0	11.2
Prop In Lane	1.00		0.00	1.00		0.00	0.00		0.00	1.00		0.49
Lane Grp Cap(c), veh/h	238	2627	0	80	1975	0	0	304	0	370	0	280
V/C Ratio(X)	0.86	0.25	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.51	0.00	0.79
Avail Cap(c_a), veh/h	404	2627	0	80	1975	0	0	528	0	583	0	486
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.99	0.99	0.00	0.00	0.80	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.1	0.0	0.0	0.0	9.9	0.0	0.0	0.0	0.0	35.3	0.0	36.2
Incr Delay (d2), s/veh	8.7	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.1	0.0	5.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	0.1	0.0	0.0	2.5	0.0	0.0	0.0	0.0	4.5	0.0	5.7
LnGrp Delay(d),s/veh	40.8	0.2	0.0	0.0	10.1	0.0	0.0	0.0	0.0	36.4	0.0	41.2
LnGrp LOS	D	A			B					D		D
Approach Vol, veh/h		850			399			0			412	
Approach Delay, s/veh		10.0			10.1			0.0			39.0	
Approach LOS		A			B						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		70.8		19.2	16.6	54.2		19.2				
Change Period (Y+Rc), s		4.0		4.5	4.5	4.0		4.5				
Max Green Setting (Gmax), s		56.0		25.5	20.5	31.0		25.5				
Max Q Clear Time (g_c+I1), s		2.0		13.2	11.8	7.1		0.0				
Green Ext Time (p_c), s		8.1		1.5	0.3	7.0		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				17.2								
HCM 2010 LOS				B								
Notes												

User approved volume balancing among the lanes for turning movement.

Intersection

Intersection Delay, s/veh 18.5

Intersection LOS C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			←←				↔	↔			↔	↔			↔	↔
Traffic Vol, veh/h	0	100	430	9	0	15	213	4	0	8	22	12	0	239	27	143
Future Vol, veh/h	0	100	430	9	0	15	213	4	0	8	22	12	0	239	27	143
Peak Hour Factor	0.92	0.97	0.97	0.97	0.92	0.85	0.85	0.85	0.92	0.88	0.88	0.88	0.92	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	103	443	9	0	18	251	5	0	9	25	14	0	278	31	166
Number of Lanes	0	0	2	0	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	18.5	18.3	11.3	19.3
HCM LOS	C	C	B	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	27%	0%	32%	0%	7%	0%	90%	0%
Vol Thru, %	73%	0%	68%	96%	93%	0%	10%	0%
Vol Right, %	0%	100%	0%	4%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	30	12	315	224	228	4	266	143
LT Vol	8	0	100	0	15	0	239	0
Through Vol	22	0	215	215	213	0	27	0
RT Vol	0	12	0	9	0	4	0	143
Lane Flow Rate	34	14	325	231	268	5	309	166
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.078	0.028	0.634	0.438	0.544	0.009	0.651	0.296
Departure Headway (Hd)	8.287	7.425	7.023	6.833	7.307	6.556	7.581	6.407
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	432	482	516	529	494	546	479	564
Service Time	6.038	5.176	4.744	4.554	5.044	4.293	5.298	4.124
HCM Lane V/C Ratio	0.079	0.029	0.63	0.437	0.543	0.009	0.645	0.294
HCM Control Delay	11.7	10.4	21.2	14.8	18.5	9.4	23.4	11.8
HCM Lane LOS	B	B	C	B	C	A	C	B
HCM 95th-tile Q	0.3	0.1	4.4	2.2	3.2	0	4.6	1.2

Intersection							
Int Delay, s/veh	30.4						
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Vol, veh/h	183	542	342	73	114	13	
Future Vol, veh/h	183	542	342	73	114	13	
Conflicting Peds, #/hr	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	
RT Channelized	-	Free	-	None	-	Free	
Storage Length	0	0	24	-	-	65	
Veh in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	91	91	92	92	74	74	
Heavy Vehicles, %	2	2	2	2	2	2	
Mvmt Flow	201	596	372	79	154	18	
Major/Minor	Minor2	Major1		Major2			
Conflicting Flow All	977	-	154	0	-	0	
Stage 1	154	-	-	-	-	-	
Stage 2	823	-	-	-	-	-	
Critical Hdwy	6.42	-	4.12	-	-	-	
Critical Hdwy Stg 1	5.42	-	-	-	-	-	
Critical Hdwy Stg 2	5.42	-	-	-	-	-	
Follow-up Hdwy	3.518	-	2.218	-	-	-	
Pot Cap-1 Maneuver	278	0	1426	-	-	0	
Stage 1	874	0	-	-	-	0	
Stage 2	431	0	-	-	-	0	
Platoon blocked, %				-	-		
Mov Cap-1 Maneuver	205	-	1426	-	-	-	
Mov Cap-2 Maneuver	205	-	-	-	-	-	
Stage 1	874	-	-	-	-	-	
Stage 2	319	-	-	-	-	-	
Approach	EB	NB		SB			
HCM Control Delay, s	106.4	6.9		0			
HCM LOS	F						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT		
Capacity (veh/h)	1426	-	205	-	-		
HCM Lane V/C Ratio	0.261	-	0.981	-	-		
HCM Control Delay (s)	8.4	-	106.4	0	-		
HCM Lane LOS	A	-	F	A	-		
HCM 95th %tile Q(veh)	1	-	8.4	-	-		

HCM 2010 Signalized Intersection Summary
4: E. La Cadena & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	629	17	26	465	257	21	53	35	410	16	230
Future Volume (veh/h)	105	629	17	26	465	257	21	53	35	410	16	230
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1937	1900	1863	1863	1863
Adj Flow Rate, veh/h	133	796	22	32	574	317	24	60	39	477	19	267
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	1	1	1
Peak Hour Factor	0.79	0.79	0.79	0.81	0.81	0.81	0.89	0.89	0.89	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	164	1143	497	72	960	429	420	294	191	742	838	712
Arrive On Green	0.09	0.32	0.32	0.04	0.27	0.27	0.03	0.27	0.27	0.22	0.45	0.45
Sat Flow, veh/h	1774	3539	1538	1774	3539	1583	1774	1098	714	1774	1863	1583
Grp Volume(v), veh/h	133	796	22	32	574	317	24	0	99	477	19	267
Grp Sat Flow(s),veh/h/ln	1774	1770	1538	1774	1770	1583	1774	0	1811	1774	1863	1583
Q Serve(g_s), s	7.7	20.5	1.0	1.8	14.7	19.1	1.0	0.0	4.4	19.1	0.6	11.7
Cycle Q Clear(g_c), s	7.7	20.5	1.0	1.8	14.7	19.1	1.0	0.0	4.4	19.1	0.6	11.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.39	1.00		1.00
Lane Grp Cap(c), veh/h	164	1143	497	72	960	429	420	0	485	742	838	712
V/C Ratio(X)	0.81	0.70	0.04	0.45	0.60	0.74	0.06	0.00	0.20	0.64	0.02	0.37
Avail Cap(c_a), veh/h	289	1456	633	119	1118	500	479	0	485	1005	838	712
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.5	30.9	24.3	49.0	33.1	34.7	25.9	0.0	29.7	18.0	16.0	19.0
Incr Delay (d2), s/veh	9.3	1.0	0.0	4.3	0.7	4.8	0.1	0.0	1.0	0.9	0.0	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	10.2	0.4	1.0	7.3	8.9	0.5	0.0	2.3	9.3	0.3	5.4
LnGrp Delay(d),s/veh	55.8	31.9	24.3	53.2	33.8	39.5	25.9	0.0	30.6	18.9	16.0	20.5
LnGrp LOS	E	C	C	D	C	D	C		C	B	B	C
Approach Vol, veh/h		951			923			123			763	
Approach Delay, s/veh		35.1			36.4			29.7			19.4	
Approach LOS		D			D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.2	37.8	7.5	51.0	13.6	32.3	26.6	32.0				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	7.0	43.0	7.0	47.0	17.0	33.0	38.0	16.0				
Max Q Clear Time (g_c+I1), s	3.8	22.5	3.0	13.7	9.7	21.1	21.1	6.4				
Green Ext Time (p_c), s	0.0	10.2	0.0	1.7	0.2	7.3	1.4	1.1				
Intersection Summary												
HCM 2010 Ctrl Delay			31.0									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary 5: Chicago Avenue/Paige Drive & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	624	447	21	393	3	329	10	49	6	7	21
Future Volume (veh/h)	3	624	447	21	393	3	329	10	49	6	7	21
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	4	734	0	25	473	4	445	14	66	7	8	25
Adj No. of Lanes	1	2	1	1	3	0	2	1	0	1	2	0
Peak Hour Factor	0.85	0.85	0.85	0.83	0.83	0.83	0.74	0.74	0.74	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	13	1083	484	65	1743	15	561	124	584	22	505	446
Arrive On Green	0.01	0.31	0.00	0.04	0.34	0.34	0.16	0.44	0.44	0.01	0.29	0.29
Sat Flow, veh/h	1774	3539	1583	1774	5200	44	3442	284	1341	1774	1770	1563
Grp Volume(v), veh/h	4	734	0	25	308	169	445	0	80	7	8	25
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1695	1854	1721	0	1625	1774	1770	1563
Q Serve(g_s), s	0.2	15.6	0.0	1.2	5.7	5.7	10.7	0.0	2.5	0.3	0.3	1.0
Cycle Q Clear(g_c), s	0.2	15.6	0.0	1.2	5.7	5.7	10.7	0.0	2.5	0.3	0.3	1.0
Prop In Lane	1.00		1.00	1.00		0.02	1.00		0.82	1.00		1.00
Lane Grp Cap(c), veh/h	13	1083	484	65	1136	621	561	0	708	22	505	446
V/C Ratio(X)	0.30	0.68	0.00	0.39	0.27	0.27	0.79	0.00	0.11	0.31	0.02	0.06
Avail Cap(c_a), veh/h	155	2036	911	155	1950	1066	1060	0	708	155	505	446
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.5	26.2	0.0	40.5	20.9	20.9	34.6	0.0	14.4	42.1	22.1	22.3
Incr Delay (d2), s/veh	12.4	0.8	0.0	3.7	0.1	0.2	2.6	0.0	0.3	7.8	0.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	7.8	0.0	0.7	2.7	2.9	5.3	0.0	1.2	0.2	0.1	0.5
LnGrp Delay(d),s/veh	54.9	26.9	0.0	44.2	21.1	21.2	37.2	0.0	14.7	50.0	22.1	22.6
LnGrp LOS	D	C		D	C	C	D		B	D	C	C
Approach Vol, veh/h		738			502			525			40	
Approach Delay, s/veh		27.1			22.2			33.8			27.3	
Approach LOS		C			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.6	30.8	18.5	29.0	5.1	33.3	5.6	42.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	7.5	49.5	26.5	18.5	7.5	49.5	7.5	37.5				
Max Q Clear Time (g_c+1/3), s	13.2	17.6	12.7	3.0	2.2	7.7	2.3	4.5				
Green Ext Time (p_c), s	0.0	8.7	1.3	0.5	0.0	9.2	0.0	0.6				
Intersection Summary												
HCM 2010 Ctrl Delay			27.7									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary
6: Iowa Avenue & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	178	228	268	39	92	17	165	604	83	67	688	148
Future Volume (veh/h)	178	228	268	39	92	17	165	604	83	67	688	148
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	214	275	323	46	110	20	188	686	94	80	819	176
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	1
Peak Hour Factor	0.83	0.83	0.83	0.84	0.84	0.84	0.88	0.88	0.88	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	284	832	372	166	711	312	256	1742	769	202	1687	755
Arrive On Green	0.08	0.24	0.24	0.05	0.20	0.20	0.07	0.49	0.49	0.06	0.48	0.48
Sat Flow, veh/h	3442	3539	1583	3442	3539	1553	3442	3539	1563	3442	3539	1583
Grp Volume(v), veh/h	214	275	323	46	110	20	188	686	94	80	819	176
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1770	1553	1721	1770	1563	1721	1770	1583
Q Serve(g_s), s	6.6	7.0	21.3	1.4	2.8	1.1	5.8	13.3	3.5	2.4	17.1	7.1
Cycle Q Clear(g_c), s	6.6	7.0	21.3	1.4	2.8	1.1	5.8	13.3	3.5	2.4	17.1	7.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	284	832	372	166	711	312	256	1742	769	202	1687	755
V/C Ratio(X)	0.75	0.33	0.87	0.28	0.15	0.06	0.73	0.39	0.12	0.40	0.49	0.23
Avail Cap(c_a), veh/h	491	1026	459	269	798	350	459	1742	769	269	1687	755
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	34.5	39.9	49.9	35.8	35.1	49.3	17.4	14.9	49.3	19.4	16.7
Incr Delay (d2), s/veh	4.1	0.2	13.8	0.9	0.1	0.1	4.1	0.7	0.3	1.3	1.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.3	3.5	10.8	0.7	1.4	0.5	2.9	6.6	1.6	1.2	8.5	3.2
LnGrp Delay(d),s/veh	52.8	34.7	53.7	50.8	35.9	35.2	53.3	18.0	15.2	50.6	20.4	17.5
LnGrp LOS	D	C	D	D	D	D	D	B	B	D	C	B
Approach Vol, veh/h	812			176			968			1075		
Approach Delay, s/veh	47.1			39.7			24.6			22.1		
Approach LOS	D			D			C			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.9	58.0	9.8	30.0	12.6	56.3	13.5	26.3				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	4.5	53.5	8.5	31.5	14.5	47.5	15.5	24.5				
Max Q Clear Time (g_c+1.4), s	14.4	15.3	3.4	23.3	7.8	19.1	8.6	4.8				
Green Ext Time (p_c), s	0.1	13.8	0.0	2.2	0.3	12.4	0.4	3.3				
Intersection Summary												
HCM 2010 Ctrl Delay	30.6											
HCM 2010 LOS	C											

Intersection

Int Delay, s/veh 1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Vol, veh/h	285	47	26	128	10	9
Future Vol, veh/h	285	47	26	128	10	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	42
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	77	77	68	68
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	339	56	34	166	15	13

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	518
Stage 1	-	-	367
Stage 2	-	-	151
Critical Hdwy	-	4.14	6.84
Critical Hdwy Stg 1	-	-	5.84
Critical Hdwy Stg 2	-	-	5.84
Follow-up Hdwy	-	2.22	3.52
Pot Cap-1 Maneuver	-	1160	487
Stage 1	-	-	671
Stage 2	-	-	861
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1160	473
Mov Cap-2 Maneuver	-	-	473
Stage 1	-	-	671
Stage 2	-	-	836

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	11.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	473	810	-	-	1160	-
HCM Lane V/C Ratio	0.031	0.016	-	-	0.029	-
HCM Control Delay (s)	12.9	9.5	-	-	8.2	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0.1	-

Intersection						
Int Delay, s/veh	0.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	124	124	18	171	15	3
Future Vol, veh/h	124	124	18	171	15	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	84	84	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	143	143	21	204	17	3
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	285	0	359	143
Stage 1	-	-	-	-	214	-
Stage 2	-	-	-	-	145	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	1274	-	613	879
Stage 1	-	-	-	-	801	-
Stage 2	-	-	-	-	867	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1274	-	603	879
Mov Cap-2 Maneuver	-	-	-	-	651	-
Stage 1	-	-	-	-	801	-
Stage 2	-	-	-	-	853	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.7		10.5	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	680	-	-	1274	-	
HCM Lane V/C Ratio	0.029	-	-	0.017	-	
HCM Control Delay (s)	10.5	-	-	7.9	-	
HCM Lane LOS	B	-	-	A	-	
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-	

Intersection												
Int Delay, s/veh	5.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	60	3	186	152	1	6	3	109	0	1	5
Future Vol, veh/h	8	60	3	186	152	1	6	3	109	0	1	5
Conflicting Peds, #/hr	3	0	3	3	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	152	-	-	152	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	81	81	81	84	84	84	50	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	78	4	230	188	1	7	4	130	0	2	10
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	192	0	0	85	0	0	658	755	44	713	757	97
Stage 1	-	-	-	-	-	-	104	104	-	651	651	-
Stage 2	-	-	-	-	-	-	554	651	-	62	106	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1379	-	-	1509	-	-	350	336	1017	319	335	940
Stage 1	-	-	-	-	-	-	890	808	-	424	463	-
Stage 2	-	-	-	-	-	-	484	463	-	942	807	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1379	-	-	1509	-	-	302	281	1014	241	280	937
Mov Cap-2 Maneuver	-	-	-	-	-	-	302	281	-	241	280	-
Stage 1	-	-	-	-	-	-	881	800	-	420	391	-
Stage 2	-	-	-	-	-	-	404	391	-	812	799	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.9			4.3			10			10.4		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	855	1379	-	-	1509	-	-	674				
HCM Lane V/C Ratio	0.164	0.008	-	-	0.152	-	-	0.018				
HCM Control Delay (s)	10	7.6	-	-	7.8	-	-	10.4				
HCM Lane LOS	B	A	-	-	A	-	-	B				
HCM 95th %tile O(veh)	0.6	0	-	-	0.5	-	-	0.1				

Intersection

Int Delay, s/veh 2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	48	46	379	88	61	404
Future Vol, veh/h	48	46	379	88	61	404
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	-	-	-	45	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	67	67	74	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	55	53	566	131	82	553

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1073	349	0
Stage 1	631	-	-
Stage 2	442	-	-
Critical Hdwy	6.84	6.94	4.14
Critical Hdwy Stg 1	5.84	-	-
Critical Hdwy Stg 2	5.84	-	-
Follow-up Hdwy	3.52	3.32	2.22
Pot Cap-1 Maneuver	215	647	895
Stage 1	492	-	-
Stage 2	615	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	195	647	895
Mov Cap-2 Maneuver	195	-	-
Stage 1	492	-	-
Stage 2	559	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24	0	1.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	296	895
HCM Lane V/C Ratio	-	-	0.365	0.092
HCM Control Delay (s)	-	-	24	9.4
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	1.6	0.3

Intersection												
Int Delay, s/veh	3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	98	28	37	96	13	10	2	21	5	0	8
Future Vol, veh/h	3	98	28	37	96	13	10	2	21	5	0	8
Conflicting Peds, #/hr	0	0	3	3	0	0	3	0	2	2	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	87	87	87	52	52	52	65	65	65
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	118	34	43	110	15	19	4	40	8	0	12
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	125	0	0	155	0	0	357	355	140	369	365	121
Stage 1	-	-	-	-	-	-	145	145	-	203	203	-
Stage 2	-	-	-	-	-	-	212	210	-	166	162	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1462	-	-	1425	-	-	598	571	908	588	563	930
Stage 1	-	-	-	-	-	-	858	777	-	799	733	-
Stage 2	-	-	-	-	-	-	790	728	-	836	764	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1458	-	-	1422	-	-	571	549	904	542	541	927
Mov Cap-2 Maneuver	-	-	-	-	-	-	571	549	-	542	541	-
Stage 1	-	-	-	-	-	-	853	772	-	797	709	-
Stage 2	-	-	-	-	-	-	752	704	-	791	760	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			1.9			10.3			10.1		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	743	1458	-	-	1422	-	-	728				
HCM Lane V/C Ratio	0.085	0.002	-	-	0.03	-	-	0.027				
HCM Control Delay (s)	10.3	7.5	0	-	7.6	0	-	10.1				
HCM Lane LOS	B	A	A	-	A	A	-	B				
HCM 95th %tile O(veh)	0.3	0	-	-	0.1	-	-	0.1				

HCM 2010 Signalized Intersection Summary
12: Iowa Avenue & Marlborough Avenue

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	69	34	43	47	17	47	30	745	76	111	775	80
Future Volume (veh/h)	69	34	43	47	17	47	30	745	76	111	775	80
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	100	49	62	66	24	66	35	866	88	131	912	94
Adj No. of Lanes	1	1	0	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.69	0.69	0.69	0.71	0.71	0.71	0.86	0.86	0.86	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	186	79	99	167	175	147	137	1309	133	184	1525	654
Arrive On Green	0.10	0.10	0.10	0.09	0.09	0.09	0.08	0.40	0.40	0.10	0.43	0.43
Sat Flow, veh/h	1774	749	947	1774	1863	1563	1774	3240	329	1774	3539	1518
Grp Volume(v), veh/h	100	0	111	66	24	66	35	473	481	131	912	94
Grp Sat Flow(s),veh/h/ln	1774	0	1696	1774	1863	1563	1774	1770	1799	1774	1770	1518
Q Serve(g_s), s	3.5	0.0	4.1	2.3	0.8	2.6	1.2	14.1	14.1	4.6	12.8	2.4
Cycle Q Clear(g_c), s	3.5	0.0	4.1	2.3	0.8	2.6	1.2	14.1	14.1	4.6	12.8	2.4
Prop In Lane	1.00		0.56	1.00		1.00	1.00		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	186	0	178	167	175	147	137	715	727	184	1525	654
V/C Ratio(X)	0.54	0.00	0.62	0.40	0.14	0.45	0.26	0.66	0.66	0.71	0.60	0.14
Avail Cap(c_a), veh/h	958	0	916	1122	1178	989	506	860	874	506	1720	738
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.5	0.0	27.8	27.6	26.9	27.8	28.2	15.7	15.7	28.1	14.1	11.2
Incr Delay (d2), s/veh	2.4	0.0	3.6	1.5	0.4	2.1	0.4	1.4	1.4	1.9	0.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	2.1	1.2	0.4	1.2	0.6	7.1	7.2	2.4	6.3	1.0
LnGrp Delay(d),s/veh	29.9	0.0	31.3	29.1	27.3	29.9	28.5	17.2	17.1	30.0	14.6	11.3
LnGrp LOS	C		C	C	C	C	C	B	B	C	B	B
Approach Vol, veh/h		211			156			989			1137	
Approach Delay, s/veh		30.7			29.2			17.5			16.1	
Approach LOS		C			C			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.7	32.2		11.3	9.0	33.9		10.6				
Change Period (Y+Rc), s	4.0	6.0		4.5	4.0	6.0		4.5				
Max Green Setting (Gmax), s	18.5	31.5		35.0	18.5	31.5		41.0				
Max Q Clear Time (g_c+I1), s	6.6	16.1		6.1	3.2	14.8		4.6				
Green Ext Time (p_c), s	0.1	9.9		0.9	0.0	10.4		0.5				
Intersection Summary												
HCM 2010 Ctrl Delay				18.7								
HCM 2010 LOS				B								

Intersection												
Int Delay, s/veh	6.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	88	44	88	82	0	67	1	159	0	0	1
Future Vol, veh/h	2	88	44	88	82	0	67	1	159	0	0	1
Conflicting Peds, #/hr	8	0	6	6	0	8	1	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	85	-	-	-	-	-	-	-	60
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	76	76	76	82	82	82	90	90	90	25	25	25
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	116	58	107	100	0	74	1	177	0	0	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	108	0	0	180	0	0	472	479	151	562	508	109
Stage 1	-	-	-	-	-	-	156	156	-	323	323	-
Stage 2	-	-	-	-	-	-	316	323	-	239	185	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1483	-	-	1396	-	-	502	486	895	438	468	945
Stage 1	-	-	-	-	-	-	846	769	-	689	650	-
Stage 2	-	-	-	-	-	-	695	650	-	764	747	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1482	-	-	1396	-	-	467	442	890	327	426	937
Mov Cap-2 Maneuver	-	-	-	-	-	-	467	442	-	327	426	-
Stage 1	-	-	-	-	-	-	839	763	-	682	596	-
Stage 2	-	-	-	-	-	-	638	596	-	610	741	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			4			13			8.9		
HCM LOS							B			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2			
Capacity (veh/h)	700	1482	-	-	1396	-	-	-	937			
HCM Lane V/C Ratio	0.36	0.002	-	-	0.077	-	-	-	0.004			
HCM Control Delay (s)	13	7.4	-	-	7.8	-	-	0	8.9			
HCM Lane LOS	B	A	-	-	A	-	-	A	A			
HCM 95th %tile Q(veh)	1.6	0	-	-	0.2	-	-	-	0			

Intersection						
Int Delay, s/veh	7.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	198	49	23	3	6	147
Future Vol, veh/h	198	49	23	3	6	147
Conflicting Peds, #/hr	8	0	0	8	0	53
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	54	54	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	215	53	43	6	7	181
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	56	0	-	0	537	106
Stage 1	-	-	-	-	53	-
Stage 2	-	-	-	-	484	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1549	-	-	-	505	948
Stage 1	-	-	-	-	970	-
Stage 2	-	-	-	-	620	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1471	-	-	-	422	893
Mov Cap-2 Maneuver	-	-	-	-	422	-
Stage 1	-	-	-	-	963	-
Stage 2	-	-	-	-	522	-
Approach	EB		WB		SB	
HCM Control Delay, s	6.3		0		10.4	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1471	-	-	-	856	
HCM Lane V/C Ratio	0.146	-	-	-	0.221	
HCM Control Delay (s)	7.9	0	-	-	10.4	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.5	-	-	-	0.8	

HCM 2010 Signalized Intersection Summary

1: Columbia Ave & Primer St

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	179	738	0	0	368	589	0	0	0	240	0	153
Future Volume (veh/h)	179	738	0	0	368	589	0	0	0	240	0	153
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	190	785	0	0	404	0	0	0	0	207	64	161
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.92	0.92	0.92	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	224	2603	0	80	1979	0	0	317	0	382	80	201
Arrive On Green	0.25	1.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.17	0.17	0.17
Sat Flow, veh/h	1774	3632	0	686	3632	0	0	1863	0	1774	470	1183
Grp Volume(v), veh/h	190	785	0	0	404	0	0	0	0	207	0	225
Grp Sat Flow(s),veh/h/ln	1774	1770	0	686	1770	0	0	1863	0	1774	0	1654
Q Serve(g_s), s	9.2	0.0	0.0	0.0	5.1	0.0	0.0	0.0	0.0	9.9	0.0	11.8
Cycle Q Clear(g_c), s	9.2	0.0	0.0	0.0	5.1	0.0	0.0	0.0	0.0	9.9	0.0	11.8
Prop In Lane	1.00		0.00	1.00		0.00	0.00		0.00	1.00		0.72
Lane Grp Cap(c), veh/h	224	2603	0	80	1979	0	0	317	0	382	0	281
V/C Ratio(X)	0.85	0.30	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.54	0.00	0.80
Avail Cap(c_a), veh/h	365	2603	0	80	1979	0	0	528	0	583	0	469
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.96	0.96	0.00	0.00	0.78	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.8	0.0	0.0	0.0	9.9	0.0	0.0	0.0	0.0	35.1	0.0	35.9
Incr Delay (d2), s/veh	9.5	0.3	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.2	0.0	5.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	0.1	0.0	0.0	2.5	0.0	0.0	0.0	0.0	5.0	0.0	5.8
LnGrp Delay(d),s/veh	42.4	0.3	0.0	0.0	10.0	0.0	0.0	0.0	0.0	36.3	0.0	41.1
LnGrp LOS	D	A			B					D		D
Approach Vol, veh/h		975			404			0			432	
Approach Delay, s/veh		8.5			10.0			0.0			38.8	
Approach LOS		A			B						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		70.2		19.8	15.9	54.3		19.8				
Change Period (Y+Rc), s		4.0		4.5	4.5	4.0		4.5				
Max Green Setting (Gmax), s		56.0		25.5	18.5	33.0		25.5				
Max Q Clear Time (g_c+I1), s		2.0		13.8	11.2	7.1		0.0				
Green Ext Time (p_c), s		9.9		1.6	0.3	8.5		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				16.1								
HCM 2010 LOS				B								
Notes												

User approved volume balancing among the lanes for turning movement.

Intersection

Intersection Delay, s/veh45.8

Intersection LOS E

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			←←				↔	↔			↔	↔			↔	↔
Traffic Vol, veh/h	0	124	607	27	0	27	239	9	0	4	145	12	0	218	71	156
Future Vol, veh/h	0	124	607	27	0	27	239	9	0	4	145	12	0	218	71	156
Peak Hour Factor	0.92	0.89	0.89	0.89	0.92	0.96	0.96	0.96	0.92	0.86	0.86	0.86	0.92	0.91	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	139	682	30	0	28	249	9	0	5	169	14	0	240	78	171
Number of Lanes	0	0	2	0	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	68.6	26.7	18.3	27.8
HCM LOS	F	D	C	D

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	3%	0%	29%	0%	10%	0%	75%	0%
Vol Thru, %	97%	0%	71%	92%	90%	0%	25%	0%
Vol Right, %	0%	100%	0%	8%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	149	12	428	331	266	9	289	156
LT Vol	4	0	124	0	27	0	218	0
Through Vol	145	0	304	304	239	0	71	0
RT Vol	0	12	0	27	0	9	0	156
Lane Flow Rate	173	14	480	371	277	9	318	171
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.433	0.032	1.078	0.812	0.661	0.02	0.762	0.358
Departure Headway (Hd)	9.251	8.506	8.081	7.872	8.839	8.059	8.844	7.729
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	392	423	452	464	410	447	413	468
Service Time	6.951	6.206	5.781	5.572	6.539	5.759	6.544	5.429
HCM Lane V/C Ratio	0.441	0.033	1.062	0.8	0.676	0.02	0.77	0.365
HCM Control Delay	18.8	11.5	93.4	36.6	27.2	10.9	34.8	14.7
HCM Lane LOS	C	B	F	E	D	B	D	B
HCM 95th-tile Q	2.1	0.1	15.8	7.6	4.6	0.1	6.3	1.6

Intersection						
Int Delay, s/veh	36.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	79	280	610	124	179	33
Future Vol, veh/h	79	280	610	124	179	33
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	0	0	24	-	-	65
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	96	96	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	89	315	635	129	199	37
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1599	-	199	0	-	0
Stage 1	199	-	-	-	-	-
Stage 2	1400	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	117	0	1373	-	-	0
Stage 1	835	0	-	-	-	0
Stage 2	228	0	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 63	-	1373	-	-	-
Mov Cap-2 Maneuver	~ 63	-	-	-	-	-
Stage 1	835	-	-	-	-	-
Stage 2	123	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	\$ 365.6	8.2		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	
Capacity (veh/h)	1373	-	63	-	-	
HCM Lane V/C Ratio	0.463	-	1.409	-	-	
HCM Control Delay (s)	9.9	-\$ 365.6	0	-	-	
HCM Lane LOS	A	-	F	A	-	
HCM 95th %tile Q(veh)	2.5	-	7.6	-	-	
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

HCM 2010 Signalized Intersection Summary
4: E. La Cadena & Columbia Ave

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	171	764	43	32	690	486	28	77	12	188	32	239
Future Volume (veh/h)	171	764	43	32	690	486	28	77	12	188	32	239
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1937	1900	1863	1863	1863
Adj Flow Rate, veh/h	186	830	47	35	758	534	31	87	13	204	35	260
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.89	0.89	0.89	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	222	1818	809	77	1529	684	327	278	42	429	449	382
Arrive On Green	0.13	0.51	0.51	0.04	0.43	0.43	0.04	0.17	0.17	0.11	0.24	0.24
Sat Flow, veh/h	1774	3539	1576	1774	3539	1583	1774	1642	245	1774	1863	1583
Grp Volume(v), veh/h	186	830	47	35	758	534	31	0	100	204	35	260
Grp Sat Flow(s),veh/h/ln	1774	1770	1576	1774	1770	1583	1774	0	1887	1774	1863	1583
Q Serve(g_s), s	10.2	14.8	1.5	1.9	15.4	28.7	1.4	0.0	4.6	9.0	1.4	14.8
Cycle Q Clear(g_c), s	10.2	14.8	1.5	1.9	15.4	28.7	1.4	0.0	4.6	9.0	1.4	14.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	222	1818	809	77	1529	684	327	0	319	429	449	382
V/C Ratio(X)	0.84	0.46	0.06	0.45	0.50	0.78	0.09	0.00	0.31	0.48	0.08	0.68
Avail Cap(c_a), veh/h	410	2348	1045	125	1779	796	380	0	319	497	449	382
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.5	15.4	12.1	46.4	20.4	24.2	31.6	0.0	36.2	27.7	29.2	34.3
Incr Delay (d2), s/veh	8.1	0.2	0.0	4.1	0.2	4.3	0.1	0.0	2.5	0.8	0.3	9.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	7.2	0.7	1.0	7.5	13.4	0.7	0.0	2.6	4.5	0.8	7.5
LnGrp Delay(d),s/veh	50.6	15.5	12.1	50.5	20.7	28.5	31.7	0.0	38.8	28.5	29.5	43.7
LnGrp LOS	D	B	B	D	C	C	C		D	C	C	D
Approach Vol, veh/h	1063			1327			131			499		
Approach Delay, s/veh	21.5			24.6			37.1			36.5		
Approach LOS	C			C			D			D		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.3	55.1	8.0	28.0	16.5	47.0	15.2	20.8				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	7.0	66.0	7.0	24.0	23.0	50.0	15.0	16.0				
Max Q Clear Time (g_c+I1), s	3.9	16.8	3.4	16.8	12.2	30.7	11.0	6.6				
Green Ext Time (p_c), s	0.0	19.7	0.0	1.0	0.3	12.2	0.2	1.2				
Intersection Summary												
HCM 2010 Ctrl Delay			26.0									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary 5: Chicago Avenue/Paige Drive & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	390	551	60	687	4	499	12	82	8	28	32
Future Volume (veh/h)	10	390	551	60	687	4	499	12	82	8	28	32
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	11	415	0	67	763	4	580	14	95	11	38	43
Adj No. of Lanes	1	2	1	1	3	0	2	1	0	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.86	0.86	0.86	0.74	0.74	0.74
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	33	795	356	116	1417	7	710	99	672	33	514	460
Arrive On Green	0.02	0.22	0.00	0.07	0.27	0.27	0.21	0.48	0.48	0.02	0.29	0.29
Sat Flow, veh/h	1774	3539	1583	1774	5221	27	3442	207	1406	1774	1770	1583
Grp Volume(v), veh/h	11	415	0	67	495	272	580	0	109	11	38	43
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1695	1858	1721	0	1613	1774	1770	1583
Q Serve(g_s), s	0.5	8.7	0.0	3.1	10.5	10.5	13.6	0.0	3.2	0.5	1.3	1.7
Cycle Q Clear(g_c), s	0.5	8.7	0.0	3.1	10.5	10.5	13.6	0.0	3.2	0.5	1.3	1.7
Prop In Lane	1.00		1.00	1.00		0.01	1.00		0.87	1.00		1.00
Lane Grp Cap(c), veh/h	33	795	356	116	920	504	710	0	771	33	514	460
V/C Ratio(X)	0.33	0.52	0.00	0.58	0.54	0.54	0.82	0.00	0.14	0.33	0.07	0.09
Avail Cap(c_a), veh/h	149	1842	824	220	1901	1042	1201	0	771	149	514	460
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.9	28.8	0.0	38.4	26.3	26.3	32.0	0.0	12.4	40.9	21.7	21.9
Incr Delay (d2), s/veh	5.6	0.5	0.0	4.4	0.5	0.9	2.4	0.0	0.4	5.6	0.3	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	4.3	0.0	1.7	4.9	5.5	6.7	0.0	1.5	0.3	0.7	0.8
LnGrp Delay(d),s/veh	46.5	29.3	0.0	42.8	26.8	27.2	34.4	0.0	12.7	46.5	22.0	22.3
LnGrp LOS	D	C		D	C	C	C		B	D	C	C
Approach Vol, veh/h		426			834			689			92	
Approach Delay, s/veh		29.8			28.2			31.0			25.1	
Approach LOS		C			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	23.5	21.9	29.1	6.1	27.5	6.1	44.9				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	10.5	44.0	29.5	18.0	7.1	47.4	7.1	40.4				
Max Q Clear Time (g_c+1.5), s	15.5	10.7	15.6	3.7	2.5	12.5	2.5	5.2				
Green Ext Time (p_c), s	0.0	8.3	1.8	0.8	0.0	8.4	0.0	1.2				
Intersection Summary												
HCM 2010 Ctrl Delay			29.3									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

6: Iowa Avenue & Columbia Ave

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	114	319	97	266	34	257	653	71	23	893	224
Future Volume (veh/h)	115	114	319	97	266	34	257	653	71	23	893	224
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	132	131	367	108	296	38	292	742	81	26	1003	252
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	1
Peak Hour Factor	0.87	0.87	0.87	0.90	0.90	0.90	0.88	0.88	0.88	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	208	910	397	204	906	405	359	1740	766	118	1493	668
Arrive On Green	0.06	0.26	0.26	0.06	0.26	0.26	0.10	0.49	0.49	0.03	0.42	0.42
Sat Flow, veh/h	3442	3539	1544	3442	3539	1583	3442	3539	1557	3442	3539	1583
Grp Volume(v), veh/h	132	131	367	108	296	38	292	742	81	26	1003	252
Grp Sat Flow(s),veh/h/ln	1721	1770	1544	1721	1770	1583	1721	1770	1557	1721	1770	1583
Q Serve(g_s), s	4.3	3.3	26.5	3.5	7.8	2.1	9.5	15.4	3.2	0.8	26.1	12.5
Cycle Q Clear(g_c), s	4.3	3.3	26.5	3.5	7.8	2.1	9.5	15.4	3.2	0.8	26.1	12.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	208	910	397	204	906	405	359	1740	766	118	1493	668
V/C Ratio(X)	0.64	0.14	0.92	0.53	0.33	0.09	0.81	0.43	0.11	0.22	0.67	0.38
Avail Cap(c_a), veh/h	274	948	414	244	917	410	503	1740	766	214	1493	668
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.5	32.8	41.4	52.2	34.5	32.4	50.1	18.7	15.6	53.7	26.7	22.7
Incr Delay (d2), s/veh	3.2	0.1	25.9	2.1	0.2	0.1	6.9	0.8	0.3	0.9	2.4	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	1.6	14.2	1.7	3.8	0.9	4.8	7.7	1.4	0.4	13.2	5.8
LnGrp Delay(d),s/veh	55.7	32.8	67.3	54.3	34.7	32.5	57.0	19.4	15.8	54.6	29.1	24.3
LnGrp LOS	E	C	E	D	C	C	E	B	B	D	C	C
Approach Vol, veh/h	630		442				1115			1281		
Approach Delay, s/veh	57.7		39.3				29.0			28.7		
Approach LOS	E		D				C			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	60.7	11.3	33.9	16.4	52.7	11.4	33.8					
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5					
Max Green Setting (Gmax), s	56.2	8.1	30.6	16.7	46.6	9.1	29.6					
Max Q Clear Time (g_c+1/2, s)	17.4	5.5	28.5	11.5	28.1	6.3	9.8					
Green Ext Time (p_c), s	0.0	17.5	0.1	0.9	0.4	11.6	0.1	3.9				
Intersection Summary												
HCM 2010 Ctrl Delay	35.4											
HCM 2010 LOS	D											

Intersection						
Int Delay, s/veh	2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Vol, veh/h	168	16	12	312	71	12
Future Vol, veh/h	168	16	12	312	71	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	42
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	91	91	80	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	207	20	13	343	89	15
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	227	0	415	114
Stage 1	-	-	-	-	217	-
Stage 2	-	-	-	-	198	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	1339	-	566	917
Stage 1	-	-	-	-	798	-
Stage 2	-	-	-	-	816	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1339	-	561	917
Mov Cap-2 Maneuver	-	-	-	-	561	-
Stage 1	-	-	-	-	798	-
Stage 2	-	-	-	-	808	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.3		12.1	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	561	917	-	-	1339	-
HCM Lane V/C Ratio	0.158	0.016	-	-	0.01	-
HCM Control Delay (s)	12.6	9	-	-	7.7	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0	-

Intersection						
Int Delay, s/veh	4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	216	23	4	222	112	16
Future Vol, veh/h	216	23	4	222	112	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	65	65	53	53
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	260	28	6	342	211	30
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	288	0	457	144
Stage 1	-	-	-	-	274	-
Stage 2	-	-	-	-	183	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	1271	-	532	877
Stage 1	-	-	-	-	747	-
Stage 2	-	-	-	-	830	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1271	-	529	877
Mov Cap-2 Maneuver	-	-	-	-	598	-
Stage 1	-	-	-	-	747	-
Stage 2	-	-	-	-	826	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		14.4	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	623	-	-	1271	-	
HCM Lane V/C Ratio	0.388	-	-	0.005	-	
HCM Control Delay (s)	14.4	-	-	7.8	-	
HCM Lane LOS	B	-	-	A	-	
HCM 95th %tile Q(veh)	1.8	-	-	0	-	

Intersection												
Int Delay, s/veh	6.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	124	4	145	108	0	0	6	223	6	9	2
Future Vol, veh/h	5	124	4	145	108	0	0	6	223	6	9	2
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	152	-	-	152	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	87	87	87	84	84	84	53	53	53
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	153	5	167	124	0	0	7	265	11	17	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	124	0	0	159	0	0	573	626	80	549	628	62
Stage 1	-	-	-	-	-	-	169	169	-	457	457	-
Stage 2	-	-	-	-	-	-	404	457	-	92	171	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1461	-	-	1418	-	-	402	399	964	419	398	990
Stage 1	-	-	-	-	-	-	816	758	-	553	566	-
Stage 2	-	-	-	-	-	-	594	566	-	905	756	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1461	-	-	1418	-	-	350	350	963	271	349	990
Mov Cap-2 Maneuver	-	-	-	-	-	-	350	350	-	271	349	-
Stage 1	-	-	-	-	-	-	812	754	-	551	499	-
Stage 2	-	-	-	-	-	-	504	499	-	647	752	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			4.5			10.5			16.7		
HCM LOS							B			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	921	1461	-	-	1418	-	-	340				
HCM Lane V/C Ratio	0.296	0.004	-	-	0.118	-	-	0.094				
HCM Control Delay (s)	10.5	7.5	-	-	7.9	-	-	16.7				
HCM Lane LOS	B	A	-	-	A	-	-	C				
HCM 95th %tile O(veh)	1.2	0	-	-	0.4	-	-	0.3				

Intersection

Int Delay, s/veh 2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	64	63	502	48	32	579
Future Vol, veh/h	64	63	502	48	32	579
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	-	-	-	45	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	94	94	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	74	73	534	51	37	673

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	971	293	0
Stage 1	560	-	-
Stage 2	411	-	-
Critical Hdwy	6.84	6.94	4.14
Critical Hdwy Stg 1	5.84	-	-
Critical Hdwy Stg 2	5.84	-	-
Follow-up Hdwy	3.52	3.32	2.22
Pot Cap-1 Maneuver	250	703	986
Stage 1	535	-	-
Stage 2	638	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	241	703	986
Mov Cap-2 Maneuver	241	-	-
Stage 1	535	-	-
Stage 2	614	-	-

Approach	WB	NB	SB
HCM Control Delay, s	21.9	0	0.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 358	986	-
HCM Lane V/C Ratio	-	- 0.412	0.038	-
HCM Control Delay (s)	-	- 21.9	8.8	-
HCM Lane LOS	-	- C	A	-
HCM 95th %tile Q(veh)	-	- 2	0.1	-

Intersection												
Int Delay, s/veh	3.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	82	21	38	79	2	21	2	25	5	1	2
Future Vol, veh/h	3	82	21	38	79	2	21	2	25	5	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	4	4	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	90	90	90	80	80	80	50	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	114	29	42	88	2	26	3	31	10	2	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	90	0	0	143	0	0	313	311	132	331	324	89
Stage 1	-	-	-	-	-	-	137	137	-	173	173	-
Stage 2	-	-	-	-	-	-	176	174	-	158	151	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1505	-	-	1440	-	-	640	604	917	622	594	969
Stage 1	-	-	-	-	-	-	866	783	-	829	756	-
Stage 2	-	-	-	-	-	-	826	755	-	844	772	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1505	-	-	1435	-	-	619	584	914	581	574	969
Mov Cap-2 Maneuver	-	-	-	-	-	-	619	584	-	581	574	-
Stage 1	-	-	-	-	-	-	863	781	-	827	733	-
Stage 2	-	-	-	-	-	-	795	732	-	807	770	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			2.4			10.3			10.7		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	742	1505	-	-	1435	-	-	645				
HCM Lane V/C Ratio	0.081	0.003	-	-	0.029	-	-	0.025				
HCM Control Delay (s)	10.3	7.4	0	-	7.6	0	-	10.7				
HCM Lane LOS	B	A	A	-	A	A	-	B				
HCM 95th %tile O(veh)	0.3	0	-	-	0.1	-	-	0.1				

HCM 2010 Signalized Intersection Summary
12: Iowa Avenue & Marlborough Avenue

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	81	19	23	111	37	109	46	774	31	50	1180	76
Future Volume (veh/h)	81	19	23	111	37	109	46	774	31	50	1180	76
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.97	1.00		0.99	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	100	23	28	166	55	163	48	815	33	53	1255	81
Adj No. of Lanes	1	1	0	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.81	0.81	0.81	0.67	0.67	0.67	0.95	0.95	0.95	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	156	67	82	290	304	250	97	1687	68	97	1723	749
Arrive On Green	0.09	0.09	0.09	0.16	0.16	0.16	0.05	0.49	0.49	0.05	0.49	0.49
Sat Flow, veh/h	1774	763	929	1774	1863	1530	1774	3465	140	1774	3539	1539
Grp Volume(v), veh/h	100	0	51	166	55	163	48	416	432	53	1255	81
Grp Sat Flow(s),veh/h/ln	1774	0	1691	1774	1863	1530	1774	1770	1836	1774	1770	1539
Q Serve(g_s), s	5.0	0.0	2.6	7.9	2.3	9.1	2.4	14.5	14.5	2.7	25.8	2.6
Cycle Q Clear(g_c), s	5.0	0.0	2.6	7.9	2.3	9.1	2.4	14.5	14.5	2.7	25.8	2.6
Prop In Lane	1.00		0.55	1.00		1.00	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	156	0	149	290	304	250	97	861	893	97	1723	749
V/C Ratio(X)	0.64	0.00	0.34	0.57	0.18	0.65	0.50	0.48	0.48	0.55	0.73	0.11
Avail Cap(c_a), veh/h	678	0	646	794	834	685	358	1091	1132	358	2183	949
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.4	0.0	39.3	35.4	33.0	35.9	42.1	15.8	15.8	42.2	18.7	12.7
Incr Delay (d2), s/veh	4.3	0.0	1.4	1.8	0.3	2.9	1.5	0.4	0.4	1.8	0.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.0	1.3	4.0	1.2	4.1	1.2	7.2	7.4	1.4	12.8	1.1
LnGrp Delay(d),s/veh	44.7	0.0	40.6	37.2	33.3	38.8	43.5	16.2	16.2	44.0	19.6	12.8
LnGrp LOS	D		D	D	C	D	D	B	B	D	B	B
Approach Vol, veh/h		151			384			896			1389	
Approach Delay, s/veh		43.3			37.3			17.7			20.2	
Approach LOS		D			D			B			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.0	50.6		12.6	9.0	50.6		19.5				
Change Period (Y+Rc), s	4.0	6.0		4.5	4.0	6.0		4.5				
Max Green Setting (Gmax), s	18.5	56.5		35.0	18.5	56.5		41.0				
Max Q Clear Time (g_c+I1), s	4.7	16.5		7.0	4.4	27.8		11.1				
Green Ext Time (p_c), s	0.0	20.0		0.5	0.0	16.8		1.3				
Intersection Summary												
HCM 2010 Ctrl Delay				22.9								
HCM 2010 LOS				C								

Intersection												
Int Delay, s/veh	5.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	54	53	157	119	0	35	2	104	3	3	2
Future Vol, veh/h	1	54	53	157	119	0	35	2	104	3	3	2
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	85	-	-	-	-	-	-	-	60
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	69	69	69	91	91	91	84	84	84	40	40	40
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	78	77	173	131	0	42	2	124	8	8	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	132	0	0	155	0	0	600	597	117	660	635	132
Stage 1	-	-	-	-	-	-	120	120	-	477	477	-
Stage 2	-	-	-	-	-	-	480	477	-	183	158	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1453	-	-	1425	-	-	413	416	935	376	396	917
Stage 1	-	-	-	-	-	-	884	796	-	569	556	-
Stage 2	-	-	-	-	-	-	567	556	-	819	767	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1453	-	-	1425	-	-	366	365	935	294	347	916
Mov Cap-2 Maneuver	-	-	-	-	-	-	366	365	-	294	347	-
Stage 1	-	-	-	-	-	-	883	795	-	568	488	-
Stage 2	-	-	-	-	-	-	488	488	-	708	766	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	4.5	12.2	14.9
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	664	1453	-	-	1425	-	-	318	916
HCM Lane V/C Ratio	0.253	0.001	-	-	0.121	-	-	0.047	0.005
HCM Control Delay (s)	12.2	7.5	-	-	7.9	-	-	16.9	9
HCM Lane LOS	B	A	-	-	A	-	-	C	A
HCM 95th %tile Q(veh)	1	0	-	-	0.4	-	-	0.1	0

Intersection

Int Delay, s/veh 7.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	140	21	33	5	2	243
Future Vol, veh/h	140	21	33	5	2	243
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	79	79	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	171	26	42	6	2	259

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	48	0	412
Stage 1	-	-	45
Stage 2	-	-	367
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1559	-	596
Stage 1	-	-	977
Stage 2	-	-	701
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1559	-	530
Mov Cap-2 Maneuver	-	-	530
Stage 1	-	-	977
Stage 2	-	-	623

Approach	EB	WB	SB
HCM Control Delay, s	6.6	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1559	-	-	-	1017
HCM Lane V/C Ratio	0.11	-	-	-	0.256
HCM Control Delay (s)	7.6	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.4	-	-	-	1

EXISTING + AMBIENT

HCM 2010 Signalized Intersection Summary

1: Columbia Ave & Primer St

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	158	501	0	0	342	389	0	0	0	265	0	106
Future Volume (veh/h)	158	501	0	0	342	389	0	0	0	265	0	106
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	208	659	0	0	407	0	0	0	0	193	116	110
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	1	1	0
Peak Hour Factor	0.76	0.76	0.76	0.84	0.84	0.84	0.92	0.92	0.92	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	242	2619	0	80	1958	0	0	309	0	374	146	138
Arrive On Green	0.27	1.00	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.17	0.17	0.17
Sat Flow, veh/h	1774	3632	0	772	3632	0	0	1863	0	1774	880	835
Grp Volume(v), veh/h	208	659	0	0	407	0	0	0	0	193	0	226
Grp Sat Flow(s),veh/h/ln	1774	1770	0	772	1770	0	0	1863	0	1774	0	1715
Q Serve(g_s), s	10.0	0.0	0.0	0.0	5.2	0.0	0.0	0.0	0.0	9.2	0.0	11.4
Cycle Q Clear(g_c), s	10.0	0.0	0.0	0.0	5.2	0.0	0.0	0.0	0.0	9.2	0.0	11.4
Prop In Lane	1.00		0.00	1.00		0.00	0.00		0.00	1.00		0.49
Lane Grp Cap(c), veh/h	242	2619	0	80	1958	0	0	309	0	374	0	284
V/C Ratio(X)	0.86	0.25	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.52	0.00	0.80
Avail Cap(c_a), veh/h	404	2619	0	80	1958	0	0	528	0	583	0	486
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.96	0.96	0.00	0.00	0.79	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.9	0.0	0.0	0.0	10.1	0.0	0.0	0.0	0.0	35.1	0.0	36.1
Incr Delay (d2), s/veh	9.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.1	0.0	5.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.1	0.0	0.0	2.6	0.0	0.0	0.0	0.0	4.6	0.0	5.8
LnGrp Delay(d),s/veh	40.9	0.2	0.0	0.0	10.3	0.0	0.0	0.0	0.0	36.3	0.0	41.1
LnGrp LOS	D	A			B					D		D
Approach Vol, veh/h		867			407			0			419	
Approach Delay, s/veh		10.0			10.3			0.0			38.9	
Approach LOS		A			B						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		70.6		19.4	16.8	53.8		19.4				
Change Period (Y+Rc), s		4.0		4.5	4.5	4.0		4.5				
Max Green Setting (Gmax), s		56.0		25.5	20.5	31.0		25.5				
Max Q Clear Time (g_c+I1), s		2.0		13.4	12.0	7.2		0.0				
Green Ext Time (p_c), s		8.4		1.5	0.3	7.2		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				17.2								
HCM 2010 LOS				B								
Notes												

User approved volume balancing among the lanes for turning movement.

Intersection

Intersection Delay, s/veh 19.2

Intersection LOS C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			←←				↔	↔			↔	↔			↔	↔
Traffic Vol, veh/h	0	102	439	9	0	15	217	4	0	8	22	12	0	244	28	146
Future Vol, veh/h	0	102	439	9	0	15	217	4	0	8	22	12	0	244	28	146
Peak Hour Factor	0.92	0.97	0.97	0.97	0.92	0.85	0.85	0.85	0.92	0.88	0.88	0.88	0.92	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	105	453	9	0	18	255	5	0	9	25	14	0	284	33	170
Number of Lanes	0	0	2	0	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	19.2	18.9	11.5	20.2
HCM LOS	C	C	B	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	27%	0%	32%	0%	6%	0%	90%	0%
Vol Thru, %	73%	0%	68%	96%	94%	0%	10%	0%
Vol Right, %	0%	100%	0%	4%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	30	12	322	229	232	4	272	146
LT Vol	8	0	102	0	15	0	244	0
Through Vol	22	0	220	220	217	0	28	0
RT Vol	0	12	0	9	0	4	0	146
Lane Flow Rate	34	14	331	236	273	5	316	170
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.079	0.028	0.651	0.45	0.559	0.009	0.672	0.305
Departure Headway (Hd)	8.382	7.519	7.073	6.883	7.376	6.625	7.649	6.475
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	427	476	510	523	489	540	474	559
Service Time	6.132	5.269	4.809	4.619	5.116	4.365	5.349	4.175
HCM Lane V/C Ratio	0.08	0.029	0.649	0.451	0.558	0.009	0.667	0.304
HCM Control Delay	11.9	10.5	22.1	15.2	19.1	9.4	24.6	12
HCM Lane LOS	B	B	C	C	C	A	C	B
HCM 95th-tile Q	0.3	0.1	4.6	2.3	3.4	0	4.9	1.3

Intersection						
Int Delay, s/veh	34.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	187	553	349	74	116	13
Future Vol, veh/h	187	553	349	74	116	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	0	0	24	-	-	65
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	92	92	74	74
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	205	608	379	80	157	18
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	996	-	157	0	-	0
Stage 1	157	-	-	-	-	-
Stage 2	839	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	271	0	1423	-	-	0
Stage 1	871	0	-	-	-	0
Stage 2	424	0	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 199	-	1423	-	-	-
Mov Cap-2 Maneuver	~ 199	-	-	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	311	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	122.4		7		0	
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	
Capacity (veh/h)	1423	-	199	-	-	
HCM Lane V/C Ratio	0.267	-	1.033	-	-	
HCM Control Delay (s)	8.4	-	122.4	0	-	
HCM Lane LOS	A	-	F	A	-	
HCM 95th %tile Q(veh)	1.1	-	9.2	-	-	
Notes						
~: Volume exceeds capacity	\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon	

HCM 2010 Signalized Intersection Summary
4: E. La Cadena & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	107	642	17	27	474	262	21	54	36	418	16	235
Future Volume (veh/h)	107	642	17	27	474	262	21	54	36	418	16	235
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1937	1900	1863	1863	1863
Adj Flow Rate, veh/h	135	813	22	33	585	323	24	61	40	486	19	273
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	1	1	1
Peak Hour Factor	0.79	0.79	0.79	0.81	0.81	0.81	0.89	0.89	0.89	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	166	1153	501	73	968	433	409	283	186	739	833	708
Arrive On Green	0.09	0.33	0.33	0.04	0.27	0.27	0.03	0.26	0.26	0.22	0.45	0.45
Sat Flow, veh/h	1774	3539	1538	1774	3539	1583	1774	1094	717	1774	1863	1583
Grp Volume(v), veh/h	135	813	22	33	585	323	24	0	101	486	19	273
Grp Sat Flow(s),veh/h/ln	1774	1770	1538	1774	1770	1583	1774	0	1811	1774	1863	1583
Q Serve(g_s), s	7.8	21.1	1.0	1.9	15.1	19.6	1.0	0.0	4.6	19.8	0.6	12.1
Cycle Q Clear(g_c), s	7.8	21.1	1.0	1.9	15.1	19.6	1.0	0.0	4.6	19.8	0.6	12.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.40	1.00		1.00
Lane Grp Cap(c), veh/h	166	1153	501	73	968	433	409	0	469	739	833	708
V/C Ratio(X)	0.81	0.71	0.04	0.45	0.60	0.75	0.06	0.00	0.22	0.66	0.02	0.39
Avail Cap(c_a), veh/h	287	1448	629	118	1111	497	467	0	469	988	833	708
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.7	31.0	24.2	49.2	33.2	34.8	26.6	0.0	30.5	18.4	16.2	19.4
Incr Delay (d2), s/veh	9.3	1.2	0.0	4.3	0.7	5.3	0.1	0.0	1.0	1.0	0.1	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	10.5	0.4	1.0	7.5	9.2	0.5	0.0	2.4	9.8	0.3	5.6
LnGrp Delay(d),s/veh	56.0	32.2	24.3	53.5	34.0	40.1	26.7	0.0	31.6	19.4	16.3	21.0
LnGrp LOS	E	C	C	D	C	D	C		C	B	B	C
Approach Vol, veh/h		970			941			125			778	
Approach Delay, s/veh		35.3			36.7			30.7			19.9	
Approach LOS		D			D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.3	38.2	7.5	51.0	13.8	32.7	27.3	31.2				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	7.0	43.0	7.0	47.0	17.0	33.0	38.0	16.0				
Max Q Clear Time (g_c+I1), s	3.9	23.1	3.0	14.1	9.8	21.6	21.8	6.6				
Green Ext Time (p_c), s	0.0	10.2	0.0	1.7	0.2	7.2	1.5	1.1				
Intersection Summary												
HCM 2010 Ctrl Delay			31.3									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary 5: Chicago Avenue/Paige Drive & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	636	456	21	401	3	336	10	50	6	7	21
Future Volume (veh/h)	3	636	456	21	401	3	336	10	50	6	7	21
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	4	748	0	25	483	4	454	14	68	7	8	25
Adj No. of Lanes	1	2	1	1	3	0	2	1	0	1	2	0
Peak Hour Factor	0.85	0.85	0.85	0.83	0.83	0.83	0.74	0.74	0.74	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	13	1099	492	65	1767	15	570	120	583	22	495	437
Arrive On Green	0.01	0.31	0.00	0.04	0.34	0.34	0.17	0.43	0.43	0.01	0.28	0.28
Sat Flow, veh/h	1774	3539	1583	1774	5201	43	3442	277	1347	1774	1770	1563
Grp Volume(v), veh/h	4	748	0	25	315	172	454	0	82	7	8	25
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1695	1854	1721	0	1624	1774	1770	1563
Q Serve(g_s), s	0.2	16.0	0.0	1.2	5.9	5.9	11.0	0.0	2.6	0.3	0.3	1.0
Cycle Q Clear(g_c), s	0.2	16.0	0.0	1.2	5.9	5.9	11.0	0.0	2.6	0.3	0.3	1.0
Prop In Lane	1.00		1.00	1.00		0.02	1.00		0.83	1.00		1.00
Lane Grp Cap(c), veh/h	13	1099	492	65	1151	630	570	0	703	22	495	437
V/C Ratio(X)	0.30	0.68	0.00	0.39	0.27	0.27	0.80	0.00	0.12	0.32	0.02	0.06
Avail Cap(c_a), veh/h	154	2022	904	154	1936	1059	1052	0	703	154	495	437
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.8	26.1	0.0	40.8	20.8	20.8	34.8	0.0	14.7	42.4	22.6	22.8
Incr Delay (d2), s/veh	12.4	0.8	0.0	3.7	0.1	0.2	2.6	0.0	0.3	7.8	0.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	7.9	0.0	0.7	2.8	3.1	5.4	0.0	1.2	0.2	0.1	0.5
LnGrp Delay(d),s/veh	55.2	26.9	0.0	44.5	21.0	21.1	37.4	0.0	15.0	50.3	22.6	23.1
LnGrp LOS	E	C		D	C	C	D		B	D	C	C
Approach Vol, veh/h	752				512		536				40	
Approach Delay, s/veh	27.0				22.1		33.9				27.8	
Approach LOS	C				C		C				C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.7	31.4	18.8	28.7	5.1	33.9	5.6	42.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	7.5	49.5	26.5	18.5	7.5	49.5	7.5	37.5				
Max Q Clear Time (g_c+1/3), s	13.2	18.0	13.0	3.0	2.2	7.9	2.3	4.6				
Green Ext Time (p_c), s	0.0	8.9	1.4	0.5	0.0	9.4	0.0	0.7				
Intersection Summary												
HCM 2010 Ctrl Delay	27.7											
HCM 2010 LOS	C											

HCM 2010 Signalized Intersection Summary
6: Iowa Avenue & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	182	233	273	40	94	17	168	616	85	68	702	151
Future Volume (veh/h)	182	233	273	40	94	17	168	616	85	68	702	151
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	219	281	329	48	112	20	191	700	97	81	836	180
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	1
Peak Hour Factor	0.83	0.83	0.83	0.84	0.84	0.84	0.88	0.88	0.88	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	288	843	377	169	720	316	259	1732	765	202	1674	749
Arrive On Green	0.08	0.24	0.24	0.05	0.20	0.20	0.08	0.49	0.49	0.06	0.47	0.47
Sat Flow, veh/h	3442	3539	1583	3442	3539	1553	3442	3539	1563	3442	3539	1583
Grp Volume(v), veh/h	219	281	329	48	112	20	191	700	97	81	836	180
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1770	1553	1721	1770	1563	1721	1770	1583
Q Serve(g_s), s	6.8	7.2	21.8	1.5	2.8	1.1	5.9	13.8	3.7	2.5	17.8	7.4
Cycle Q Clear(g_c), s	6.8	7.2	21.8	1.5	2.8	1.1	5.9	13.8	3.7	2.5	17.8	7.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	288	843	377	169	720	316	259	1732	765	202	1674	749
V/C Ratio(X)	0.76	0.33	0.87	0.28	0.16	0.06	0.74	0.40	0.13	0.40	0.50	0.24
Avail Cap(c_a), veh/h	488	1020	456	268	793	348	457	1732	765	268	1674	749
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.0	34.5	40.0	50.1	35.8	35.1	49.5	17.8	15.2	49.6	19.9	17.1
Incr Delay (d2), s/veh	4.1	0.2	14.6	0.9	0.1	0.1	4.1	0.7	0.3	1.3	1.1	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	3.5	11.1	0.7	1.4	0.5	3.0	6.9	1.7	1.2	9.0	3.4
LnGrp Delay(d),s/veh	53.1	34.7	54.7	51.0	35.9	35.2	53.6	18.5	15.5	50.9	21.0	17.9
LnGrp LOS	D	C	D	D	D	D	D	B	B	D	C	B
Approach Vol, veh/h	829			180			988			1097		
Approach Delay, s/veh	47.5			39.9			25.0			22.7		
Approach LOS	D			D			C			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.9	58.0	9.9	30.5	12.7	56.2	13.7	26.7				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	53.5	53.5	8.5	31.5	14.5	47.5	15.5	24.5				
Max Q Clear Time (g_c+14), s	14.5	15.8	3.5	23.8	7.9	19.8	8.8	4.8				
Green Ext Time (p_c), s	0.1	14.1	0.0	2.2	0.3	12.6	0.4	3.4				
Intersection Summary												
HCM 2010 Ctrl Delay	31.0											
HCM 2010 LOS	C											

Intersection

Int Delay, s/veh 0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Vol, veh/h	291	48	27	131	10	9
Future Vol, veh/h	291	48	27	131	10	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	42
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	77	77	68	68
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	346	57	35	170	15	13

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	530
Stage 1	-	-	375
Stage 2	-	-	155
Critical Hdwy	-	4.14	6.84
Critical Hdwy Stg 1	-	-	5.84
Critical Hdwy Stg 2	-	-	5.84
Follow-up Hdwy	-	2.22	3.52
Pot Cap-1 Maneuver	-	1151	479
Stage 1	-	-	665
Stage 2	-	-	857
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1151	464
Mov Cap-2 Maneuver	-	-	464
Stage 1	-	-	665
Stage 2	-	-	831

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	11.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	464	805	-	-	1151	-
HCM Lane V/C Ratio	0.032	0.016	-	-	0.03	-
HCM Control Delay (s)	13	9.5	-	-	8.2	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0.1	-

Intersection						
Int Delay, s/veh	0.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	126	126	18	174	15	3
Future Vol, veh/h	126	126	18	174	15	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	84	84	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	145	145	21	207	17	3
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	290	0	363	145
Stage 1	-	-	-	-	217	-
Stage 2	-	-	-	-	146	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	1269	-	610	876
Stage 1	-	-	-	-	798	-
Stage 2	-	-	-	-	866	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1269	-	600	876
Mov Cap-2 Maneuver	-	-	-	-	649	-
Stage 1	-	-	-	-	798	-
Stage 2	-	-	-	-	852	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.7		10.5	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	678	-	-	1269	-	
HCM Lane V/C Ratio	0.029	-	-	0.017	-	
HCM Control Delay (s)	10.5	-	-	7.9	-	
HCM Lane LOS	B	-	-	A	-	
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-	

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	61	3	190	155	1	6	3	111	0	1	5
Future Vol, veh/h	8	61	3	190	155	1	6	3	111	0	1	5
Conflicting Peds, #/hr	3	0	3	3	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	152	-	-	152	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	81	81	81	84	84	84	50	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	79	4	235	191	1	7	4	132	0	2	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	196	0	0	86	0	0	671	770	45	726	771	99
Stage 1	-	-	-	-	-	-	105	105	-	664	664	-
Stage 2	-	-	-	-	-	-	566	665	-	62	107	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1374	-	-	1508	-	-	342	330	1015	312	329	937
Stage 1	-	-	-	-	-	-	889	807	-	416	456	-
Stage 2	-	-	-	-	-	-	476	456	-	942	806	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1374	-	-	1508	-	-	294	275	1012	235	274	934
Mov Cap-2 Maneuver	-	-	-	-	-	-	294	275	-	235	274	-
Stage 1	-	-	-	-	-	-	880	799	-	412	384	-
Stage 2	-	-	-	-	-	-	395	384	-	809	798	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	4.3	10.1	10.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	851	1374	-	-	1508	-	-	666
HCM Lane V/C Ratio	0.168	0.008	-	-	0.156	-	-	0.018
HCM Control Delay (s)	10.1	7.6	-	-	7.8	-	-	10.5
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.6	0	-	-	0.6	-	-	0.1

Intersection						
Int Delay, s/veh	2.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	49	47	387	90	62	412
Future Vol, veh/h	49	47	387	90	62	412
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	-	-	-	45	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	67	67	74	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	56	54	578	134	84	564
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1095	356	0	0	712	0
Stage 1	645	-	-	-	-	-
Stage 2	450	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	208	640	-	-	884	-
Stage 1	484	-	-	-	-	-
Stage 2	609	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	188	640	-	-	884	-
Mov Cap-2 Maneuver	188	-	-	-	-	-
Stage 1	484	-	-	-	-	-
Stage 2	551	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	25.2		0		1.2	
HCM LOS	D					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	- 287	884	-		
HCM Lane V/C Ratio	-	- 0.384	0.095	-		
HCM Control Delay (s)	-	- 25.2	9.5	-		
HCM Lane LOS	-	- D	A	-		
HCM 95th %tile Q(veh)	-	- 1.7	0.3	-		

Intersection

Int Delay, s/veh 2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	100	29	38	98	13	10	2	21	5	0	8
Future Vol, veh/h	3	100	29	38	98	13	10	2	21	5	0	8
Conflicting Peds, #/hr	0	0	3	3	0	0	3	0	2	2	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	87	87	87	52	52	52	65	65	65
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	120	35	44	113	15	19	4	40	8	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	128	0	0	158	0	0	365	363	143	376	373	123
Stage 1	-	-	-	-	-	-	148	148	-	207	207	-
Stage 2	-	-	-	-	-	-	217	215	-	169	166	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1458	-	-	1422	-	-	591	565	905	581	557	928
Stage 1	-	-	-	-	-	-	855	775	-	795	731	-
Stage 2	-	-	-	-	-	-	785	725	-	833	761	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1454	-	-	1419	-	-	564	543	901	536	535	925
Mov Cap-2 Maneuver	-	-	-	-	-	-	564	543	-	536	535	-
Stage 1	-	-	-	-	-	-	850	770	-	793	707	-
Stage 2	-	-	-	-	-	-	747	701	-	788	757	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1.9	10.3	10.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	738	1454	-	-	1419	-	-	723
HCM Lane V/C Ratio	0.086	0.002	-	-	0.031	-	-	0.028
HCM Control Delay (s)	10.3	7.5	0	-	7.6	0	-	10.1
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.1

HCM 2010 Signalized Intersection Summary
12: Iowa Avenue & Marlborough Avenue

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	35	44	48	17	48	31	760	78	113	791	82
Future Volume (veh/h)	70	35	44	48	17	48	31	760	78	113	791	82
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	101	51	64	68	24	68	36	884	91	133	931	96
Adj No. of Lanes	1	1	0	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.69	0.69	0.69	0.71	0.71	0.71	0.86	0.86	0.86	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	190	81	101	169	177	149	135	1310	135	186	1535	658
Arrive On Green	0.11	0.11	0.11	0.10	0.10	0.10	0.08	0.40	0.40	0.10	0.43	0.43
Sat Flow, veh/h	1774	752	944	1774	1863	1563	1774	3235	333	1774	3539	1518
Grp Volume(v), veh/h	101	0	115	68	24	68	36	484	491	133	931	96
Grp Sat Flow(s),veh/h/ln	1774	0	1696	1774	1863	1563	1774	1770	1798	1774	1770	1518
Q Serve(g_s), s	3.6	0.0	4.3	2.4	0.8	2.7	1.3	14.8	14.8	4.8	13.3	2.5
Cycle Q Clear(g_c), s	3.6	0.0	4.3	2.4	0.8	2.7	1.3	14.8	14.8	4.8	13.3	2.5
Prop In Lane	1.00		0.56	1.00		1.00	1.00		0.19	1.00		1.00
Lane Grp Cap(c), veh/h	190	0	182	169	177	149	135	716	728	186	1535	658
V/C Ratio(X)	0.53	0.00	0.63	0.40	0.14	0.46	0.27	0.67	0.67	0.72	0.61	0.15
Avail Cap(c_a), veh/h	942	0	901	1103	1158	972	498	846	859	498	1691	725
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.9	0.0	28.2	28.1	27.3	28.2	28.7	16.1	16.1	28.6	14.3	11.3
Incr Delay (d2), s/veh	2.3	0.0	3.6	1.5	0.3	2.2	0.4	1.7	1.7	1.9	0.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	2.2	1.2	0.4	1.3	0.6	7.5	7.6	2.4	6.6	1.1
LnGrp Delay(d),s/veh	30.2	0.0	31.8	29.6	27.7	30.4	29.1	17.8	17.7	30.5	14.9	11.4
LnGrp LOS	C		C	C	C	C	C	B	B	C	B	B
Approach Vol, veh/h		216			160			1011			1160	
Approach Delay, s/veh		31.0			29.6			18.2			16.4	
Approach LOS		C			C			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.9	32.7		11.6	9.0	34.6		10.8				
Change Period (Y+Rc), s	4.0	6.0		4.5	4.0	6.0		4.5				
Max Green Setting (Gmax), s	18.5	31.5		35.0	18.5	31.5		41.0				
Max Q Clear Time (g_c+I1), s	6.8	16.8		6.3	3.3	15.3		4.7				
Green Ext Time (p_c), s	0.1	9.8		0.9	0.0	10.4		0.5				
Intersection Summary												
HCM 2010 Ctrl Delay				19.2								
HCM 2010 LOS				B								

Intersection												
Int Delay, s/veh	6.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	90	45	90	84	0	68	1	162	0	0	1
Future Vol, veh/h	2	90	45	90	84	0	68	1	162	0	0	1
Conflicting Peds, #/hr	8	0	6	6	0	8	1	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	85	-	-	-	-	-	-	-	60
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	76	76	76	82	82	82	90	90	90	25	25	25
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	118	59	110	102	0	76	1	180	0	0	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	110	0	0	184	0	0	482	489	154	574	519	111
Stage 1	-	-	-	-	-	-	159	159	-	330	330	-
Stage 2	-	-	-	-	-	-	323	330	-	244	189	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1480	-	-	1391	-	-	495	480	892	430	461	942
Stage 1	-	-	-	-	-	-	843	766	-	683	646	-
Stage 2	-	-	-	-	-	-	689	646	-	760	744	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1479	-	-	1391	-	-	459	435	887	318	418	934
Mov Cap-2 Maneuver	-	-	-	-	-	-	459	435	-	318	418	-
Stage 1	-	-	-	-	-	-	836	760	-	676	590	-
Stage 2	-	-	-	-	-	-	631	590	-	604	738	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			4			13.2			8.9		
HCM LOS							B			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2			
Capacity (veh/h)	694	1479	-	-	1391	-	-	-	934			
HCM Lane V/C Ratio	0.37	0.002	-	-	0.079	-	-	-	0.004			
HCM Control Delay (s)	13.2	7.4	-	-	7.8	-	-	0	8.9			
HCM Lane LOS	B	A	-	-	A	-	-	A	A			
HCM 95th %tile Q(veh)	1.7	0	-	-	0.3	-	-	-	0			

Intersection

Int Delay, s/veh 7.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	202	50	23	3	6	150
Future Vol, veh/h	202	50	23	3	6	150
Conflicting Peds, #/hr	8	0	0	8	0	53
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	54	54	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	220	54	43	6	7	185

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	56	0	546
Stage 1	-	-	53
Stage 2	-	-	493
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1549	-	499
Stage 1	-	-	970
Stage 2	-	-	614
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1471	-	416
Mov Cap-2 Maneuver	-	-	416
Stage 1	-	-	963
Stage 2	-	-	515

Approach	EB	WB	SB
HCM Control Delay, s	6.3	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1471	-	-	-	855
HCM Lane V/C Ratio	0.149	-	-	-	0.225
HCM Control Delay (s)	7.9	0	-	-	10.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9

HCM 2010 Signalized Intersection Summary
1: Columbia Ave & Primer St

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	183	753	0	0	375	601	0	0	0	245	0	156
Future Volume (veh/h)	183	753	0	0	375	601	0	0	0	245	0	156
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	195	801	0	0	412	0	0	0	0	211	66	164
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.92	0.92	0.92	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	235	2592	0	80	1946	0	0	323	0	387	82	204
Arrive On Green	0.09	0.49	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.17	0.17	0.17
Sat Flow, veh/h	1774	3632	0	676	3632	0	0	1863	0	1774	475	1180
Grp Volume(v), veh/h	195	801	0	0	412	0	0	0	0	211	0	230
Grp Sat Flow(s),veh/h/ln	1774	1770	0	676	1770	0	0	1863	0	1774	0	1655
Q Serve(g_s), s	9.7	12.2	0.0	0.0	5.3	0.0	0.0	0.0	0.0	10.0	0.0	12.0
Cycle Q Clear(g_c), s	9.7	12.2	0.0	0.0	5.3	0.0	0.0	0.0	0.0	10.0	0.0	12.0
Prop In Lane	1.00		0.00	1.00		0.00	0.00		0.00	1.00		0.71
Lane Grp Cap(c), veh/h	235	2592	0	80	1946	0	0	323	0	387	0	287
V/C Ratio(X)	0.83	0.31	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.54	0.00	0.80
Avail Cap(c_a), veh/h	365	2592	0	80	1946	0	0	528	0	583	0	469
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.91	0.91	0.00	0.00	0.77	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.0	9.2	0.0	0.0	10.3	0.0	0.0	0.0	0.0	34.9	0.0	35.7
Incr Delay (d2), s/veh	8.3	0.3	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.2	0.0	5.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	6.1	0.0	0.0	2.6	0.0	0.0	0.0	0.0	5.1	0.0	5.9
LnGrp Delay(d),s/veh	48.4	9.5	0.0	0.0	10.5	0.0	0.0	0.0	0.0	36.1	0.0	40.9
LnGrp LOS	D	A			B					D		D
Approach Vol, veh/h		996			412			0			441	
Approach Delay, s/veh		17.1			10.5			0.0			38.6	
Approach LOS		B			B						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		69.9		20.1	16.4	53.5		20.1				
Change Period (Y+Rc), s		4.0		4.5	4.5	4.0		4.5				
Max Green Setting (Gmax), s		56.0		25.5	18.5	33.0		25.5				
Max Q Clear Time (g_c+I1), s		14.2		14.0	11.7	7.3		0.0				
Green Ext Time (p_c), s		9.8		1.6	0.3	8.7		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				20.8								
HCM 2010 LOS				C								
Notes												

User approved volume balancing among the lanes for turning movement.

Intersection

Intersection Delay, s/veh50.2

Intersection LOS F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↔↔				↔	↔			↔	↔			↔	↔
Traffic Vol, veh/h	0	126	619	28	0	28	244	9	0	4	148	12	0	222	72	159
Future Vol, veh/h	0	126	619	28	0	28	244	9	0	4	148	12	0	222	72	159
Peak Hour Factor	0.92	0.89	0.89	0.89	0.92	0.96	0.96	0.96	0.92	0.86	0.86	0.86	0.92	0.91	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	142	696	31	0	29	254	9	0	5	172	14	0	244	79	175
Number of Lanes	0	0	2	0	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	76.4	28.2	18.8	29.3
HCM LOS	F	D	C	D

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	3%	0%	29%	0%	10%	0%	76%	0%
Vol Thru, %	97%	0%	71%	92%	90%	0%	24%	0%
Vol Right, %	0%	100%	0%	8%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	152	12	436	338	272	9	294	159
LT Vol	4	0	126	0	28	0	222	0
Through Vol	148	0	310	310	244	0	72	0
RT Vol	0	12	0	28	0	9	0	159
Lane Flow Rate	177	14	489	379	283	9	323	175
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.446	0.032	1.111	0.839	0.683	0.021	0.782	0.369
Departure Headway (Hd)	9.343	8.597	8.175	7.965	8.931	8.15	8.916	7.8
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	389	419	445	459	408	442	407	465
Service Time	7.043	6.297	5.875	5.665	6.631	5.85	6.616	5.5
HCM Lane V/C Ratio	0.455	0.033	1.099	0.826	0.694	0.02	0.794	0.376
HCM Control Delay	19.4	11.6	104.5	40.2	28.8	11	37	15
HCM Lane LOS	C	B	F	E	D	B	E	B
HCM 95th-tile Q	2.2	0.1	16.9	8.2	4.9	0.1	6.7	1.7

Intersection						
Int Delay, s/veh	42.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	81	286	622	126	183	34
Future Vol, veh/h	81	286	622	126	183	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	0	0	24	-	-	65
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	96	96	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	91	321	648	131	203	38
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1630	-	203	0	-	0
Stage 1	203	-	-	-	-	-
Stage 2	1427	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	112	0	1369	-	-	0
Stage 1	831	0	-	-	-	0
Stage 2	221	0	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 59	-	1369	-	-	-
Mov Cap-2 Maneuver	~ 59	-	-	-	-	-
Stage 1	831	-	-	-	-	-
Stage 2	116	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	\$ 427.4	8.3		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	
Capacity (veh/h)	1369	-	59	-	-	
HCM Lane V/C Ratio	0.473	-	1.543	-	-	
HCM Control Delay (s)	10	-\$ 427.4	0	-	-	
HCM Lane LOS	A	-	F	A	-	
HCM 95th %tile Q(veh)	2.6	-	8.2	-	-	
Notes						
~: Volume exceeds capacity	\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon	

HCM 2010 Signalized Intersection Summary
4: E. La Cadena & Columbia Ave

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	174	779	44	33	704	496	29	79	12	192	33	244
Future Volume (veh/h)	174	779	44	33	704	496	29	79	12	192	33	244
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1937	1900	1863	1863	1863
Adj Flow Rate, veh/h	189	847	48	36	774	545	33	89	13	209	36	265
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.89	0.89	0.89	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	225	1832	816	78	1539	689	323	272	40	425	443	377
Arrive On Green	0.13	0.52	0.52	0.04	0.43	0.43	0.04	0.16	0.16	0.11	0.24	0.24
Sat Flow, veh/h	1774	3539	1576	1774	3539	1583	1774	1647	241	1774	1863	1583
Grp Volume(v), veh/h	189	847	48	36	774	545	33	0	102	209	36	265
Grp Sat Flow(s),veh/h/ln	1774	1770	1576	1774	1770	1583	1774	0	1888	1774	1863	1583
Q Serve(g_s), s	10.5	15.3	1.5	2.0	16.0	29.9	1.5	0.0	4.8	9.4	1.5	15.5
Cycle Q Clear(g_c), s	10.5	15.3	1.5	2.0	16.0	29.9	1.5	0.0	4.8	9.4	1.5	15.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	225	1832	816	78	1539	689	323	0	311	425	443	377
V/C Ratio(X)	0.84	0.46	0.06	0.46	0.50	0.79	0.10	0.00	0.33	0.49	0.08	0.70
Avail Cap(c_a), veh/h	404	2315	1031	123	1754	785	371	0	311	485	443	377
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.1	15.4	12.1	47.0	20.6	24.6	32.3	0.0	37.2	28.3	29.9	35.2
Incr Delay (d2), s/veh	8.2	0.2	0.0	4.2	0.3	4.9	0.1	0.0	2.8	0.9	0.4	10.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	7.5	0.7	1.1	7.8	14.0	0.8	0.0	2.8	4.7	0.8	7.9
LnGrp Delay(d),s/veh	51.3	15.6	12.1	51.2	20.9	29.5	32.5	0.0	40.0	29.2	30.2	45.7
LnGrp LOS	D	B	B	D	C	C	C		D	C	C	D
Approach Vol, veh/h	1084				1355				135		510	
Approach Delay, s/veh	21.7				25.1				38.2		37.8	
Approach LOS	C				C				D		D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.4	56.2	8.2	28.0	16.8	47.9	15.6	20.6				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	7.0	66.0	7.0	24.0	23.0	50.0	15.0	16.0				
Max Q Clear Time (g_c+I1), s	4.0	17.3	3.5	17.5	12.5	31.9	11.4	6.8				
Green Ext Time (p_c), s	0.0	20.3	0.0	0.9	0.3	12.0	0.2	1.2				
Intersection Summary												
HCM 2010 Ctrl Delay	26.6											
HCM 2010 LOS	C											

HCM 2010 Signalized Intersection Summary

5: Chicago Avenue/Paige Drive & Columbia Ave

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	398	562	61	701	4	509	12	84	8	29	33
Future Volume (veh/h)	10	398	562	61	701	4	509	12	84	8	29	33
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	11	423	0	68	779	4	592	14	98	11	39	45
Adj No. of Lanes	1	2	1	1	3	0	2	1	0	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.86	0.86	0.86	0.74	0.74	0.74
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	33	808	361	117	1437	7	721	96	670	33	504	451
Arrive On Green	0.02	0.23	0.00	0.07	0.28	0.28	0.21	0.48	0.48	0.02	0.28	0.28
Sat Flow, veh/h	1774	3539	1583	1774	5221	27	3442	201	1410	1774	1770	1583
Grp Volume(v), veh/h	11	423	0	68	506	277	592	0	112	11	39	45
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1695	1858	1721	0	1612	1774	1770	1583
Q Serve(g_s), s	0.5	8.9	0.0	3.2	10.8	10.8	14.0	0.0	3.3	0.5	1.4	1.8
Cycle Q Clear(g_c), s	0.5	8.9	0.0	3.2	10.8	10.8	14.0	0.0	3.3	0.5	1.4	1.8
Prop In Lane	1.00		1.00	1.00		0.01	1.00		0.88	1.00		1.00
Lane Grp Cap(c), veh/h	33	808	361	117	933	511	721	0	766	33	504	451
V/C Ratio(X)	0.33	0.52	0.00	0.58	0.54	0.54	0.82	0.00	0.15	0.33	0.08	0.10
Avail Cap(c_a), veh/h	148	1832	820	219	1891	1036	1194	0	766	148	504	451
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.2	28.7	0.0	38.6	26.2	26.2	32.1	0.0	12.6	41.2	22.2	22.4
Incr Delay (d2), s/veh	5.6	0.5	0.0	4.5	0.5	0.9	2.4	0.0	0.4	5.6	0.3	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	4.4	0.0	1.7	5.1	5.7	6.8	0.0	1.5	0.3	0.7	0.8
LnGrp Delay(d),s/veh	46.8	29.3	0.0	43.1	26.7	27.1	34.5	0.0	13.0	46.8	22.5	22.8
LnGrp LOS	D	C		D	C	C	C		B	D	C	C
Approach Vol, veh/h		434			851			704			95	
Approach Delay, s/veh		29.7			28.2			31.0			25.5	
Approach LOS		C			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.1	23.9	22.3	28.7	6.1	27.9	6.1	44.9				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	10.5	44.0	29.5	18.0	7.1	47.4	7.1	40.4				
Max Q Clear Time (g_c+1.2), s	15.2	10.9	16.0	3.8	2.5	12.8	2.5	5.3				
Green Ext Time (p_c), s	0.0	8.5	1.9	0.9	0.0	8.6	0.0	1.2				
Intersection Summary												
HCM 2010 Ctrl Delay			29.3									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary 6: Iowa Avenue & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	116	325	99	271	35	262	666	72	23	911	228
Future Volume (veh/h)	117	116	325	99	271	35	262	666	72	23	911	228
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	134	133	374	110	301	39	298	757	82	26	1024	256
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	1
Peak Hour Factor	0.87	0.87	0.87	0.90	0.90	0.90	0.88	0.88	0.88	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	207	918	401	204	915	409	365	1734	763	118	1481	662
Arrive On Green	0.06	0.26	0.26	0.06	0.26	0.26	0.11	0.49	0.49	0.03	0.42	0.42
Sat Flow, veh/h	3442	3539	1545	3442	3539	1583	3442	3539	1557	3442	3539	1583
Grp Volume(v), veh/h	134	133	374	110	301	39	298	757	82	26	1024	256
Grp Sat Flow(s),veh/h/ln	1721	1770	1545	1721	1770	1583	1721	1770	1557	1721	1770	1583
Q Serve(g_s), s	4.4	3.3	27.1	3.6	7.9	2.1	9.7	15.9	3.3	0.8	27.2	12.9
Cycle Q Clear(g_c), s	4.4	3.3	27.1	3.6	7.9	2.1	9.7	15.9	3.3	0.8	27.2	12.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	207	918	401	204	915	409	365	1734	763	118	1481	662
V/C Ratio(X)	0.65	0.14	0.93	0.54	0.33	0.10	0.82	0.44	0.11	0.22	0.69	0.39
Avail Cap(c_a), veh/h	273	944	412	243	915	409	501	1734	763	213	1481	662
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.7	32.7	41.5	52.4	34.5	32.3	50.2	19.0	15.7	53.9	27.3	23.1
Incr Delay (d2), s/veh	3.4	0.1	27.8	2.2	0.2	0.1	7.4	0.8	0.3	0.9	2.7	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	1.6	14.6	1.8	3.9	1.0	5.0	8.0	1.5	0.4	13.8	5.9
LnGrp Delay(d),s/veh	56.1	32.7	69.3	54.7	34.7	32.4	57.5	19.8	16.0	54.8	30.0	24.8
LnGrp LOS	E	C	E	D	C	C	E	B	B	D	C	C
Approach Vol, veh/h	641					450		1137		1306		
Approach Delay, s/veh	59.0					39.4		29.4		29.5		
Approach LOS	E					D		C		C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	60.7	11.3	34.3	16.7	52.5	11.4	34.2					
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5					
Max Green Setting (Gmax), s	56.2	8.1	30.6	16.7	46.6	9.1	29.6					
Max Q Clear Time (g_c+I2), s	17.9	5.6	29.1	11.7	29.2	6.4	9.9					
Green Ext Time (p_c), s	0.0	17.9	0.1	0.6	0.4	11.4	0.1	3.9				
Intersection Summary												
HCM 2010 Ctrl Delay			36.1									
HCM 2010 LOS			D									

Intersection						
Int Delay, s/veh	2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Vol, veh/h	171	16	12	318	72	12
Future Vol, veh/h	171	16	12	318	72	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	42
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	91	91	80	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	211	20	13	349	90	15
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	231	0	422	115
Stage 1	-	-	-	-	221	-
Stage 2	-	-	-	-	201	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	1334	-	560	916
Stage 1	-	-	-	-	795	-
Stage 2	-	-	-	-	813	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1334	-	555	916
Mov Cap-2 Maneuver	-	-	-	-	555	-
Stage 1	-	-	-	-	795	-
Stage 2	-	-	-	-	805	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.3		12.2	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	555	916	-	-	1334	-
HCM Lane V/C Ratio	0.162	0.016	-	-	0.01	-
HCM Control Delay (s)	12.7	9	-	-	7.7	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0	-

Intersection

Int Delay, s/veh 4.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	220	23	4	226	114	16
Future Vol, veh/h	220	23	4	226	114	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	65	65	53	53
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	265	28	6	348	215	30

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	465
Stage 1	-	-	279
Stage 2	-	-	186
Critical Hdwy	-	4.14	6.84
Critical Hdwy Stg 1	-	-	5.84
Critical Hdwy Stg 2	-	-	5.84
Follow-up Hdwy	-	2.22	3.52
Pot Cap-1 Maneuver	-	1265	526
Stage 1	-	-	743
Stage 2	-	-	827
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1265	524
Mov Cap-2 Maneuver	-	-	594
Stage 1	-	-	743
Stage 2	-	-	823

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	14.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	618	-	-	1265	-
HCM Lane V/C Ratio	0.397	-	-	0.005	-
HCM Control Delay (s)	14.6	-	-	7.9	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	1.9	-	-	0	-

Intersection												
Int Delay, s/veh	6.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	126	4	148	110	0	0	6	227	6	9	2
Future Vol, veh/h	5	126	4	148	110	0	0	6	227	6	9	2
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	152	-	-	152	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	87	87	87	84	84	84	53	53	53
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	156	5	170	126	0	0	7	270	11	17	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	126	0	0	161	0	0	583	638	81	561	641	63
Stage 1	-	-	-	-	-	-	171	171	-	467	467	-
Stage 2	-	-	-	-	-	-	412	467	-	94	174	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1458	-	-	1416	-	-	396	393	963	410	391	988
Stage 1	-	-	-	-	-	-	814	756	-	545	560	-
Stage 2	-	-	-	-	-	-	588	560	-	902	754	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1458	-	-	1416	-	-	344	344	962	263	342	988
Mov Cap-2 Maneuver	-	-	-	-	-	-	344	344	-	263	342	-
Stage 1	-	-	-	-	-	-	810	752	-	543	493	-
Stage 2	-	-	-	-	-	-	498	493	-	640	750	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			4.5			10.6			17		
HCM LOS							B			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	919	1458	-	-	1416	-	-	332				
HCM Lane V/C Ratio	0.302	0.004	-	-	0.12	-	-	0.097				
HCM Control Delay (s)	10.6	7.5	-	-	7.9	-	-	17				
HCM Lane LOS	B	A	-	-	A	-	-	C				
HCM 95th %tile O(veh)	1.3	0	-	-	0.4	-	-	0.3				

Intersection						
Int Delay, s/veh	2.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	65	64	512	49	33	591
Future Vol, veh/h	65	64	512	49	33	591
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	-	-	-	45	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	94	94	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	76	74	545	52	38	687
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	991	298	0	0	597	0
Stage 1	571	-	-	-	-	-
Stage 2	420	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	243	698	-	-	976	-
Stage 1	529	-	-	-	-	-
Stage 2	631	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	234	698	-	-	976	-
Mov Cap-2 Maneuver	234	-	-	-	-	-
Stage 1	529	-	-	-	-	-
Stage 2	606	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	22.9		0		0.5	
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	349	976	-	
HCM Lane V/C Ratio	-	-	0.43	0.039	-	
HCM Control Delay (s)	-	-	22.9	8.8	-	
HCM Lane LOS	-	-	C	A	-	
HCM 95th %tile Q(veh)	-	-	2.1	0.1	-	

Intersection												
Int Delay, s/veh	3.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	84	21	39	81	2	21	2	26	5	1	2
Future Vol, veh/h	3	84	21	39	81	2	21	2	26	5	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	4	4	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	90	90	90	80	80	80	50	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	117	29	43	90	2	26	3	33	10	2	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	92	0	0	146	0	0	321	319	135	339	332	91
Stage 1	-	-	-	-	-	-	140	140	-	178	178	-
Stage 2	-	-	-	-	-	-	181	179	-	161	154	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1503	-	-	1436	-	-	632	598	914	615	588	967
Stage 1	-	-	-	-	-	-	863	781	-	824	752	-
Stage 2	-	-	-	-	-	-	821	751	-	841	770	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1503	-	-	1431	-	-	611	577	911	573	567	967
Mov Cap-2 Maneuver	-	-	-	-	-	-	611	577	-	573	567	
Stage 1	-	-	-	-	-	-	860	779	-	822	728	-
Stage 2	-	-	-	-	-	-	789	727	-	803	768	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			2.4			10.3			10.8		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	738	1503	-	-	1431	-	-	637				
HCM Lane V/C Ratio	0.083	0.003	-	-	0.03	-	-	0.025				
HCM Control Delay (s)	10.3	7.4	0	-	7.6	0	-	10.8				
HCM Lane LOS	B	A	A	-	A	A	-	B				
HCM 95th %tile O(veh)	0.3	0	-	-	0.1	-	-	0.1				

HCM 2010 Signalized Intersection Summary
12: Iowa Avenue & Marlborough Avenue

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	83	19	23	113	38	111	47	789	32	51	1204	78
Future Volume (veh/h)	83	19	23	113	38	111	47	789	32	51	1204	78
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.97	1.00		0.99	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	102	23	28	169	57	166	49	831	34	54	1281	83
Adj No. of Lanes	1	1	0	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.81	0.81	0.81	0.67	0.67	0.67	0.95	0.95	0.95	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	157	68	82	292	306	251	95	1697	69	95	1734	754
Arrive On Green	0.09	0.09	0.09	0.16	0.16	0.16	0.05	0.49	0.49	0.05	0.49	0.49
Sat Flow, veh/h	1774	763	929	1774	1863	1530	1774	3463	142	1774	3539	1539
Grp Volume(v), veh/h	102	0	51	169	57	166	49	425	440	54	1281	83
Grp Sat Flow(s),veh/h/ln	1774	0	1691	1774	1863	1530	1774	1770	1835	1774	1770	1539
Q Serve(g_s), s	5.2	0.0	2.6	8.2	2.5	9.5	2.5	15.0	15.0	2.8	27.0	2.7
Cycle Q Clear(g_c), s	5.2	0.0	2.6	8.2	2.5	9.5	2.5	15.0	15.0	2.8	27.0	2.7
Prop In Lane	1.00		0.55	1.00		1.00	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	157	0	150	292	306	251	95	867	899	95	1734	754
V/C Ratio(X)	0.65	0.00	0.34	0.58	0.19	0.66	0.52	0.49	0.49	0.57	0.74	0.11
Avail Cap(c_a), veh/h	665	0	634	779	818	671	351	1070	1110	351	2141	931
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.1	0.0	40.0	36.0	33.6	36.6	43.0	16.0	16.0	43.2	19.0	12.8
Incr Delay (d2), s/veh	4.4	0.0	1.3	1.8	0.3	2.9	1.6	0.4	0.4	2.0	1.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.0	1.3	4.2	1.3	4.2	1.3	7.4	7.7	1.4	13.4	1.2
LnGrp Delay(d),s/veh	45.6	0.0	41.3	37.9	33.9	39.5	44.6	16.4	16.4	45.1	20.1	12.9
LnGrp LOS	D		D	D	C	D	D	B	B	D	C	B
Approach Vol, veh/h		153			392			914			1418	
Approach Delay, s/veh		44.1			38.0			17.9			20.7	
Approach LOS		D			D			B			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.0	51.8		12.8	9.0	51.8		19.9				
Change Period (Y+Rc), s	4.0	6.0		4.5	4.0	6.0		4.5				
Max Green Setting (Gmax), s	18.5	56.5		35.0	18.5	56.5		41.0				
Max Q Clear Time (g_c+I1), s	4.8	17.0		7.2	4.5	29.0		11.5				
Green Ext Time (p_c), s	0.0	20.5		0.5	0.0	16.7		1.4				
Intersection Summary												
HCM 2010 Ctrl Delay			23.4									
HCM 2010 LOS			C									

Intersection												
Int Delay, s/veh	5.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	55	54	160	121	0	36	2	106	3	3	2
Future Vol, veh/h	1	55	54	160	121	0	36	2	106	3	3	2
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	85	-	-	-	-	-	-	-	60
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	69	69	69	91	91	91	84	84	84	40	40	40
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	80	78	176	133	0	43	2	126	8	8	5
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	134	0	0	158	0	0	610	608	119	672	647	134
Stage 1	-	-	-	-	-	-	122	122	-	486	486	-
Stage 2	-	-	-	-	-	-	488	486	-	186	161	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1451	-	-	1422	-	-	407	410	933	370	390	915
Stage 1	-	-	-	-	-	-	882	795	-	563	551	-
Stage 2	-	-	-	-	-	-	561	551	-	816	765	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1451	-	-	1422	-	-	360	359	933	288	341	914
Mov Cap-2 Maneuver	-	-	-	-	-	-	360	359	-	288	341	-
Stage 1	-	-	-	-	-	-	881	794	-	562	482	-
Stage 2	-	-	-	-	-	-	481	482	-	703	764	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			4.5			12.4			15.1		
HCM LOS							B			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2			
Capacity (veh/h)	657	1451	-	-	1422	-	-	312	914			
HCM Lane V/C Ratio	0.261	0.001	-	-	0.124	-	-	0.048	0.005			
HCM Control Delay (s)	12.4	7.5	-	-	7.9	-	-	17.1	9			
HCM Lane LOS	B	A	-	-	A	-	-	C	A			
HCM 95th %tile Q(veh)	1	0	-	-	0.4	-	-	0.2	0			

Intersection

Int Delay, s/veh 7.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	143	21	34	5	2	248
Future Vol, veh/h	143	21	34	5	2	248
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	79	79	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	174	26	43	6	2	264

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	49	0	420
Stage 1	-	-	46
Stage 2	-	-	374
Critical Hdwy	4.12	-	7.12
Critical Hdwy Stg 1	-	-	6.12
Critical Hdwy Stg 2	-	-	6.12
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1558	-	544
Stage 1	-	-	968
Stage 2	-	-	647
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1558	-	497
Mov Cap-2 Maneuver	-	-	497
Stage 1	-	-	859
Stage 2	-	-	574

Approach	EB	WB	SB
HCM Control Delay, s	6.6	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1558	-	-	-	1014
HCM Lane V/C Ratio	0.112	-	-	-	0.262
HCM Control Delay (s)	7.6	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.4	-	-	-	1.1

EXISTING + PROJECT

HCM 2010 Signalized Intersection Summary
1: Columbia Ave & Primer St

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	155	498	0	0	337	400	0	0	0	331	0	104
Future Volume (veh/h)	155	498	0	0	337	400	0	0	0	331	0	104
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1827	1827	1900
Adj Flow Rate, veh/h	204	655	0	0	401	0	0	0	0	226	166	108
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	1	1	0
Peak Hour Factor	0.76	0.76	0.76	0.84	0.84	0.84	0.92	0.92	0.92	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	4	4	4
Cap, veh/h	238	2516	0	80	1863	0	0	363	0	419	201	131
Arrive On Green	0.27	1.00	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.19	0.19	0.19
Sat Flow, veh/h	1774	3632	0	775	3632	0	0	1863	0	1740	1035	673
Grp Volume(v), veh/h	204	655	0	0	401	0	0	0	0	226	0	274
Grp Sat Flow(s),veh/h/ln	1774	1770	0	775	1770	0	0	1863	0	1740	0	1708
Q Serve(g_s), s	9.8	0.0	0.0	0.0	5.4	0.0	0.0	0.0	0.0	10.8	0.0	13.8
Cycle Q Clear(g_c), s	9.8	0.0	0.0	0.0	5.4	0.0	0.0	0.0	0.0	10.8	0.0	13.8
Prop In Lane	1.00		0.00	1.00		0.00	0.00		0.00	1.00		0.39
Lane Grp Cap(c), veh/h	238	2516	0	80	1863	0	0	363	0	419	0	332
V/C Ratio(X)	0.86	0.26	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.54	0.00	0.82
Avail Cap(c_a), veh/h	404	2516	0	80	1863	0	0	528	0	573	0	484
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.96	0.96	0.00	0.00	0.79	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.1	0.0	0.0	0.0	11.4	0.0	0.0	0.0	0.0	33.5	0.0	34.8
Incr Delay (d2), s/veh	8.5	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.1	0.0	7.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	0.1	0.0	0.0	2.7	0.0	0.0	0.0	0.0	5.3	0.0	7.2
LnGrp Delay(d),s/veh	40.6	0.2	0.0	0.0	11.6	0.0	0.0	0.0	0.0	34.6	0.0	42.2
LnGrp LOS	D	A			B					C		D
Approach Vol, veh/h		859			401			0			500	
Approach Delay, s/veh		9.8			11.6			0.0			38.8	
Approach LOS		A			B						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		68.0		22.0	16.6	51.4		22.0				
Change Period (Y+Rc), s		4.0		4.5	4.5	4.0		4.5				
Max Green Setting (Gmax), s		56.0		25.5	20.5	31.0		25.5				
Max Q Clear Time (g_c+I1), s		2.0		15.8	11.8	7.4		0.0				
Green Ext Time (p_c), s		8.3		1.7	0.3	7.1		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				18.4								
HCM 2010 LOS				B								
Notes												

User approved volume balancing among the lanes for turning movement.

Intersection

Intersection Delay, s/veh22.2

Intersection LOS C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↔↔				↔	↔			↔	↔			↔	↔
Traffic Vol, veh/h	0	100	449	9	0	15	284	4	0	8	22	12	0	239	27	143
Future Vol, veh/h	0	100	449	9	0	15	284	4	0	8	22	12	0	239	27	143
Peak Hour Factor	0.92	0.97	0.97	0.97	0.92	0.85	0.85	0.85	0.92	0.88	0.88	0.88	0.92	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	3	3	3	2	2	2	2	2	2	2	2
Mvmt Flow	0	103	463	9	0	18	334	5	0	9	25	14	0	278	31	166
Number of Lanes	0	0	2	0	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	20.7	27.5	11.9	21.1
HCM LOS	C	D	B	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	27%	0%	31%	0%	5%	0%	90%	0%
Vol Thru, %	73%	0%	69%	96%	95%	0%	10%	0%
Vol Right, %	0%	100%	0%	4%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	30	12	325	234	299	4	266	143
LT Vol	8	0	100	0	15	0	239	0
Through Vol	22	0	225	225	284	0	27	0
RT Vol	0	12	0	9	0	4	0	143
Lane Flow Rate	34	14	335	241	352	5	309	166
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.083	0.03	0.676	0.474	0.728	0.009	0.678	0.31
Departure Headway (Hd)	8.753	7.887	7.274	7.088	7.448	6.704	7.89	6.712
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	409	453	498	508	485	534	458	535
Service Time	6.515	5.648	5.017	4.831	5.192	4.449	5.63	4.452
HCM Lane V/C Ratio	0.083	0.031	0.673	0.474	0.726	0.009	0.675	0.31
HCM Control Delay	12.3	10.9	24	16.1	27.7	9.5	25.7	12.5
HCM Lane LOS	B	B	C	C	D	A	D	B
HCM 95th-tile Q	0.3	0.1	5	2.5	5.9	0	5	1.3

Intersection						
Int Delay, s/veh	35.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	183	613	361	73	114	13
Future Vol, veh/h	183	613	361	73	114	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	0	0	24	-	-	65
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	92	92	74	74
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	201	674	392	79	154	18
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1018	-	154	0	-	0
Stage 1	154	-	-	-	-	-
Stage 2	864	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	263	0	1426	-	-	0
Stage 1	874	0	-	-	-	0
Stage 2	413	0	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 191	-	1426	-	-	-
Mov Cap-2 Maneuver	~ 191	-	-	-	-	-
Stage 1	874	-	-	-	-	-
Stage 2	299	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	131		7.1		0	
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	
Capacity (veh/h)	1426	-	191	-	-	
HCM Lane V/C Ratio	0.275	-	1.053	-	-	
HCM Control Delay (s)	8.5	-	131	0	-	
HCM Lane LOS	A	-	F	A	-	
HCM 95th %tile Q(veh)	1.1	-	9.3	-	-	
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

HCM 2010 Signalized Intersection Summary
4: E. La Cadena & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	707	17	26	486	276	21	53	35	481	16	230
Future Volume (veh/h)	105	707	17	26	486	276	21	53	35	481	16	230
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1937	1900	1863	1863	1863
Adj Flow Rate, veh/h	133	895	22	32	600	341	24	60	39	559	19	267
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	1	1	1
Peak Hour Factor	0.79	0.79	0.79	0.81	0.81	0.81	0.89	0.89	0.89	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	163	1192	518	71	1008	451	352	227	147	748	819	697
Arrive On Green	0.09	0.34	0.34	0.04	0.28	0.28	0.03	0.21	0.21	0.27	0.44	0.44
Sat Flow, veh/h	1774	3539	1538	1774	3539	1583	1774	1098	714	1774	1863	1583
Grp Volume(v), veh/h	133	895	22	32	600	341	24	0	99	559	19	267
Grp Sat Flow(s),veh/h/ln	1774	1770	1538	1774	1770	1583	1774	0	1811	1774	1863	1583
Q Serve(g_s), s	7.9	24.0	1.0	1.9	15.6	21.0	1.1	0.0	4.9	25.0	0.6	12.1
Cycle Q Clear(g_c), s	7.9	24.0	1.0	1.9	15.6	21.0	1.1	0.0	4.9	25.0	0.6	12.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.39	1.00		1.00
Lane Grp Cap(c), veh/h	163	1192	518	71	1008	451	352	0	374	748	819	697
V/C Ratio(X)	0.81	0.75	0.04	0.45	0.59	0.76	0.07	0.00	0.26	0.75	0.02	0.38
Avail Cap(c_a), veh/h	282	1424	619	116	1093	489	409	0	374	906	819	697
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.6	31.5	23.8	50.1	32.9	34.8	31.3	0.0	35.6	20.5	16.9	20.2
Incr Delay (d2), s/veh	9.4	1.9	0.0	4.4	0.8	6.1	0.1	0.0	1.7	2.8	0.1	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	12.0	0.4	1.0	7.7	9.9	0.5	0.0	2.6	12.5	0.3	5.6
LnGrp Delay(d),s/veh	57.0	33.3	23.9	54.5	33.7	41.0	31.4	0.0	37.3	23.3	17.0	21.8
LnGrp LOS	E	C	C	D	C	D	C		D	C	B	C
Approach Vol, veh/h	1050				973				123			
Approach Delay, s/veh	36.1				36.9				36.1			
Approach LOS	D				D				D			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.3	40.0	7.6	51.0	13.8	34.4	32.5	26.1				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	7.0	43.0	7.0	47.0	17.0	33.0	38.0	16.0				
Max Q Clear Time (g_c+I1), s	3.9	26.0	3.1	14.1	9.9	23.0	27.0	6.9				
Green Ext Time (p_c), s	0.0	10.0	0.0	1.7	0.2	6.9	1.5	1.1				
Intersection Summary												
HCM 2010 Ctrl Delay	32.6											
HCM 2010 LOS	C											

HCM 2010 Signalized Intersection Summary
5: Chicago Avenue/Paige Drive & Columbia Ave

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	773	447	21	433	3	329	10	49	6	7	21
Future Volume (veh/h)	3	773	447	21	433	3	329	10	49	6	7	21
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	4	909	0	25	522	4	445	14	66	7	8	25
Adj No. of Lanes	1	2	1	1	3	0	2	1	0	1	2	0
Peak Hour Factor	0.85	0.85	0.85	0.83	0.83	0.83	0.74	0.74	0.74	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	13	1257	562	64	1997	15	551	115	540	22	452	399
Arrive On Green	0.01	0.36	0.00	0.04	0.38	0.38	0.16	0.40	0.40	0.01	0.26	0.26
Sat Flow, veh/h	1774	3539	1583	1774	5205	40	3442	284	1341	1774	1770	1563
Grp Volume(v), veh/h	4	909	0	25	340	186	445	0	80	7	8	25
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1695	1855	1721	0	1625	1774	1770	1563
Q Serve(g_s), s	0.2	20.7	0.0	1.3	6.4	6.4	11.6	0.0	2.9	0.4	0.3	1.1
Cycle Q Clear(g_c), s	0.2	20.7	0.0	1.3	6.4	6.4	11.6	0.0	2.9	0.4	0.3	1.1
Prop In Lane	1.00		1.00	1.00		0.02	1.00		0.82	1.00		1.00
Lane Grp Cap(c), veh/h	13	1257	562	64	1301	712	551	0	655	22	452	399
V/C Ratio(X)	0.31	0.72	0.00	0.39	0.26	0.26	0.81	0.00	0.12	0.32	0.02	0.06
Avail Cap(c_a), veh/h	143	1883	842	143	1804	987	980	0	655	143	452	399
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.9	26.0	0.0	43.9	19.6	19.6	37.7	0.0	17.4	45.5	25.9	26.2
Incr Delay (d2), s/veh	12.5	0.8	0.0	3.9	0.1	0.2	2.9	0.0	0.4	8.0	0.1	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	10.2	0.0	0.7	3.0	3.3	5.7	0.0	1.4	0.2	0.2	0.5
LnGrp Delay(d),s/veh	58.5	26.8	0.0	47.8	19.7	19.8	40.5	0.0	17.8	53.5	26.0	26.5
LnGrp LOS	E	C		D	B	B	D		B	D	C	C
Approach Vol, veh/h		913			551			525			40	
Approach Delay, s/veh		27.0			21.0			37.1			31.1	
Approach LOS		C			C			D			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.8	37.6	19.4	28.3	5.2	40.2	5.7	42.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5	49.5	26.5	18.5	7.5	49.5	7.5	37.5				
Max Q Clear Time (g_c+1/3), s	13.3	22.7	13.6	3.1	2.2	8.4	2.4	4.9				
Green Ext Time (p_c), s	0.0	10.3	1.3	0.4	0.0	11.7	0.0	0.6				
Intersection Summary												
HCM 2010 Ctrl Delay				28.1								
HCM 2010 LOS				C								

HCM 2010 Signalized Intersection Summary 6: Iowa Avenue & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 		 	 		 	 		 	 	
Traffic Volume (veh/h)	178	273	372	39	104	18	193	606	83	72	694	148
Future Volume (veh/h)	178	273	372	39	104	18	193	606	83	72	694	148
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1810	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	214	329	448	46	124	21	219	689	94	86	826	176
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	1
Peak Hour Factor	0.83	0.83	0.83	0.84	0.84	0.84	0.88	0.88	0.88	0.84	0.84	0.84
Percent Heavy Veh, %	5	5	5	2	2	2	2	2	2	2	2	2
Cap, veh/h	277	942	422	161	842	370	283	1647	727	196	1558	697
Arrive On Green	0.08	0.27	0.27	0.05	0.24	0.24	0.08	0.47	0.47	0.06	0.44	0.44
Sat Flow, veh/h	3343	3438	1538	3442	3539	1555	3442	3539	1563	3442	3539	1583
Grp Volume(v), veh/h	214	329	448	46	124	21	219	689	94	86	826	176
Grp Sat Flow(s),veh/h/ln	1672	1719	1538	1721	1770	1555	1721	1770	1563	1721	1770	1583
Q Serve(g_s), s	7.2	8.8	31.5	1.5	3.2	1.2	7.2	14.9	3.9	2.8	19.6	8.0
Cycle Q Clear(g_c), s	7.2	8.8	31.5	1.5	3.2	1.2	7.2	14.9	3.9	2.8	19.6	8.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	277	942	422	161	842	370	283	1647	727	196	1558	697
V/C Ratio(X)	0.77	0.35	1.06	0.29	0.15	0.06	0.77	0.42	0.13	0.44	0.53	0.25
Avail Cap(c_a), veh/h	451	942	422	255	842	370	434	1647	727	255	1558	697
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.6	33.5	41.7	52.9	34.6	33.8	51.7	20.4	17.5	52.4	23.5	20.3
Incr Delay (d2), s/veh	4.5	0.2	61.5	1.0	0.1	0.1	4.6	0.8	0.4	1.5	1.3	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.5	4.2	20.6	0.7	1.6	0.5	3.6	7.5	1.8	1.4	9.8	3.7
LnGrp Delay(d),s/veh	56.2	33.7	103.2	53.9	34.7	33.9	56.3	21.2	17.8	54.0	24.8	21.1
LnGrp LOS	E	C	F	D	C	C	E	C	B	D	C	C
Approach Vol, veh/h	991		191				1002			1088		
Approach Delay, s/veh	70.0		39.2				28.5			26.5		
Approach LOS	E		D				C			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.1	58.0	9.9	36.0	14.0	55.1	14.0	31.8				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5	53.5	8.5	31.5	14.5	47.5	15.5	24.5				
Max Q Clear Time (g_c+14.8), s	14.8	16.9	3.5	33.5	9.2	21.6	9.2	5.2				
Green Ext Time (p_c), s	0.1	13.7	0.0	0.0	0.3	12.0	0.3	4.3				
Intersection Summary												
HCM 2010 Ctrl Delay			41.0									
HCM 2010 LOS			D									

Intersection

Int Delay, s/veh 0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Vol, veh/h	335	47	26	141	10	9
Future Vol, veh/h	335	47	26	141	10	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	42
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	77	77	68	68
Heavy Vehicles, %	3	3	2	2	2	2
Mvmt Flow	399	56	34	183	15	13

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	455	586
Stage 1	-	-	427
Stage 2	-	-	159
Critical Hdwy	-	4.14	6.84
Critical Hdwy Stg 1	-	-	5.84
Critical Hdwy Stg 2	-	-	5.84
Follow-up Hdwy	-	2.22	3.52
Pot Cap-1 Maneuver	-	1102	441
Stage 1	-	-	626
Stage 2	-	-	853
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1102	427
Mov Cap-2 Maneuver	-	-	427
Stage 1	-	-	626
Stage 2	-	-	827

Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	427	776	-	-	1102	-
HCM Lane V/C Ratio	0.034	0.017	-	-	0.031	-
HCM Control Delay (s)	13.7	9.7	-	-	8.4	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0.1	-

Intersection						
Int Delay, s/veh	1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	124	174	22	171	28	4
Future Vol, veh/h	124	174	22	171	28	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	84	84	90	90
Heavy Vehicles, %	5	5	5	5	9	9
Mvmt Flow	143	200	26	204	31	4
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	343	0	397	171
Stage 1	-	-	-	-	243	-
Stage 2	-	-	-	-	154	-
Critical Hdwy	-	-	4.2	-	6.98	7.08
Critical Hdwy Stg 1	-	-	-	-	5.98	-
Critical Hdwy Stg 2	-	-	-	-	5.98	-
Follow-up Hdwy	-	-	2.25	-	3.59	3.39
Pot Cap-1 Maneuver	-	-	1191	-	562	821
Stage 1	-	-	-	-	754	-
Stage 2	-	-	-	-	838	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1191	-	550	821
Mov Cap-2 Maneuver	-	-	-	-	608	-
Stage 1	-	-	-	-	754	-
Stage 2	-	-	-	-	820	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.9		11.1	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	628	-	-	1191	-	
HCM Lane V/C Ratio	0.057	-	-	0.022	-	
HCM Control Delay (s)	11.1	-	-	8.1	-	
HCM Lane LOS	B	-	-	A	-	
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-	

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	60	3	190	152	1	6	3	110	0	1	5
Future Vol, veh/h	8	60	3	190	152	1	6	3	110	0	1	5
Conflicting Peds, #/hr	3	0	3	3	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	152	-	-	152	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	81	81	81	84	84	84	50	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	78	4	235	188	1	7	4	131	0	2	10
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	192	0	0	85	0	0	668	765	44	722	766	97
Stage 1	-	-	-	-	-	-	104	104	-	660	660	-
Stage 2	-	-	-	-	-	-	564	661	-	62	106	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1379	-	-	1509	-	-	344	332	1017	314	331	940
Stage 1	-	-	-	-	-	-	890	808	-	418	458	-
Stage 2	-	-	-	-	-	-	478	458	-	942	807	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1379	-	-	1509	-	-	296	277	1014	236	276	937
Mov Cap-2 Maneuver	-	-	-	-	-	-	296	277	-	236	276	-
Stage 1	-	-	-	-	-	-	881	800	-	414	386	-
Stage 2	-	-	-	-	-	-	397	386	-	811	799	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.9			4.3			10.1			10.5		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	853	1379	-	-	1509	-	-	670				
HCM Lane V/C Ratio	0.166	0.008	-	-	0.155	-	-	0.018				
HCM Control Delay (s)	10.1	7.6	-	-	7.8	-	-	10.5				
HCM Lane LOS	B	A	-	-	A	-	-	B				
HCM 95th %tile O(veh)	0.6	0	-	-	0.6	-	-	0.1				

Intersection

Int Delay, s/veh 2.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	50	46	379	97	61	404
Future Vol, veh/h	50	46	379	97	61	404
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	-	-	-	45	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	67	67	74	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	57	53	566	145	82	553

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1080	355	0
Stage 1	638	-	-
Stage 2	442	-	-
Critical Hdwy	6.84	6.94	4.14
Critical Hdwy Stg 1	5.84	-	-
Critical Hdwy Stg 2	5.84	-	-
Follow-up Hdwy	3.52	3.32	2.22
Pot Cap-1 Maneuver	213	641	885
Stage 1	488	-	-
Stage 2	615	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	193	641	885
Mov Cap-2 Maneuver	193	-	-
Stage 1	488	-	-
Stage 2	558	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.8	0	1.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	290	885
HCM Lane V/C Ratio	-	-	0.38	0.093
HCM Control Delay (s)	-	-	24.8	9.5
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	1.7	0.3

Intersection

Int Delay, s/veh 2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	107	28	37	98	13	10	2	21	5	0	8
Future Vol, veh/h	3	107	28	37	98	13	10	2	21	5	0	8
Conflicting Peds, #/hr	0	0	3	3	0	0	3	0	2	2	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	87	87	87	52	52	52	65	65	65
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	129	34	43	113	15	19	4	40	8	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	128	0	0	166	0	0	370	369	151	382	378	123
Stage 1	-	-	-	-	-	-	156	156	-	205	205	-
Stage 2	-	-	-	-	-	-	214	213	-	177	173	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1458	-	-	1412	-	-	587	560	895	576	554	928
Stage 1	-	-	-	-	-	-	846	769	-	797	732	-
Stage 2	-	-	-	-	-	-	788	726	-	825	756	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1454	-	-	1409	-	-	560	538	891	531	533	925
Mov Cap-2 Maneuver	-	-	-	-	-	-	560	538	-	531	533	-
Stage 1	-	-	-	-	-	-	841	765	-	795	708	-
Stage 2	-	-	-	-	-	-	750	702	-	780	752	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1.9	10.4	10.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	731	1454	-	-	1409	-	-	720
HCM Lane V/C Ratio	0.087	0.002	-	-	0.03	-	-	0.028
HCM Control Delay (s)	10.4	7.5	0	-	7.6	0	-	10.1
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.1

HCM 2010 Signalized Intersection Summary
12: Iowa Avenue & Marlborough Avenue

Marlborough Industrial Project

09/25/2017

																		
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR						
Lane Configurations																		
Traffic Volume (veh/h)	69	43	43	59	19	77	30	745	119	221	775	80						
Future Volume (veh/h)	69	43	43	59	19	77	30	745	119	221	775	80						
Number	7	4	14	3	8	18	5	2	12	1	6	16						
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0						
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.96						
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00						
Adj Sat Flow, veh/h/ln	1863	1863	1900	1743	1743	1743	1827	1827	1900	1792	1792	1792						
Adj Flow Rate, veh/h	100	62	62	83	27	108	35	866	138	260	912	94						
Adj No. of Lanes	1	1	0	1	1	1	1	2	0	1	2	1						
Peak Hour Factor	0.69	0.69	0.69	0.71	0.71	0.71	0.86	0.86	0.86	0.85	0.85	0.85						
Percent Heavy Veh, %	2	2	2	9	9	9	4	4	4	6	6	6						
Cap, veh/h	191	92	92	204	215	181	115	1021	163	302	1539	661						
Arrive On Green	0.11	0.11	0.11	0.12	0.12	0.12	0.07	0.34	0.34	0.18	0.45	0.45						
Sat Flow, veh/h	1774	856	856	1660	1743	1467	1740	2993	477	1707	3406	1462						
Grp Volume(v), veh/h	100	0	124	83	27	108	35	502	502	260	912	94						
Grp Sat Flow(s),veh/h/ln	1774	0	1712	1660	1743	1467	1740	1736	1735	1707	1703	1462						
Q Serve(g_s), s	4.0	0.0	5.3	3.5	1.0	5.3	1.4	20.3	20.3	11.2	15.2	2.8						
Cycle Q Clear(g_c), s	4.0	0.0	5.3	3.5	1.0	5.3	1.4	20.3	20.3	11.2	15.2	2.8						
Prop In Lane	1.00		0.50	1.00		1.00	1.00		0.27	1.00		1.00						
Lane Grp Cap(c), veh/h	191	0	185	204	215	181	115	592	592	302	1539	661						
V/C Ratio(X)	0.52	0.00	0.67	0.41	0.13	0.60	0.30	0.85	0.85	0.86	0.59	0.14						
Avail Cap(c_a), veh/h	821	0	792	900	945	795	437	711	711	429	1539	661						
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00						
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00						
Uniform Delay (d), s/veh	31.9	0.0	32.4	30.6	29.5	31.4	33.7	23.1	23.1	30.2	15.5	12.1						
Incr Delay (d2), s/veh	2.2	0.0	4.2	1.3	0.3	3.2	0.5	8.2	8.2	8.9	0.6	0.1						
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
%ile BackOfQ(50%),veh/ln	2.1	0.0	2.7	1.7	0.5	2.3	0.7	11.0	11.0	6.0	7.2	1.2						
LnGrp Delay(d),s/veh	34.1	0.0	36.6	31.9	29.8	34.5	34.2	31.3	31.3	39.2	16.1	12.2						
LnGrp LOS	C		D	C	C	C	C	C	C	D	B	B						
Approach Vol, veh/h	224					218		1039			1266							
Approach Delay, s/veh	35.5					32.9		31.4			20.6							
Approach LOS	D					C		C			C							
Timer	1	2	3	4	5	6	7	8										
Assigned Phs	1	2			4	5	6	8										
Phs Duration (G+Y+Rc), s	17.4	31.8			12.7	9.0	40.2	13.8										
Change Period (Y+Rc), s	4.0	6.0			4.5	4.0	6.0	4.5										
Max Green Setting (Gmax), s	19.0	31.0			35.0	19.0	31.0	41.0										
Max Q Clear Time (g_c+I1), s	13.2	22.3			7.3	3.4	17.2	7.3										
Green Ext Time (p_c), s	0.2	3.5			1.0	0.0	9.4	0.7										
Intersection Summary																		
HCM 2010 Ctrl Delay					26.9													
HCM 2010 LOS					C													

Intersection												
Int Delay, s/veh	6.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	250	44	88	126	0	67	1	159	0	0	1
Future Vol, veh/h	2	250	44	88	126	0	67	1	159	0	0	1
Conflicting Peds, #/hr	8	0	6	6	0	8	1	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	85	-	-	-	-	-	-	-	60
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	76	76	76	82	82	82	90	90	90	25	25	25
Heavy Vehicles, %	8	8	8	5	5	5	2	2	2	2	2	2
Mvmt Flow	3	329	58	107	154	0	74	1	177	0	0	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	162	0	0	393	0	0	738	745	364	828	774	163
Stage 1	-	-	-	-	-	-	369	369	-	376	376	-
Stage 2	-	-	-	-	-	-	369	376	-	452	398	-
Critical Hdwy	4.18	-	-	4.15	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.272	-	-	2.245	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1381	-	-	1149	-	-	334	342	681	290	329	882
Stage 1	-	-	-	-	-	-	651	621	-	645	616	-
Stage 2	-	-	-	-	-	-	651	616	-	587	603	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1380	-	-	1149	-	-	306	305	677	197	294	874
Mov Cap-2 Maneuver	-	-	-	-	-	-	306	305	-	197	294	-
Stage 1	-	-	-	-	-	-	646	616	-	639	554	-
Stage 2	-	-	-	-	-	-	587	554	-	432	598	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			3.5			19.5			9.1		
HCM LOS							C			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2			
Capacity (veh/h)	497	1380	-	-	1149	-	-	-	874			
HCM Lane V/C Ratio	0.507	0.002	-	-	0.093	-	-	-	0.005			
HCM Control Delay (s)	19.5	7.6	-	-	8.5	-	-	0	9.1			
HCM Lane LOS	C	A	-	-	A	-	-	A	A			
HCM 95th %tile Q(veh)	2.8	0	-	-	0.3	-	-	-	0			

Intersection

Int Delay, s/veh 5.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	198	211	67	3	6	147
Future Vol, veh/h	198	211	67	3	6	147
Conflicting Peds, #/hr	8	0	0	8	0	53
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	54	54	81	81
Heavy Vehicles, %	14	14	13	13	2	2
Mvmt Flow	215	229	124	6	7	181

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	138	0	795
Stage 1	-	-	135
Stage 2	-	-	660
Critical Hdwy	4.24	-	7.12
Critical Hdwy Stg 1	-	-	6.12
Critical Hdwy Stg 2	-	-	6.12
Follow-up Hdwy	2.326	-	3.518
Pot Cap-1 Maneuver	1375	-	305
Stage 1	-	-	868
Stage 2	-	-	452
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1306	-	259
Mov Cap-2 Maneuver	-	-	259
Stage 1	-	-	699
Stage 2	-	-	367

Approach	EB	WB	SB
HCM Control Delay, s	4	0	11.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1306	-	-	-	744
HCM Lane V/C Ratio	0.165	-	-	-	0.254
HCM Control Delay (s)	8.3	0	-	-	11.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.6	-	-	-	1

HCM 2010 Signalized Intersection Summary

1: Columbia Ave & Primer St

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	179	740	0	0	375	665	0	0	0	275	0	153
Future Volume (veh/h)	179	740	0	0	375	665	0	0	0	275	0	153
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	190	787	0	0	412	0	0	0	0	225	90	161
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.92	0.92	0.92	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	230	2552	0	80	1917	0	0	344	0	407	111	198
Arrive On Green	0.09	0.48	0.00	0.00	0.54	0.00	0.00	0.00	0.00	0.18	0.18	0.18
Sat Flow, veh/h	1774	3632	0	685	3632	0	0	1863	0	1774	600	1073
Grp Volume(v), veh/h	190	787	0	0	412	0	0	0	0	225	0	251
Grp Sat Flow(s),veh/h/ln	1774	1770	0	685	1770	0	0	1863	0	1774	0	1673
Q Serve(g_s), s	9.5	12.2	0.0	0.0	5.4	0.0	0.0	0.0	0.0	10.7	0.0	13.0
Cycle Q Clear(g_c), s	9.5	12.2	0.0	0.0	5.4	0.0	0.0	0.0	0.0	10.7	0.0	13.0
Prop In Lane	1.00		0.00	1.00		0.00	0.00		0.00	1.00		0.64
Lane Grp Cap(c), veh/h	230	2552	0	80	1917	0	0	344	0	407	0	309
V/C Ratio(X)	0.83	0.31	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.55	0.00	0.81
Avail Cap(c_a), veh/h	365	2552	0	80	1917	0	0	528	0	583	0	474
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.92	0.92	0.00	0.00	0.76	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.1	9.6	0.0	0.0	10.7	0.0	0.0	0.0	0.0	34.3	0.0	35.2
Incr Delay (d2), s/veh	7.8	0.3	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.2	0.0	6.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	6.1	0.0	0.0	2.7	0.0	0.0	0.0	0.0	5.3	0.0	6.5
LnGrp Delay(d),s/veh	47.9	9.9	0.0	0.0	10.9	0.0	0.0	0.0	0.0	35.4	0.0	41.4
LnGrp LOS	D	A			B					D		D
Approach Vol, veh/h		977			412			0			476	
Approach Delay, s/veh		17.3			10.9			0.0			38.6	
Approach LOS		B			B						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		68.9		21.1	16.2	52.7		21.1				
Change Period (Y+Rc), s		4.0		4.5	4.5	4.0		4.5				
Max Green Setting (Gmax), s		56.0		25.5	18.5	33.0		25.5				
Max Q Clear Time (g_c+I1), s		14.2		15.0	11.5	7.4		0.0				
Green Ext Time (p_c), s		9.7		1.7	0.3	8.5		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				21.3								
HCM 2010 LOS				C								
Notes												

User approved volume balancing among the lanes for turning movement.

Intersection

Intersection Delay, s/veh 62

Intersection LOS F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↔				↔	↔			↔	↔			↔	↔
Traffic Vol, veh/h	0	124	683	27	0	27	274	9	0	4	145	12	0	218	71	156
Future Vol, veh/h	0	124	683	27	0	27	274	9	0	4	145	12	0	218	71	156
Peak Hour Factor	0.92	0.89	0.89	0.89	0.92	0.96	0.96	0.96	0.92	0.86	0.86	0.86	0.92	0.91	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	139	767	30	0	28	285	9	0	5	169	14	0	240	78	171
Number of Lanes	0	0	2	0	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	97.6	33.7	18.8	29
HCM LOS	F	D	C	D

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	3%	0%	27%	0%	9%	0%	75%	0%
Vol Thru, %	97%	0%	73%	93%	91%	0%	25%	0%
Vol Right, %	0%	100%	0%	7%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	149	12	466	369	301	9	289	156
LT Vol	4	0	124	0	27	0	218	0
Through Vol	145	0	342	342	274	0	71	0
RT Vol	0	12	0	27	0	9	0	156
Lane Flow Rate	173	14	523	414	314	9	318	171
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.44	0.033	1.19	0.92	0.754	0.021	0.773	0.366
Departure Headway (Hd)	9.474	8.727	8.194	8.003	8.96	8.186	9.032	7.914
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	383	413	445	455	408	440	403	458
Service Time	7.174	6.427	5.941	5.75	6.66	5.886	6.732	5.614
HCM Lane V/C Ratio	0.452	0.034	1.175	0.91	0.77	0.02	0.789	0.373
HCM Control Delay	19.4	11.7	132.7	53.2	34.4	11.1	36.5	15.1
HCM Lane LOS	C	B	F	F	D	B	E	C
HCM 95th-tile Q	2.2	0.1	20.1	10.4	6.1	0.1	6.5	1.7

Intersection							
Int Delay, s/veh	57.5						
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Vol, veh/h	79	315	685	124	179	33	
Future Vol, veh/h	79	315	685	124	179	33	
Conflicting Peds, #/hr	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	
RT Channelized	-	Free	-	None	-	Free	
Storage Length	0	0	24	-	-	65	
Veh in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	89	89	96	96	90	90	
Heavy Vehicles, %	2	2	2	2	2	2	
Mvmt Flow	89	354	714	129	199	37	
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	1755	-	199	0	-	-	0
Stage 1	199	-	-	-	-	-	-
Stage 2	1556	-	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-	-
Pot Cap-1 Maneuver	94	0	1373	-	-	-	0
Stage 1	835	0	-	-	-	-	0
Stage 2	191	0	-	-	-	-	0
Platoon blocked, %				-	-		
Mov Cap-1 Maneuver	~ 45	-	1373	-	-	-	-
Mov Cap-2 Maneuver	~ 45	-	-	-	-	-	-
Stage 1	835	-	-	-	-	-	-
Stage 2	92	-	-	-	-	-	-
Approach	EB		NB		SB		
HCM Control Delay, s	\$ 648.6		8.8		0		
HCM LOS	F						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT		
Capacity (veh/h)	1373	-	45	-	-		
HCM Lane V/C Ratio	0.52	-	1.973	-	-		
HCM Control Delay (s)	10.4	-\$ 648.6	0	-	-		
HCM Lane LOS	B	-	F	A	-		
HCM 95th %tile Q(veh)	3.1	-	9.1	-	-		
Notes							
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon							

HCM 2010 Signalized Intersection Summary
4: E. La Cadena & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	171	801	43	32	773	561	28	77	12	223	32	239
Future Volume (veh/h)	171	801	43	32	773	561	28	77	12	223	32	239
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.97	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1937	1900	1863	1863	1863
Adj Flow Rate, veh/h	186	871	47	35	849	616	31	87	13	242	35	260
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.89	0.89	0.89	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	220	1871	833	75	1582	708	299	245	37	429	448	380
Arrive On Green	0.12	0.53	0.53	0.04	0.45	0.45	0.04	0.15	0.15	0.13	0.24	0.24
Sat Flow, veh/h	1774	3539	1576	1774	3539	1583	1774	1641	245	1774	1863	1583
Grp Volume(v), veh/h	186	871	47	35	849	616	31	0	100	242	35	260
Grp Sat Flow(s),veh/h/ln	1774	1770	1576	1774	1770	1583	1774	0	1886	1774	1863	1583
Q Serve(g_s), s	11.0	16.5	1.6	2.1	18.7	37.7	1.5	0.0	5.1	11.9	1.6	16.0
Cycle Q Clear(g_c), s	11.0	16.5	1.6	2.1	18.7	37.7	1.5	0.0	5.1	11.9	1.6	16.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	220	1871	833	75	1582	708	299	0	282	429	448	380
V/C Ratio(X)	0.85	0.47	0.06	0.47	0.54	0.87	0.10	0.00	0.35	0.56	0.08	0.68
Avail Cap(c_a), veh/h	381	2182	972	116	1653	740	345	0	282	446	448	380
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.9	15.8	12.3	50.1	21.5	26.8	35.8	0.0	40.9	30.8	31.5	37.0
Incr Delay (d2), s/veh	8.7	0.2	0.0	4.4	0.3	10.7	0.2	0.0	3.5	1.5	0.3	9.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	8.0	0.7	1.1	9.1	18.6	0.8	0.0	2.9	5.9	0.8	8.0
LnGrp Delay(d),s/veh	54.6	16.0	12.3	54.5	21.8	37.4	36.0	0.0	44.4	32.3	31.8	46.5
LnGrp LOS	D	B	B	D	C	D	D		D	C	C	D
Approach Vol, veh/h	1104				1500				131		537	
Approach Delay, s/veh	22.3				29.0				42.4		39.2	
Approach LOS	C				C				D		D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.5	60.6	8.2	29.7	17.3	51.9	17.9	20.0				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	7.0	66.0	7.0	24.0	23.0	50.0	15.0	16.0				
Max Q Clear Time (g_c+I1), s	4.1	18.5	3.5	18.0	13.0	39.7	13.9	7.1				
Green Ext Time (p_c), s	0.0	22.6	0.0	0.9	0.3	8.2	0.1	1.1				
Intersection Summary												
HCM 2010 Ctrl Delay			29.0									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

5: Chicago Avenue/Paige Drive & Columbia Ave

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	462	551	60	845	4	499	12	82	8	28	32
Future Volume (veh/h)	10	462	551	60	845	4	499	12	82	8	28	32
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	11	491	0	67	939	4	580	14	95	11	38	43
Adj No. of Lanes	1	2	1	1	3	0	2	1	0	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.86	0.86	0.86	0.74	0.74	0.74
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	33	921	412	113	1596	7	702	94	639	33	477	427
Arrive On Green	0.02	0.26	0.00	0.06	0.31	0.31	0.20	0.45	0.45	0.02	0.27	0.27
Sat Flow, veh/h	1774	3539	1583	1774	5227	22	3442	207	1405	1774	1770	1583
Grp Volume(v), veh/h	11	491	0	67	609	334	580	0	109	11	38	43
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1695	1859	1721	0	1613	1774	1770	1583
Q Serve(g_s), s	0.5	10.6	0.0	3.3	13.5	13.5	14.3	0.0	3.5	0.5	1.4	1.8
Cycle Q Clear(g_c), s	0.5	10.6	0.0	3.3	13.5	13.5	14.3	0.0	3.5	0.5	1.4	1.8
Prop In Lane	1.00		1.00	1.00		0.01	1.00		0.87	1.00		1.00
Lane Grp Cap(c), veh/h	33	921	412	113	1035	567	702	0	733	33	477	427
V/C Ratio(X)	0.33	0.53	0.00	0.59	0.59	0.59	0.83	0.00	0.15	0.33	0.08	0.10
Avail Cap(c_a), veh/h	142	1753	784	210	1809	992	1143	0	733	142	477	427
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.0	28.2	0.0	40.5	26.1	26.1	33.9	0.0	14.2	43.0	24.2	24.4
Incr Delay (d2), s/veh	5.7	0.5	0.0	4.9	0.5	1.0	2.7	0.0	0.4	5.7	0.3	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	5.2	0.0	1.8	6.4	7.1	7.0	0.0	1.6	0.3	0.7	0.8
LnGrp Delay(d),s/veh	48.7	28.7	0.0	45.4	26.7	27.1	36.5	0.0	14.6	48.7	24.6	24.9
LnGrp LOS	D	C		D	C	C	D		B	D	C	C
Approach Vol, veh/h		502			1010			689			92	
Approach Delay, s/veh		29.1			28.1			33.1			27.6	
Approach LOS		C			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.2	27.6	22.6	28.4	6.2	31.6	6.2	44.9				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	10.5	44.0	29.5	18.0	7.1	47.4	7.1	40.4				
Max Q Clear Time (g_c+1.5), s	15.3	12.6	16.3	3.8	2.5	15.5	2.5	5.5				
Green Ext Time (p_c), s	0.0	10.5	1.8	0.8	0.0	10.6	0.0	1.2				
Intersection Summary												
HCM 2010 Ctrl Delay			29.8									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary 6: Iowa Avenue & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	136	369	97	314	39	367	660	71	25	897	224
Future Volume (veh/h)	115	136	369	97	314	39	367	660	71	25	897	224
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1863	1863	1863	1845	1845	1845	1863	1863	1863
Adj Flow Rate, veh/h	132	156	424	108	349	43	417	750	81	28	1008	252
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	1
Peak Hour Factor	0.87	0.87	0.87	0.90	0.90	0.90	0.88	0.88	0.88	0.89	0.89	0.89
Percent Heavy Veh, %	3	3	3	2	2	2	3	3	3	2	2	2
Cap, veh/h	199	907	396	198	912	408	470	1739	765	122	1394	624
Arrive On Green	0.06	0.26	0.26	0.06	0.26	0.26	0.14	0.50	0.50	0.04	0.39	0.39
Sat Flow, veh/h	3408	3505	1530	3442	3539	1583	3408	3505	1542	3442	3539	1583
Grp Volume(v), veh/h	132	156	424	108	349	43	417	750	81	28	1008	252
Grp Sat Flow(s),veh/h/ln	1704	1752	1530	1721	1770	1583	1704	1752	1542	1721	1770	1583
Q Serve(g_s), s	4.5	4.1	30.6	3.6	9.6	2.5	14.2	16.2	3.3	0.9	28.6	13.6
Cycle Q Clear(g_c), s	4.5	4.1	30.6	3.6	9.6	2.5	14.2	16.2	3.3	0.9	28.6	13.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	199	907	396	198	912	408	470	1739	765	122	1394	624
V/C Ratio(X)	0.66	0.17	1.07	0.55	0.38	0.11	0.89	0.43	0.11	0.23	0.72	0.40
Avail Cap(c_a), veh/h	262	907	396	236	912	408	481	1739	765	207	1394	624
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.6	34.0	43.9	54.3	36.2	33.5	50.1	19.1	15.9	55.5	30.4	25.8
Incr Delay (d2), s/veh	3.8	0.1	65.7	2.3	0.3	0.1	17.7	0.8	0.3	0.9	3.3	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	2.0	20.2	1.8	4.7	1.1	7.9	8.0	1.5	0.5	14.5	6.3
LnGrp Delay(d),s/veh	58.4	34.1	109.5	56.6	36.4	33.6	67.8	19.9	16.1	56.4	33.7	27.8
LnGrp LOS	E	C	F	E	D	C	E	B	B	E	C	C
Approach Vol, veh/h	712				500		1248				1288	
Approach Delay, s/veh	83.5				40.5		35.7				33.0	
Approach LOS	F				D		D				C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.7	63.2	11.3	35.1	20.8	51.1	11.4	35.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	7.5	56.2	8.1	30.6	16.7	46.6	9.1	29.6				
Max Q Clear Time (g_c+12, s)	12.5	18.2	5.6	32.6	16.2	30.6	6.5	11.6				
Green Ext Time (p_c), s	0.0	17.5	0.1	0.0	0.1	10.6	0.1	4.5				
Intersection Summary												
HCM 2010 Ctrl Delay			44.5									
HCM 2010 LOS			D									

Intersection

Int Delay, s/veh 1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Vol, veh/h	192	16	12	365	71	12
Future Vol, veh/h	192	16	12	365	71	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	42
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	91	91	80	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	237	20	13	401	89	15

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	474
Stage 1	-	-	247
Stage 2	-	-	227
Critical Hdwy	-	4.14	6.84
Critical Hdwy Stg 1	-	-	5.84
Critical Hdwy Stg 2	-	-	5.84
Follow-up Hdwy	-	2.22	3.52
Pot Cap-1 Maneuver	-	1305	519
Stage 1	-	-	771
Stage 2	-	-	789
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1305	514
Mov Cap-2 Maneuver	-	-	514
Stage 1	-	-	771
Stage 2	-	-	781

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	12.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	514	898	-	-	1305	-
HCM Lane V/C Ratio	0.173	0.017	-	-	0.01	-
HCM Control Delay (s)	13.5	9.1	-	-	7.8	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0	-

Intersection						
Int Delay, s/veh	6.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	216	47	6	222	165	21
Future Vol, veh/h	216	47	6	222	165	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	65	65	53	53
Heavy Vehicles, %	9	9	8	8	7	7
Mvmt Flow	260	57	9	342	311	40
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	317	0	478	158
Stage 1	-	-	-	-	289	-
Stage 2	-	-	-	-	189	-
Critical Hdwy	-	-	4.26	-	6.94	7.04
Critical Hdwy Stg 1	-	-	-	-	5.94	-
Critical Hdwy Stg 2	-	-	-	-	5.94	-
Follow-up Hdwy	-	-	2.28	-	3.57	3.37
Pot Cap-1 Maneuver	-	-	1198	-	504	844
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	810	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1198	-	500	844
Mov Cap-2 Maneuver	-	-	-	-	573	-
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	804	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.2		19.4	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	595	-	-	1198	-	
HCM Lane V/C Ratio	0.59	-	-	0.008	-	
HCM Control Delay (s)	19.4	-	-	8	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q(veh)	3.8	-	-	0	-	

Intersection												
Int Delay, s/veh	6.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	124	4	147	108	0	0	6	228	6	9	2
Future Vol, veh/h	5	124	4	147	108	0	0	6	228	6	9	2
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	152	-	-	152	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	87	87	87	84	84	84	53	53	53
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	153	5	169	124	0	0	7	271	11	17	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	124	0	0	159	0	0	577	631	80	554	633	62
Stage 1	-	-	-	-	-	-	169	169	-	462	462	-
Stage 2	-	-	-	-	-	-	408	462	-	92	171	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1461	-	-	1418	-	-	400	397	964	415	395	990
Stage 1	-	-	-	-	-	-	816	758	-	549	563	-
Stage 2	-	-	-	-	-	-	591	563	-	905	756	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1461	-	-	1418	-	-	347	348	963	266	346	990
Mov Cap-2 Maneuver	-	-	-	-	-	-	347	348	-	266	346	-
Stage 1	-	-	-	-	-	-	812	754	-	547	496	-
Stage 2	-	-	-	-	-	-	501	496	-	641	752	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			4.5			10.6			16.8		
HCM LOS							B			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	921	1461	-	-	1418	-	-	336				
HCM Lane V/C Ratio	0.302	0.004	-	-	0.119	-	-	0.095				
HCM Control Delay (s)	10.6	7.5	-	-	7.9	-	-	16.8				
HCM Lane LOS	B	A	-	-	A	-	-	C				
HCM 95th %tile O(veh)	1.3	0	-	-	0.4	-	-	0.3				

Intersection						
Int Delay, s/veh	2.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	73	63	502	52	32	579
Future Vol, veh/h	73	63	502	52	32	579
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	-	-	-	45	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	94	94	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	85	73	534	55	37	673
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	973	295	0	0	589	0
Stage 1	562	-	-	-	-	-
Stage 2	411	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	250	701	-	-	982	-
Stage 1	534	-	-	-	-	-
Stage 2	638	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	241	701	-	-	982	-
Mov Cap-2 Maneuver	241	-	-	-	-	-
Stage 1	534	-	-	-	-	-
Stage 2	614	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	23.9		0		0.5	
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	- 346	982	-		
HCM Lane V/C Ratio	-	- 0.457	0.038	-		
HCM Control Delay (s)	-	- 23.9	8.8	-		
HCM Lane LOS	-	- C	A	-		
HCM 95th %tile Q(veh)	-	- 2.3	0.1	-		

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	86	21	38	88	2	21	2	25	5	1	2
Future Vol, veh/h	3	86	21	38	88	2	21	2	25	5	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	4	4	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	90	90	90	80	80	80	50	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	119	29	42	98	2	26	3	31	10	2	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	100	0	0	149	0	0	328	326	138	346	340	99
Stage 1	-	-	-	-	-	-	142	142	-	183	183	-
Stage 2	-	-	-	-	-	-	186	184	-	163	157	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1493	-	-	1432	-	-	625	592	910	608	582	957
Stage 1	-	-	-	-	-	-	861	779	-	819	748	-
Stage 2	-	-	-	-	-	-	816	747	-	839	768	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1493	-	-	1427	-	-	605	572	907	568	562	957
Mov Cap-2 Maneuver	-	-	-	-	-	-	605	572	-	568	562	-
Stage 1	-	-	-	-	-	-	858	777	-	817	725	-
Stage 2	-	-	-	-	-	-	785	724	-	802	766	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			2.3			10.4			10.9		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	730	1493	-	-	1427	-	-	631				
HCM Lane V/C Ratio	0.082	0.003	-	-	0.03	-	-	0.025				
HCM Control Delay (s)	10.4	7.4	0	-	7.6	0	-	10.9				
HCM Lane LOS	B	A	A	-	A	A	-	B				
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.1				

HCM 2010 Signalized Intersection Summary 12: Iowa Avenue & Marlborough Avenue

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	81	23	23	157	46	226	46	774	52	104	1180	76
Future Volume (veh/h)	81	23	23	157	46	226	46	774	52	104	1180	76
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.97	1.00		0.99	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1743	1743	1743	1810	1810	1900	1792	1792	1792
Adj Flow Rate, veh/h	100	28	28	234	69	337	48	815	55	111	1255	81
Adj No. of Lanes	1	1	0	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.81	0.81	0.81	0.67	0.67	0.67	0.95	0.95	0.95	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	9	9	9	5	5	5	6	6	6
Cap, veh/h	148	71	71	444	466	386	77	1324	89	139	1506	655
Arrive On Green	0.08	0.08	0.08	0.27	0.27	0.27	0.04	0.41	0.41	0.08	0.44	0.44
Sat Flow, veh/h	1774	853	853	1660	1743	1444	1723	3265	220	1707	3406	1480
Grp Volume(v), veh/h	100	0	56	234	69	337	48	429	441	111	1255	81
Grp Sat Flow(s),veh/h/ln	1774	0	1705	1660	1743	1444	1723	1719	1767	1707	1703	1480
Q Serve(g_s), s	6.4	0.0	3.6	14.1	3.5	26.1	3.2	23.1	23.1	7.5	38.1	3.8
Cycle Q Clear(g_c), s	6.4	0.0	3.6	14.1	3.5	26.1	3.2	23.1	23.1	7.5	38.1	3.8
Prop In Lane	1.00		0.50	1.00		1.00	1.00		0.12	1.00		1.00
Lane Grp Cap(c), veh/h	148	0	142	444	466	386	77	697	716	139	1506	655
V/C Ratio(X)	0.68	0.00	0.39	0.53	0.15	0.87	0.62	0.62	0.62	0.80	0.83	0.12
Avail Cap(c_a), veh/h	531	0	510	582	611	506	273	829	852	271	1645	715
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.1	0.0	50.8	36.6	32.7	41.0	54.9	27.6	27.6	52.8	28.8	19.3
Incr Delay (d2), s/veh	5.3	0.0	1.8	1.0	0.1	12.5	3.0	1.0	1.0	3.9	3.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	0.0	1.8	6.6	1.7	11.7	1.6	11.2	11.5	3.7	18.5	1.6
LnGrp Delay(d),s/veh	57.4	0.0	52.6	37.5	32.8	53.5	58.0	28.6	28.5	56.7	32.4	19.3
LnGrp LOS	E		D	D	C	D	E	C	C	E	C	B
Approach Vol, veh/h		156			640			918			1447	
Approach Delay, s/veh		55.7			45.4			30.1			33.5	
Approach LOS		E			D			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.5	53.4		14.2	9.2	57.7		35.8				
Change Period (Y+Rc), s	4.0	6.0		4.5	4.0	6.0		4.5				
Max Green Setting (Gmax), s	18.6	56.4		35.0	18.5	56.5		41.0				
Max Q Clear Time (g_c+I1), s	9.5	25.1		8.4	5.2	40.1		28.1				
Green Ext Time (p_c), s	0.1	17.9		0.5	0.0	11.7		2.0				
Intersection Summary												
HCM 2010 Ctrl Delay			36.0									
HCM 2010 LOS			D									

Intersection

Int Delay, s/veh 4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	133	53	157	291	0	35	2	104	3	3	2
Future Vol, veh/h	1	133	53	157	291	0	35	2	104	3	3	2
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	85	-	-	-	-	-	-	-	60
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	69	69	69	91	91	91	84	84	84	40	40	40
Heavy Vehicles, %	7	7	7	2	2	2	5	5	5	2	2	2
Mvmt Flow	1	193	77	173	320	0	42	2	124	8	8	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	321	0	0	270	0	0	903	900	231	963	938	321
Stage 1	-	-	-	-	-	-	234	234	-	666	666	-
Stage 2	-	-	-	-	-	-	669	666	-	297	272	-
Critical Hdwy	4.17	-	-	4.12	-	-	7.15	6.55	6.25	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.12	5.52	-
Follow-up Hdwy	2.263	-	-	2.218	-	-	3.545	4.045	3.345	3.518	4.018	3.318
Pot Cap-1 Maneuver	1211	-	-	1293	-	-	255	275	801	235	264	720
Stage 1	-	-	-	-	-	-	762	706	-	449	457	-
Stage 2	-	-	-	-	-	-	442	453	-	712	685	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1211	-	-	1293	-	-	222	238	801	177	228	719
Mov Cap-2 Maneuver	-	-	-	-	-	-	222	238	-	177	228	-
Stage 1	-	-	-	-	-	-	761	705	-	448	395	-
Stage 2	-	-	-	-	-	-	373	392	-	599	684	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.9	16.6	21
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	477	1211	-	-	1293	-	-	199	719
HCM Lane V/C Ratio	0.352	0.001	-	-	0.133	-	-	0.075	0.007
HCM Control Delay (s)	16.6	8	-	-	8.2	-	-	24.6	10
HCM Lane LOS	C	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	1.6	0	-	-	0.5	-	-	0.2	0

Intersection						
Int Delay, s/veh	5.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	140	100	205	5	2	243
Future Vol, veh/h	140	100	205	5	2	243
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	79	79	94	94
Heavy Vehicles, %	13	13	12	12	2	2
Mvmt Flow	171	122	259	6	2	259
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	266	0	-	0	726	263
Stage 1	-	-	-	-	263	-
Stage 2	-	-	-	-	463	-
Critical Hdwy	4.23	-	-	-	7.12	6.22
Critical Hdwy Stg 1	-	-	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-	6.12	-
Follow-up Hdwy	2.317	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1237	-	-	-	340	776
Stage 1	-	-	-	-	742	-
Stage 2	-	-	-	-	579	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1237	-	-	-	301	776
Mov Cap-2 Maneuver	-	-	-	-	301	-
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	493	-
Approach	EB		WB		SB	
HCM Control Delay, s	4.9		0		12.1	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1237	-	-	-	766	
HCM Lane V/C Ratio	0.138	-	-	-	0.34	
HCM Control Delay (s)	8.4	0	-	-	12.1	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.5	-	-	-	1.5	

EXISTING + AMBIENT + PROJECT

HCM 2010 Signalized Intersection Summary
1: Columbia Ave & Primer St

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	158	508	0	0	344	408	0	0	0	336	0	106
Future Volume (veh/h)	158	508	0	0	344	408	0	0	0	336	0	106
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1827	1827	1900
Adj Flow Rate, veh/h	208	668	0	0	410	0	0	0	0	230	168	110
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	1	1	0
Peak Hour Factor	0.76	0.76	0.76	0.84	0.84	0.84	0.92	0.92	0.92	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	4	4	4
Cap, veh/h	242	2508	0	80	1847	0	0	367	0	423	203	133
Arrive On Green	0.27	1.00	0.00	0.00	0.52	0.00	0.00	0.00	0.00	0.20	0.20	0.20
Sat Flow, veh/h	1774	3632	0	766	3632	0	0	1863	0	1740	1032	676
Grp Volume(v), veh/h	208	668	0	0	410	0	0	0	0	230	0	278
Grp Sat Flow(s),veh/h/ln	1774	1770	0	766	1770	0	0	1863	0	1740	0	1708
Q Serve(g_s), s	10.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	11.0	0.0	14.1
Cycle Q Clear(g_c), s	10.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	11.0	0.0	14.1
Prop In Lane	1.00		0.00	1.00		0.00	0.00		0.00	1.00		0.40
Lane Grp Cap(c), veh/h	242	2508	0	80	1847	0	0	367	0	423	0	336
V/C Ratio(X)	0.86	0.27	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.54	0.00	0.83
Avail Cap(c_a), veh/h	404	2508	0	80	1847	0	0	528	0	573	0	484
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.96	0.96	0.00	0.00	0.79	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.9	0.0	0.0	0.0	11.6	0.0	0.0	0.0	0.0	33.4	0.0	34.7
Incr Delay (d2), s/veh	9.0	0.3	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.1	0.0	7.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.1	0.0	0.0	2.8	0.0	0.0	0.0	0.0	5.4	0.0	7.4
LnGrp Delay(d),s/veh	40.9	0.3	0.0	0.0	11.9	0.0	0.0	0.0	0.0	34.5	0.0	42.4
LnGrp LOS	D	A			B					C		D
Approach Vol, veh/h		876			410			0			508	
Approach Delay, s/veh		9.9			11.9			0.0			38.8	
Approach LOS		A			B						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		67.8		22.2	16.8	51.0		22.2				
Change Period (Y+Rc), s		4.0		4.5	4.5	4.0		4.5				
Max Green Setting (Gmax), s		56.0		25.5	20.5	31.0		25.5				
Max Q Clear Time (g_c+I1), s		2.0		16.1	12.0	7.6		0.0				
Green Ext Time (p_c), s		8.5		1.7	0.3	7.2		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			18.5									
HCM 2010 LOS			B									
Notes												

User approved volume balancing among the lanes for turning movement.

Intersection

Intersection Delay, s/veh23.2

Intersection LOS C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			←←				↔	↔			↔	↔			↔	↔
Traffic Vol, veh/h	0	102	458	9	0	15	288	4	0	8	22	12	0	244	28	146
Future Vol, veh/h	0	102	458	9	0	15	288	4	0	8	22	12	0	244	28	146
Peak Hour Factor	0.92	0.97	0.97	0.97	0.92	0.85	0.85	0.85	0.92	0.88	0.88	0.88	0.92	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	3	3	3	2	2	2	2	2	2	2	2
Mvmt Flow	0	105	472	9	0	18	339	5	0	9	25	14	0	284	33	170
Number of Lanes	0	0	2	0	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	21.6	28.9	12	22.1
HCM LOS	C	D	B	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	27%	0%	31%	0%	5%	0%	90%	0%
Vol Thru, %	73%	0%	69%	96%	95%	0%	10%	0%
Vol Right, %	0%	100%	0%	4%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	30	12	331	238	303	4	272	146
LT Vol	8	0	102	0	15	0	244	0
Through Vol	22	0	229	229	288	0	28	0
RT Vol	0	12	0	9	0	4	0	146
Lane Flow Rate	34	14	341	245	356	5	316	170
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.084	0.03	0.695	0.487	0.744	0.009	0.698	0.319
Departure Headway (Hd)	8.847	7.98	7.337	7.152	7.518	6.775	7.943	6.764
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	405	448	491	503	481	528	455	531
Service Time	6.61	5.743	5.081	4.896	5.264	4.52	5.68	4.502
HCM Lane V/C Ratio	0.084	0.031	0.695	0.487	0.74	0.009	0.695	0.32
HCM Control Delay	12.4	11	25.2	16.5	29.2	9.6	27.1	12.7
HCM Lane LOS	B	B	D	C	D	A	D	B
HCM 95th-tile Q	0.3	0.1	5.3	2.6	6.2	0	5.3	1.4

Intersection						
Int Delay, s/veh	41.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	187	624	368	74	116	13
Future Vol, veh/h	187	624	368	74	116	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	0	0	24	-	-	65
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	92	92	74	74
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	205	686	400	80	157	18
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1037	-	157	0	-	0
Stage 1	157	-	-	-	-	-
Stage 2	880	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	256	0	1423	-	-	0
Stage 1	871	0	-	-	-	0
Stage 2	406	0	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 184	-	1423	-	-	-
Mov Cap-2 Maneuver	~ 184	-	-	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	292	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	153.4		7.1		0	
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	
Capacity (veh/h)	1423	-	184	-	-	
HCM Lane V/C Ratio	0.281	-	1.117	-	-	
HCM Control Delay (s)	8.5	-	153.4	0	-	
HCM Lane LOS	A	-	F	A	-	
HCM 95th %tile Q(veh)	1.2	-	10.2	-	-	
Notes						
~: Volume exceeds capacity	\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon	

HCM 2010 Signalized Intersection Summary
4: E. La Cadena & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	107	720	17	27	495	281	21	54	36	489	16	235
Future Volume (veh/h)	107	720	17	27	495	281	21	54	36	489	16	235
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1937	1900	1863	1863	1863
Adj Flow Rate, veh/h	135	911	22	33	611	347	24	61	40	569	19	273
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	1	1	1
Peak Hour Factor	0.79	0.79	0.79	0.81	0.81	0.81	0.89	0.89	0.89	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	165	1203	523	72	1018	455	339	215	141	745	814	692
Arrive On Green	0.09	0.34	0.34	0.04	0.29	0.29	0.03	0.20	0.20	0.27	0.44	0.44
Sat Flow, veh/h	1774	3539	1539	1774	3539	1583	1774	1094	717	1774	1863	1583
Grp Volume(v), veh/h	135	911	22	33	611	347	24	0	101	569	19	273
Grp Sat Flow(s),veh/h/ln	1774	1770	1539	1774	1770	1583	1774	0	1811	1774	1863	1583
Q Serve(g_s), s	8.0	24.6	1.0	2.0	16.0	21.5	1.1	0.0	5.1	25.9	0.6	12.6
Cycle Q Clear(g_c), s	8.0	24.6	1.0	2.0	16.0	21.5	1.1	0.0	5.1	25.9	0.6	12.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.40	1.00		1.00
Lane Grp Cap(c), veh/h	165	1203	523	72	1018	455	339	0	356	745	814	692
V/C Ratio(X)	0.82	0.76	0.04	0.46	0.60	0.76	0.07	0.00	0.28	0.76	0.02	0.39
Avail Cap(c_a), veh/h	281	1416	615	116	1086	486	396	0	356	887	814	692
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.8	31.5	23.8	50.4	33.0	34.9	32.3	0.0	36.7	21.1	17.2	20.6
Incr Delay (d2), s/veh	9.4	2.0	0.0	4.4	0.8	6.6	0.1	0.0	2.0	3.3	0.1	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	12.4	0.4	1.1	7.9	10.2	0.6	0.0	2.7	13.2	0.3	5.8
LnGrp Delay(d),s/veh	57.3	33.6	23.8	54.8	33.8	41.5	32.4	0.0	38.7	24.4	17.3	22.3
LnGrp LOS	E	C	C	D	C	D	C		D	C	B	C
Approach Vol, veh/h	1068				991				125		861	
Approach Delay, s/veh	36.4				37.2				37.5		23.6	
Approach LOS	D				D				D		C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.4	40.5	7.6	51.0	14.0	34.9	33.4	25.2				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	7.0	43.0	7.0	47.0	17.0	33.0	38.0	16.0				
Max Q Clear Time (g_c+I1), s	4.0	26.6	3.1	14.6	10.0	23.5	27.9	7.1				
Green Ext Time (p_c), s	0.0	9.9	0.0	1.7	0.2	6.7	1.5	1.1				
Intersection Summary												
HCM 2010 Ctrl Delay	33.1											
HCM 2010 LOS	C											

HCM 2010 Signalized Intersection Summary 5: Chicago Avenue/Paige Drive & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	785	456	21	441	3	336	10	50	6	7	21
Future Volume (veh/h)	3	785	456	21	441	3	336	10	50	6	7	21
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	4	924	0	25	531	4	454	14	68	7	8	25
Adj No. of Lanes	1	2	1	1	3	0	2	1	0	1	2	0
Peak Hour Factor	0.85	0.85	0.85	0.83	0.83	0.83	0.74	0.74	0.74	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	13	1272	569	63	2018	15	560	111	539	22	442	391
Arrive On Green	0.01	0.36	0.00	0.04	0.39	0.39	0.16	0.40	0.40	0.01	0.25	0.25
Sat Flow, veh/h	1774	3539	1583	1774	5206	39	3442	277	1347	1774	1770	1563
Grp Volume(v), veh/h	4	924	0	25	346	189	454	0	82	7	8	25
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1695	1855	1721	0	1624	1774	1770	1563
Q Serve(g_s), s	0.2	21.2	0.0	1.3	6.5	6.5	11.9	0.0	3.0	0.4	0.3	1.1
Cycle Q Clear(g_c), s	0.2	21.2	0.0	1.3	6.5	6.5	11.9	0.0	3.0	0.4	0.3	1.1
Prop In Lane	1.00		1.00	1.00		0.02	1.00		0.83	1.00		1.00
Lane Grp Cap(c), veh/h	13	1272	569	63	1314	719	560	0	650	22	442	391
V/C Ratio(X)	0.31	0.73	0.00	0.39	0.26	0.26	0.81	0.00	0.13	0.32	0.02	0.06
Avail Cap(c_a), veh/h	142	1870	837	142	1791	980	974	0	650	142	442	391
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.3	26.0	0.0	44.2	19.6	19.6	37.8	0.0	17.7	45.9	26.5	26.8
Incr Delay (d2), s/veh	12.5	0.8	0.0	3.9	0.1	0.2	2.9	0.0	0.4	8.0	0.1	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	10.4	0.0	0.7	3.0	3.4	5.9	0.0	1.4	0.2	0.2	0.5
LnGrp Delay(d),s/veh	58.8	26.8	0.0	48.1	19.7	19.7	40.7	0.0	18.1	53.8	26.5	27.1
LnGrp LOS	E	C		D	B	B	D		B	D	C	C
Approach Vol, veh/h	928				560				536		40	
Approach Delay, s/veh	27.0				21.0				37.3		31.7	
Approach LOS	C				C				D		C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.8	38.2	19.7	27.9	5.2	40.8	5.7	42.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	7.5	49.5	26.5	18.5	7.5	49.5	7.5	37.5				
Max Q Clear Time (g_c+I1), s	13.3	23.2	13.9	3.1	2.2	8.5	2.4	5.0				
Green Ext Time (p_c), s	0.0	10.5	1.3	0.5	0.0	12.0	0.0	0.6				
Intersection Summary												
HCM 2010 Ctrl Delay			28.1									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

6: Iowa Avenue & Columbia Ave

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	182	278	377	40	106	18	196	618	85	73	708	151
Future Volume (veh/h)	182	278	377	40	106	18	196	618	85	73	708	151
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1810	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	219	335	454	48	126	21	223	702	97	87	843	180
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	1
Peak Hour Factor	0.83	0.83	0.83	0.84	0.84	0.84	0.88	0.88	0.88	0.84	0.84	0.84
Percent Heavy Veh, %	5	5	5	2	2	2	2	2	2	2	2	2
Cap, veh/h	282	941	421	164	839	369	287	1646	727	196	1552	694
Arrive On Green	0.08	0.27	0.27	0.05	0.24	0.24	0.08	0.46	0.46	0.06	0.44	0.44
Sat Flow, veh/h	3343	3438	1538	3442	3539	1555	3442	3539	1563	3442	3539	1583
Grp Volume(v), veh/h	219	335	454	48	126	21	223	702	97	87	843	180
Grp Sat Flow(s),veh/h/ln	1672	1719	1538	1721	1770	1555	1721	1770	1563	1721	1770	1583
Q Serve(g_s), s	7.4	9.0	31.5	1.5	3.2	1.2	7.3	15.2	4.1	2.8	20.2	8.3
Cycle Q Clear(g_c), s	7.4	9.0	31.5	1.5	3.2	1.2	7.3	15.2	4.1	2.8	20.2	8.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	282	941	421	164	839	369	287	1646	727	196	1552	694
V/C Ratio(X)	0.78	0.36	1.08	0.29	0.15	0.06	0.78	0.43	0.13	0.44	0.54	0.26
Avail Cap(c_a), veh/h	450	941	421	254	839	369	434	1646	727	254	1552	694
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.6	33.6	41.8	52.9	34.7	33.9	51.7	20.5	17.6	52.5	23.8	20.5
Incr Delay (d2), s/veh	4.5	0.2	66.4	1.0	0.1	0.1	4.9	0.8	0.4	1.6	1.4	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.6	4.3	21.2	0.8	1.6	0.5	3.7	7.6	1.8	1.4	10.1	3.8
LnGrp Delay(d),s/veh	56.1	33.8	108.2	53.9	34.8	34.0	56.6	21.4	17.9	54.0	25.2	21.4
LnGrp LOS	E	C	F	D	C	C	E	C	B	D	C	C
Approach Vol, veh/h	1008					195		1022		1110		
Approach Delay, s/veh	72.2					39.4		28.7		26.8		
Approach LOS	E					D		C		C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.1	58.0	10.0	36.0	14.1	55.0	14.2	31.8				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	8.5	53.5	8.5	31.5	14.5	47.5	15.5	24.5				
Max Q Clear Time (g_c+1.8), s	14.8	17.2	3.5	33.5	9.3	22.2	9.4	5.2				
Green Ext Time (p_c), s	0.1	14.1	0.0	0.0	0.3	12.1	0.3	4.3				
Intersection Summary												
HCM 2010 Ctrl Delay			41.8									
HCM 2010 LOS			D									

Intersection

Int Delay, s/veh 0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Vol, veh/h	341	48	27	144	10	9
Future Vol, veh/h	341	48	27	144	10	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	42
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	77	77	68	68
Heavy Vehicles, %	3	3	2	2	2	2
Mvmt Flow	406	57	35	187	15	13

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	599
Stage 1	-	-	435
Stage 2	-	-	164
Critical Hdwy	-	4.14	6.84
Critical Hdwy Stg 1	-	-	5.84
Critical Hdwy Stg 2	-	-	5.84
Follow-up Hdwy	-	2.22	3.52
Pot Cap-1 Maneuver	-	1095	433
Stage 1	-	-	620
Stage 2	-	-	848
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1095	419
Mov Cap-2 Maneuver	-	-	419
Stage 1	-	-	620
Stage 2	-	-	821

Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	12
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	419	770	-	-	1095	-
HCM Lane V/C Ratio	0.035	0.017	-	-	0.032	-
HCM Control Delay (s)	13.9	9.8	-	-	8.4	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0.1	-

Intersection						
Int Delay, s/veh	1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	126	176	22	174	28	4
Future Vol, veh/h	126	176	22	174	28	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	84	84	90	90
Heavy Vehicles, %	5	5	5	5	9	9
Mvmt Flow	145	202	26	207	31	4
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	347	0	402	174
Stage 1	-	-	-	-	246	-
Stage 2	-	-	-	-	156	-
Critical Hdwy	-	-	4.2	-	6.98	7.08
Critical Hdwy Stg 1	-	-	-	-	5.98	-
Critical Hdwy Stg 2	-	-	-	-	5.98	-
Follow-up Hdwy	-	-	2.25	-	3.59	3.39
Pot Cap-1 Maneuver	-	-	1187	-	558	818
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	836	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1187	-	546	818
Mov Cap-2 Maneuver	-	-	-	-	605	-
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	818	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.9		11.1	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	625	-	-	1187	-	
HCM Lane V/C Ratio	0.057	-	-	0.022	-	
HCM Control Delay (s)	11.1	-	-	8.1	-	
HCM Lane LOS	B	-	-	A	-	
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-	

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	61	3	194	155	1	6	3	112	0	1	5
Future Vol, veh/h	8	61	3	194	155	1	6	3	112	0	1	5
Conflicting Peds, #/hr	3	0	3	3	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	152	-	-	152	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	81	81	81	84	84	84	50	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	79	4	240	191	1	7	4	133	0	2	10
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	196	0	0	86	0	0	681	780	45	736	781	99
Stage 1	-	-	-	-	-	-	105	105	-	674	674	-
Stage 2	-	-	-	-	-	-	576	675	-	62	107	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1374	-	-	1508	-	-	336	325	1015	307	325	937
Stage 1	-	-	-	-	-	-	889	807	-	410	452	-
Stage 2	-	-	-	-	-	-	470	451	-	942	806	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1374	-	-	1508	-	-	288	270	1012	230	270	934
Mov Cap-2 Maneuver	-	-	-	-	-	-	288	270	-	230	270	-
Stage 1	-	-	-	-	-	-	880	799	-	406	379	-
Stage 2	-	-	-	-	-	-	389	378	-	808	798	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.8			4.3			10.1			10.5		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	848	1374	-	-	1508	-	-	662				
HCM Lane V/C Ratio	0.17	0.008	-	-	0.159	-	-	0.018				
HCM Control Delay (s)	10.1	7.6	-	-	7.8	-	-	10.5				
HCM Lane LOS	B	A	-	-	A	-	-	B				
HCM 95th %tile O(veh)	0.6	0	-	-	0.6	-	-	0.1				

Intersection						
Int Delay, s/veh	2.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	51	47	387	99	62	412
Future Vol, veh/h	51	47	387	99	62	412
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	-	-	-	45	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	67	67	74	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	59	54	578	148	84	564
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1101	363	0	0	725	0
Stage 1	651	-	-	-	-	-
Stage 2	450	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	206	634	-	-	874	-
Stage 1	481	-	-	-	-	-
Stage 2	609	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	186	634	-	-	874	-
Mov Cap-2 Maneuver	186	-	-	-	-	-
Stage 1	481	-	-	-	-	-
Stage 2	550	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	26.1	0		1.2		
HCM LOS	D					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	- 281	874	-		
HCM Lane V/C Ratio	-	- 0.401	0.096	-		
HCM Control Delay (s)	-	- 26.1	9.6	-		
HCM Lane LOS	-	- D	A	-		
HCM 95th %tile Q(veh)	-	- 1.8	0.3	-		

Intersection												
Int Delay, s/veh	2.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	109	29	38	100	13	10	2	21	5	0	8
Future Vol, veh/h	3	109	29	38	100	13	10	2	21	5	0	8
Conflicting Peds, #/hr	0	0	3	3	0	0	3	0	2	2	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	87	87	87	52	52	52	65	65	65
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	131	35	44	115	15	19	4	40	8	0	12
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	130	0	0	169	0	0	378	376	154	390	386	125
Stage 1	-	-	-	-	-	-	159	159	-	210	210	-
Stage 2	-	-	-	-	-	-	219	217	-	180	176	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1455	-	-	1409	-	-	580	555	892	569	548	926
Stage 1	-	-	-	-	-	-	843	766	-	792	728	-
Stage 2	-	-	-	-	-	-	783	723	-	822	753	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1451	-	-	1406	-	-	553	533	888	524	526	923
Mov Cap-2 Maneuver	-	-	-	-	-	-	553	533	-	524	526	
Stage 1	-	-	-	-	-	-	838	762	-	790	703	-
Stage 2	-	-	-	-	-	-	744	698	-	777	749	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			1.9			10.4			10.2		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	726	1451	-	-	1406	-	-	714				
HCM Lane V/C Ratio	0.087	0.002	-	-	0.031	-	-	0.028				
HCM Control Delay (s)	10.4	7.5	0	-	7.6	0	-	10.2				
HCM Lane LOS	B	A	A	-	A	A	-	B				
HCM 95th %tile O(veh)	0.3	0	-	-	0.1	-	-	0.1				

HCM 2010 Signalized Intersection Summary
12: Iowa Avenue & Marlborough Avenue

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	44	44	60	19	78	31	760	121	223	791	82
Future Volume (veh/h)	70	44	44	60	19	78	31	760	121	223	791	82
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1743	1743	1743	1827	1827	1900	1792	1792	1792
Adj Flow Rate, veh/h	101	64	64	85	27	110	36	884	141	262	931	96
Adj No. of Lanes	1	1	0	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.69	0.69	0.69	0.71	0.71	0.71	0.86	0.86	0.86	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	9	9	9	4	4	4	6	6	6
Cap, veh/h	195	94	94	206	216	182	113	1023	163	303	1547	664
Arrive On Green	0.11	0.11	0.11	0.12	0.12	0.12	0.06	0.34	0.34	0.18	0.45	0.45
Sat Flow, veh/h	1774	856	856	1660	1743	1467	1740	2993	477	1707	3406	1462
Grp Volume(v), veh/h	101	0	128	85	27	110	36	513	512	262	931	96
Grp Sat Flow(s),veh/h/ln	1774	0	1712	1660	1743	1467	1740	1736	1735	1707	1703	1462
Q Serve(g_s), s	4.1	0.0	5.5	3.6	1.1	5.5	1.5	21.2	21.2	11.5	15.8	3.0
Cycle Q Clear(g_c), s	4.1	0.0	5.5	3.6	1.1	5.5	1.5	21.2	21.2	11.5	15.8	3.0
Prop In Lane	1.00		0.50	1.00		1.00	1.00		0.28	1.00		1.00
Lane Grp Cap(c), veh/h	195	0	188	206	216	182	113	593	593	303	1547	664
V/C Ratio(X)	0.52	0.00	0.68	0.41	0.12	0.60	0.32	0.86	0.86	0.86	0.60	0.14
Avail Cap(c_a), veh/h	807	0	779	885	929	782	430	699	699	421	1547	664
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.3	0.0	32.9	31.1	30.0	31.9	34.3	23.7	23.7	30.8	15.8	12.3
Incr Delay (d2), s/veh	2.1	0.0	4.3	1.3	0.3	3.2	0.6	9.7	9.7	9.9	0.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	2.8	1.8	0.5	2.4	0.7	11.7	11.7	6.2	7.5	1.2
LnGrp Delay(d),s/veh	34.4	0.0	37.2	32.4	30.3	35.1	34.9	33.4	33.4	40.7	16.4	12.4
LnGrp LOS	C		D	C	C	D	C	C	C	D	B	B
Approach Vol, veh/h		229			222			1061			1289	
Approach Delay, s/veh		36.0			33.5			33.4			21.1	
Approach LOS		D			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	17.7	32.3		13.0	9.0	41.0		14.0				
Change Period (Y+Rc), s	4.0	6.0		4.5	4.0	6.0		4.5				
Max Green Setting (Gmax), s	19.0	31.0		35.0	19.0	31.0		41.0				
Max Q Clear Time (g_c+I1), s	13.5	23.2		7.5	3.5	17.8		7.5				
Green Ext Time (p_c), s	0.2	3.1		1.0	0.0	9.2		0.7				
Intersection Summary												
HCM 2010 Ctrl Delay			27.9									
HCM 2010 LOS			C									

Intersection												
Int Delay, s/veh	6.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	252	45	90	128	0	68	1	162	0	0	1
Future Vol, veh/h	2	252	45	90	128	0	68	1	162	0	0	1
Conflicting Peds, #/hr	8	0	6	6	0	8	1	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	85	-	-	-	-	-	-	-	60
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	76	76	76	82	82	82	90	90	90	25	25	25
Heavy Vehicles, %	8	8	8	5	5	5	2	2	2	2	2	2
Mvmt Flow	3	332	59	110	156	0	76	1	180	0	0	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	164	0	0	397	0	0	749	756	367	841	786	165
Stage 1	-	-	-	-	-	-	372	372	-	384	384	-
Stage 2	-	-	-	-	-	-	377	384	-	457	402	-
Critical Hdwy	4.18	-	-	4.15	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.272	-	-	2.245	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1379	-	-	1145	-	-	328	337	678	284	324	879
Stage 1	-	-	-	-	-	-	648	619	-	639	611	-
Stage 2	-	-	-	-	-	-	644	611	-	583	600	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1378	-	-	1145	-	-	300	300	674	191	288	871
Mov Cap-2 Maneuver	-	-	-	-	-	-	300	300	-	191	288	-
Stage 1	-	-	-	-	-	-	643	614	-	633	548	-
Stage 2	-	-	-	-	-	-	579	548	-	426	595	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.1			3.5			20.1			9.2		
HCM LOS							C			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2			
Capacity (veh/h)	491	1378	-	-	1145	-	-	-	871			
HCM Lane V/C Ratio	0.523	0.002	-	-	0.096	-	-	-	0.005			
HCM Control Delay (s)	20.1	7.6	-	-	8.5	-	-	0	9.2			
HCM Lane LOS	C	A	-	-	A	-	-	A	A			
HCM 95th %tile Q(veh)	3	0	-	-	0.3	-	-	-	0			

Intersection						
Int Delay, s/veh	5.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	202	212	67	3	6	150
Future Vol, veh/h	202	212	67	3	6	150
Conflicting Peds, #/hr	8	0	0	8	0	53
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	54	54	81	81
Heavy Vehicles, %	14	14	13	13	2	2
Mvmt Flow	220	230	124	6	7	185
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	138	0	-	0	805	188
Stage 1	-	-	-	-	135	-
Stage 2	-	-	-	-	670	-
Critical Hdwy	4.24	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.326	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1375	-	-	-	352	854
Stage 1	-	-	-	-	891	-
Stage 2	-	-	-	-	509	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1306	-	-	-	280	805
Mov Cap-2 Maneuver	-	-	-	-	280	-
Stage 1	-	-	-	-	884	-
Stage 2	-	-	-	-	408	-
Approach	EB		WB		SB	
HCM Control Delay, s	4.1		0		11.4	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1306	-	-	-	751	
HCM Lane V/C Ratio	0.168	-	-	-	0.256	
HCM Control Delay (s)	8.3	0	-	-	11.4	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.6	-	-	-	1	

HCM 2010 Signalized Intersection Summary
1: Columbia Ave & Primer St

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	183	755	0	0	382	677	0	0	0	280	0	156
Future Volume (veh/h)	183	755	0	0	382	677	0	0	0	280	0	156
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	195	803	0	0	420	0	0	0	0	230	92	164
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.92	0.92	0.92	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	235	2541	0	80	1896	0	0	349	0	413	113	201
Arrive On Green	0.09	0.48	0.00	0.00	0.54	0.00	0.00	0.00	0.00	0.19	0.19	0.19
Sat Flow, veh/h	1774	3632	0	675	3632	0	0	1863	0	1774	601	1072
Grp Volume(v), veh/h	195	803	0	0	420	0	0	0	0	230	0	256
Grp Sat Flow(s),veh/h/ln	1774	1770	0	675	1770	0	0	1863	0	1774	0	1674
Q Serve(g_s), s	9.7	12.5	0.0	0.0	5.6	0.0	0.0	0.0	0.0	10.9	0.0	13.2
Cycle Q Clear(g_c), s	9.7	12.5	0.0	0.0	5.6	0.0	0.0	0.0	0.0	10.9	0.0	13.2
Prop In Lane	1.00		0.00	1.00		0.00	0.00		0.00	1.00		0.64
Lane Grp Cap(c), veh/h	235	2541	0	80	1896	0	0	349	0	413	0	314
V/C Ratio(X)	0.83	0.32	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.56	0.00	0.82
Avail Cap(c_a), veh/h	365	2541	0	80	1896	0	0	528	0	583	0	474
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.91	0.91	0.00	0.00	0.75	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.0	9.8	0.0	0.0	11.0	0.0	0.0	0.0	0.0	34.1	0.0	35.1
Incr Delay (d2), s/veh	8.3	0.3	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.2	0.0	6.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	6.2	0.0	0.0	2.8	0.0	0.0	0.0	0.0	5.4	0.0	6.7
LnGrp Delay(d),s/veh	48.4	10.1	0.0	0.0	11.2	0.0	0.0	0.0	0.0	35.3	0.0	41.6
LnGrp LOS	D	B			B					D		D
Approach Vol, veh/h		998			420			0			486	
Approach Delay, s/veh		17.6			11.2			0.0			38.6	
Approach LOS		B			B						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		68.6		21.4	16.4	52.2		21.4				
Change Period (Y+Rc), s		4.0		4.5	4.5	4.0		4.5				
Max Green Setting (Gmax), s		56.0		25.5	18.5	33.0		25.5				
Max Q Clear Time (g_c+I1), s		14.5		15.2	11.7	7.6		0.0				
Green Ext Time (p_c), s		9.9		1.7	0.3	8.7		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				21.6								
HCM 2010 LOS				C								
Notes												

User approved volume balancing among the lanes for turning movement.

Intersection

Intersection Delay, s/veh67.5

Intersection LOS F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↔				↔	↔			↔	↔			↔	↔
Traffic Vol, veh/h	0	126	695	28	0	28	279	9	0	4	148	12	0	222	72	159
Future Vol, veh/h	0	126	695	28	0	28	279	9	0	4	148	12	0	222	72	159
Peak Hour Factor	0.92	0.89	0.89	0.89	0.92	0.96	0.96	0.96	0.92	0.86	0.86	0.86	0.92	0.91	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	142	781	31	0	29	291	9	0	5	172	14	0	244	79	175
Number of Lanes	0	0	2	0	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	107.3	36	19.3	30.5
HCM LOS	F	E	C	D

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	3%	0%	27%	0%	9%	0%	76%	0%
Vol Thru, %	97%	0%	73%	93%	91%	0%	24%	0%
Vol Right, %	0%	100%	0%	7%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	152	12	474	376	307	9	294	159
LT Vol	4	0	126	0	28	0	222	0
Through Vol	148	0	348	348	279	0	72	0
RT Vol	0	12	0	28	0	9	0	159
Lane Flow Rate	177	14	532	422	320	9	323	175
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.452	0.033	1.223	0.948	0.775	0.021	0.791	0.376
Departure Headway (Hd)	9.544	8.797	8.278	8.087	9.038	8.262	9.086	7.967
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	380	409	442	447	403	436	401	454
Service Time	7.244	6.497	6.028	5.837	6.738	5.962	6.786	5.667
HCM Lane V/C Ratio	0.466	0.034	1.204	0.944	0.794	0.021	0.805	0.385
HCM Control Delay	19.9	11.8	145.5	59.2	36.7	11.1	38.6	15.4
HCM Lane LOS	C	B	F	F	E	B	E	C
HCM 95th-tile Q	2.3	0.1	21.3	11.2	6.5	0.1	6.8	1.7

Intersection						
Int Delay, s/veh	65.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	81	321	697	126	183	34
Future Vol, veh/h	81	321	697	126	183	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	0	0	24	-	-	65
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	96	96	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	91	361	726	131	203	38
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1786	-	203	0	-	0
Stage 1	203	-	-	-	-	-
Stage 2	1583	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	~ 90	0	1369	-	-	0
Stage 1	831	0	-	-	-	0
Stage 2	186	0	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 42	-	1369	-	-	-
Mov Cap-2 Maneuver	~ 42	-	-	-	-	-
Stage 1	831	-	-	-	-	-
Stage 2	~ 87	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	\$ 743.8	8.9		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	
Capacity (veh/h)	1369	-	42	-	-	
HCM Lane V/C Ratio	0.53	-	2.167	-	-	
HCM Control Delay (s)	10.6	-\$ 743.8	0	-	-	
HCM Lane LOS	B	-	F	A	-	
HCM 95th %tile Q(veh)	3.3	-	9.7	-	-	
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

HCM 2010 Signalized Intersection Summary 4: E. La Cadena & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	174	816	44	33	787	571	29	79	12	227	33	244
Future Volume (veh/h)	174	816	44	33	787	571	29	79	12	227	33	244
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.97	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1937	1900	1863	1863	1863
Adj Flow Rate, veh/h	189	887	48	36	865	627	33	89	13	247	36	265
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.89	0.89	0.89	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	222	1874	834	76	1582	708	297	243	36	428	446	379
Arrive On Green	0.13	0.53	0.53	0.04	0.45	0.45	0.04	0.15	0.15	0.13	0.24	0.24
Sat Flow, veh/h	1774	3539	1576	1774	3539	1583	1774	1647	241	1774	1863	1583
Grp Volume(v), veh/h	189	887	48	36	865	627	33	0	102	247	36	265
Grp Sat Flow(s),veh/h/ln	1774	1770	1576	1774	1770	1583	1774	0	1887	1774	1863	1583
Q Serve(g_s), s	11.3	17.0	1.6	2.1	19.4	39.3	1.7	0.0	5.3	12.3	1.6	16.6
Cycle Q Clear(g_c), s	11.3	17.0	1.6	2.1	19.4	39.3	1.7	0.0	5.3	12.3	1.6	16.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	222	1874	834	76	1582	708	297	0	279	428	446	379
V/C Ratio(X)	0.85	0.47	0.06	0.47	0.55	0.89	0.11	0.00	0.37	0.58	0.08	0.70
Avail Cap(c_a), veh/h	377	2156	960	115	1633	731	340	0	279	439	446	379
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.4	16.0	12.4	50.7	21.9	27.4	36.4	0.0	41.6	31.3	32.0	37.6
Incr Delay (d2), s/veh	8.9	0.2	0.0	4.5	0.4	12.4	0.2	0.0	3.7	1.8	0.4	10.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.1	8.3	0.7	1.1	9.6	19.5	0.8	0.0	3.0	6.2	0.9	8.3
LnGrp Delay(d),s/veh	55.3	16.2	12.4	55.2	22.3	39.8	36.5	0.0	45.3	33.1	32.3	47.9
LnGrp LOS	E	B	B	E	C	D	D		D	C	C	D
Approach Vol, veh/h	1124				1528				135		548	
Approach Delay, s/veh	22.6				30.3				43.1		40.2	
Approach LOS	C				C				D		D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.6	61.4	8.4	29.9	17.6	52.4	18.3	20.0				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	7.0	66.0	7.0	24.0	23.0	50.0	15.0	16.0				
Max Q Clear Time (g_c+I1), s	4.1	19.0	3.7	18.6	13.3	41.3	14.3	7.3				
Green Ext Time (p_c), s	0.0	23.2	0.0	0.8	0.3	7.1	0.1	1.1				
Intersection Summary												
HCM 2010 Ctrl Delay	29.8											
HCM 2010 LOS	C											

HCM 2010 Signalized Intersection Summary
5: Chicago Avenue/Paige Drive & Columbia Ave

Marlborough Industrial Project

09/25/2017

	           											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	470	562	61	859	4	509	12	84	8	29	33
Future Volume (veh/h)	10	470	562	61	859	4	509	12	84	8	29	33
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	11	500	0	68	954	4	592	14	98	11	39	45
Adj No. of Lanes	1	2	1	1	3	0	2	1	0	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.86	0.86	0.86	0.74	0.74	0.74
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	33	934	418	113	1615	7	714	91	638	33	466	417
Arrive On Green	0.02	0.26	0.00	0.06	0.31	0.31	0.21	0.45	0.45	0.02	0.26	0.26
Sat Flow, veh/h	1774	3539	1583	1774	5227	22	3442	201	1410	1774	1770	1583
Grp Volume(v), veh/h	11	500	0	68	619	339	592	0	112	11	39	45
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1695	1859	1721	0	1612	1774	1770	1583
Q Serve(g_s), s	0.5	10.8	0.0	3.3	13.8	13.8	14.7	0.0	3.7	0.5	1.5	1.9
Cycle Q Clear(g_c), s	0.5	10.8	0.0	3.3	13.8	13.8	14.7	0.0	3.7	0.5	1.5	1.9
Prop In Lane	1.00		1.00	1.00		0.01	1.00		0.88	1.00		1.00
Lane Grp Cap(c), veh/h	33	934	418	113	1048	574	714	0	729	33	466	417
V/C Ratio(X)	0.33	0.54	0.00	0.60	0.59	0.59	0.83	0.00	0.15	0.33	0.08	0.11
Avail Cap(c_a), veh/h	141	1743	780	208	1798	986	1136	0	729	141	466	417
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.3	28.2	0.0	40.7	26.1	26.1	33.9	0.0	14.4	43.3	24.8	24.9
Incr Delay (d2), s/veh	5.7	0.5	0.0	5.0	0.5	1.0	2.9	0.0	0.4	5.7	0.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	5.3	0.0	1.8	6.5	7.2	7.3	0.0	1.7	0.3	0.8	0.9
LnGrp Delay(d),s/veh	49.0	28.7	0.0	45.7	26.6	27.1	36.8	0.0	14.9	49.0	25.1	25.5
LnGrp LOS	D	C		D	C	C	D		B	D	C	C
Approach Vol, veh/h	511			1026			704			95		
Approach Delay, s/veh	29.1			28.0			33.3			28.1		
Approach LOS	C			C			C			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.2	28.1	23.0	28.0	6.2	32.1	6.2	44.9				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	10.5	44.0	29.5	18.0	7.1	47.4	7.1	40.4				
Max Q Clear Time (g_c+1.5), s	15.3	12.8	16.7	3.9	2.5	15.8	2.5	5.7				
Green Ext Time (p_c), s	0.0	10.8	1.8	0.9	0.0	10.8	0.0	1.2				
Intersection Summary												
HCM 2010 Ctrl Delay	29.9											
HCM 2010 LOS	C											

HCM 2010 Signalized Intersection Summary

6: Iowa Avenue & Columbia Ave

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	138	375	99	319	40	372	673	72	25	915	228
Future Volume (veh/h)	117	138	375	99	319	40	372	673	72	25	915	228
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1863	1863	1863	1845	1845	1845	1863	1863	1863
Adj Flow Rate, veh/h	134	159	431	110	354	44	423	765	82	28	1028	256
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	1
Peak Hour Factor	0.87	0.87	0.87	0.90	0.90	0.90	0.88	0.88	0.88	0.89	0.89	0.89
Percent Heavy Veh, %	3	3	3	2	2	2	3	3	3	2	2	2
Cap, veh/h	199	905	395	198	911	407	475	1741	766	122	1392	623
Arrive On Green	0.06	0.26	0.26	0.06	0.26	0.26	0.14	0.50	0.50	0.04	0.39	0.39
Sat Flow, veh/h	3408	3505	1530	3442	3539	1583	3408	3505	1542	3442	3539	1583
Grp Volume(v), veh/h	134	159	431	110	354	44	423	765	82	28	1028	256
Grp Sat Flow(s),veh/h/ln	1704	1752	1530	1721	1770	1583	1704	1752	1542	1721	1770	1583
Q Serve(g_s), s	4.6	4.2	30.6	3.7	9.8	2.5	14.5	16.6	3.3	0.9	29.4	13.9
Cycle Q Clear(g_c), s	4.6	4.2	30.6	3.7	9.8	2.5	14.5	16.6	3.3	0.9	29.4	13.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	199	905	395	198	911	407	475	1741	766	122	1392	623
V/C Ratio(X)	0.67	0.18	1.09	0.56	0.39	0.11	0.89	0.44	0.11	0.23	0.74	0.41
Avail Cap(c_a), veh/h	262	905	395	235	911	407	480	1741	766	206	1392	623
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.7	34.2	44.0	54.4	36.3	33.6	50.1	19.2	15.8	55.6	30.7	26.0
Incr Delay (d2), s/veh	4.3	0.1	72.1	2.4	0.3	0.1	18.4	0.8	0.3	0.9	3.5	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	2.0	20.8	1.8	4.8	1.1	8.0	8.3	1.5	0.5	15.1	6.4
LnGrp Delay(d),s/veh	59.0	34.2	116.1	56.8	36.6	33.7	68.5	20.0	16.1	56.5	34.3	28.0
LnGrp LOS	E	C	F	E	D	C	E	B	B	E	C	C
Approach Vol, veh/h	724				508		1270				1312	
Approach Delay, s/veh	87.5				40.7		35.9				33.5	
Approach LOS	F				D		D				C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.7	63.4	11.3	35.1	21.0	51.1	11.4	35.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	7.5	56.2	8.1	30.6	16.7	46.6	9.1	29.6				
Max Q Clear Time (g_c+1/2g), s	12.5	18.6	5.7	32.6	16.5	31.4	6.6	11.8				
Green Ext Time (p_c), s	0.0	17.9	0.1	0.0	0.0	10.4	0.1	4.6				
Intersection Summary												
HCM 2010 Ctrl Delay			45.5									
HCM 2010 LOS			D									

Intersection

Int Delay, s/veh 1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Vol, veh/h	195	16	12	371	72	12
Future Vol, veh/h	195	16	12	371	72	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	42
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	91	91	80	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	241	20	13	408	90	15

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	481
Stage 1	-	-	251
Stage 2	-	-	230
Critical Hdwy	-	4.14	6.84
Critical Hdwy Stg 1	-	-	5.84
Critical Hdwy Stg 2	-	-	5.84
Follow-up Hdwy	-	2.22	3.52
Pot Cap-1 Maneuver	-	1302	514
Stage 1	-	-	768
Stage 2	-	-	786
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1302	509
Mov Cap-2 Maneuver	-	-	509
Stage 1	-	-	768
Stage 2	-	-	778

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	13
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	509	896	-	-	1302	-
HCM Lane V/C Ratio	0.177	0.017	-	-	0.01	-
HCM Control Delay (s)	13.6	9.1	-	-	7.8	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0	-

Intersection						
Int Delay, s/veh	6.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	220	47	6	226	167	21
Future Vol, veh/h	220	47	6	226	167	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	65	65	53	53
Heavy Vehicles, %	9	9	8	8	7	7
Mvmt Flow	265	57	9	348	315	40
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	322	0	485	161
Stage 1	-	-	-	-	293	-
Stage 2	-	-	-	-	192	-
Critical Hdwy	-	-	4.26	-	6.94	7.04
Critical Hdwy Stg 1	-	-	-	-	5.94	-
Critical Hdwy Stg 2	-	-	-	-	5.94	-
Follow-up Hdwy	-	-	2.28	-	3.57	3.37
Pot Cap-1 Maneuver	-	-	1192	-	499	840
Stage 1	-	-	-	-	717	-
Stage 2	-	-	-	-	807	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1192	-	495	840
Mov Cap-2 Maneuver	-	-	-	-	569	-
Stage 1	-	-	-	-	717	-
Stage 2	-	-	-	-	801	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.2		19.9	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	590	-	-	1192	-	
HCM Lane V/C Ratio	0.601	-	-	0.008	-	
HCM Control Delay (s)	19.9	-	-	8	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q(veh)	4	-	-	0	-	

Intersection												
Int Delay, s/veh	6.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	126	4	150	110	0	0	6	232	6	9	2
Future Vol, veh/h	5	126	4	150	110	0	0	6	232	6	9	2
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	152	-	-	152	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	87	87	87	84	84	84	53	53	53
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	156	5	172	126	0	0	7	276	11	17	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	126	0	0	161	0	0	588	642	81	565	645	63
Stage 1	-	-	-	-	-	-	171	171	-	471	471	-
Stage 2	-	-	-	-	-	-	417	471	-	94	174	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1458	-	-	1416	-	-	392	391	963	408	389	988
Stage 1	-	-	-	-	-	-	814	756	-	542	558	-
Stage 2	-	-	-	-	-	-	584	558	-	902	754	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1458	-	-	1416	-	-	340	342	962	259	340	988
Mov Cap-2 Maneuver	-	-	-	-	-	-	340	342	-	259	340	-
Stage 1	-	-	-	-	-	-	810	752	-	540	490	-
Stage 2	-	-	-	-	-	-	493	490	-	634	750	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			4.6			10.6			17.1		
HCM LOS							B			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	920	1458	-	-	1416	-	-	329				
HCM Lane V/C Ratio	0.308	0.004	-	-	0.122	-	-	0.097				
HCM Control Delay (s)	10.6	7.5	-	-	7.9	-	-	17.1				
HCM Lane LOS	B	A	-	-	A	-	-	C				
HCM 95th %tile O(veh)	1.3	0	-	-	0.4	-	-	0.3				

Intersection

Int Delay, s/veh 3.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	74	64	512	53	33	591
Future Vol, veh/h	74	64	512	53	33	591
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	-	-	-	45	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	94	94	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	86	74	545	56	38	687

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	993	301	0
Stage 1	573	-	-
Stage 2	420	-	-
Critical Hdwy	7.54	6.94	4.14
Critical Hdwy Stg 1	6.54	-	-
Critical Hdwy Stg 2	6.54	-	-
Follow-up Hdwy	3.52	3.32	2.22
Pot Cap-1 Maneuver	200	695	972
Stage 1	472	-	-
Stage 2	581	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	194	695	972
Mov Cap-2 Maneuver	194	-	-
Stage 1	472	-	-
Stage 2	558	-	-

Approach	WB	NB	SB
HCM Control Delay, s	31.6	0	0.5
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	291	972
HCM Lane V/C Ratio	-	-	0.551	0.039
HCM Control Delay (s)	-	-	31.6	8.9
HCM Lane LOS	-	-	D	A
HCM 95th %tile Q(veh)	-	-	3.1	0.1

Intersection

Int Delay, s/veh 3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	88	21	39	90	2	21	2	26	5	1	2
Future Vol, veh/h	3	88	21	39	90	2	21	2	26	5	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	4	4	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	90	90	90	80	80	80	50	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	122	29	43	100	2	26	3	33	10	2	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	102	0	0	151	0	0	336	334	141	355	348	101
Stage 1	-	-	-	-	-	-	145	145	-	188	188	-
Stage 2	-	-	-	-	-	-	191	189	-	167	160	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1490	-	-	1430	-	-	618	586	907	600	576	954
Stage 1	-	-	-	-	-	-	858	777	-	814	745	-
Stage 2	-	-	-	-	-	-	811	744	-	835	766	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1490	-	-	1425	-	-	597	566	904	559	556	954
Mov Cap-2 Maneuver	-	-	-	-	-	-	597	566	-	559	556	-
Stage 1	-	-	-	-	-	-	855	775	-	812	721	-
Stage 2	-	-	-	-	-	-	780	720	-	797	764	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			2.3			10.4			10.9		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	726	1490	-	-	1425	-	-	623
HCM Lane V/C Ratio	0.084	0.003	-	-	0.03	-	-	0.026
HCM Control Delay (s)	10.4	7.4	0	-	7.6	0	-	10.9
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.1

HCM 2010 Signalized Intersection Summary
12: Iowa Avenue & Marlborough Avenue

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	83	23	23	159	47	228	47	789	53	105	1204	78
Future Volume (veh/h)	83	23	23	159	47	228	47	789	53	105	1204	78
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.97	1.00		0.99	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1743	1743	1743	1810	1810	1900	1792	1792	1792
Adj Flow Rate, veh/h	102	28	28	237	70	340	49	831	56	112	1281	83
Adj No. of Lanes	1	1	0	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.81	0.81	0.81	0.67	0.67	0.67	0.95	0.95	0.95	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	9	9	9	5	5	5	6	6	6
Cap, veh/h	149	72	72	445	468	387	78	1327	89	140	1509	656
Arrive On Green	0.08	0.08	0.08	0.27	0.27	0.27	0.04	0.41	0.41	0.08	0.44	0.44
Sat Flow, veh/h	1774	853	853	1660	1743	1444	1723	3266	220	1707	3406	1480
Grp Volume(v), veh/h	102	0	56	237	70	340	49	437	450	112	1281	83
Grp Sat Flow(s),veh/h/ln	1774	0	1705	1660	1743	1444	1723	1719	1767	1707	1703	1480
Q Serve(g_s), s	6.7	0.0	3.7	14.5	3.6	26.8	3.3	24.1	24.1	7.7	40.0	3.9
Cycle Q Clear(g_c), s	6.7	0.0	3.7	14.5	3.6	26.8	3.3	24.1	24.1	7.7	40.0	3.9
Prop In Lane	1.00		0.50	1.00		1.00	1.00		0.12	1.00		1.00
Lane Grp Cap(c), veh/h	149	0	143	445	468	387	78	698	718	140	1509	656
V/C Ratio(X)	0.68	0.00	0.39	0.53	0.15	0.88	0.63	0.63	0.63	0.80	0.85	0.13
Avail Cap(c_a), veh/h	522	0	501	572	600	497	268	814	837	267	1616	702
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.0	0.0	51.6	37.2	33.2	41.7	55.9	28.1	28.2	53.7	29.6	19.6
Incr Delay (d2), s/veh	5.4	0.0	1.7	1.0	0.1	13.5	3.1	1.2	1.1	4.0	4.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	0.0	1.8	6.8	1.8	12.1	1.7	11.6	12.0	3.8	19.6	1.6
LnGrp Delay(d),s/veh	58.4	0.0	53.4	38.2	33.4	55.2	59.0	29.3	29.3	57.7	33.8	19.6
LnGrp LOS	E		D	D	C	E	E	C	C	E	C	B
Approach Vol, veh/h		158			647			936			1476	
Approach Delay, s/veh		56.6			46.6			30.9			34.9	
Approach LOS		E			D			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.7	54.4		14.5	9.4	58.8		36.4				
Change Period (Y+Rc), s	4.0	6.0		4.5	4.0	6.0		4.5				
Max Green Setting (Gmax), s	18.6	56.4		35.0	18.5	56.5		41.0				
Max Q Clear Time (g_c+I1), s	9.7	26.1		8.7	5.3	42.0		28.8				
Green Ext Time (p_c), s	0.1	18.0		0.5	0.0	10.8		2.0				
Intersection Summary												
HCM 2010 Ctrl Delay				37.1								
HCM 2010 LOS				D								

Intersection												
Int Delay, s/veh	5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	134	54	160	293	0	36	2	106	3	3	2
Future Vol, veh/h	1	134	54	160	293	0	36	2	106	3	3	2
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	85	-	-	-	-	-	-	-	60
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	69	69	69	91	91	91	84	84	84	40	40	40
Heavy Vehicles, %	7	7	7	2	2	2	5	5	5	2	2	2
Mvmt Flow	1	194	78	176	322	0	43	2	126	8	8	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	323	0	0	272	0	0	913	911	233	976	950	323
Stage 1	-	-	-	-	-	-	236	236	-	675	675	-
Stage 2	-	-	-	-	-	-	677	675	-	301	275	-
Critical Hdwy	4.17	-	-	4.12	-	-	7.15	6.55	6.25	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.12	5.52	-
Follow-up Hdwy	2.263	-	-	2.218	-	-	3.545	4.045	3.345	3.518	4.018	3.318
Pot Cap-1 Maneuver	1209	-	-	1291	-	-	251	271	799	230	260	718
Stage 1	-	-	-	-	-	-	760	704	-	444	453	-
Stage 2	-	-	-	-	-	-	438	449	-	708	683	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1209	-	-	1291	-	-	217	234	799	172	224	717
Mov Cap-2 Maneuver	-	-	-	-	-	-	217	234	-	172	224	-
Stage 1	-	-	-	-	-	-	759	703	-	443	391	-
Stage 2	-	-	-	-	-	-	368	387	-	594	682	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.9	17	21.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	469	1209	-	-	1291	-	-	195	717
HCM Lane V/C Ratio	0.366	0.001	-	-	0.136	-	-	0.077	0.007
HCM Control Delay (s)	17	8	-	-	8.2	-	-	25	10.1
HCM Lane LOS	C	A	-	-	A	-	-	D	B
HCM 95th %tile Q(veh)	1.7	0	-	-	0.5	-	-	0.2	0

Intersection

Int Delay, s/veh 5.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	143	100	206	5	2	248
Future Vol, veh/h	143	100	206	5	2	248
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	79	79	94	94
Heavy Vehicles, %	13	13	12	12	2	2
Mvmt Flow	174	122	261	6	2	264

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	267	0	735
Stage 1	-	-	264
Stage 2	-	-	471
Critical Hdwy	4.23	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.317	-	3.518
Pot Cap-1 Maneuver	1236	-	387
Stage 1	-	-	780
Stage 2	-	-	628
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1236	-	329
Mov Cap-2 Maneuver	-	-	329
Stage 1	-	-	780
Stage 2	-	-	533

Approach	EB	WB	SB
HCM Control Delay, s	4.9	0	12.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1236	-	-	-	767
HCM Lane V/C Ratio	0.141	-	-	-	0.347
HCM Control Delay (s)	8.4	0	-	-	12.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.5	-	-	-	1.6

EXISTING + AMBIENT + PROJECT + CUMULATIVE

HCM 2010 Signalized Intersection Summary

1: Columbia Ave & Primer St

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	158	511	0	0	344	417	0	0	0	371	0	106
Future Volume (veh/h)	158	511	0	0	344	417	0	0	0	371	0	106
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1827	1827	1900
Adj Flow Rate, veh/h	208	672	0	0	410	0	0	0	0	248	193	110
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	1	1	0
Peak Hour Factor	0.76	0.76	0.76	0.84	0.84	0.84	0.92	0.92	0.92	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	4	4	4
Cap, veh/h	242	2460	0	80	1800	0	0	392	0	446	230	131
Arrive On Green	0.27	1.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.21	0.21	0.21
Sat Flow, veh/h	1774	3632	0	763	3632	0	0	1863	0	1740	1094	623
Grp Volume(v), veh/h	208	672	0	0	410	0	0	0	0	248	0	303
Grp Sat Flow(s),veh/h/ln	1774	1770	0	763	1770	0	0	1863	0	1740	0	1717
Q Serve(g_s), s	10.0	0.0	0.0	0.0	5.8	0.0	0.0	0.0	0.0	11.8	0.0	15.2
Cycle Q Clear(g_c), s	10.0	0.0	0.0	0.0	5.8	0.0	0.0	0.0	0.0	11.8	0.0	15.2
Prop In Lane	1.00		0.00	1.00		0.00	0.00		0.00	1.00		0.36
Lane Grp Cap(c), veh/h	242	2460	0	80	1800	0	0	392	0	446	0	361
V/C Ratio(X)	0.86	0.27	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.56	0.00	0.84
Avail Cap(c_a), veh/h	404	2460	0	80	1800	0	0	528	0	573	0	486
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.96	0.96	0.00	0.00	0.78	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.9	0.0	0.0	0.0	12.3	0.0	0.0	0.0	0.0	32.7	0.0	34.1
Incr Delay (d2), s/veh	9.0	0.3	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.1	0.0	9.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.1	0.0	0.0	2.8	0.0	0.0	0.0	0.0	5.8	0.0	8.2
LnGrp Delay(d),s/veh	40.9	0.3	0.0	0.0	12.5	0.0	0.0	0.0	0.0	33.8	0.0	43.4
LnGrp LOS	D	A			B					C		D
Approach Vol, veh/h		880			410			0			551	
Approach Delay, s/veh		9.9			12.5			0.0			39.1	
Approach LOS		A			B						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		66.6		23.4	16.8	49.8		23.4				
Change Period (Y+Rc), s		4.0		4.5	4.5	4.0		4.5				
Max Green Setting (Gmax), s		56.0		25.5	20.5	31.0		25.5				
Max Q Clear Time (g_c+I1), s		2.0		17.2	12.0	7.8		0.0				
Green Ext Time (p_c), s		8.5		1.7	0.3	7.3		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				19.2								
HCM 2010 LOS				B								
Notes												

User approved volume balancing among the lanes for turning movement.

Intersection

Intersection Delay, s/veh 26.7

Intersection LOS D

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			LT				RT	RT			LT	LT			RT	RT
Traffic Vol, veh/h	0	102	467	9	0	15	323	4	0	8	22	12	0	244	28	146
Future Vol, veh/h	0	102	467	9	0	15	323	4	0	8	22	12	0	244	28	146
Peak Hour Factor	0.92	0.97	0.97	0.97	0.92	0.85	0.85	0.85	0.92	0.88	0.88	0.88	0.92	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	3	3	3	2	2	2	2	2	2	2	2
Mvmt Flow	0	105	481	9	0	18	380	5	0	9	25	14	0	284	33	170
Number of Lanes	0	0	2	0	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	23	38.3	12.3	23.1
HCM LOS	C	E	B	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	27%	0%	30%	0%	4%	0%	90%	0%
Vol Thru, %	73%	0%	70%	96%	96%	0%	10%	0%
Vol Right, %	0%	100%	0%	4%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	30	12	336	243	338	4	272	146
LT Vol	8	0	102	0	15	0	244	0
Through Vol	22	0	234	234	323	0	28	0
RT Vol	0	12	0	9	0	4	0	146
Lane Flow Rate	34	14	346	250	398	5	316	170
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.086	0.031	0.718	0.506	0.837	0.009	0.711	0.326
Departure Headway (Hd)	9.075	8.206	7.469	7.286	7.58	6.838	8.095	6.915
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	394	435	484	495	477	523	446	519
Service Time	6.847	5.977	5.218	5.035	5.329	4.588	5.84	4.659
HCM Lane V/C Ratio	0.086	0.032	0.715	0.505	0.834	0.01	0.709	0.328
HCM Control Delay	12.7	11.2	27.1	17.3	38.6	9.7	28.5	13
HCM Lane LOS	B	B	D	C	E	A	D	B
HCM 95th-tile Q	0.3	0.1	5.7	2.8	8.3	0	5.5	1.4

Intersection						
Int Delay, s/veh	45.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	187	659	377	74	116	13
Future Vol, veh/h	187	659	377	74	116	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	0	0	24	-	-	65
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	92	92	74	74
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	205	724	410	80	157	18
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1057	-	157	0	-	0
Stage 1	157	-	-	-	-	-
Stage 2	900	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-
Pot Cap-1 Maneuver	249	0	1423	-	-	0
Stage 1	871	0	-	-	-	0
Stage 2	397	0	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 177	-	1423	-	-	-
Mov Cap-2 Maneuver	~ 177	-	-	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	283	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	170.8		7.1		0	
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	
Capacity (veh/h)	1423	-	177	-	-	
HCM Lane V/C Ratio	0.288	-	1.161	-	-	
HCM Control Delay (s)	8.6	-	170.8	0	-	
HCM Lane LOS	A	-	F	A	-	
HCM 95th %tile Q(veh)	1.2	-	10.7	-	-	
Notes						
~: Volume exceeds capacity	\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon	

HCM 2010 Signalized Intersection Summary
4: E. La Cadena & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	107	758	17	27	504	290	21	54	36	524	16	235
Future Volume (veh/h)	107	758	17	27	504	290	21	54	36	524	16	235
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1937	1900	1863	1863	1863
Adj Flow Rate, veh/h	135	959	22	33	622	358	24	61	40	609	19	273
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	1	1	1
Peak Hour Factor	0.79	0.79	0.79	0.81	0.81	0.81	0.89	0.89	0.89	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	165	1231	535	72	1046	468	303	180	118	747	804	683
Arrive On Green	0.09	0.35	0.35	0.04	0.30	0.30	0.03	0.16	0.16	0.30	0.43	0.43
Sat Flow, veh/h	1774	3539	1539	1774	3539	1583	1774	1094	717	1774	1863	1583
Grp Volume(v), veh/h	135	959	22	33	622	358	24	0	101	609	19	273
Grp Sat Flow(s),veh/h/ln	1774	1770	1539	1774	1770	1583	1774	0	1811	1774	1863	1583
Q Serve(g_s), s	8.1	26.4	1.0	2.0	16.4	22.4	1.2	0.0	5.4	29.4	0.6	12.9
Cycle Q Clear(g_c), s	8.1	26.4	1.0	2.0	16.4	22.4	1.2	0.0	5.4	29.4	0.6	12.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.40	1.00		1.00
Lane Grp Cap(c), veh/h	165	1231	535	72	1046	468	303	0	297	747	804	683
V/C Ratio(X)	0.82	0.78	0.04	0.46	0.59	0.77	0.08	0.00	0.34	0.82	0.02	0.40
Avail Cap(c_a), veh/h	277	1397	607	114	1072	480	358	0	297	833	804	683
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.5	31.8	23.5	51.1	32.8	34.9	35.6	0.0	40.3	22.6	17.8	21.3
Incr Delay (d2), s/veh	9.5	2.6	0.0	4.5	0.9	7.1	0.1	0.0	3.1	5.7	0.1	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	13.4	0.4	1.1	8.1	10.7	0.6	0.0	2.9	15.6	0.3	5.9
LnGrp Delay(d),s/veh	58.0	34.3	23.5	55.6	33.7	42.0	35.7	0.0	43.4	28.4	17.8	23.0
LnGrp LOS	E	C	C	E	C	D	D		D	C	B	C
Approach Vol, veh/h	1116				1013				125		901	
Approach Delay, s/veh	37.0				37.3				41.9		26.5	
Approach LOS	D				D				D		C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.4	41.9	7.6	51.0	14.1	36.2	36.7	21.9				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	7.0	43.0	7.0	47.0	17.0	33.0	38.0	16.0				
Max Q Clear Time (g_c+I1), s	4.0	28.4	3.2	14.9	10.1	24.4	31.4	7.4				
Green Ext Time (p_c), s	0.0	9.5	0.0	1.7	0.2	6.3	1.3	1.1				
Intersection Summary												
HCM 2010 Ctrl Delay	34.3											
HCM 2010 LOS	C											

HCM 2010 Signalized Intersection Summary 5: Chicago Avenue/Paige Drive & Columbia Ave

Marlborough Industrial Project
09/25/2017

	           											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	854	456	21	457	4	336	10	50	6	7	23
Future Volume (veh/h)	7	854	456	21	457	4	336	10	50	6	7	23
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	8	1005	0	25	551	5	454	14	68	7	8	27
Adj No. of Lanes	1	2	1	1	3	0	2	1	0	1	2	0
Peak Hour Factor	0.85	0.85	0.85	0.83	0.83	0.83	0.74	0.74	0.74	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	25	1342	600	63	2081	19	556	107	521	22	421	372
Arrive On Green	0.01	0.38	0.00	0.04	0.40	0.40	0.16	0.39	0.39	0.01	0.24	0.24
Sat Flow, veh/h	1774	3539	1583	1774	5196	47	3442	277	1347	1774	1770	1563
Grp Volume(v), veh/h	8	1005	0	25	359	197	454	0	82	7	8	27
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1695	1853	1721	0	1624	1774	1770	1563
Q Serve(g_s), s	0.4	23.8	0.0	1.3	6.9	6.9	12.3	0.0	3.2	0.4	0.3	1.3
Cycle Q Clear(g_c), s	0.4	23.8	0.0	1.3	6.9	6.9	12.3	0.0	3.2	0.4	0.3	1.3
Prop In Lane	1.00		1.00	1.00		0.03	1.00		0.83	1.00		1.00
Lane Grp Cap(c), veh/h	25	1342	600	63	1358	742	556	0	629	22	421	372
V/C Ratio(X)	0.32	0.75	0.00	0.40	0.26	0.27	0.82	0.00	0.13	0.32	0.02	0.07
Avail Cap(c_a), veh/h	137	1809	809	137	1733	947	942	0	629	137	421	372
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.3	26.1	0.0	45.7	19.5	19.5	39.2	0.0	19.2	47.4	28.2	28.6
Incr Delay (d2), s/veh	7.3	1.2	0.0	4.0	0.1	0.2	3.0	0.0	0.4	8.0	0.1	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	11.8	0.0	0.7	3.2	3.5	6.1	0.0	1.5	0.2	0.2	0.6
LnGrp Delay(d),s/veh	54.6	27.3	0.0	49.7	19.6	19.7	42.2	0.0	19.6	55.4	28.3	29.0
LnGrp LOS	D	C		D	B	B	D		B	E	C	C
Approach Vol, veh/h	1013					581		536		42		
Approach Delay, s/veh	27.5					20.9		38.8		33.3		
Approach LOS	C					C		D		C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.9	41.2	20.1	27.6	5.9	43.3	5.7	42.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	7.5	49.5	26.5	18.5	7.5	49.5	7.5	37.5				
Max Q Clear Time (g_c+I13), s	13.3	25.8	14.3	3.3	2.4	8.9	2.4	5.2				
Green Ext Time (p_c), s	0.0	10.9	1.3	0.5	0.0	13.3	0.0	0.7				
Intersection Summary												
HCM 2010 Ctrl Delay			28.6									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary 6: Iowa Avenue & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	182	299	425	40	110	18	207	618	85	75	711	151
Future Volume (veh/h)	182	299	425	40	110	18	207	618	85	75	711	151
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1810	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	219	360	512	48	131	21	235	702	97	89	846	180
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	1
Peak Hour Factor	0.83	0.83	0.83	0.84	0.84	0.84	0.88	0.88	0.88	0.84	0.84	0.84
Percent Heavy Veh, %	5	5	5	2	2	2	2	2	2	2	2	2
Cap, veh/h	282	941	421	164	839	368	299	1645	727	197	1540	689
Arrive On Green	0.08	0.27	0.27	0.05	0.24	0.24	0.09	0.46	0.46	0.06	0.44	0.44
Sat Flow, veh/h	3343	3438	1538	3442	3539	1555	3442	3539	1563	3442	3539	1583
Grp Volume(v), veh/h	219	360	512	48	131	21	235	702	97	89	846	180
Grp Sat Flow(s),veh/h/ln	1672	1719	1538	1721	1770	1555	1721	1770	1563	1721	1770	1583
Q Serve(g_s), s	7.4	9.8	31.5	1.6	3.4	1.2	7.7	15.2	4.1	2.9	20.4	8.3
Cycle Q Clear(g_c), s	7.4	9.8	31.5	1.6	3.4	1.2	7.7	15.2	4.1	2.9	20.4	8.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	282	941	421	164	839	368	299	1645	727	197	1540	689
V/C Ratio(X)	0.78	0.38	1.22	0.29	0.16	0.06	0.79	0.43	0.13	0.45	0.55	0.26
Avail Cap(c_a), veh/h	450	941	421	254	839	368	434	1645	727	254	1540	689
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.6	33.9	41.8	52.9	34.8	34.0	51.5	20.6	17.6	52.5	24.1	20.7
Incr Delay (d2), s/veh	4.5	0.3	117.2	1.0	0.1	0.1	5.8	0.8	0.4	1.6	1.4	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.6	4.7	27.1	0.8	1.7	0.5	3.9	7.6	1.8	1.4	10.3	3.8
LnGrp Delay(d),s/veh	56.2	34.2	159.0	53.9	34.9	34.0	57.3	21.4	17.9	54.1	25.5	21.6
LnGrp LOS	E	C	F	D	C	C	E	C	B	D	C	C
Approach Vol, veh/h	1091					200		1034		1115		
Approach Delay, s/veh	97.2					39.4		29.2		27.2		
Approach LOS	F					D		C		C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.1	58.0	10.0	36.0	14.5	54.6	14.2	31.8				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	8.5	53.5	8.5	31.5	14.5	47.5	15.5	24.5				
Max Q Clear Time (g_c+14.5), s	17.2	17.2	3.6	33.5	9.7	22.4	9.4	5.4				
Green Ext Time (p_c), s	0.1	14.1	0.0	0.0	0.3	12.1	0.3	4.8				
Intersection Summary												
HCM 2010 Ctrl Delay	50.7											
HCM 2010 LOS	D											

Intersection

Int Delay, s/veh 1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Vol, veh/h	341	71	29	144	16	9
Future Vol, veh/h	341	71	29	144	16	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	42
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	77	77	68	68
Heavy Vehicles, %	3	3	2	2	2	2
Mvmt Flow	406	85	38	187	24	13

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	490	617
Stage 1	-	-	448
Stage 2	-	-	169
Critical Hdwy	-	4.14	6.84
Critical Hdwy Stg 1	-	-	5.84
Critical Hdwy Stg 2	-	-	5.84
Follow-up Hdwy	-	2.22	3.52
Pot Cap-1 Maneuver	-	1070	422
Stage 1	-	-	611
Stage 2	-	-	843
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1070	407
Mov Cap-2 Maneuver	-	-	407
Stage 1	-	-	611
Stage 2	-	-	813

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	407	755	-	-	1070	-
HCM Lane V/C Ratio	0.058	0.018	-	-	0.035	-
HCM Control Delay (s)	14.4	9.9	-	-	8.5	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0.1	-

Intersection

Int Delay, s/veh 1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	126	176	22	176	28	4
Future Vol, veh/h	126	176	22	176	28	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	84	84	90	90
Heavy Vehicles, %	5	5	5	5	9	9
Mvmt Flow	145	202	26	210	31	4

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	403
Stage 1	-	-	246
Stage 2	-	-	157
Critical Hdwy	-	4.2	6.98
Critical Hdwy Stg 1	-	-	5.98
Critical Hdwy Stg 2	-	-	5.98
Follow-up Hdwy	-	2.25	3.59
Pot Cap-1 Maneuver	-	1187	557
Stage 1	-	-	751
Stage 2	-	-	835
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1187	545
Mov Cap-2 Maneuver	-	-	604
Stage 1	-	-	751
Stage 2	-	-	817

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	11.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	624	-	-	1187	-
HCM Lane V/C Ratio	0.057	-	-	0.022	-
HCM Control Delay (s)	11.1	-	-	8.1	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	61	3	196	155	1	6	3	112	0	1	5
Future Vol, veh/h	8	61	3	196	155	1	6	3	112	0	1	5
Conflicting Peds, #/hr	3	0	3	3	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	152	-	-	152	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	81	81	81	84	84	84	50	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	79	4	242	191	1	7	4	133	0	2	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	196	0	0	86	0	0	686	785	45	741	786	99
Stage 1	-	-	-	-	-	-	105	105	-	679	679	-
Stage 2	-	-	-	-	-	-	581	680	-	62	107	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1374	-	-	1508	-	-	334	323	1015	305	323	937
Stage 1	-	-	-	-	-	-	889	807	-	408	449	-
Stage 2	-	-	-	-	-	-	467	449	-	942	806	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1374	-	-	1508	-	-	286	268	1012	228	268	934
Mov Cap-2 Maneuver	-	-	-	-	-	-	286	268	-	228	268	-
Stage 1	-	-	-	-	-	-	880	799	-	404	376	-
Stage 2	-	-	-	-	-	-	386	376	-	808	798	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	4.4	10.1	10.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	847	1374	-	-	1508	-	-	660
HCM Lane V/C Ratio	0.17	0.008	-	-	0.16	-	-	0.018
HCM Control Delay (s)	10.1	7.6	-	-	7.8	-	-	10.6
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.6	0	-	-	0.6	-	-	0.1

Intersection

Int Delay, s/veh 2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	51	47	387	103	62	412
Future Vol, veh/h	51	47	387	103	62	412
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	-	-	-	45	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	67	67	74	73
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	59	54	578	154	84	564

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1104	366	0
Stage 1	654	-	-
Stage 2	450	-	-
Critical Hdwy	6.84	6.94	4.14
Critical Hdwy Stg 1	5.84	-	-
Critical Hdwy Stg 2	5.84	-	-
Follow-up Hdwy	3.52	3.32	2.22
Pot Cap-1 Maneuver	205	631	869
Stage 1	479	-	-
Stage 2	609	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	185	631	869
Mov Cap-2 Maneuver	185	-	-
Stage 1	479	-	-
Stage 2	550	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26.2	0	1.2
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	280	869
HCM Lane V/C Ratio	-	-	0.402	0.096
HCM Control Delay (s)	-	-	26.2	9.6
HCM Lane LOS	-	-	D	A
HCM 95th %tile Q(veh)	-	-	1.9	0.3

Intersection												
Int Delay, s/veh	2.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	113	29	38	100	13	10	2	21	5	0	8
Future Vol, veh/h	3	113	29	38	100	13	10	2	21	5	0	8
Conflicting Peds, #/hr	0	0	3	3	0	0	3	0	2	2	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	87	87	87	52	52	52	65	65	65
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	136	35	44	115	15	19	4	40	8	0	12
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	130	0	0	174	0	0	383	381	159	395	391	125
Stage 1	-	-	-	-	-	-	164	164	-	210	210	-
Stage 2	-	-	-	-	-	-	219	217	-	185	181	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1455	-	-	1403	-	-	575	552	886	565	545	926
Stage 1	-	-	-	-	-	-	838	762	-	792	728	-
Stage 2	-	-	-	-	-	-	783	723	-	817	750	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1451	-	-	1400	-	-	548	530	882	520	523	923
Mov Cap-2 Maneuver	-	-	-	-	-	-	548	530	-	520	523	
Stage 1	-	-	-	-	-	-	833	758	-	790	703	-
Stage 2	-	-	-	-	-	-	744	698	-	772	746	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			1.9			10.5			10.2		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	720	1451	-	-	1400	-	-	711				
HCM Lane V/C Ratio	0.088	0.002	-	-	0.031	-	-	0.028				
HCM Control Delay (s)	10.5	7.5	0	-	7.7	0	-	10.2				
HCM Lane LOS	B	A	A	-	A	A	-	B				
HCM 95th %tile O(veh)	0.3	0	-	-	0.1	-	-	0.1				

HCM 2010 Signalized Intersection Summary 12: Iowa Avenue & Marlborough Avenue

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	48	44	64	19	90	31	761	141	274	791	82
Future Volume (veh/h)	70	48	44	64	19	90	31	761	141	274	791	82
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		0.99	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1743	1743	1743	1827	1827	1900	1792	1792	1792
Adj Flow Rate, veh/h	101	70	64	90	27	127	36	885	164	322	931	96
Adj No. of Lanes	1	1	0	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.69	0.69	0.69	0.71	0.71	0.71	0.86	0.86	0.86	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	9	9	9	4	4	4	6	6	6
Cap, veh/h	194	98	90	218	229	193	100	970	180	355	1644	707
Arrive On Green	0.11	0.11	0.11	0.13	0.13	0.13	0.06	0.33	0.33	0.21	0.48	0.48
Sat Flow, veh/h	1774	897	821	1660	1743	1468	1740	2917	540	1707	3406	1464
Grp Volume(v), veh/h	101	0	134	90	27	127	36	526	523	322	931	96
Grp Sat Flow(s),veh/h/ln	1774	0	1718	1660	1743	1468	1740	1736	1722	1707	1703	1464
Q Serve(g_s), s	4.7	0.0	6.5	4.3	1.2	7.1	1.7	25.3	25.3	16.0	16.9	3.2
Cycle Q Clear(g_c), s	4.7	0.0	6.5	4.3	1.2	7.1	1.7	25.3	25.3	16.0	16.9	3.2
Prop In Lane	1.00		0.48	1.00		1.00	1.00		0.31	1.00		1.00
Lane Grp Cap(c), veh/h	194	0	188	218	229	193	100	577	573	355	1644	707
V/C Ratio(X)	0.52	0.00	0.71	0.41	0.12	0.66	0.36	0.91	0.91	0.91	0.57	0.14
Avail Cap(c_a), veh/h	714	0	692	783	822	693	370	619	614	373	1644	707
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.5	0.0	37.4	34.7	33.3	35.9	39.4	27.8	27.8	33.6	16.0	12.4
Incr Delay (d2), s/veh	2.1	0.0	4.9	1.2	0.2	3.8	0.8	17.3	17.4	23.7	0.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	3.3	2.1	0.6	3.1	0.9	14.8	14.7	9.8	8.0	1.3
LnGrp Delay(d),s/veh	38.7	0.0	42.3	35.9	33.5	39.7	40.2	45.1	45.2	57.3	16.5	12.5
LnGrp LOS	D		D	D	C	D	D	D	D	E	B	B
Approach Vol, veh/h		235			244			1085			1349	
Approach Delay, s/veh		40.7			37.6			45.0			25.9	
Approach LOS		D			D			D			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	22.1	34.9		14.0	9.0	48.0		15.9				
Change Period (Y+Rc), s	4.0	6.0		4.5	4.0	6.0		4.5				
Max Green Setting (Gmax), s	19.0	31.0		35.0	18.5	31.5		41.0				
Max Q Clear Time (g_c+I1), s	18.0	27.3		8.5	3.7	18.9		9.1				
Green Ext Time (p_c), s	0.1	1.6		1.0	0.0	9.0		0.8				
Intersection Summary												
HCM 2010 Ctrl Delay			35.2									
HCM 2010 LOS			D									

Intersection												
Int Delay, s/veh	7.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	327	45	90	144	0	68	1	162	0	0	1
Future Vol, veh/h	2	327	45	90	144	0	68	1	162	0	0	1
Conflicting Peds, #/hr	8	0	6	6	0	8	1	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	85	-	-	-	-	-	-	-	60
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	76	76	76	82	82	82	90	90	90	25	25	25
Heavy Vehicles, %	8	8	8	5	5	5	2	2	2	2	2	2
Mvmt Flow	3	430	59	110	176	0	76	1	180	0	0	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	184	0	0	495	0	0	867	874	466	959	904	185
Stage 1	-	-	-	-	-	-	471	471	-	403	403	-
Stage 2	-	-	-	-	-	-	396	403	-	556	501	-
Critical Hdwy	4.18	-	-	4.15	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.272	-	-	2.245	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1355	-	-	1053	-	-	273	288	597	237	277	857
Stage 1	-	-	-	-	-	-	573	560	-	624	600	-
Stage 2	-	-	-	-	-	-	629	600	-	515	543	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1354	-	-	1053	-	-	248	254	594	150	244	850
Mov Cap-2 Maneuver	-	-	-	-	-	-	248	254	-	150	244	-
Stage 1	-	-	-	-	-	-	568	556	-	618	533	-
Stage 2	-	-	-	-	-	-	560	533	-	357	539	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			3.4			26.3			9.3		
HCM LOS							D			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2			
Capacity (veh/h)	419	1354	-	-	1053	-	-	-	850			
HCM Lane V/C Ratio	0.613	0.002	-	-	0.104	-	-	-	0.005			
HCM Control Delay (s)	26.3	7.7	-	-	8.8	-	-	0	9.3			
HCM Lane LOS	D	A	-	-	A	-	-	A	A			
HCM 95th %tile Q(veh)	4	0	-	-	0.3	-	-	-	0			

Intersection

Int Delay, s/veh 5.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	208	212	67	3	6	175
Future Vol, veh/h	208	212	67	3	6	175
Conflicting Peds, #/hr	8	0	0	8	0	53
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	54	54	81	81
Heavy Vehicles, %	14	14	13	13	2	2
Mvmt Flow	226	230	124	6	7	216

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	138	0	818
Stage 1	-	-	135
Stage 2	-	-	683
Critical Hdwy	4.24	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.326	-	3.518
Pot Cap-1 Maneuver	1375	-	346
Stage 1	-	-	891
Stage 2	-	-	502
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1306	-	273
Mov Cap-2 Maneuver	-	-	273
Stage 1	-	-	884
Stage 2	-	-	400

Approach	EB	WB	SB
HCM Control Delay, s	4.1	0	11.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1306	-	-	-	756
HCM Lane V/C Ratio	0.173	-	-	-	0.296
HCM Control Delay (s)	8.3	0	-	-	11.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.6	-	-	-	1.2

HCM 2010 Signalized Intersection Summary

1: Columbia Ave & Primer St

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	183	755	0	0	384	701	0	0	0	290	0	156
Future Volume (veh/h)	183	755	0	0	384	701	0	0	0	290	0	156
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1900	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	195	803	0	0	422	0	0	0	0	234	99	164
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.92	0.92	0.92	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	235	2528	0	80	1882	0	0	356	0	419	121	200
Arrive On Green	0.09	0.48	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.19	0.19	0.19
Sat Flow, veh/h	1774	3632	0	675	3632	0	0	1863	0	1774	632	1046
Grp Volume(v), veh/h	195	803	0	0	422	0	0	0	0	234	0	263
Grp Sat Flow(s),veh/h/ln	1774	1770	0	675	1770	0	0	1863	0	1774	0	1678
Q Serve(g_s), s	9.7	12.6	0.0	0.0	5.7	0.0	0.0	0.0	0.0	11.1	0.0	13.5
Cycle Q Clear(g_c), s	9.7	12.6	0.0	0.0	5.7	0.0	0.0	0.0	0.0	11.1	0.0	13.5
Prop In Lane	1.00		0.00	1.00		0.00	0.00		0.00	1.00		0.62
Lane Grp Cap(c), veh/h	235	2528	0	80	1882	0	0	356	0	419	0	321
V/C Ratio(X)	0.83	0.32	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.56	0.00	0.82
Avail Cap(c_a), veh/h	365	2528	0	80	1882	0	0	528	0	583	0	475
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.91	0.91	0.00	0.00	0.74	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.0	10.0	0.0	0.0	11.2	0.0	0.0	0.0	0.0	33.9	0.0	34.9
Incr Delay (d2), s/veh	8.3	0.3	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.2	0.0	7.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	6.3	0.0	0.0	2.8	0.0	0.0	0.0	0.0	5.5	0.0	6.9
LnGrp Delay(d),s/veh	48.4	10.3	0.0	0.0	11.4	0.0	0.0	0.0	0.0	35.1	0.0	41.9
LnGrp LOS	D	B			B					D		D
Approach Vol, veh/h		998			422			0			497	
Approach Delay, s/veh		17.7			11.4			0.0			38.7	
Approach LOS		B			B						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		68.3		21.7	16.4	51.9		21.7				
Change Period (Y+Rc), s		4.0		4.5	4.5	4.0		4.5				
Max Green Setting (Gmax), s		56.0		25.5	18.5	33.0		25.5				
Max Q Clear Time (g_c+I1), s		14.6		15.5	11.7	7.7		0.0				
Green Ext Time (p_c), s		10.0		1.7	0.3	8.7		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				21.8								
HCM 2010 LOS				C								
Notes												

User approved volume balancing among the lanes for turning movement.

Intersection

Intersection Delay, s/veh74.5

Intersection LOS F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations			↔↔				↔	↔			↔	↔			↔	↔
Traffic Vol, veh/h	0	126	719	28	0	28	289	9	0	4	148	12	0	222	72	159
Future Vol, veh/h	0	126	719	28	0	28	289	9	0	4	148	12	0	222	72	159
Peak Hour Factor	0.92	0.89	0.89	0.89	0.92	0.96	0.96	0.96	0.92	0.86	0.86	0.86	0.92	0.91	0.91	0.91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	142	808	31	0	29	301	9	0	5	172	14	0	244	79	175
Number of Lanes	0	0	2	0	0	0	1	1	0	0	1	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	119.6	39	19.5	30.8
HCM LOS	F	E	C	D

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	3%	0%	26%	0%	9%	0%	76%	0%
Vol Thru, %	97%	0%	74%	93%	91%	0%	24%	0%
Vol Right, %	0%	100%	0%	7%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	152	12	486	388	317	9	294	159
LT Vol	4	0	126	0	28	0	222	0
Through Vol	148	0	360	360	289	0	72	0
RT Vol	0	12	0	28	0	9	0	159
Lane Flow Rate	177	14	546	435	330	9	323	175
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.455	0.033	1.262	0.985	0.803	0.021	0.795	0.378
Departure Headway (Hd)	9.594	8.847	8.331	8.144	9.07	8.297	9.128	8.009
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	378	407	436	444	403	434	401	453
Service Time	7.294	6.547	6.079	5.893	6.77	5.997	6.828	5.709
HCM Lane V/C Ratio	0.468	0.034	1.252	0.98	0.819	0.021	0.805	0.386
HCM Control Delay	20.1	11.8	160.8	67.9	39.8	11.2	39.1	15.5
HCM Lane LOS	C	B	F	F	E	B	E	C
HCM 95th-tile Q	2.3	0.1	22.9	12.3	7.1	0.1	6.9	1.7

Intersection							
Int Delay, s/veh	76.1						
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Vol, veh/h	81	331	721	126	183	34	
Future Vol, veh/h	81	331	721	126	183	34	
Conflicting Peds, #/hr	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	
RT Channelized	-	Free	-	None	-	Free	
Storage Length	0	0	24	-	-	65	
Veh in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	89	89	96	96	90	90	
Heavy Vehicles, %	2	2	2	2	2	2	
Mvmt Flow	91	372	751	131	203	38	
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	1836	-	203	0	-	-	0
Stage 1	203	-	-	-	-	-	-
Stage 2	1633	-	-	-	-	-	-
Critical Hdwy	6.42	-	4.12	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-	-
Follow-up Hdwy	3.518	-	2.218	-	-	-	-
Pot Cap-1 Maneuver	~ 83	0	1369	-	-	-	0
Stage 1	831	0	-	-	-	-	0
Stage 2	175	0	-	-	-	-	0
Platoon blocked, %				-	-		
Mov Cap-1 Maneuver	~ 37	-	1369	-	-	-	-
Mov Cap-2 Maneuver	~ 37	-	-	-	-	-	-
Stage 1	831	-	-	-	-	-	-
Stage 2	~ 79	-	-	-	-	-	-
Approach	EB		NB		SB		
HCM Control Delay, s	\$ 895		9.2		0		
HCM LOS	F						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT		
Capacity (veh/h)	1369	-	37	-	-		
HCM Lane V/C Ratio	0.549	-	2.46	-	-		
HCM Control Delay (s)	10.8	-	\$ 895	0	-		
HCM Lane LOS	B	-	F	A	-		
HCM 95th %tile Q(veh)	3.5	-	10.1	-	-		
Notes							
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon	

HCM 2010 Signalized Intersection Summary 4: E. La Cadena & Columbia Ave

Marlborough Industrial Project
09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	174	828	44	33	813	595	29	79	12	237	33	244
Future Volume (veh/h)	174	828	44	33	813	595	29	79	12	237	33	244
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.97	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1937	1900	1863	1863	1863
Adj Flow Rate, veh/h	189	900	48	36	893	654	33	89	13	258	36	265
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.89	0.89	0.89	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	222	1878	836	75	1586	709	293	239	35	430	449	382
Arrive On Green	0.13	0.53	0.53	0.04	0.45	0.45	0.04	0.15	0.15	0.14	0.24	0.24
Sat Flow, veh/h	1774	3539	1576	1774	3539	1583	1774	1647	241	1774	1863	1583
Grp Volume(v), veh/h	189	900	48	36	893	654	33	0	102	258	36	265
Grp Sat Flow(s),veh/h/ln	1774	1770	1576	1774	1770	1583	1774	0	1887	1774	1863	1583
Q Serve(g_s), s	11.5	17.6	1.6	2.2	20.5	42.8	1.7	0.0	5.4	13.1	1.6	16.8
Cycle Q Clear(g_c), s	11.5	17.6	1.6	2.2	20.5	42.8	1.7	0.0	5.4	13.1	1.6	16.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	222	1878	836	75	1586	709	293	0	274	430	449	382
V/C Ratio(X)	0.85	0.48	0.06	0.48	0.56	0.92	0.11	0.00	0.37	0.60	0.08	0.69
Avail Cap(c_a), veh/h	371	2122	945	113	1607	719	334	0	274	430	449	382
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.2	16.3	12.5	51.5	22.4	28.6	37.2	0.0	42.5	31.9	32.3	38.1
Incr Delay (d2), s/veh	9.5	0.2	0.0	4.6	0.4	17.2	0.2	0.0	3.8	2.3	0.3	10.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	8.5	0.7	1.2	10.0	22.1	0.8	0.0	3.1	6.7	0.9	8.4
LnGrp Delay(d),s/veh	56.6	16.5	12.5	56.2	22.9	45.8	37.4	0.0	46.3	34.2	32.7	48.0
LnGrp LOS	E	B	B	E	C	D	D		D	C	C	D
Approach Vol, veh/h	1137				1583				135		559	
Approach Delay, s/veh	23.0				33.1				44.1		40.7	
Approach LOS	C				C				D		D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.7	62.4	8.4	30.6	17.8	53.3	19.0	20.0				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Green Setting (Gmax), s	7.0	66.0	7.0	24.0	23.0	50.0	15.0	16.0				
Max Q Clear Time (g_c+I1), s	4.2	19.6	3.7	18.8	13.5	44.8	15.1	7.4				
Green Ext Time (p_c), s	0.0	24.1	0.0	0.8	0.3	4.6	0.0	1.1				
Intersection Summary												
HCM 2010 Ctrl Delay	31.4											
HCM 2010 LOS	C											

HCM 2010 Signalized Intersection Summary
5: Chicago Avenue/Paige Drive & Columbia Ave

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	488	562	61	904	4	509	12	84	9	29	37
Future Volume (veh/h)	14	488	562	61	904	4	509	12	84	9	29	37
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	15	519	0	68	1004	4	592	14	98	12	39	50
Adj No. of Lanes	1	2	1	1	3	0	2	1	0	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.86	0.86	0.86	0.74	0.74	0.74
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	43	964	431	112	1629	6	712	90	628	36	458	410
Arrive On Green	0.02	0.27	0.00	0.06	0.31	0.31	0.21	0.45	0.45	0.02	0.26	0.26
Sat Flow, veh/h	1774	3539	1583	1774	5228	21	3442	201	1410	1774	1770	1583
Grp Volume(v), veh/h	15	519	0	68	651	357	592	0	112	12	39	50
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1695	1859	1721	0	1612	1774	1770	1583
Q Serve(g_s), s	0.8	11.3	0.0	3.4	14.8	14.8	14.9	0.0	3.8	0.6	1.5	2.2
Cycle Q Clear(g_c), s	0.8	11.3	0.0	3.4	14.8	14.8	14.9	0.0	3.8	0.6	1.5	2.2
Prop In Lane	1.00		1.00	1.00		0.01	1.00		0.88	1.00		1.00
Lane Grp Cap(c), veh/h	43	964	431	112	1056	579	712	0	718	36	458	410
V/C Ratio(X)	0.35	0.54	0.00	0.61	0.62	0.62	0.83	0.00	0.16	0.34	0.09	0.12
Avail Cap(c_a), veh/h	139	1717	768	205	1772	972	1120	0	718	139	458	410
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.5	28.1	0.0	41.4	26.6	26.6	34.5	0.0	15.0	43.8	25.5	25.7
Incr Delay (d2), s/veh	4.7	0.5	0.0	5.2	0.6	1.1	3.1	0.0	0.5	5.4	0.4	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	5.6	0.0	1.8	7.0	7.8	7.4	0.0	1.7	0.4	0.8	1.0
LnGrp Delay(d),s/veh	48.3	28.6	0.0	46.5	27.2	27.7	37.6	0.0	15.4	49.2	25.8	26.3
LnGrp LOS	D	C		D	C	C	D		B	D	C	C
Approach Vol, veh/h		534			1076			704			101	
Approach Delay, s/veh		29.1			28.6			34.1			28.8	
Approach LOS		C			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.2	29.2	23.2	28.0	6.7	32.7	6.3	44.9				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	10.5	44.0	29.5	18.0	7.1	47.4	7.1	40.4				
Max Q Clear Time (g_c+1.5), s	15.4	13.3	16.9	4.2	2.8	16.8	2.6	5.8				
Green Ext Time (p_c), s	0.0	11.4	1.8	0.9	0.0	11.4	0.0	1.3				
Intersection Summary												
HCM 2010 Ctrl Delay			30.3									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

6: Iowa Avenue & Columbia Ave

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	144	388	99	333	42	403	675	72	25	915	228
Future Volume (veh/h)	117	144	388	99	333	42	403	675	72	25	915	228
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1863	1863	1863	1845	1845	1845	1863	1863	1863
Adj Flow Rate, veh/h	134	166	446	110	370	47	458	767	82	28	1028	256
Adj No. of Lanes	2	2	1	2	2	1	2	2	1	2	2	1
Peak Hour Factor	0.87	0.87	0.87	0.90	0.90	0.90	0.88	0.88	0.88	0.89	0.89	0.89
Percent Heavy Veh, %	3	3	3	2	2	2	3	3	3	2	2	2
Cap, veh/h	199	903	394	198	909	407	479	1744	767	122	1389	622
Arrive On Green	0.06	0.26	0.26	0.06	0.26	0.26	0.14	0.50	0.50	0.04	0.39	0.39
Sat Flow, veh/h	3408	3505	1530	3442	3539	1583	3408	3505	1542	3442	3539	1583
Grp Volume(v), veh/h	134	166	446	110	370	47	458	767	82	28	1028	256
Grp Sat Flow(s),veh/h/ln	1704	1752	1530	1721	1770	1583	1704	1752	1542	1721	1770	1583
Q Serve(g_s), s	4.6	4.4	30.6	3.7	10.3	2.7	15.8	16.7	3.3	0.9	29.5	13.9
Cycle Q Clear(g_c), s	4.6	4.4	30.6	3.7	10.3	2.7	15.8	16.7	3.3	0.9	29.5	13.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	199	903	394	198	909	407	479	1744	767	122	1389	622
V/C Ratio(X)	0.67	0.18	1.13	0.56	0.41	0.12	0.96	0.44	0.11	0.23	0.74	0.41
Avail Cap(c_a), veh/h	261	903	394	235	909	407	479	1744	767	206	1389	622
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.8	34.3	44.1	54.5	36.6	33.8	50.6	19.2	15.8	55.7	30.9	26.1
Incr Delay (d2), s/veh	4.3	0.1	86.1	2.4	0.3	0.1	30.0	0.8	0.3	0.9	3.6	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	2.1	22.4	1.8	5.1	1.2	9.4	8.3	1.5	0.5	15.1	6.4
LnGrp Delay(d),s/veh	59.1	34.4	130.1	56.9	36.9	33.9	80.6	20.0	16.1	56.6	34.4	28.1
LnGrp LOS	E	C	F	E	D	C	F	B	B	E	C	C
Approach Vol, veh/h	746		527				1307			1312		
Approach Delay, s/veh	96.1		40.8				41.0			33.7		
Approach LOS	F		D				D			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.7	63.6	11.3	35.1	21.2	51.1	11.4	35.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	7.5	56.2	8.1	30.6	16.7	46.6	9.1	29.6				
Max Q Clear Time (g_c+1/2, s)	12.5	18.7	5.7	32.6	17.8	31.5	6.6	12.3				
Green Ext Time (p_c), s	0.0	17.9	0.1	0.0	0.0	10.3	0.1	4.7				
Intersection Summary												
HCM 2010 Ctrl Delay			49.1									
HCM 2010 LOS			D									

Intersection						
Int Delay, s/veh	2.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Vol, veh/h	195	22	12	371	87	14
Future Vol, veh/h	195	22	12	371	87	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	42
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	91	91	80	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	241	27	13	408	109	18
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	268	0	484	134
Stage 1	-	-	-	-	254	-
Stage 2	-	-	-	-	230	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	1293	-	512	890
Stage 1	-	-	-	-	765	-
Stage 2	-	-	-	-	786	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1293	-	507	890
Mov Cap-2 Maneuver	-	-	-	-	507	-
Stage 1	-	-	-	-	765	-
Stage 2	-	-	-	-	778	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.2		13.3	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	507	890	-	-	1293	-
HCM Lane V/C Ratio	0.214	0.02	-	-	0.01	-
HCM Control Delay (s)	14	9.1	-	-	7.8	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.8	0.1	-	-	0	-

Intersection						
Int Delay, s/veh	6.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	
Traffic Vol, veh/h	222	47	6	226	167	21
Future Vol, veh/h	222	47	6	226	167	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	65	65	53	53
Heavy Vehicles, %	9	9	8	8	7	7
Mvmt Flow	267	57	9	348	315	40
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	324	0	488	162
Stage 1	-	-	-	-	296	-
Stage 2	-	-	-	-	192	-
Critical Hdwy	-	-	4.26	-	6.94	7.04
Critical Hdwy Stg 1	-	-	-	-	5.94	-
Critical Hdwy Stg 2	-	-	-	-	5.94	-
Follow-up Hdwy	-	-	2.28	-	3.57	3.37
Pot Cap-1 Maneuver	-	-	1190	-	497	839
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	807	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1190	-	493	839
Mov Cap-2 Maneuver	-	-	-	-	567	-
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	801	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.2		20	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	588	-	-	1190	-	
HCM Lane V/C Ratio	0.603	-	-	0.008	-	
HCM Control Delay (s)	20	-	-	8	-	
HCM Lane LOS	C	-	-	A	-	
HCM 95th %tile Q(veh)	4	-	-	0	-	

Intersection												
Int Delay, s/veh	6.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	126	4	150	110	0	0	6	234	6	9	2
Future Vol, veh/h	5	126	4	150	110	0	0	6	234	6	9	2
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	152	-	-	152	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	87	87	87	84	84	84	53	53	53
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	156	5	172	126	0	0	7	279	11	17	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	126	0	0	161	0	0	588	642	81	565	645	63
Stage 1	-	-	-	-	-	-	171	171	-	471	471	-
Stage 2	-	-	-	-	-	-	417	471	-	94	174	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1458	-	-	1416	-	-	392	391	963	408	389	988
Stage 1	-	-	-	-	-	-	814	756	-	542	558	-
Stage 2	-	-	-	-	-	-	584	558	-	902	754	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1458	-	-	1416	-	-	340	342	962	258	340	988
Mov Cap-2 Maneuver	-	-	-	-	-	-	340	342	-	258	340	-
Stage 1	-	-	-	-	-	-	810	752	-	540	490	-
Stage 2	-	-	-	-	-	-	493	490	-	632	750	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			4.6			10.7			17.2		
HCM LOS							B			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	920	1458	-	-	1416	-	-	328				
HCM Lane V/C Ratio	0.311	0.004	-	-	0.122	-	-	0.098				
HCM Control Delay (s)	10.7	7.5	-	-	7.9	-	-	17.2				
HCM Lane LOS	B	A	-	-	A	-	-	C				
HCM 95th %tile O(veh)	1.3	0	-	-	0.4	-	-	0.3				

Intersection						
Int Delay, s/veh	3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	76	64	512	55	33	591
Future Vol, veh/h	76	64	512	55	33	591
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	-	-	-	45	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	94	94	86	86
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	88	74	545	59	38	687
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	994	302	0	0	603	0
Stage 1	574	-	-	-	-	-
Stage 2	420	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	242	694	-	-	971	-
Stage 1	527	-	-	-	-	-
Stage 2	631	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	233	694	-	-	971	-
Mov Cap-2 Maneuver	233	-	-	-	-	-
Stage 1	527	-	-	-	-	-
Stage 2	606	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	25.5		0		0.5	
HCM LOS	D					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	- 335	971	-		
HCM Lane V/C Ratio	-	- 0.486	0.04	-		
HCM Control Delay (s)	-	- 25.5	8.9	-		
HCM Lane LOS	-	- D	A	-		
HCM 95th %tile Q(veh)	-	- 2.5	0.1	-		

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	90	21	39	92	2	21	2	26	5	1	2
Future Vol, veh/h	3	90	21	39	92	2	21	2	26	5	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	4	4	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	90	90	90	80	80	80	50	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	125	29	43	102	2	26	3	33	10	2	4
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	104	0	0	154	0	0	341	339	144	359	353	103
Stage 1	-	-	-	-	-	-	148	148	-	190	190	-
Stage 2	-	-	-	-	-	-	193	191	-	169	163	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1488	-	-	1426	-	-	613	582	903	596	572	952
Stage 1	-	-	-	-	-	-	855	775	-	812	743	-
Stage 2	-	-	-	-	-	-	809	742	-	833	763	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1488	-	-	1421	-	-	593	562	900	555	552	952
Mov Cap-2 Maneuver	-	-	-	-	-	-	593	562	-	555	552	-
Stage 1	-	-	-	-	-	-	852	773	-	810	719	-
Stage 2	-	-	-	-	-	-	778	718	-	795	761	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			2.2			10.4			11		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	722	1488	-	-	1421	-	-	619				
HCM Lane V/C Ratio	0.085	0.003	-	-	0.03	-	-	0.026				
HCM Control Delay (s)	10.4	7.4	0	-	7.6	0	-	11				
HCM Lane LOS	B	A	A	-	A	A	-	B				
HCM 95th %tile O(veh)	0.3	0	-	-	0.1	-	-	0.1				

HCM 2010 Signalized Intersection Summary
12: Iowa Avenue & Marlborough Avenue

Marlborough Industrial Project

09/25/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	83	25	23	172	49	261	47	789	59	119	1205	78
Future Volume (veh/h)	83	25	23	172	49	261	47	789	59	119	1205	78
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		0.99	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1743	1743	1743	1810	1810	1900	1792	1792	1792
Adj Flow Rate, veh/h	102	31	28	257	73	390	49	831	62	127	1282	83
Adj No. of Lanes	1	1	0	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.81	0.81	0.81	0.67	0.67	0.67	0.95	0.95	0.95	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	9	9	9	5	5	5	6	6	6
Cap, veh/h	147	75	67	487	511	424	76	1242	93	153	1461	635
Arrive On Green	0.08	0.08	0.08	0.29	0.29	0.29	0.04	0.38	0.38	0.09	0.43	0.43
Sat Flow, veh/h	1774	900	813	1660	1743	1446	1723	3240	242	1707	3406	1480
Grp Volume(v), veh/h	102	0	59	257	73	390	49	441	452	127	1282	83
Grp Sat Flow(s),veh/h/ln	1774	0	1712	1660	1743	1446	1723	1719	1763	1707	1703	1480
Q Serve(g_s), s	7.1	0.0	4.1	16.3	3.9	32.9	3.5	26.8	26.8	9.2	43.5	4.3
Cycle Q Clear(g_c), s	7.1	0.0	4.1	16.3	3.9	32.9	3.5	26.8	26.8	9.2	43.5	4.3
Prop In Lane	1.00		0.47	1.00		1.00	1.00		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	147	0	142	487	511	424	76	659	676	153	1461	635
V/C Ratio(X)	0.69	0.00	0.41	0.53	0.14	0.92	0.65	0.67	0.67	0.83	0.88	0.13
Avail Cap(c_a), veh/h	492	0	475	540	567	470	253	777	796	244	1525	663
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.3	0.0	54.9	37.3	32.9	43.1	59.3	32.2	32.3	56.5	33.0	21.8
Incr Delay (d2), s/veh	5.7	0.0	1.9	0.9	0.1	22.1	3.4	1.8	1.7	6.4	6.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	0.0	2.0	7.6	1.9	15.7	1.8	13.1	13.4	4.6	21.7	1.8
LnGrp Delay(d),s/veh	62.0	0.0	56.9	38.2	33.0	65.3	62.7	34.0	34.0	62.8	39.0	21.9
LnGrp LOS	E		E	D	C	E	E	C	C	E	D	C
Approach Vol, veh/h		161			720			942			1492	
Approach Delay, s/veh		60.1			52.3			35.5			40.0	
Approach LOS		E			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.3	54.4		15.0	9.6	60.1		41.5				
Change Period (Y+Rc), s	4.0	6.0		4.5	4.0	6.0		4.5				
Max Green Setting (Gmax), s	18.0	57.0		35.0	18.5	56.5		41.0				
Max Q Clear Time (g_c+I1), s	11.2	28.8		9.1	5.5	45.5		34.9				
Green Ext Time (p_c), s	0.1	17.3		0.6	0.0	8.6		1.5				
Intersection Summary												
HCM 2010 Ctrl Delay			42.4									
HCM 2010 LOS			D									

Intersection												
Int Delay, s/veh	5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	154	54	160	342	0	36	2	106	3	3	2
Future Vol, veh/h	1	154	54	160	342	0	36	2	106	3	3	2
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	85	-	-	-	-	-	-	-	60
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	69	69	69	91	91	91	84	84	84	40	40	40
Heavy Vehicles, %	7	7	7	2	2	2	5	5	5	2	2	2
Mvmt Flow	1	223	78	176	376	0	43	2	126	8	8	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	377	0	0	301	0	0	996	993	262	1058	1032	377
Stage 1	-	-	-	-	-	-	265	265	-	728	728	-
Stage 2	-	-	-	-	-	-	731	728	-	330	304	-
Critical Hdwy	4.17	-	-	4.12	-	-	7.15	6.55	6.25	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.12	5.52	-
Follow-up Hdwy	2.263	-	-	2.218	-	-	3.545	4.045	3.345	3.518	4.018	3.318
Pot Cap-1 Maneuver	1155	-	-	1260	-	-	220	243	769	203	233	670
Stage 1	-	-	-	-	-	-	734	684	-	415	429	-
Stage 2	-	-	-	-	-	-	409	424	-	683	663	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1155	-	-	1260	-	-	189	209	769	150	200	669
Mov Cap-2 Maneuver	-	-	-	-	-	-	189	209	-	150	200	-
Stage 1	-	-	-	-	-	-	733	683	-	414	369	-
Stage 2	-	-	-	-	-	-	342	364	-	568	662	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.7	19	23.7
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	426	1155	-	-	1260	-	-	171	669
HCM Lane V/C Ratio	0.402	0.001	-	-	0.14	-	-	0.088	0.007
HCM Control Delay (s)	19	8.1	-	-	8.3	-	-	28.1	10.4
HCM Lane LOS	C	A	-	-	A	-	-	D	B
HCM 95th %tile Q(veh)	1.9	0	-	-	0.5	-	-	0.3	0

Intersection

Int Delay, s/veh 5.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	159	100	206	5	2	254
Future Vol, veh/h	159	100	206	5	2	254
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	79	79	94	94
Heavy Vehicles, %	13	13	12	12	2	2
Mvmt Flow	194	122	261	6	2	270

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	267	0	774
Stage 1	-	-	264
Stage 2	-	-	510
Critical Hdwy	4.23	-	7.12
Critical Hdwy Stg 1	-	-	6.12
Critical Hdwy Stg 2	-	-	6.12
Follow-up Hdwy	2.317	-	3.518
Pot Cap-1 Maneuver	1236	-	316
Stage 1	-	-	741
Stage 2	-	-	546
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1236	-	275
Mov Cap-2 Maneuver	-	-	275
Stage 1	-	-	617
Stage 2	-	-	454

Approach	EB	WB	SB
HCM Control Delay, s	5.2	0	12.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1236	-	-	-	764
HCM Lane V/C Ratio	0.157	-	-	-	0.356
HCM Control Delay (s)	8.5	0	-	-	12.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.6	-	-	-	1.6

MITIGATION

HCM 2010 Signalized Intersection Summary 3: E. La Cadena & I-215 Ramp

Marlborough Industrial Project
09/06/2017

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	183	613	361	73	114	13		
Future Volume (veh/h)	183	613	361	73	114	13		
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	1937	1937	1863	1937	1937	1937		
Adj Flow Rate, veh/h	201	0	392	79	154	0		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.91	0.91	0.92	0.92	0.74	0.74		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	363	324	796	940	940	799		
Arrive On Green	0.20	0.00	0.49	0.49	0.49	0.00		
Sat Flow, veh/h	1845	1647	1228	1937	1937	1647		
Grp Volume(v), veh/h	201	0	392	79	154	0		
Grp Sat Flow(s),veh/h/ln	1845	1647	1228	1937	1937	1647		
Q Serve(g_s), s	2.8	0.0	7.4	0.6	1.3	0.0		
Cycle Q Clear(g_c), s	2.8	0.0	8.7	0.6	1.3	0.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	363	324	796	940	940	799		
V/C Ratio(X)	0.55	0.00	0.49	0.08	0.16	0.00		
Avail Cap(c_a), veh/h	2121	1893	2307	3323	3323	2825		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	10.2	0.0	6.5	3.9	4.1	0.0		
Incr Delay (d2), s/veh	1.3	0.0	0.5	0.0	0.1	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	1.5	0.0	2.5	0.3	0.7	0.0		
LnGrp Delay(d),s/veh	11.6	0.0	7.0	3.9	4.2	0.0		
LnGrp LOS	B		A	A	A			
Approach Vol, veh/h	201			471	154			
Approach Delay, s/veh	11.6			6.5	4.2			
Approach LOS	B			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		18.2		10.1		18.2		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		48.5		32.5		48.5		
Max Q Clear Time (g_c+I1), s		10.7		4.8		3.3		
Green Ext Time (p_c), s		3.0		0.6		3.1		
Intersection Summary								
HCM 2010 Ctrl Delay			7.3					
HCM 2010 LOS			A					

HCM 2010 Signalized Intersection Summary 2: W. La Cadena & I-215 Ramps

Marlborough Industrial Project
09/06/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	124	683	27	27	274	9	4	145	12	218	71	156
Future Volume (veh/h)	124	683	27	27	274	9	4	145	12	218	71	156
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1900	1937	1863	1900	1937	1863
Adj Flow Rate, veh/h	139	767	30	28	285	9	5	169	14	240	78	171
Adj No. of Lanes	0	2	0	0	1	1	0	1	1	0	1	1
Peak Hour Factor	0.89	0.89	0.89	0.96	0.96	0.96	0.86	0.86	0.86	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	164	953	39	32	327	307	6	213	179	276	90	310
Arrive On Green	0.31	0.31	0.31	0.19	0.19	0.19	0.11	0.11	0.11	0.20	0.20	0.20
Sat Flow, veh/h	522	3032	124	166	1689	1583	56	1879	1583	1409	458	1583
Grp Volume(v), veh/h	490	0	446	313	0	9	174	0	14	318	0	171
Grp Sat Flow(s),veh/h/ln	1837	0	1841	1854	0	1583	1934	0	1583	1867	0	1583
Q Serve(g_s), s	24.5	0.0	21.6	16.1	0.0	0.5	8.6	0.0	0.8	16.2	0.0	9.6
Cycle Q Clear(g_c), s	24.5	0.0	21.6	16.1	0.0	0.5	8.6	0.0	0.8	16.2	0.0	9.6
Prop In Lane	0.28		0.07	0.09		1.00	0.03		1.00	0.75		1.00
Lane Grp Cap(c), veh/h	577	0	579	359	0	307	219	0	179	366	0	310
V/C Ratio(X)	0.85	0.00	0.77	0.87	0.00	0.03	0.79	0.00	0.08	0.87	0.00	0.55
Avail Cap(c_a), veh/h	691	0	692	462	0	394	354	0	290	427	0	362
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.5	0.0	30.5	38.5	0.0	32.2	42.5	0.0	39.0	38.3	0.0	35.7
Incr Delay (d2), s/veh	8.4	0.0	4.5	13.6	0.0	0.0	6.4	0.0	0.2	15.6	0.0	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.7	0.0	11.6	9.6	0.0	0.2	5.0	0.0	0.4	10.0	0.0	4.3
LnGrp Delay(d),s/veh	40.0	0.0	35.0	52.0	0.0	32.2	48.9	0.0	39.2	53.9	0.0	37.2
LnGrp LOS	D		D	D		C	D		D	D		D
Approach Vol, veh/h		936			322			188			489	
Approach Delay, s/veh		37.6			51.5			48.2			48.1	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		35.4		23.8		23.6		15.6				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		37.0		22.5		24.5		18.0				
Max Q Clear Time (g_c+I1), s		26.5		18.2		18.1		10.6				
Green Ext Time (p_c), s		4.4		1.0		1.0		0.5				
Intersection Summary												
HCM 2010 Ctrl Delay				43.6								
HCM 2010 LOS				D								

HCM 2010 Signalized Intersection Summary 3: E. La Cadena & I-215 Ramp

Marlborough Industrial Project
09/06/2017

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	79	315	685	124	179	33		
Future Volume (veh/h)	79	315	685	124	179	33		
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	1937	1937	1863	1937	1937	1937		
Adj Flow Rate, veh/h	89	0	714	129	199	0		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.89	0.89	0.96	0.96	0.90	0.90		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	190	169	948	1366	1366	1161		
Arrive On Green	0.10	0.00	0.70	0.70	0.70	0.00		
Sat Flow, veh/h	1845	1647	1179	1937	1937	1647		
Grp Volume(v), veh/h	89	0	714	129	199	0		
Grp Sat Flow(s),veh/h/ln	1845	1647	1179	1937	1937	1647		
Q Serve(g_s), s	2.1	0.0	23.4	1.0	1.6	0.0		
Cycle Q Clear(g_c), s	2.1	0.0	24.9	1.0	1.6	0.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	190	169	948	1366	1366	1161		
V/C Ratio(X)	0.47	0.00	0.75	0.09	0.15	0.00		
Avail Cap(c_a), veh/h	709	633	1703	2606	2606	2215		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	19.8	0.0	6.3	2.2	2.3	0.0		
Incr Delay (d2), s/veh	1.8	0.0	1.2	0.0	0.0	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	1.2	0.0	7.7	0.5	0.8	0.0		
LnGrp Delay(d),s/veh	21.6	0.0	7.5	2.2	2.3	0.0		
LnGrp LOS	C		A	A	A			
Approach Vol, veh/h	89			843	199			
Approach Delay, s/veh	21.6			6.7	2.3			
Approach LOS	C			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		37.5		9.3		37.5		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		63.0		18.0		63.0		
Max Q Clear Time (g_c+I1), s		26.9		4.1		3.6		
Green Ext Time (p_c), s		6.1		0.2		6.3		
Intersection Summary								
HCM 2010 Ctrl Delay			7.1					
HCM 2010 LOS			A					

HCM 2010 Signalized Intersection Summary

2: W. La Cadena & I-215 Ramps

Marlborough Industrial Project

06/21/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	102	458	9	15	288	4	8	22	12	244	28	146
Future Volume (veh/h)	102	458	9	15	288	4	8	22	12	244	28	146
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1845	1845	1900	1937	1863	1900	1937	1863
Adj Flow Rate, veh/h	105	472	9	18	339	5	9	25	14	284	33	170
Adj No. of Lanes	0	2	0	0	1	1	0	1	1	0	1	1
Peak Hour Factor	0.97	0.97	0.97	0.85	0.85	0.85	0.88	0.88	0.88	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	3	3	3	2	2	2	2	2	2
Cap, veh/h	139	663	13	22	411	369	47	130	146	356	41	339
Arrive On Green	0.22	0.22	0.22	0.24	0.24	0.24	0.09	0.09	0.09	0.21	0.21	0.21
Sat Flow, veh/h	630	2995	59	93	1747	1568	506	1406	1583	1661	193	1583
Grp Volume(v), veh/h	305	0	281	357	0	5	34	0	14	317	0	170
Grp Sat Flow(s),veh/h/ln	1831	0	1852	1840	0	1568	1912	0	1583	1854	0	1583
Q Serve(g_s), s	11.8	0.0	10.6	14.0	0.0	0.2	1.2	0.0	0.6	12.3	0.0	7.2
Cycle Q Clear(g_c), s	11.8	0.0	10.6	14.0	0.0	0.2	1.2	0.0	0.6	12.3	0.0	7.2
Prop In Lane	0.34		0.03	0.05		1.00	0.26		1.00	0.90		1.00
Lane Grp Cap(c), veh/h	405	0	410	433	0	369	176	0	146	397	0	339
V/C Ratio(X)	0.75	0.00	0.68	0.82	0.00	0.01	0.19	0.00	0.10	0.80	0.00	0.50
Avail Cap(c_a), veh/h	651	0	659	764	0	651	453	0	375	623	0	532
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.6	0.0	27.1	27.5	0.0	22.3	31.8	0.0	31.6	28.3	0.0	26.3
Incr Delay (d2), s/veh	2.9	0.0	2.0	4.0	0.0	0.0	0.5	0.0	0.3	4.0	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	0.0	5.6	7.5	0.0	0.1	0.7	0.0	0.3	6.7	0.0	3.2
LnGrp Delay(d),s/veh	30.5	0.0	29.2	31.5	0.0	22.3	32.4	0.0	31.8	32.2	0.0	27.4
LnGrp LOS	C		C	C		C	C		C	C		C
Approach Vol, veh/h		586			362			48			487	
Approach Delay, s/veh		29.9			31.4			32.2			30.6	
Approach LOS		C			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		21.3		20.7		22.4		11.5				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		27.0		25.5		31.5		18.0				
Max Q Clear Time (g_c+I1), s		13.8		14.3		16.0		3.2				
Green Ext Time (p_c), s		3.0		1.9		1.9		0.1				
Intersection Summary												
HCM 2010 Ctrl Delay				30.5								
HCM 2010 LOS				C								

HCM 2010 Signalized Intersection Summary 3: E. La Cadena & I-215 Ramp

Marlborough Industrial Project

06/21/2017

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	187	624	368	74	116	13		
Future Volume (veh/h)	187	624	368	74	116	13		
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	1937	1937	1863	1937	1937	1937		
Adj Flow Rate, veh/h	205	0	400	80	157	0		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.91	0.91	0.92	0.92	0.74	0.74		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	362	323	797	952	952	809		
Arrive On Green	0.20	0.00	0.49	0.49	0.49	0.00		
Sat Flow, veh/h	1845	1647	1225	1937	1937	1647		
Grp Volume(v), veh/h	205	0	400	80	157	0		
Grp Sat Flow(s),veh/h/ln	1845	1647	1225	1937	1937	1647		
Q Serve(g_s), s	2.9	0.0	7.7	0.6	1.3	0.0		
Cycle Q Clear(g_c), s	2.9	0.0	9.0	0.6	1.3	0.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	362	323	797	952	952	809		
V/C Ratio(X)	0.57	0.00	0.50	0.08	0.16	0.00		
Avail Cap(c_a), veh/h	2084	1860	2259	3265	3265	2775		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	10.5	0.0	6.5	3.9	4.1	0.0		
Incr Delay (d2), s/veh	1.4	0.0	0.5	0.0	0.1	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	1.6	0.0	2.7	0.3	0.7	0.0		
LnGrp Delay(d),s/veh	11.9	0.0	7.0	3.9	4.1	0.0		
LnGrp LOS	B		A	A	A			
Approach Vol, veh/h	205			480	157			
Approach Delay, s/veh	11.9			6.5	4.1			
Approach LOS	B			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		18.6		10.1		18.6		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		48.5		32.5		48.5		
Max Q Clear Time (g_c+I1), s		11.0		4.9		3.3		
Green Ext Time (p_c), s		3.1		0.6		3.1		
Intersection Summary								
HCM 2010 Ctrl Delay			7.4					
HCM 2010 LOS			A					

HCM 2010 Signalized Intersection Summary 2: W. La Cadena & I-215 Ramps

Marlborough Industrial Project
06/21/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	126	695	28	28	279	9	4	148	12	222	72	159
Future Volume (veh/h)	126	695	28	28	279	9	4	148	12	222	72	159
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1900	1937	1863	1900	1937	1863
Adj Flow Rate, veh/h	142	781	31	29	291	9	5	172	14	244	79	175
Adj No. of Lanes	0	2	0	0	1	1	0	1	1	0	1	1
Peak Hour Factor	0.89	0.89	0.89	0.96	0.96	0.96	0.86	0.86	0.86	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	165	956	40	33	331	311	6	214	180	277	90	311
Arrive On Green	0.32	0.32	0.32	0.20	0.20	0.20	0.11	0.11	0.11	0.20	0.20	0.20
Sat Flow, veh/h	523	3029	125	168	1686	1583	55	1880	1583	1410	457	1583
Grp Volume(v), veh/h	499	0	455	320	0	9	177	0	14	323	0	175
Grp Sat Flow(s),veh/h/ln	1837	0	1841	1854	0	1583	1935	0	1583	1867	0	1583
Q Serve(g_s), s	25.8	0.0	22.8	17.0	0.0	0.5	9.0	0.0	0.8	17.0	0.0	10.1
Cycle Q Clear(g_c), s	25.8	0.0	22.8	17.0	0.0	0.5	9.0	0.0	0.8	17.0	0.0	10.1
Prop In Lane	0.28		0.07	0.09		1.00	0.03		1.00	0.76		1.00
Lane Grp Cap(c), veh/h	580	0	581	364	0	311	220	0	180	367	0	311
V/C Ratio(X)	0.86	0.00	0.78	0.88	0.00	0.03	0.80	0.00	0.08	0.88	0.00	0.56
Avail Cap(c_a), veh/h	671	0	673	449	0	383	344	0	281	415	0	352
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.6	0.0	31.5	39.5	0.0	32.9	43.8	0.0	40.1	39.5	0.0	36.7
Incr Delay (d2), s/veh	9.9	0.0	5.2	15.5	0.0	0.0	7.4	0.0	0.2	17.7	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.6	0.0	12.3	10.3	0.0	0.2	5.3	0.0	0.4	10.6	0.0	4.6
LnGrp Delay(d),s/veh	42.5	0.0	36.7	55.0	0.0	32.9	51.1	0.0	40.3	57.2	0.0	38.3
LnGrp LOS	D		D	E		C	D		D	E		D
Approach Vol, veh/h		954			329			191			498	
Approach Delay, s/veh		39.7			54.4			50.3			50.6	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		36.5		24.4		24.4		16.0				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		37.0		22.5		24.5		18.0				
Max Q Clear Time (g_c+I1), s		27.8		19.0		19.0		11.0				
Green Ext Time (p_c), s		4.1		0.9		0.9		0.5				
Intersection Summary												
HCM 2010 Ctrl Delay				46.0								
HCM 2010 LOS				D								

HCM 2010 Signalized Intersection Summary 3: E. La Cadena & I-215 Ramp

Marlborough Industrial Project
06/21/2017

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	81	321	697	126	183	34		
Future Volume (veh/h)	81	321	697	126	183	34		
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	1937	1937	1863	1937	1937	1937		
Adj Flow Rate, veh/h	91	0	726	131	203	0		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.89	0.89	0.96	0.96	0.90	0.90		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	189	168	950	1381	1381	1174		
Arrive On Green	0.10	0.00	0.71	0.71	0.71	0.00		
Sat Flow, veh/h	1845	1647	1174	1937	1937	1647		
Grp Volume(v), veh/h	91	0	726	131	203	0		
Grp Sat Flow(s),veh/h/ln	1845	1647	1174	1937	1937	1647		
Q Serve(g_s), s	2.3	0.0	25.0	1.0	1.6	0.0		
Cycle Q Clear(g_c), s	2.3	0.0	26.4	1.0	1.6	0.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	189	168	950	1381	1381	1174		
V/C Ratio(X)	0.48	0.00	0.76	0.09	0.15	0.00		
Avail Cap(c_a), veh/h	682	609	1633	2508	2508	2131		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	20.6	0.0	6.4	2.2	2.2	0.0		
Incr Delay (d2), s/veh	1.9	0.0	1.3	0.0	0.0	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	1.2	0.0	8.0	0.5	0.9	0.0		
LnGrp Delay(d),s/veh	22.5	0.0	7.7	2.2	2.3	0.0		
LnGrp LOS	C		A	A	A			
Approach Vol, veh/h	91			857	203			
Approach Delay, s/veh	22.5			6.9	2.3			
Approach LOS	C			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		39.2		9.5		39.2		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		63.0		18.0		63.0		
Max Q Clear Time (g_c+I1), s		28.4		4.3		3.6		
Green Ext Time (p_c), s		6.3		0.2		6.5		
Intersection Summary								
HCM 2010 Ctrl Delay			7.3					
HCM 2010 LOS			A					

HCM 2010 Signalized Intersection Summary 2: W. La Cadena & I-215 Ramps

Marlborough Industrial Project
06/21/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	102	467	9	15	323	4	8	22	12	244	28	146
Future Volume (veh/h)	102	467	9	15	323	4	8	22	12	244	28	146
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1845	1845	1900	1937	1863	1900	1937	1863
Adj Flow Rate, veh/h	105	481	9	18	380	5	9	25	14	284	33	170
Adj No. of Lanes	0	2	0	0	1	1	0	1	1	0	1	1
Peak Hour Factor	0.97	0.97	0.97	0.85	0.85	0.85	0.88	0.88	0.88	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	3	3	3	2	2	2	2	2	2
Cap, veh/h	125	604	12	20	424	378	84	233	263	375	44	358
Arrive On Green	0.20	0.20	0.20	0.24	0.24	0.24	0.17	0.17	0.17	0.23	0.23	0.23
Sat Flow, veh/h	620	3005	59	83	1757	1568	506	1406	1583	1661	193	1583
Grp Volume(v), veh/h	310	0	285	398	0	5	34	0	14	317	0	170
Grp Sat Flow(s),veh/h/ln	1832	0	1852	1840	0	1568	1912	0	1583	1854	0	1583
Q Serve(g_s), s	17.7	0.0	15.8	22.7	0.0	0.3	1.6	0.0	0.8	17.3	0.0	10.1
Cycle Q Clear(g_c), s	17.7	0.0	15.8	22.7	0.0	0.3	1.6	0.0	0.8	17.3	0.0	10.1
Prop In Lane	0.34		0.03	0.05		1.00	0.26		1.00	0.90		1.00
Lane Grp Cap(c), veh/h	368	0	372	444	0	378	317	0	263	419	0	358
V/C Ratio(X)	0.84	0.00	0.77	0.90	0.00	0.01	0.11	0.00	0.05	0.76	0.00	0.48
Avail Cap(c_a), veh/h	456	0	461	551	0	470	317	0	263	419	0	358
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.7	0.0	40.9	39.8	0.0	31.3	38.4	0.0	38.1	39.2	0.0	36.4
Incr Delay (d2), s/veh	11.3	0.0	6.0	14.9	0.0	0.0	0.7	0.0	0.4	12.1	0.0	4.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.1	0.0	8.7	13.3	0.0	0.1	0.9	0.0	0.4	10.3	0.0	4.8
LnGrp Delay(d),s/veh	53.0	0.0	46.9	54.7	0.0	31.3	39.1	0.0	38.5	51.3	0.0	40.9
LnGrp LOS	D		D	D		C	D		D	D		D
Approach Vol, veh/h		595			403			48			487	
Approach Delay, s/veh		50.1			54.4			38.9			47.6	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		26.3		29.0		30.7		22.5				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		27.0		24.5		32.5		18.0				
Max Q Clear Time (g_c+I1), s		19.7		19.3		24.7		3.6				
Green Ext Time (p_c), s		2.1		1.2		1.5		0.1				
Intersection Summary												
HCM 2010 Ctrl Delay				50.1								
HCM 2010 LOS				D								

HCM 2010 Signalized Intersection Summary 3: E. La Cadena & I-215 Ramp

Marlborough Industrial Project
06/21/2017

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	187	659	377	74	116	13		
Future Volume (veh/h)	187	659	377	74	116	13		
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	1937	1937	1863	1937	1937	1937		
Adj Flow Rate, veh/h	205	0	410	80	157	0		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.91	0.91	0.92	0.92	0.74	0.74		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	359	320	801	963	963	818		
Arrive On Green	0.19	0.00	0.50	0.50	0.50	0.00		
Sat Flow, veh/h	1845	1647	1225	1937	1937	1647		
Grp Volume(v), veh/h	205	0	410	80	157	0		
Grp Sat Flow(s),veh/h/ln	1845	1647	1225	1937	1937	1647		
Q Serve(g_s), s	2.9	0.0	8.0	0.6	1.3	0.0		
Cycle Q Clear(g_c), s	2.9	0.0	9.3	0.6	1.3	0.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	359	320	801	963	963	818		
V/C Ratio(X)	0.57	0.00	0.51	0.08	0.16	0.00		
Avail Cap(c_a), veh/h	2094	1869	2204	3182	3182	2705		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	10.6	0.0	6.6	3.8	4.0	0.0		
Incr Delay (d2), s/veh	1.4	0.0	0.5	0.0	0.1	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	1.6	0.0	2.7	0.3	0.7	0.0		
LnGrp Delay(d),s/veh	12.1	0.0	7.1	3.9	4.1	0.0		
LnGrp LOS	B		A	A	A			
Approach Vol, veh/h	205			490	157			
Approach Delay, s/veh	12.1			6.6	4.1			
Approach LOS	B			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		19.0		10.2		19.0		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		47.9		33.1		47.9		
Max Q Clear Time (g_c+I1), s		11.3		4.9		3.3		
Green Ext Time (p_c), s		3.2		0.6		3.2		
Intersection Summary								
HCM 2010 Ctrl Delay			7.4					
HCM 2010 LOS			A					

HCM 2010 Signalized Intersection Summary 2: W. La Cadena & I-215 Ramps

Marlborough Industrial Project
06/21/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	126	719	28	28	289	9	4	148	12	222	72	159
Future Volume (veh/h)	126	719	28	28	289	9	4	148	12	222	72	159
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1900	1900	1863	1863	1900	1937	1863	1900	1937	1863
Adj Flow Rate, veh/h	142	808	31	29	301	9	5	172	14	244	79	175
Adj No. of Lanes	0	2	0	0	1	1	0	1	1	0	1	1
Peak Hour Factor	0.89	0.89	0.89	0.96	0.96	0.96	0.86	0.86	0.86	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	163	979	39	33	338	316	6	213	179	272	88	306
Arrive On Green	0.32	0.32	0.32	0.20	0.20	0.20	0.11	0.11	0.11	0.19	0.19	0.19
Sat Flow, veh/h	508	3048	122	163	1692	1583	55	1880	1583	1410	457	1583
Grp Volume(v), veh/h	513	0	468	330	0	9	177	0	14	323	0	175
Grp Sat Flow(s),veh/h/ln	1837	0	1841	1855	0	1583	1935	0	1583	1867	0	1583
Q Serve(g_s), s	27.4	0.0	24.1	18.0	0.0	0.5	9.3	0.0	0.8	17.6	0.0	10.4
Cycle Q Clear(g_c), s	27.4	0.0	24.1	18.0	0.0	0.5	9.3	0.0	0.8	17.6	0.0	10.4
Prop In Lane	0.28		0.07	0.09		1.00	0.03		1.00	0.76		1.00
Lane Grp Cap(c), veh/h	590	0	591	371	0	316	219	0	179	360	0	306
V/C Ratio(X)	0.87	0.00	0.79	0.89	0.00	0.03	0.81	0.00	0.08	0.90	0.00	0.57
Avail Cap(c_a), veh/h	670	0	672	436	0	372	334	0	274	385	0	327
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.3	0.0	32.2	40.6	0.0	33.5	45.1	0.0	41.3	41.0	0.0	38.1
Incr Delay (d2), s/veh	10.9	0.0	5.7	17.9	0.0	0.0	8.3	0.0	0.2	21.9	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.6	0.0	13.2	11.1	0.0	0.2	5.5	0.0	0.4	11.3	0.0	4.7
LnGrp Delay(d),s/veh	44.2	0.0	37.9	58.5	0.0	33.6	53.4	0.0	41.5	62.9	0.0	40.2
LnGrp LOS	D		D	E		C	D		D	E		D
Approach Vol, veh/h		981			339			191			498	
Approach Delay, s/veh		41.2			57.8			52.5			54.9	
Approach LOS		D			E			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		38.0		24.6		25.3		16.3				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		38.0		21.5		24.5		18.0				
Max Q Clear Time (g_c+I1), s		29.4		19.6		20.0		11.3				
Green Ext Time (p_c), s		4.0		0.5		0.8		0.5				
Intersection Summary												
HCM 2010 Ctrl Delay				48.5								
HCM 2010 LOS				D								

HCM 2010 Signalized Intersection Summary 3: E. La Cadena & I-215 Ramp

Marlborough Industrial Project
06/21/2017

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	81	331	721	126	183	34		
Future Volume (veh/h)	81	331	721	126	183	34		
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	1937	1937	1863	1937	1937	1937		
Adj Flow Rate, veh/h	91	0	751	131	203	0		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.89	0.89	0.96	0.96	0.90	0.90		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	184	164	961	1405	1405	1194		
Arrive On Green	0.10	0.00	0.73	0.73	0.73	0.00		
Sat Flow, veh/h	1845	1647	1174	1937	1937	1647		
Grp Volume(v), veh/h	91	0	751	131	203	0		
Grp Sat Flow(s),veh/h/ln	1845	1647	1174	1937	1937	1647		
Q Serve(g_s), s	2.4	0.0	27.4	1.0	1.7	0.0		
Cycle Q Clear(g_c), s	2.4	0.0	28.7	1.0	1.7	0.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	184	164	961	1405	1405	1194		
V/C Ratio(X)	0.49	0.00	0.78	0.09	0.14	0.00		
Avail Cap(c_a), veh/h	646	577	1549	2375	2375	2018		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	21.9	0.0	6.4	2.1	2.2	0.0		
Incr Delay (d2), s/veh	2.1	0.0	1.4	0.0	0.0	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	1.3	0.0	8.9	0.6	0.9	0.0		
LnGrp Delay(d),s/veh	24.0	0.0	7.9	2.1	2.2	0.0		
LnGrp LOS	C		A	A	A			
Approach Vol, veh/h	91			882	203			
Approach Delay, s/veh	24.0			7.0	2.2			
Approach LOS	C			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		41.7		9.6		41.7		
Change Period (Y+Rc), s		4.5		4.5		4.5		
Max Green Setting (Gmax), s		63.0		18.0		63.0		
Max Q Clear Time (g_c+I1), s		30.7		4.4		3.7		
Green Ext Time (p_c), s		6.4		0.2		6.7		
Intersection Summary								
HCM 2010 Ctrl Delay			7.5					
HCM 2010 LOS			A					

APPENDIX E
TRIP GENERATION CALCULATIONS

Trip Generation Summary

Alternative: Alternative 1

Phase:

Project: Marlborough Industrial Complex

Open Date: 6/6/2017

Analysis Date: 6/6/2017

ITE	Land Use	Weekday Average Daily Trips				Weekday AM Peak Hour of Adjacent Street Traffic				Weekday PM Peak Hour of Adjacent Street Traffic			
		★	Enter	Exit	Total	★	Enter	Exit	Total	★	Enter	Exit	Total
140	MANUFACTURING 1		649	648	1297		197	55	252		90	159	249
	339.5 Gross Floor Area 1000 SF												
710	OFFICEGENERAL 1		86	85	171		19	3	22		15	71	86
	6.82 Gross Floor Area 1000 SF												
	Unadjusted Volume		735	733	1468		216	58	274		105	230	335
	Internal Capture Trips		0	0	0		0	0	0		0	0	0
	Pass-By Trips		0	0	0		0	0	0		0	0	0
	Volume Added to Adjacent Streets		735	733	1468		216	58	274		105	230	335

Total Weekday Average Daily Trips Internal Capture = 0 Percent

Total Weekday AM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent

Total Weekday PM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent

★ - Custom rate used for selected time period.

Source: Institute of Transportation Engineers, Trip Generation Manual 9th Edition, 2012

TRIP GENERATION 2014, TRAFFICWARE, LLC

APPENDIX F
CUMULATIVE TRAFFIC VOLUMES

Trip Generation Summary

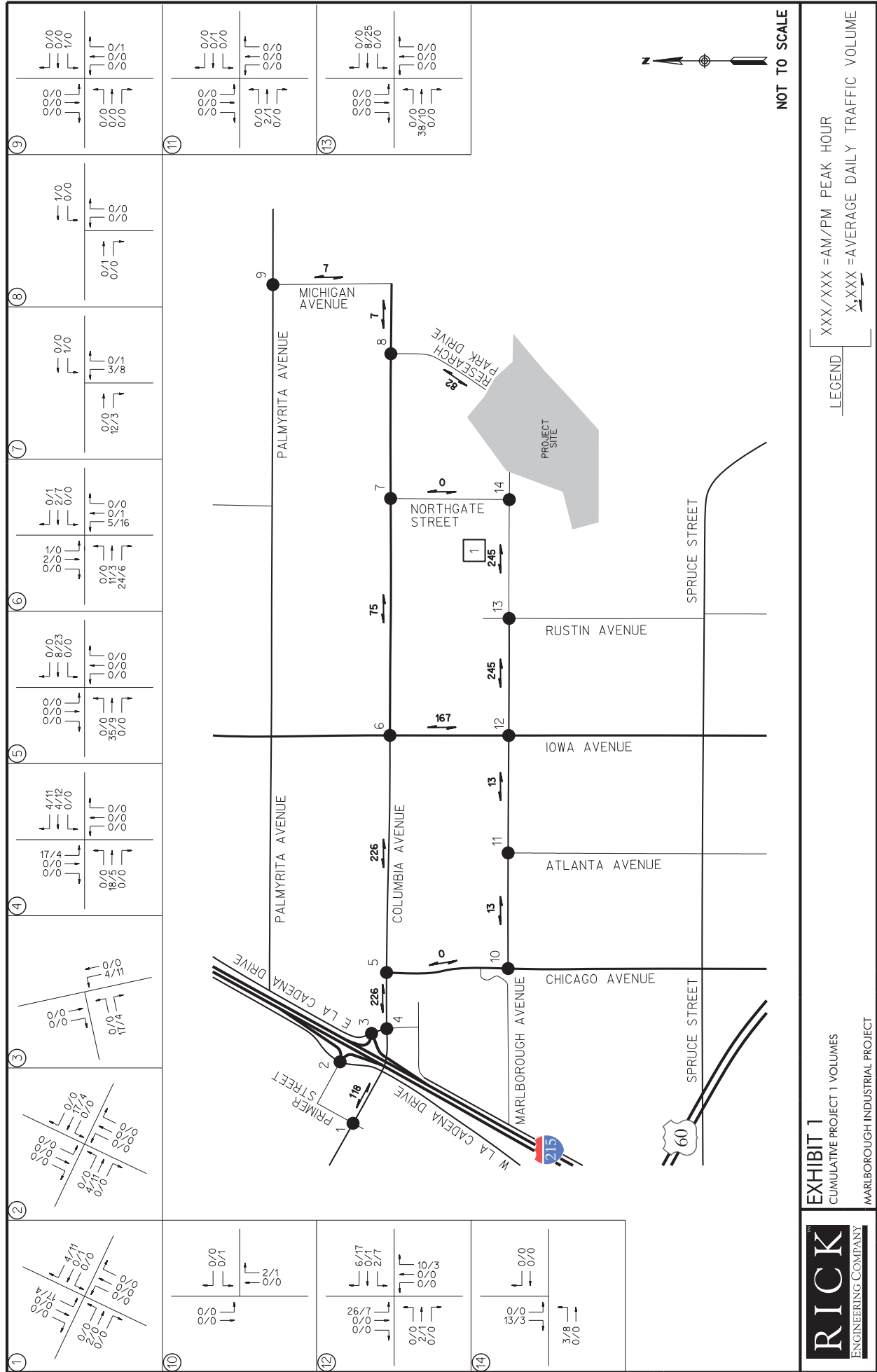
Alternative: Alternative 1	Open Date: 6/15/2017
Phase:	Analysis Date: 6/15/2017
Project: Marlborough Industrial Project	

ITE	Land Use	Weekday Average Daily Trips				Weekday AM Peak Hour of Adjacent Street Traffic				Weekday PM Peak Hour of Adjacent Street Traffic			
		★	Enter	Exit	Total	★	Enter	Exit	Total	★	Enter	Exit	Total
150	Cuml Proj 1		164	163	327		50	13	63		11	33	44
	62 Gross Floor Area 1000 SF												
150	Cuml Proj 3		158	158	316		49	13	62		11	32	43
	59.55 Gross Floor Area 1000 SF												
942	Cuml Proj 2						5	2	7		4	5	9
	3 Occupied Gross Leasable Area 1000 SF												
	Unadjusted Volume		322	321	643		104	28	132		26	70	96
	Internal Capture Trips		0	0	0		0	0	0		0	0	0
	Pass-By Trips		0	0	0		0	0	0		0	0	0
	Volume Added to Adjacent Streets		322	321	643		104	28	132		26	70	96

Total Weekday Average Daily Trips Internal Capture = 0 Percent
Total Weekday AM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent
Total Weekday PM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent

★ - Custom rate used for selected time period.

Source: Institute of Transportation Engineers, Trip Generation Manual 9th Edition, 2012
TRIP GENERATION 2014, TRAFFICWARE, LLC



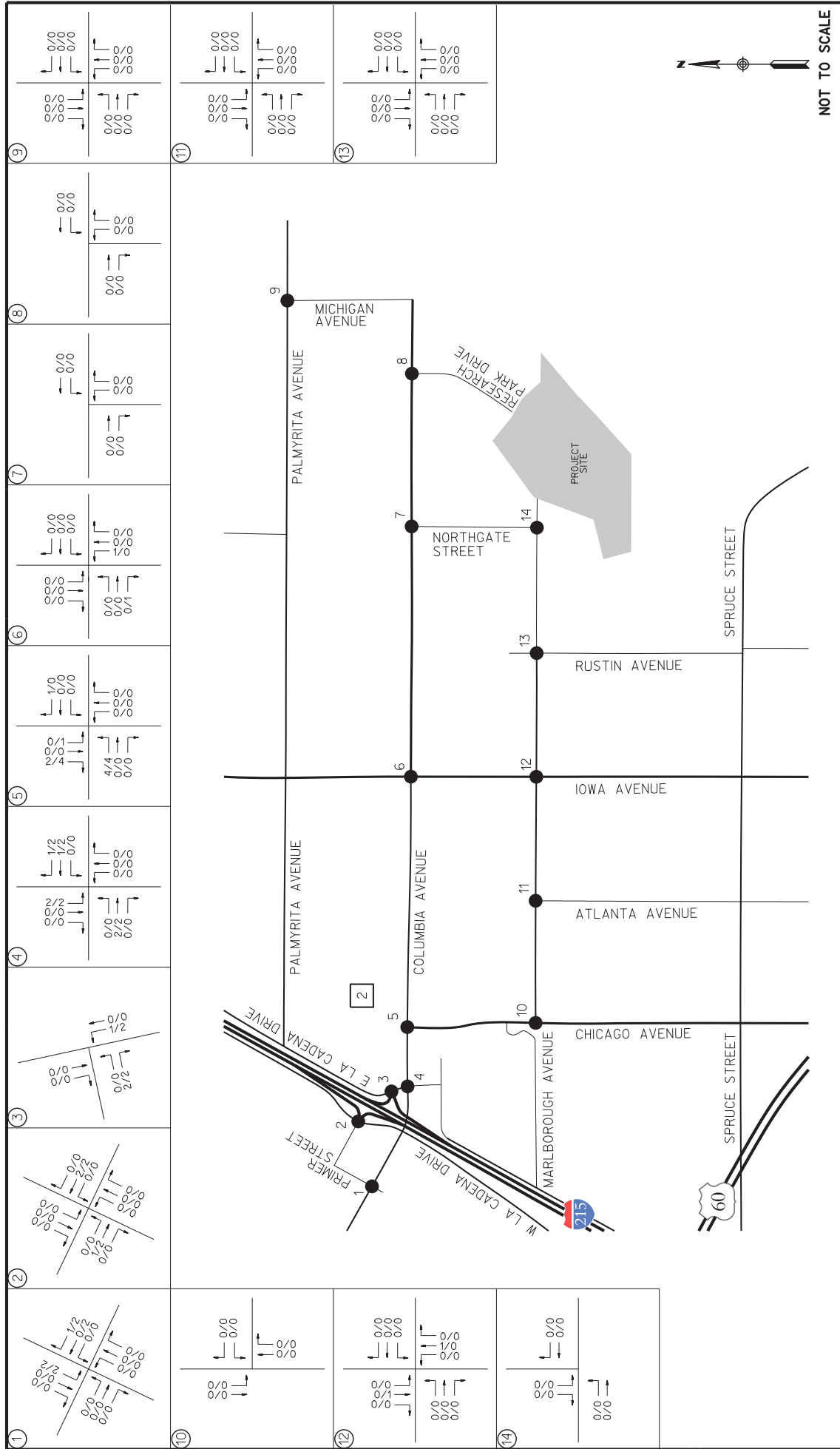
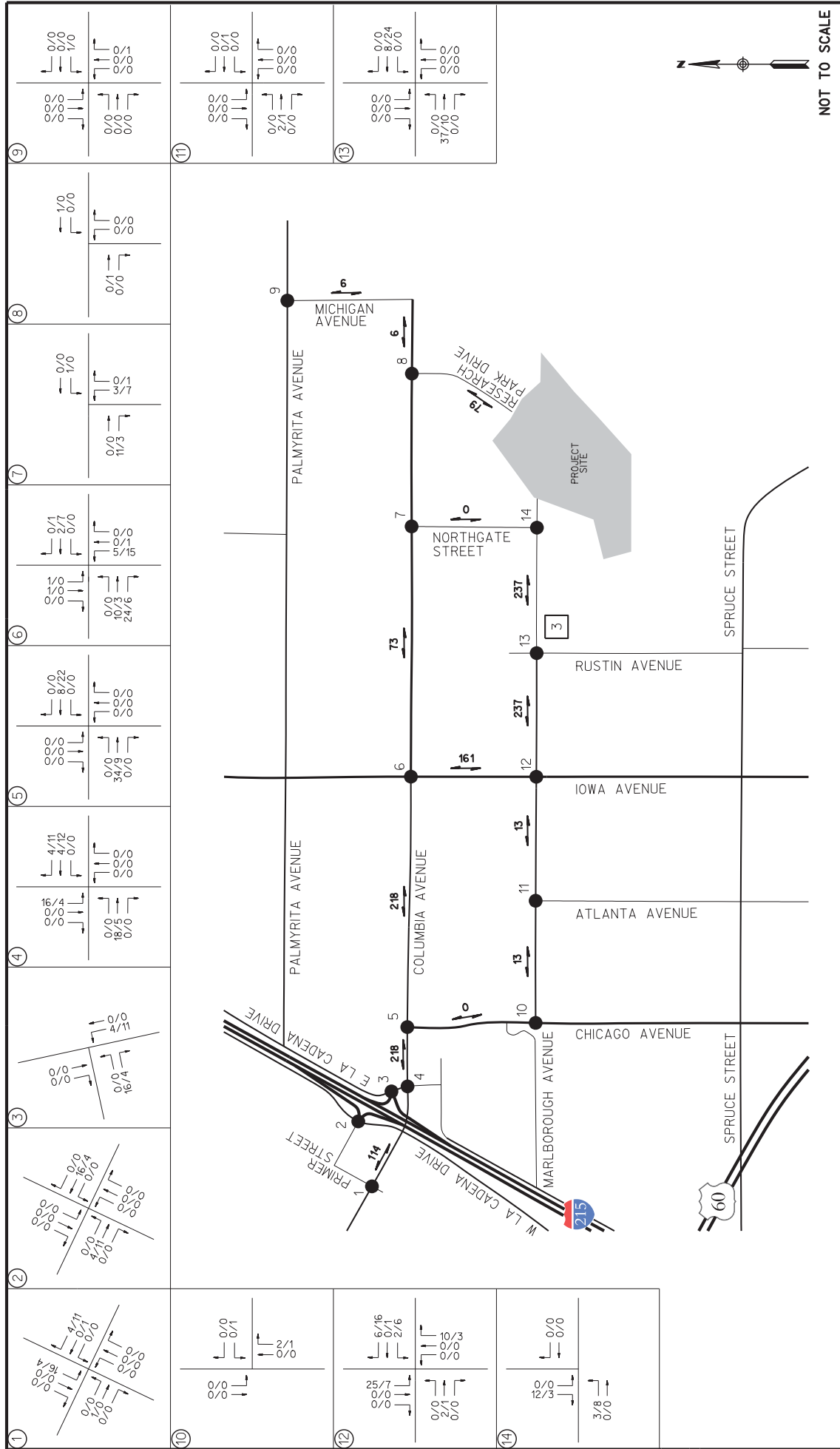


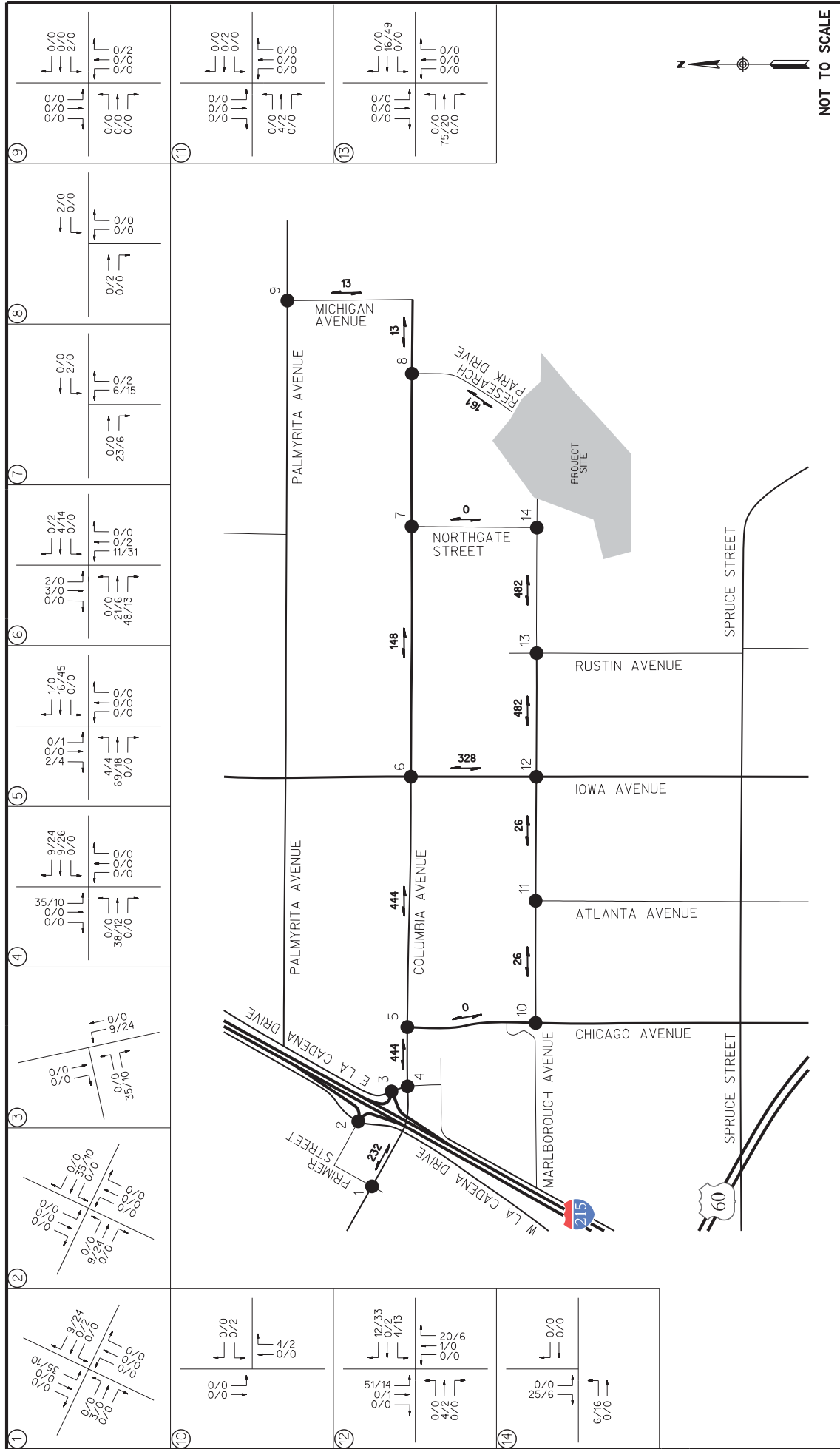
EXHIBIT 2
CUMULATIVE PROJECT 2 VOLUMES

LEGEND
XXX/XXX = AM/PM PEAK HOUR
X,XXX = AVERAGE DAILY TRAFFIC VOLUME

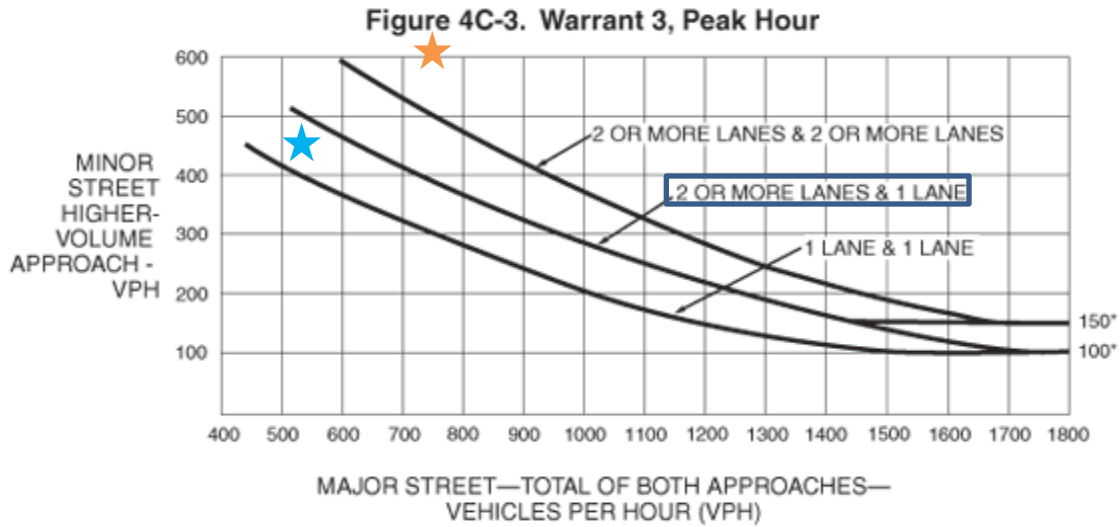
RICK
ENGINEERING COMPANY

EXHIBIT 9 - CEQA Documents

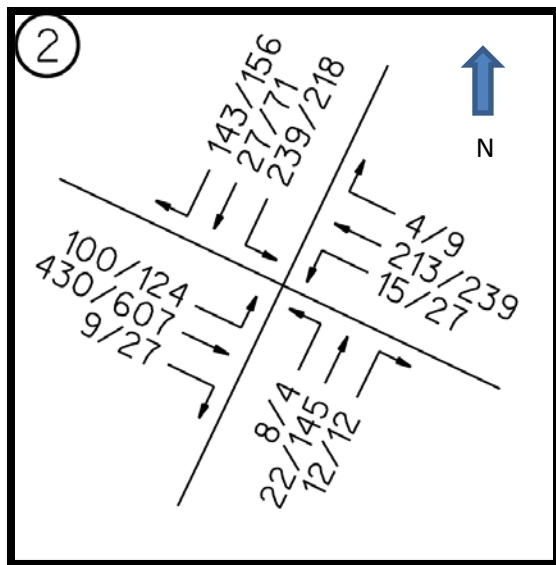




APPENDIX G
SIGNAL WARRANT CALCULATIONS



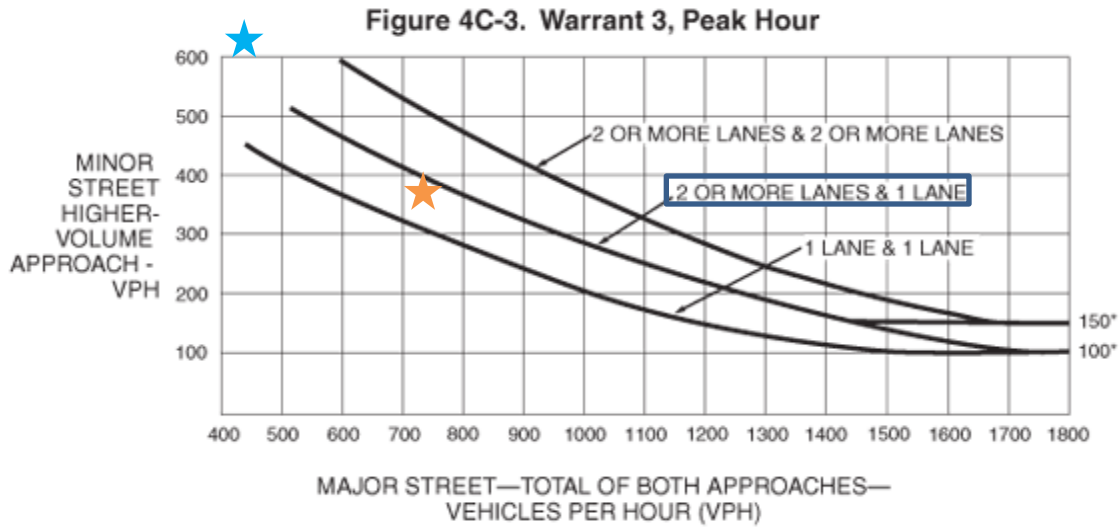
*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.



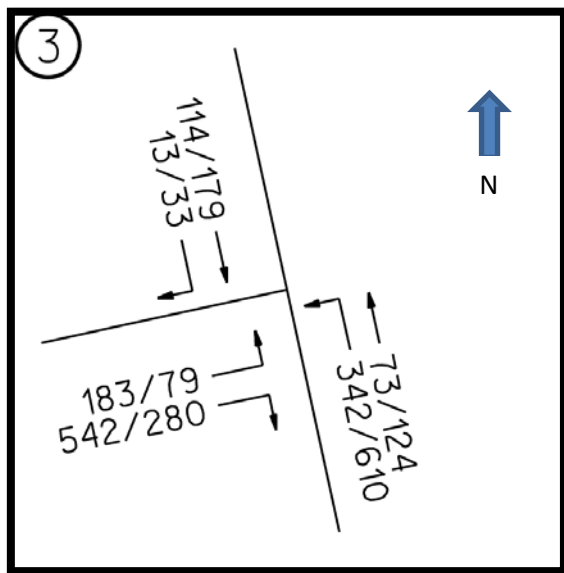
	AM	PM
Major Street Volume: (La Cadena Drive)	539	758
Minor Street Volume: (Interchange Street/I-215 SB Ramps)	451	606

EXISTING TRAFFIC VOLUMES (2017)

RESULT: WARRANTED



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.



	AM	PM
Major Street Volume: (La Cadena Drive)	415	734
Minor Street Volume: (I-215 NB Ramps)	725	359

EXISTING TRAFFIC VOLUMES (2017)

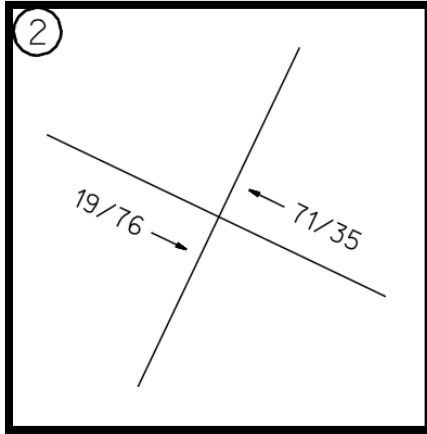
RESULT: WARRANTED

APPENDIX H
FAIR-SHARE CALCULATIONS

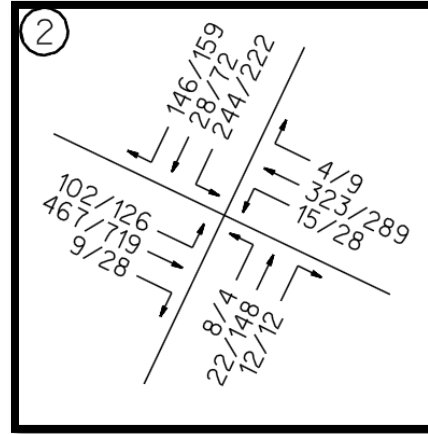
Fair-share Calculations

Fair-share Calculation = (Project Volumes) / (Existing + Ambient + Project + Cum)

Interchange Street / W La Cadena Drive / I-215 SB Ramps



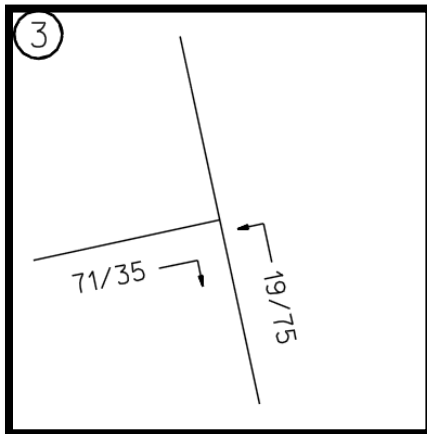
Project Volumes



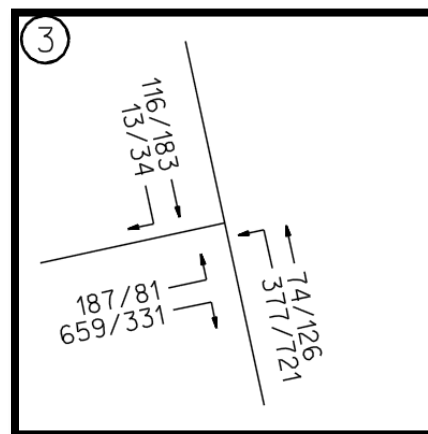
Existing + Ambient + Project + Cum

Fair-share = (201) / (3,196) = 0.06289 = **6.29%**

I-215 NB Ramps / E La Cadena Drive



Project Volumes



Existing + Ambient + Project + Cum

Fair-share = (200) / (2,902) = 0.06891 = **6.89%**

APPENDIX I

Truck Turning Template

**MARLBOROUGH INDUSTRIAL PROJECT
TRAFFIC IMPACT ANALYSIS
(ADDENDUM TO JANUARY 4, 2018 TIA)**

April 9, 2018

Prepared for:

**Guthrie Companies
1451 Research Park Drive, Suite 200
Riverside, CA 92507**



Prepared by:



Traffic Division

Job Number 17994-T

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MARLBOROUGH INDUSTRIAL PROJECT TRAFFIC IMPACT ANALYSIS

(ADDENDUM TO JANUARY 4, 2018 TIA)

April 9, 2018

INTRODUCTION

The following Traffic Impact Analysis (TIA) addendum is an update to the City approved January 4, 2018 Traffic Impact Analysis. The addendum has been prepared to determine any traffic-related impacts within the project area roadways and intersections due to the addition of a previously approved project that was not included as part of the cumulative analysis in the original TIA. The project to be added to the cumulative analysis is the Columbia Business Center. Project traffic volumes used herein are taken directly from the approved Columbia Business Center Traffic Impact Analysis, dated November 18, 2014, prepared by Kunzman Associates, Inc. The addendum will also account for an additional year of ambient traffic growth due to the most recent proposed opening year for the project.

The proposed project is located on the east end of Marlborough Avenue and the south end of Research Park Drive in the City of Riverside. **Exhibit 1** shows the project area map.

This TIA was prepared following the City of Riverside Transportation Department *Traffic Impact Analysis Preparation Guide* publication, dated January, 2016. Refer to **Appendix A** for the Scoping Agreement.

PROJECT DESCRIPTION

The project involves the construction of 339,510 square feet of industrial/manufacturing space with 6,820 square feet of office space. There are two vehicular access points to the project site, one driveway via Marlborough Avenue and the second driveway via Research Park Drive. The project will construct approximately 281 parking spaces on the site to accommodate customers/employees. **Exhibit 2** shows the project site plan.

EXISTING TRANSPORTATION CONDITIONS

The following is a brief description of the City of Riverside roadways within the project area.

Marlborough Avenue is classified as an 88' Arterial between Chicago Avenue and Rustin Avenue and as an 80' Collector between Rustin Avenue and Northgate Street per the City of Riverside's Circulation Element. Within the project area, it currently provides one vehicular travel lane in each direction. On-street parking is only permitted between Chicago Avenue and Atlanta Avenue. Bike lanes are provided between Iowa Avenue and Northgate Street within the project area. Sidewalk is provided on the north side of the roadway throughout the majority of

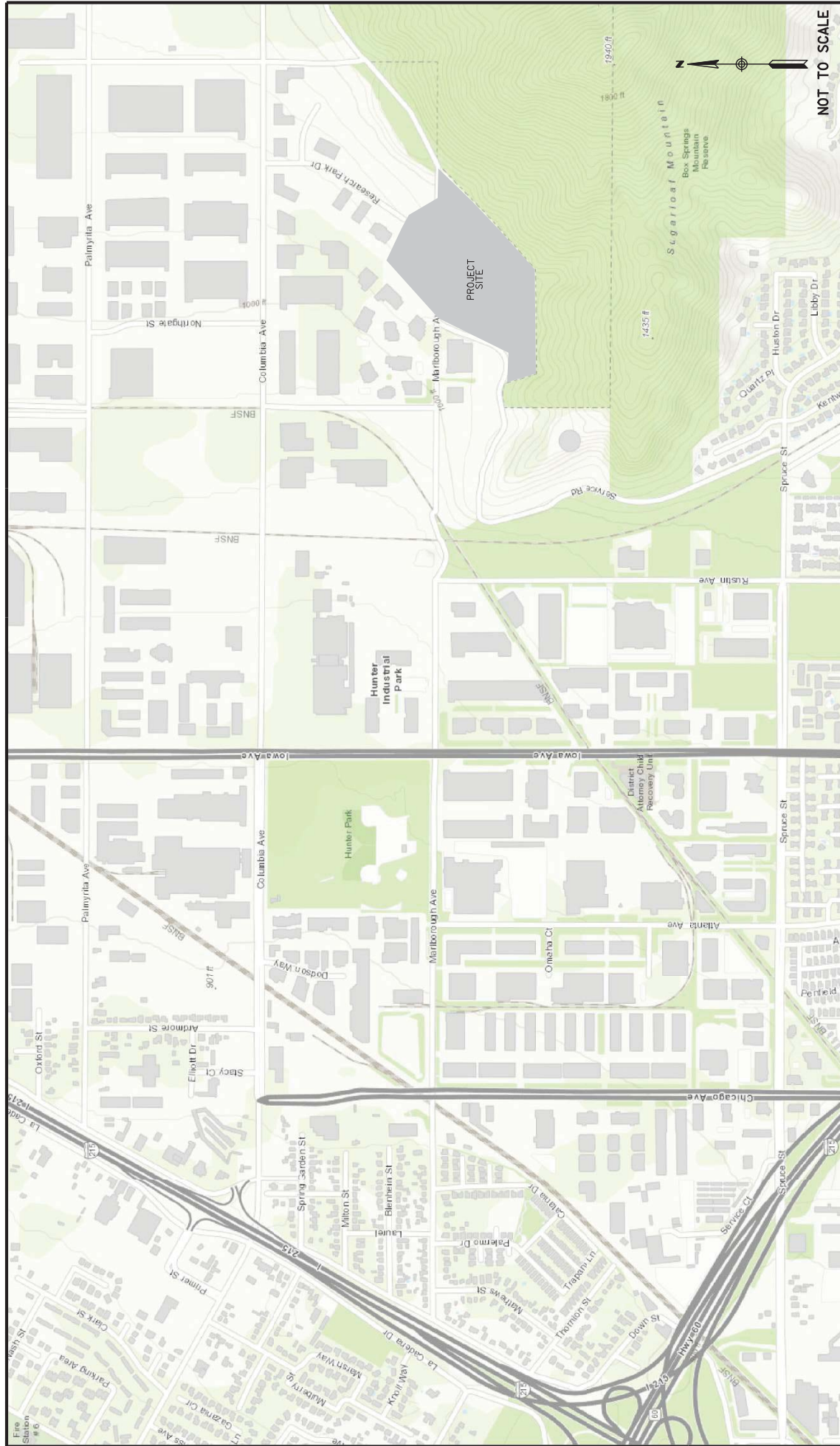
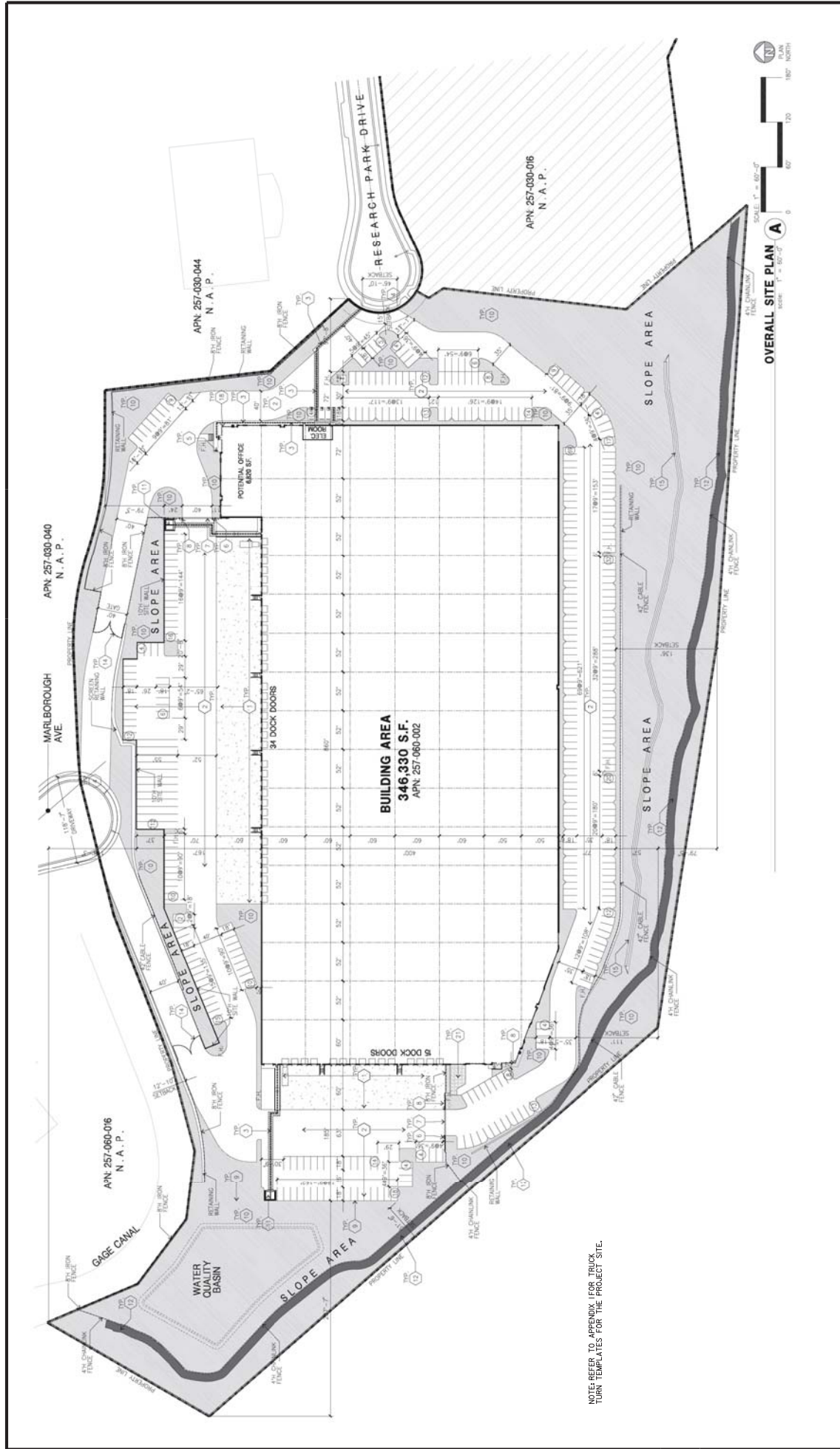


EXHIBIT 1
PROJECT AREA MAP



MARLBOROUGH INDUSTRIAL PROJECT

Exhibit 9 - CEQA Documents



NOTE: REFER TO APPENDIX FOR TRUCK TURN TEMPLATES FOR THE PROJECT SITE.

EXHIBIT 2 PROJECT SITE PLAN



MARLBOROUGH INDUSTRIAL PROJECT

Exhibit 9 - CEQA Documents

the study area, the south side provides a segment east of Atlanta and another segment between Rustin Avenue and Northgate Street. A traffic signal is provided at its intersection with Iowa Avenue. The posted speed limit is 35 mph.

Columbia Avenue is classified as an 88' Arterial between Primer Street and W La Cadena Drive, as a 100' Arterial between E La Cadena Drive and Chicago Avenue and as a 110' Arterial between Iowa Avenue and Michigan Avenue per the City of Riverside's Circulation Element. Within the project area it currently provides 3 vehicular travel lanes in each direction between E La Cadena Drive and Chicago Avenue and two vehicular travel lanes in each direction between Chicago Avenue and Michigan Avenue with a raised median between Iowa Avenue and Northgate Street and a two-way left-turn lane between Northgate Street and Michigan Avenue. On-street parking is not permitted and dedicated bike lanes are provided along both sides of the roadway within the project area. Sidewalk is provided on both sides of the roadway throughout the study area with the exception of segments on the north side of the roadway between Primer Street and E La Cadena Drive and between Chicago Avenue and Iowa Avenue. A traffic signal is provided at its intersection with Primer Street, E La Cadena Drive, Chicago Avenue and Iowa Avenue. The posted speed limit is 45 mph.

Chicago Avenue is classified as an Arterial roadway between Columbia Avenue and Marlborough Avenue per the City of Riverside's Circulation Element. Within the project area, it currently provides two vehicular travel lanes in each direction with a raised median. On-street parking is not permitted and bike lanes are provided along both sides of the roadway within the project area. Sidewalk is provided on both sides of the roadway from Columbia Avenue to Marlborough Avenue and only on the west side of the roadway south of Marlborough Avenue. A traffic signal is provided at its intersection with Columbia Avenue. The posted speed limit is 40 mph.

Iowa Avenue is classified as a 120' Arterial between Columbia Avenue and Marlborough Avenue per the City of Riverside's Circulation Element. Within the project area, it currently provides two vehicular travel lanes in each direction. On-street parking is not permitted. Bike lanes are provided between along both sides of the roadway within the project area. Sidewalk is provided on both sides of the roadway between Columbia Avenue and Marlborough Avenue including a scenic pedestrian pathway on the east side of the roadway. A traffic signal is provided at its intersection with Columbia Avenue and Marlborough Avenue. The posted speed limit is 50 mph.

Northgate Street is classified as a 66' Collector roadway between Columbia Avenue and Marlborough Avenue per the City of Riverside's Circulation Element. Within the project area, it currently provides one vehicular travel lane in each direction. On-street parking is permitted along both sides of the roadway. Bike lanes are not provided within the project area. Sidewalk is provided on the east side of the roadway between Columbia Avenue and Marlborough Avenue. There is no posted speed limit.

Research Park Drive is unclassified in the City of Riverside's Circulation Element is it assumed to function as a Local Street. Within the project area, it currently provides one vehicular travel lane in each direction. On-street parking is permitted on both sides of the roadway. Bike lanes are not provided within the project area. Sidewalk is provided on both sides of the roadway south of Columbia Avenue. There is no posted speed limit.

Michigan Avenue is classified as a 66' Collector between Marlborough Avenue and Palmyrita Avenue per the City of Riverside's Circulation Element. Within the project area, it currently provides one vehicular travel lane in each direction. On-street parking is permitted along the both sides of the roadway. Bike lanes are not provided within the project area. Sidewalk is provided on both sides of the roadway between Palmyrita Avenue and Columbia Avenue. There is no posted speed limit.

Transit services provided by the Riverside Transit Agency include three bus routes through the study area and a metrolink station as described below:

Route 13

Through the study area this route runs north on Chicago Avenue, then east on Marlborough Avenue, makes a stop at the Hunter Park Metrolink Station then south on Rustin Avenue.

Route 14

Though the study area this route runs north and south on Iowa Avenue.

Route 52

Through the study area this route runs north on Iowa Avenue, then east on Marlborough Avenue, makes a stop at the Hunter Park Metrolink Station then south on Rustin Avenue.

Hunter Park Metrolink Station is located on Marlborough Avenue just east of Rustin Avenue and provides commuters with a rail connection from LA Union Station in the north to Downtown Perris in the south.

Exhibit 3 shows the existing transportation conditions within the project area. The City of Riverside Circulation Element is included in **Appendix B**.

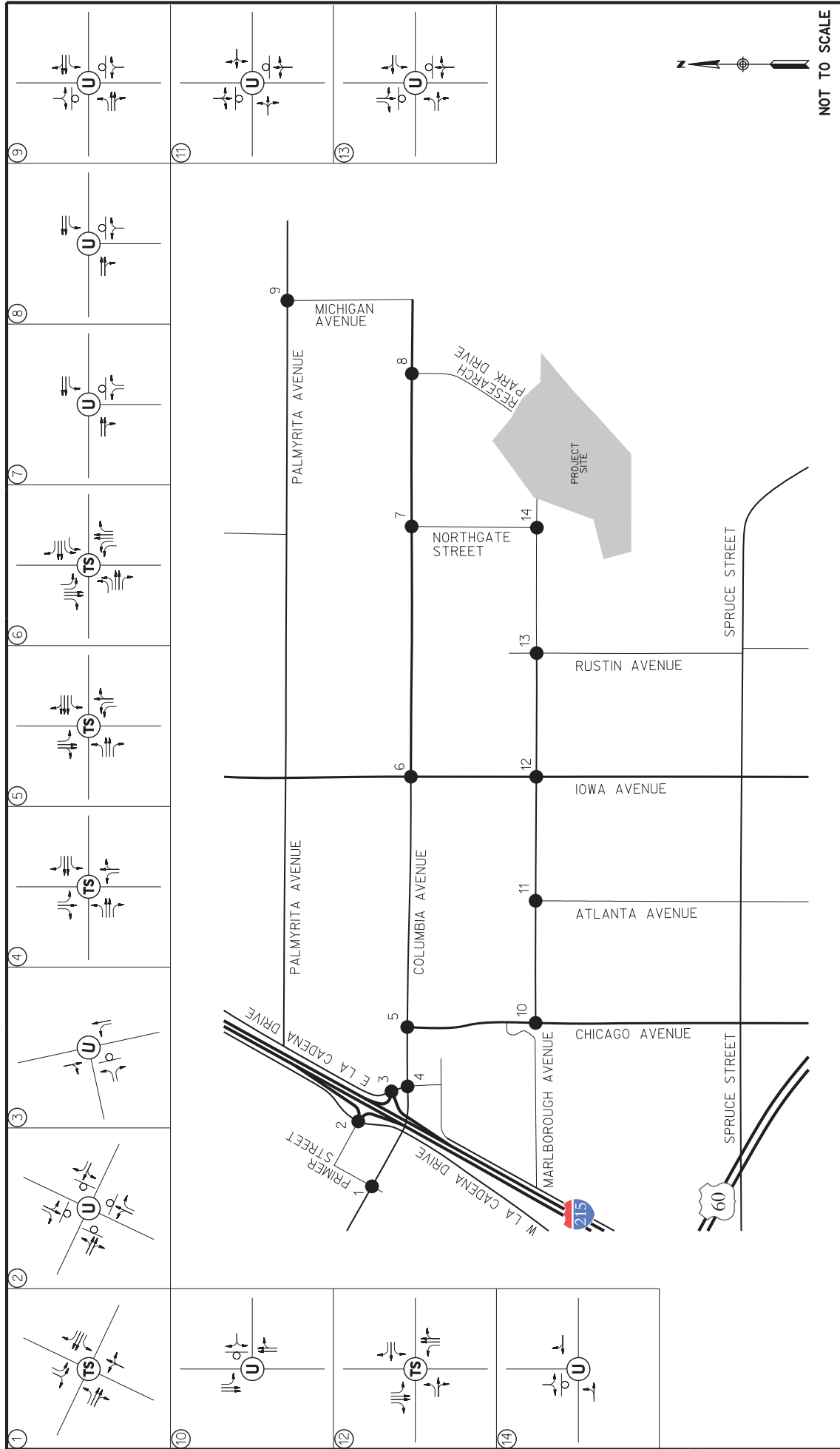
EXISTING TRAFFIC VOLUMES

Existing traffic volumes at the project area intersections were obtained from traffic counts conducted by Field Data Services of Arizona May 17-18, 2017. The turning movement counts were conducted during the weekday AM (7:00-9:00) and PM (4:00-6:00) peak periods. Additionally, 24-hour tube counts were also conducted May 17-18, 2017. It should be noted that count sheet discrepancies can occur when observed peak hour periods are different between adjacent intersections. If these discrepancies occurred, the traffic volumes were balanced to accurately reflect existing traffic volumes. **Exhibit 4** shows the existing intersection turning movement counts and ADT's within the study area. **Appendix C** contains the manual turning movement count sheets at the study intersections, daily roadway segment counts and the excel sheet used to balance existing volumes.

TRAFFIC ANALYSIS METHODOLOGY

The intersections and roadways within the project area were analyzed for the following scenarios:

- Existing Traffic Conditions (Year 2017)
- Existing + Ambient Traffic Conditions (Year 2019)
- Existing + Project Traffic Conditions (Year 2019)



LEGEND

TS = TRAFFIC SIGNAL

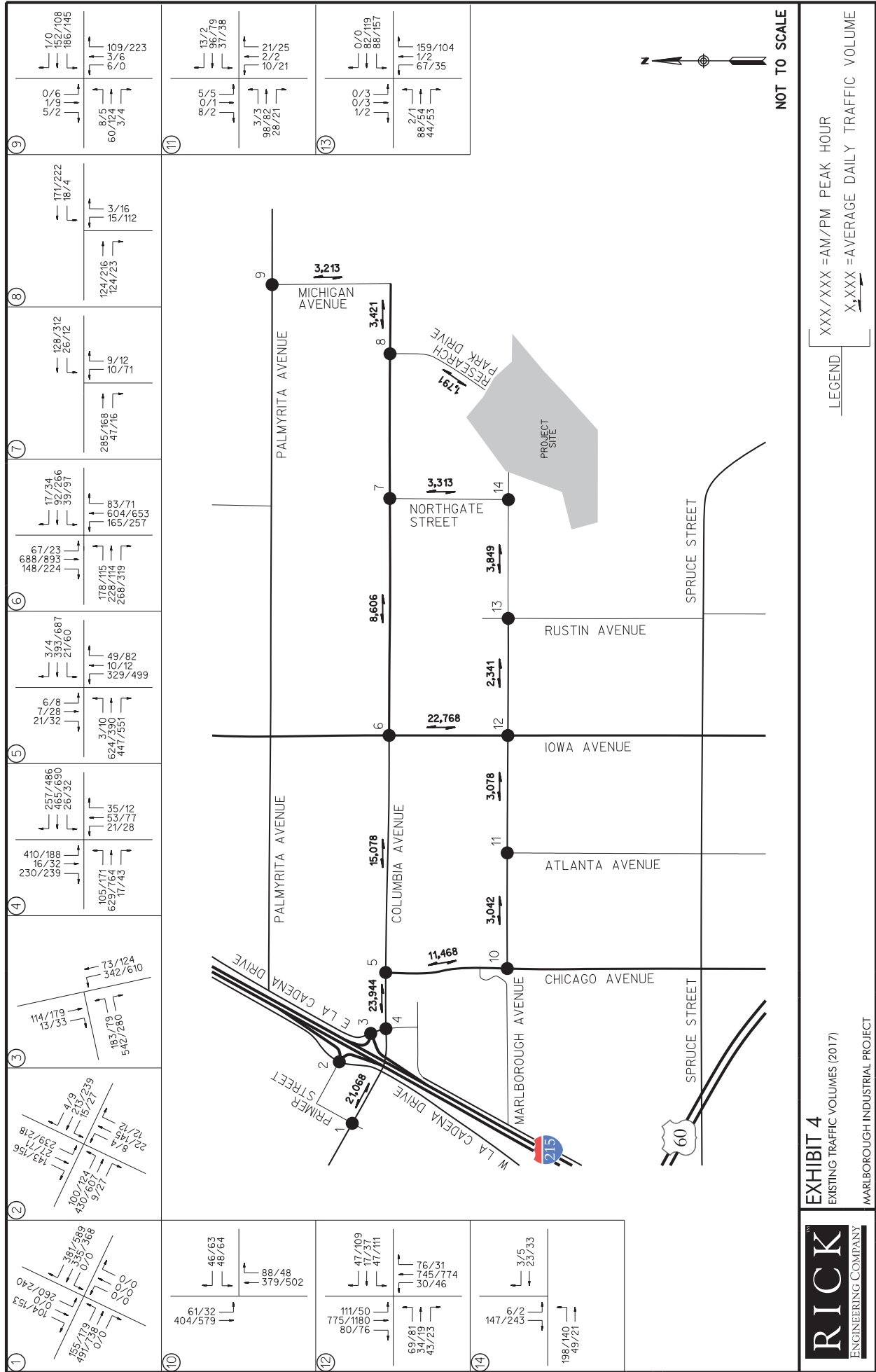
U = UNSIGNALIZED

○ = STOP CONTROLLED

EXHIBIT 3

EXISTING TRANSPORTATION CONDITIONS (2017)

MARLBOROUGH INDUSTRIAL PROJECT



- Existing + Ambient + Project Traffic Conditions (Year 2019)
- Existing + Ambient + Project + Cumulative Conditions (Year 2019)

The level of service for signalized intersections was calculated using the methodologies described in Chapter 18 of the 2010 Highway Capacity Manual (HCM). The level of service for signalized intersections is defined in terms of control delay, which is made up of a number of factors that relate to right-of-way control, geometrics and traffic volumes. The signalized intersection analysis also takes into account intersection spacing and coordination.

The level of service for un-signalized intersections was calculated using the methodologies described in Chapter 19 of the 2010 HCM. The level of service for a two-way stop-controlled intersection is determined by the computed control delay for each minor street movement and major street left turns, and not for the intersection as a whole. All-way stop-controlled intersection operations are reported for the intersection as a whole as described in Chapter 20 of the 2010 HCM.

Level of Service A through D is considered acceptable for peak hour intersection operations. The project area intersections were analyzed during the AM and PM peak hours. The intersection Synchro report sheets are contained in **Appendix D**.

The LOS for roadway segment operations was calculated based on volume to capacity ratios. LOS A through D is considered acceptable for roadway segments when compared against the City of Riverside's Roadway Capacity Exhibit D, in the City of Riverside's Traffic Impact Analysis Preparation Guide.

Due to this project's proposed industrial/warehouse classification, the vehicle mix was determined from in the City of Fontana's Truck Trip Generation Study (2003) using the land use category described as Heavy Industrial. This land use has a higher proposed percentage of truck traffic generated than the comparable Heavy Warehouse land use category. This study was used to help determine the impact of truck traffic on the circulation system. An exhibit of the total project truck traffic and its vehicle mix percentages and expected distribution onto the existing road network was included as part of the scoping agreement. The scoping agreement and the attached truck traffic exhibit can be found in **Appendix A**. It should be noted that the truck traffic volumes were used to calculate heavy vehicle percentages which were inputted into the synchro software parameters in order to analyze the project intersections.

EXISTING OPERATIONS

Exhibit 4 shows the existing traffic volumes, as encountered during the traffic counts performed on May 17-18, 2017.

Signalized Intersections

The 5 signalized intersections within the study area are:

- Columbia Avenue / Primer Street
- Columbia Avenue / E La Cadena Drive
- Columbia Avenue / Chicago Street

- Columbia Avenue / Iowa Avenue
- Marlborough Avenue / Iowa Avenue

Table 1 shows that all of the project area signalized intersections currently operate at LOS D or better during the AM and PM peak hour.

Un-signalized Intersections

The 9 un-signalized intersections within the study area are:

- Interchange Street / W La Cadena Drive / I-215 SB Ramps
- I-215 NB Ramps / E La Cadena Drive
- Columbia Avenue / Northgate Street
- Columbia Avenue / Research Park Drive
- Palmyrita Avenue / Michigan Avenue
- Marlborough Avenue / Chicago Avenue
- Marlborough Avenue / Atlanta Avenue
- Marlborough Avenue / Rustin Avenue
- Marlborough Avenue / Northgate Street

Table 1 shows that all of the project area un-signalized intersections currently operate at LOS D or better during the AM and PM peak hour, with the exception of the following:

- Interchange Street / W La Cadena Drive / I-215 SB Ramps – LOS E during PM Peak Hour
- E La Cadena Drive / I-215 NB Ramps – LOS F during AM/PM Peak Hour

Roadway Segments

The 14 roadway segments analyzed within the study area are:

- Columbia Avenue, Primer Street to E La Cadena Drive
- Columbia Avenue, E La Cadena Drive to Chicago Avenue
- Columbia Avenue, Chicago Avenue to Iowa Avenue
- Columbia Avenue, Iowa Avenue to Northgate Street
- Columbia Avenue, Research Park Drive to Michigan Avenue
- Michigan Avenue, Columbia Avenue to Palmyrita Avenue
- Marlborough Avenue, Chicago Avenue to Atlanta Avenue
- Marlborough Avenue, Atlanta Avenue to Iowa Avenue
- Marlborough Avenue, Iowa Avenue to Rustin Avenue
- Marlborough Avenue, Rustin Avenue to Northgate Street
- Chicago Avenue, Marlborough Avenue to Columbia Avenue
- Iowa Avenue, Marlborough Avenue to Columbia Avenue
- Northgate Street, Marlborough Avenue to Columbia Avenue
- Research Park Drive, South of Columbia Avenue

The roadway segment analysis was performed by comparing the Average Daily Traffic (ADT) volumes on each segment analyzed with the traffic volume thresholds contained in the “City of

TABLE 1
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING (2017) INTERSECTION OPERATIONS

INTERSECTION		DELAY	LOS
1 Columbia Avenue / Primer Street (S)	AM peak	17.4	B
	PM peak	16.2	B
2 Interchange Street / W La Cadena Drive / I-215 SB Ramps (U)	AM peak	18.9	C
	EBL	47.3	E
	PM peak		
3 E La Cadena Drive / I-215 NB Ramps (U)	AM peak	111.2	F
	EBL	388.1	F
	PM peak		
4 Columbia Avenue / E La Cadena Drive (S)	AM peak	31.5	C
	PM peak	26.8	C
5 Columbia Avenue / Chicago Avenue (S)	AM peak	27.8	C
	PM peak	29.4	C
6 Columbia Avenue / Iowa Avenue (S)	AM peak	31.3	C
	PM peak	36.5	D
7 Columbia Avenue / Northgate Street (U)	AM peak	13.0	B
	NBL	12.8	B
	PM peak		
8 Columbia Avenue / Research Park Drive (U)	AM peak	10.5	B
	NBL	14.6	B
	PM peak		
	NBL		

TABLE 1
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING (2017) INTERSECTION OPERATIONS

INTERSECTION		DELAY	LOS
9 Palmyrita Avenue / Michigan Avenue (U)	AM peak		
	SBL	10.5	B
	PM peak		
	SBL	16.9	C
10 Marlborough Avenue / Chicago Avenue (U)	AM peak		
	WBL	24.7	C
	PM peak		
	WBL	22.5	C
11 Marlborough Avenue / Atlanta Avenue (U)	AM peak		
	NBL	10.3	B
	PM peak		
	NBL	10.8	B
12 Marlborough Avenue / Iowa Avenue (S)	AM peak		
		19.2	B
	PM peak		
		23.6	C
13 Marlborough Avenue / Rustin Avenue (U)	AM peak		
	NBL	13.1	B
	PM peak		
	NBL	17.0	C
14 Marlborough Avenue / Northgate Street (U)	AM peak		
	SBL	10.4	B
	PM peak		
	SBL	9.8	A

- Delays and Level of Service calculated utilizing the methodologies described in Chapters 18 & 19 of the 2010 Highway Capacity Manual (HCM).

DELAY is measured in seconds

LOS = Level of Service

NB = Northbound, SB = Southbound, etc.

T=thru movement, R=right-turn movement, etc.

(S) = Signalized intersection

(U) = Unsignalized intersection

Riverside Roadway Capacity” Exhibit D. The results are summarized on **Table 2**. As shown, all of the segments analyzed currently operate at LOS B or better.

EXISTING + AMBIENT OPERATIONS

To estimate the opening year (2019) ambient/background traffic volumes, the existing traffic volumes were increased 4% to get from 2017 to 2019. This growth rate was provided by the City of Riverside. **Exhibit 5** shows the 2019 existing plus ambient traffic volumes.

Signalized Intersections

Table 3 shows that all project area intersections are anticipated to continue to operate at LOS D or better during the AM and PM peak hours.

Un-signalized Intersections

Table 3 shows that all project area intersections are anticipated to continue to operate at LOS D or better during the AM and PM peak hours, with the exception of the following:

- Interchange Street / W La Cadena Drive / I-215 SB Ramps – LOS F during PM Peak Hour
- E La Cadena Drive / I-215 NB Ramps – LOS F during AM/PM Peak Hour

Roadway Segments

Table 4 shows that all of the roadway segments is anticipated to continue to operate at LOS B or better with the addition the of the (2018) ambient traffic.

TABLE 2
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING ROADWAY SEGMENT OPERATIONS (2017)

STREET SEGMENT	EXISTING CLASSIFICATION	EXISTING (2017) VOLUME			
		Capacity ^a	ADT	V/C	LOS
1 Columbia Avenue, Primer Street to E La Cadena Drive	100' ARTERIAL	33,000	21,068	0.64	B
2 Columbia Avenue, E La Cadena Drive to Chicago Avenue	110' ARTERIAL	33,000	23,944	0.73	B
3 Columbia Avenue, Chicago Avenue to Iowa Avenue	110' ARTERIAL	33,000	15,078	0.46	A
4 Columbia Avenue, Iowa Avenue to Northgate Street	110' ARTERIAL	33,000	8,606	0.26	A
5 Columbia Avenue, Research Park Drive to Michigan Avenue	100' ARTERIAL	33,000	3,421	0.10	A
6 Michigan Avenue, Columbia Avenue to Palmyrita Avenue	66' COLLECTOR	12,500	3,213	0.26	A
7 Marlborough Avenue, Chicago Avenue to Atlanta Avenue	66' COLLECTOR	12,500	3,042	0.24	A
8 Marlborough Avenue, Atlanta Avenue to Iowa Avenue	66' COLLECTOR	12,500	3,078	0.25	A
9 Marlborough Avenue, Iowa Avenue to Rustin Avenue	66' COLLECTOR	12,500	2,341	0.19	A
10 Marlborough Avenue, Rustin Avenue to Northgate Street	66' COLLECTOR	12,500	3,849	0.31	A
11 Chicago Avenue, Marlborough Avenue to Columbia Avenue	110' ARTERIAL	33,000	11,468	0.35	A
12 Iowa Avenue, Marlborough Avenue to Columbia Avenue	110' ARTERIAL	33,000	22,768	0.69	B
13 Northgate Street, Marlborough Avenue to Columbia Avenue	66' COLLECTOR	12,500	3,313	0.27	A
14 Research Park Drive, South of Columbia Avenue	LOCAL	3,100	1,791	0.58	B

Footnote:

a. LOS A and LOS B capacity thresholds were derived; City of Riverside deems anything better than LOS C as acceptable.

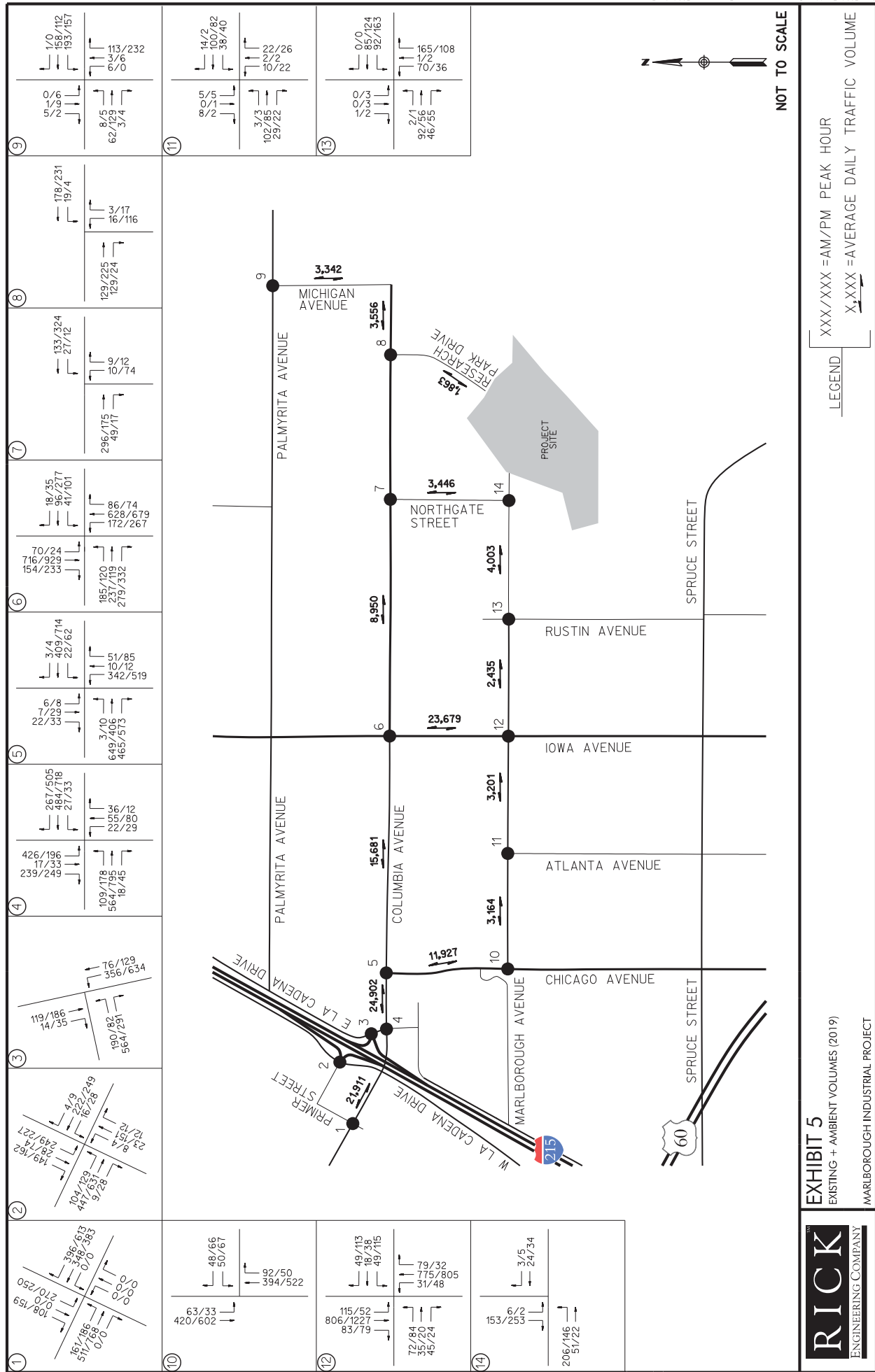


TABLE 3
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING + AMBIENT (2019)
INTERSECTION OPERATIONS

INTERSECTION		DELAY	LOS
1 Columbia Avenue / Primer Street (S)	AM peak	17.5	B
	PM peak	18.8	C
2 Interchange Street / W La Cadena Drive / I-215 SB Ramps (U)	AM peak	20.5	C
	EBL	55.4	F
	PM peak		
3 E La Cadena Drive / I-215 NB Ramps (U)	AM peak	150.0	F
	EBL	507.0	F
	PM peak		
4 Columbia Avenue / E La Cadena Drive (S)	AM peak	32.4	C
	PM peak	28.0	C
5 Columbia Avenue / Chicago Avenue (S)	AM peak	27.9	C
	PM peak	29.6	C
6 Columbia Avenue / Iowa Avenue (S)	AM peak	32.2	C
	PM peak	38.1	D
7 Columbia Avenue / Northgate Street (U)	AM peak	13.3	B
	NBL	13.0	B
	PM peak		
8 Columbia Avenue / Research Park Drive (U)	AM peak	10.6	B
	NBL	15.1	B
	PM peak		
	NBL		

TABLE 3
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING + AMBIENT (2019)
INTERSECTION OPERATIONS

INTERSECTION		DELAY	LOS
9 Palmyrita Avenue / Michigan Avenue (U)	AM peak		
	SBL	10.6	B
	PM peak		
	SBL	17.5	C
10 Marlborough Avenue / Chicago Avenue (U)	AM peak		
	WBL	27.1	D
	PM peak		
	WBL	24.7	C
11 Marlborough Avenue / Atlanta Avenue (U)	AM peak		
	NBL	10.4	B
	PM peak		
	NBL	10.9	B
12 Marlborough Avenue / Iowa Avenue (S)	AM peak		
		20.0	B
	PM peak		
		24.7	C
13 Marlborough Avenue / Rustin Avenue (U)	AM peak		
	NBL	13.6	B
	PM peak		
	NBL	17.6	C
14 Marlborough Avenue / Northgate Street (U)	AM peak		
	SBL	10.5	B
	PM peak		
	SBL	9.9	A

- Delays and Level of Service calculated utilizing the methodologies described in Chapters 18 & 19 of the 2010 Highway Capacity Manual (HCM).

DELAY is measured in seconds

LOS = Level of Service

NB = Northbound, SB = Southbound, etc.

T=thru movement, R=right-turn movement, etc.

(S) = Signalized intersection

(U) = Unsignalized intersection

TABLE 4
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING + AMBIENT ROADWAY SEGMENT OPERATIONS (2019)

STREET SEGMENT	EXISTING CLASSIFICATION	EX + AMB VOLUME		
		Capacity ^a	ADT	V/C LOS
1 Columbia Avenue, Primer Street to E La Cadena Drive	100' ARTERIAL	33,000	21,911	0.66 B
2 Columbia Avenue, E La Cadena Drive to Chicago Avenue	110' ARTERIAL	33,000	24,902	0.75 B
3 Columbia Avenue, Chicago Avenue to Iowa Avenue	110' ARTERIAL	33,000	15,681	0.48 A
4 Columbia Avenue, Iowa Avenue to Northgate Street	110' ARTERIAL	33,000	8,950	0.27 A
5 Columbia Avenue, Research Park Drive to Michigan Avenue	100' ARTERIAL	33,000	3,558	0.11 A
6 Michigan Avenue, Columbia Avenue to Palmyrita Avenue	66' COLLECTOR	12,500	3,342	0.27 A
7 Marlborough Avenue, Chicago Avenue to Atlanta Avenue	66' COLLECTOR	12,500	3,164	0.25 A
8 Marlborough Avenue, Atlanta Avenue to Iowa Avenue	66' COLLECTOR	12,500	3,201	0.26 A
9 Marlborough Avenue, Iowa Avenue to Rustin Avenue	66' COLLECTOR	12,500	2,435	0.19 A
10 Marlborough Avenue, Rustin Avenue to Northgate Street	66' COLLECTOR	12,500	4,003	0.32 A
11 Chicago Avenue, Marlborough Avenue to Columbia Avenue	110' ARTERIAL	33,000	11,927	0.36 A
12 Iowa Avenue, Marlborough Avenue to Columbia Avenue	110' ARTERIAL	33,000	23,679	0.72 B
13 Northgate Street, Marlborough Avenue to Columbia Avenue	66' COLLECTOR	12,500	3,446	0.28 A
14 Research Park Drive, South of Columbia Avenue	LOCAL	3,100	1,863	0.60 B

Footnote:

a. LOS A and LOS B capacity thresholds were derived; City of Riverside deems anything better than LOS C as acceptable.

PROJECT TRAFFIC GENERATION

Based on the Institute of Transportation Engineer's (ITE's) *Trip Generation* publication (9th edition), the relevant trip generation rates for Manufacturing (ITE Code 140) and for General Office (ITE Code 710) were utilized. The project site is estimated to generate a total of 1,468 new daily trips with 274 trips (216 inbound/58 outbound) during the AM peak hour and 335 trips (105 inbound/230 outbound) during the PM peak hour. **Table 5** shows the project traffic generation for the proposed project. The trip generation calculations are included in **Appendix E**.

It should be noted that although the project is described as a warehouse project, the land is zoned as manufacturing with the City of Riverside. In addition, the traffic volumes calculated for the Warehouse land use and the volumes calculated for the Manufacturing land use show that although the Warehouse classification does give a higher Average Daily Traffic count, the Manufacturing land use has higher peak hour volumes. For the purpose of this analysis, the Manufacturing category was used as peak hour volumes have a more significant impact on intersection operations.

In order to measure the impact of the projects truck traffic to each intersection, we calculated the number of trucks that the project would contribute to the road network based on the City of Fontana's Truck Traffic Generation Study (2003). Based on that study, it was concluded that 38.8 percent of the projects total traffic will be comprised of trucks. This truck traffic was then assigned to each movement of every leg of the intersections analyzed, based on the proposed traffic distribution patterns. These truck volumes, at each movement, were then used to calculate a heavy vehicle percentage for that movement. This heavy vehicle percentage was then input into Synchro in order to quantify the impact that the project's truck traffic would have on the existing road network.

PROJECT TRAFFIC DISTRIBUTION/ASSIGNMENT

The traffic distribution for opening year (2019) was estimated based on the site's proximity to the nearby major roadway, existing local traffic patterns and existing traffic counts at the project area intersections.

It should be noted that the distribution takes into consideration the fact that project trips also consist of heavy vehicles coming to and from the project site. No notable observations regarding truck traffic along Spruce to the Blaine Interchange were encountered during the fieldwork done for the project. Although only a minimal amount of truck traffic was observed during the times our field work was being done, and our observations did not specifically tie any of that truck traffic to the project area, a heavy vehicle percentage for turning movements at intersections was derived from the assigned heavy vehicle traffic and applied to the "+ project" scenarios for this study. **Exhibit 6** shows the project distribution percentages utilized for assigning the project trips.

Once this has been established, the project traffic volumes were added to the project area intersections and roadways. **Exhibit 7** shows the project only traffic.

TABLE 5
MARLBOROUGH INDUSTRIAL COMPLEX
PROJECT TRIP GENERATION SUMMARY(MANUFACTURING)

Land Use	Quantity	Rate	ADT	AM Peak Hour				PM Peak Hour			
				% of ADT	In : Out		Total	% of ADT	In : Out		Total
					Split	Volumes			Split	Volumes	
Manufacturing	339,510 SF	0.0038 / KSF	1,297	19%	78% : 22%	197	55	19%	36% : 64%	90	159
General Office	6,820 SF	0.0251 / KSF	171	13%	86% : 14%	19	3	50%	17% : 83%	15	71
TOTAL			1,468			216	58			105	230
							274				335

-Source: ITE Trip Generation Manual 9th Edition, 2012.

-Per the Truck Trip Generation Study, *City of Fontana*, for the Manufacturing Category, 38.8% of the project trips calculated are to represent truck traffic generated by the project. (Refer to Appendix A).
Truck volumes were calculated from this percentage and assigned to the road network per the proposed traffic distribution patterns. The truck volumes were used to calculate a heavy vehicle percentage for each movement and inputted into synchro to estimate the impact to each intersection analyzed.

PROJECT TRIP GENERATION SUMMARY(WAREHOUSE)
(INCLUDED FOR COMPARISON ONLY)

Land Use	Quantity	Rate	ADT	AM Peak Hour				PM Peak Hour			
				% of ADT	In : Out		Total	% of ADT	In : Out		Total
					Split	Volumes			Split	Volumes	
Warehouse	339,510 SF	0.0041 / KSF	1,408	13%	65% : 35%	116	63	14%	19% : 81%	36	156
General Office	6,820 SF	0.0251 / KSF	171	13%	86% : 14%	19	3	50%	17% : 83%	15	71
TOTAL			1,579			135	69			51	227
							204				278

-Source: ITE Trip Generation Manual 9th Edition, 2012.

-Per the Truck Trip Generation Study, *City of Fontana*, for the Warehouse/Heavy Warehouse Category, 20.4% of the project trips calculated are to represent truck traffic generated by the project.

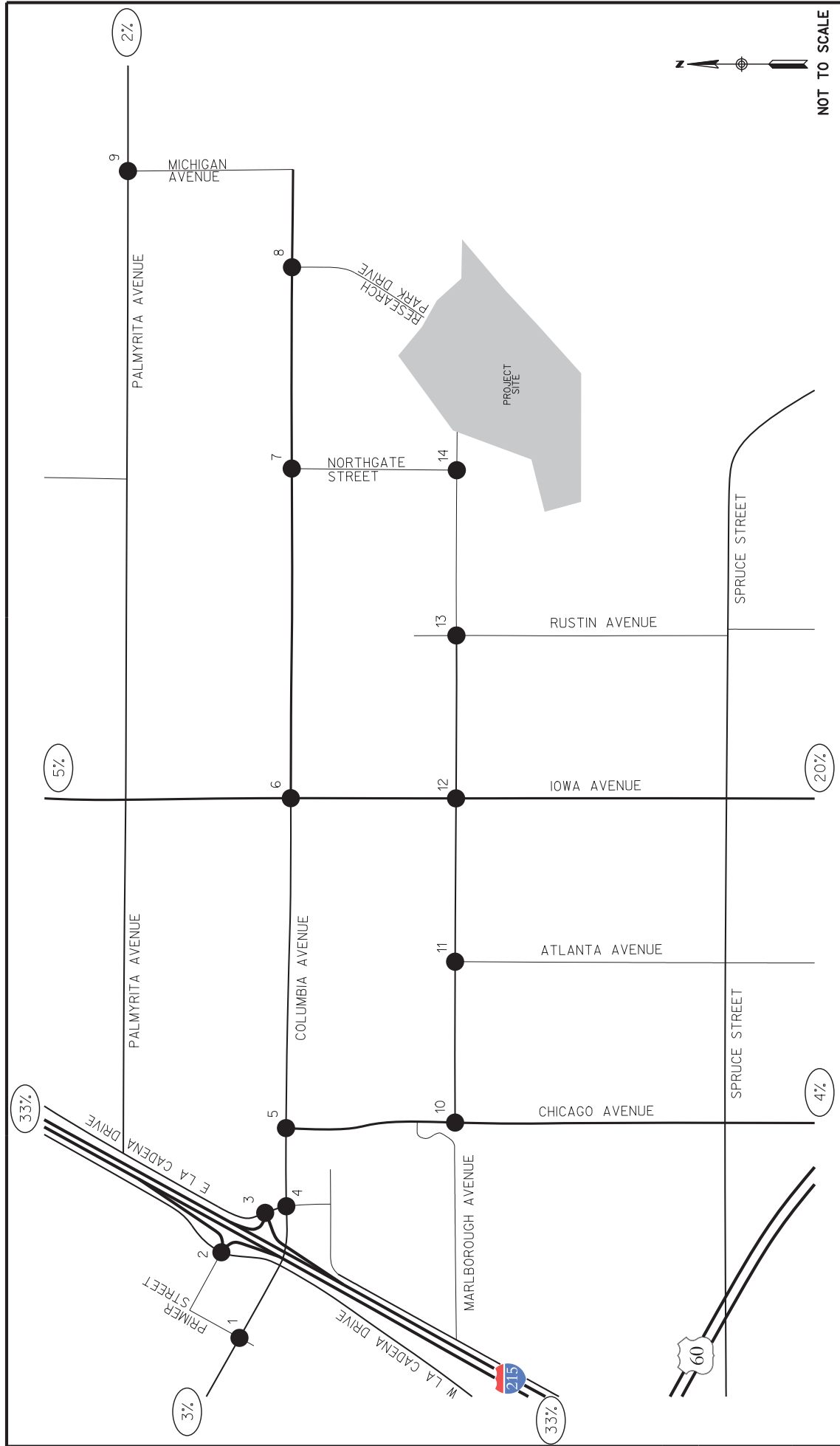


EXHIBIT 6
PROJECT TRIP DISTRIBUTION

MARLBOROUGH INDUSTRIAL PROJECT



Exhibit 9 - CEQA Documents

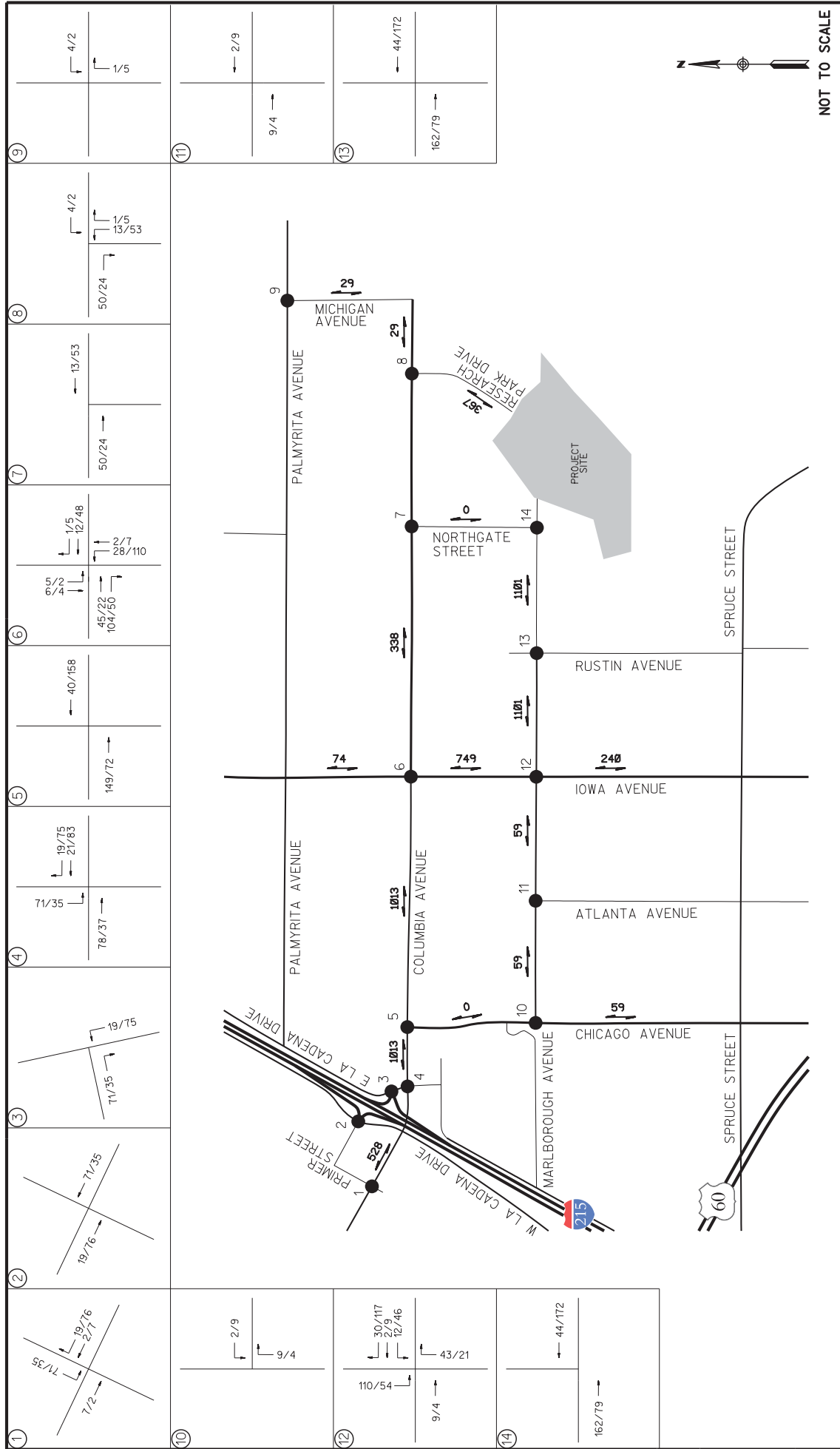


EXHIBIT 7
PROJECT VOLUMES

MARLBOROUGH INDUSTRIAL PROJECT

XXX/XXX = AM/PM PEAK HOUR

X,XXX = AVERAGE DAILY TRAFFIC VOLUME

LEGEND

EXISTING + PROJECT OPERATIONS

In order to estimate the traffic volumes at the opening of the proposed project, the calculated project trips were added to the 2018 existing traffic. **Exhibit 8** shows the 2019 total traffic volumes (includes project traffic) within the project study area.

Signalized Intersections

Table 6 shows that all project area intersections are anticipated to continue to operate at LOS D or better during the AM and PM peak hours.

Un-signalized Intersections

Table 6 shows that all project area intersections are anticipated to continue to operate at LOS D or better during the AM and PM peak hours, with the exception of the following:

- Interchange Street / W La Cadena Drive / I-215 SB Ramps – LOS F during PM Peak Hour
- E La Cadena Drive / I-215 NB Ramps – LOS F during AM/PM Peak Hour

Table 6 also shows that with signalization, these intersections could be made to work at an acceptable level of service. For the purpose of this study, one option was chosen as a possible method of improving the operations.

Roadway Segments

Table 7 shows that all of the roadway segments are anticipated to continue to operate at LOS B or better with the addition the of the (2018) project traffic.

EXISTING + AMBIENT + PROJECT OPERATIONS (2019)

In order to estimate the traffic volumes at the opening of the proposed project, the calculated project trips were added to the 2019 existing plus ambient traffic. **Exhibit 9** shows the 2019 total traffic volumes (includes project traffic) within the project study area.

Signalized Intersections

Table 8 shows that all the project area signalized intersections are anticipated to operate at LOS D or better during the AM and PM peak hours.

Un-signalized Intersections

Table 8 shows that all the project area signalized intersections are anticipated to operate at LOS D or better during the AM and PM peak hours, with the exception of the following:

- Interchange Street / W La Cadena Drive / I-215 SB Ramps – LOS F during PM Peak Hour
- E La Cadena Drive / I-215 NB Ramps – LOS F during AM/PM Peak Hour



TABLE 6
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING + PROJECT (2019)
INTERSECTION OPERATIONS

INTERSECTION		DELAY	LOS	SIGNIFICANT IMPACT	MITIGATION	
					DELAY	LOS
1 Columbia Avenue / Primer Street (S)	AM peak	18.9	B	-		
	PM peak	19.0	B	-		
2 Interchange Street / W La Cadena Drive / I-215 SB Ramps (U)	AM peak	22.8	C	-		
	PM peak	64.5	F	Y	50.1	D
3 E La Cadena Drive / I-215 NB Ramps (U)	AM peak	139.2	F	Y	7.5	A
	PM peak	200.0+	F	Y	7.5	A
4 Columbia Avenue / E La Cadena Drive (S)	AM peak	34.4	C	-		
	PM peak	32.0	C	-		
5 Columbia Avenue / Chicago Avenue (S)	AM peak	28.6	C	-		
	PM peak	30.2	C	-		
6 Columbia Avenue / Iowa Avenue (S)	AM peak	46.6	D	-		
	PM peak	49.7	D	-		
7 Columbia Avenue / Northgate Street (U)	AM peak	13.9	B	-		
	PM peak	13.6	B	-		
8 Columbia Avenue / Research Park Drive (U)	AM peak	11.4	B	-		
	PM peak	20.3	C	-		
9 Palmyrita Avenue / Michigan Avenue (U)	AM peak	10.5	B	-		
	PM peak	17.1	C	-		
10 Marlborough Avenue / Chicago Avenue (U)	AM peak	25.9	D	-		
	PM peak	25.2	D	-		

TABLE 6
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING + PROJECT (2019)
INTERSECTION OPERATIONS

INTERSECTION			DELAY	LOS	SIGNIFICANT IMPACT	MITIGATION	
						DELAY	LOS
11 Marlborough Avenue / Atlanta Avenue (U)	AM peak	NBL	10.5	B	-		
	PM peak	NBL	10.9	B	-		
12 Marlborough Avenue / Iowa Avenue (S)	AM peak		31.7	C	-		
	PM peak		39.2	D	-		
13 Marlborough Avenue / Rustin Avenue (U)	AM peak	NBL	19.8	C	-		
	PM peak	NBL	24.9	C	-		
14 Marlborough Avenue / Northgate Street (U)	AM peak	SBL	11.5	B	-		
	PM peak	SBL	12.2	B	-		

- Delays and Level of Service calculated utilizing the methodologies described in Chapters 18 & 19 of the 2010 Highway Capacity Manual (HCM).

DELAY is measured in seconds

LOS = Level of Service

NB = Northbound, SB = Southbound, etc.

T=thru movement, R=right-turn movement, etc.

(S) = Signalized intersection

(U) = Unsignalized intersection

Mitigation for Intersections 3 and 4 are analyzed to assume signalization of the intersection with protected left turns where applicable.

TABLE 7
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING + PROJECT ROADWAY SEGMENT OPERATIONS (2019)

STREET SEGMENT	EXISTING CLASSIFICATION	EX + PROJ VOLUME			
		Capacity ^a	ADT	V/C	LOS
1 Columbia Avenue, Primer Street to E La Cadena Drive	100' ARTERIAL	33,000	21,596	0.65	B
2 Columbia Avenue, E La Cadena Drive to Chicago Avenue	110' ARTERIAL	33,000	24,957	0.76	B
3 Columbia Avenue, Chicago Avenue to Iowa Avenue	110' ARTERIAL	33,000	16,091	0.49	A
4 Columbia Avenue, Iowa Avenue to Northgate Street	110' ARTERIAL	33,000	8,944	0.27	A
5 Columbia Avenue, Research Park Drive to Michigan Avenue	100' ARTERIAL	33,000	3,450	0.10	A
6 Michigan Avenue, Columbia Avenue to Palmyrita Avenue	66' COLLECTOR	12,500	3,242	0.26	A
7 Marlborough Avenue, Chicago Avenue to Atlanta Avenue	66' COLLECTOR	12,500	3,101	0.25	A
8 Marlborough Avenue, Atlanta Avenue to Iowa Avenue	66' COLLECTOR	12,500	3,137	0.25	A
9 Marlborough Avenue, Iowa Avenue to Rustin Avenue	66' COLLECTOR	12,500	3,442	0.28	A
10 Marlborough Avenue, Rustin Avenue to Northgate Street	66' COLLECTOR	12,500	4,950	0.40	A
11 Chicago Avenue, Marlborough Avenue to Columbia Avenue	110' ARTERIAL	33,000	11,468	0.35	A
12 Iowa Avenue, Marlborough Avenue to Columbia Avenue	110' ARTERIAL	33,000	23,517	0.71	B
13 Northgate Street, Marlborough Avenue to Columbia Avenue	66' COLLECTOR	12,500	3,313	0.27	A
14 Research Park Drive, South of Columbia Avenue	LOCAL	3,100	2,158	0.70	B

Footnote:

a. LOS A and LOS B capacity thresholds were derived; City of Riverside deems anything better than LOS C as acceptable.

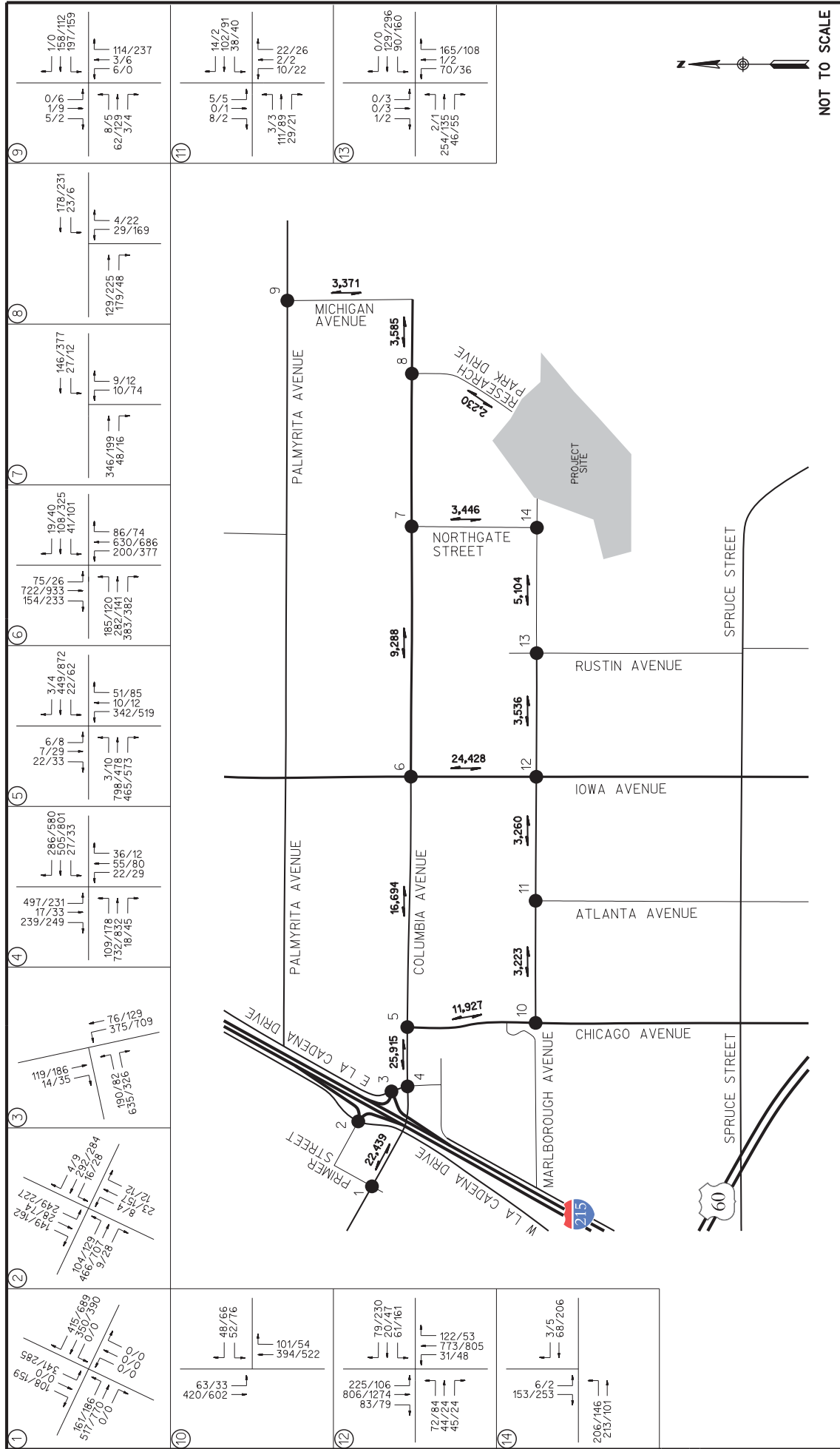


EXHIBIT 9
EXISTING + AMBIENT + PROJECT VOLUMES (2019)

MARLBOROUGH INDUSTRIAL PROJECT

XXX/XXX = AM/PM PEAK HOUR
X,XXX = AVERAGE DAILY TRAFFIC VOLUME

TABLE 8
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING + AMBIENT + PROJECT (2019)
INTERSECTION OPERATIONS

INTERSECTION		DELAY	LOS	SIGNIFICANT IMPACT	MITIGATION	
					DELAY	LOS
1 Columbia Avenue / Primer Street (S)	AM peak	19.1	B	-		
	PM peak	19.8	B	-		
2 Interchange Street / W La Cadena Drive / I-215 SB Ramps (U)	AM peak	25.2	C	-		
	PM peak	76.5	F	Y	54.3	D
3 E La Cadena Drive / I-215 NB Ramps (U)	AM peak	188.4	F	Y	7.7	A
	PM peak	200.0+	F	Y	8.2	A
4 Columbia Avenue / E La Cadena Drive (S)	AM peak	35.8	D	-		
	PM peak	34.0	C	-		
5 Columbia Avenue / Chicago Avenue (S)	AM peak	28.9	C	-		
	PM peak	30.5	C	-		
6 Columbia Avenue / Iowa Avenue (S)	AM peak	48.7	D	-		
	PM peak	52.6	D	-		
7 Columbia Avenue / Northgate Street (U)	AM peak	14.2	B	-		
	PM peak	13.9	B	-		
8 Columbia Avenue / Research Park Drive (U)	AM peak	11.5	B	-		
	PM peak	21.5	C	-		
9 Palmyrita Avenue / Michigan Avenue (U)	AM peak	10.7	B	-		
	PM peak	17.8	C	-		
10 Marlborough Avenue / Chicago Avenue (U)	AM peak	28.6	D	-		
	PM peak	27.9	D	-		

TABLE 8
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING + AMBIENT + PROJECT (2019)
INTERSECTION OPERATIONS

INTERSECTION			DELAY	LOS	SIGNIFICANT IMPACT	MITIGATION	
						DELAY	LOS
11 Marlborough Avenue / Atlanta Avenue (U)	AM peak						
	NBL	10.5	B	-			
	PM peak						
12 Marlborough Avenue / Iowa Avenue (S)	NBL	11.0	B	-			
	AM peak						
	PM peak						
13 Marlborough Avenue / Rustin Avenue (U)		34.5	C	-			
		42.0	D	-			
	AM peak						
14 Marlborough Avenue / Northgate Street (U)	NBL	21.2	C	-			
	PM peak						
	NBL	25.9	D	-			
	AM peak						
	SBL	11.6	B	-			
	PM peak						
	SBL	12.4	B	-			

- Delays and Level of Service calculated utilizing the methodologies described in Chapters 18 & 19 of the 2010 Highway Capacity Manual (HCM).

DELAY is measured in seconds

LOS = Level of Service

NB = Northbound, SB = Southbound, etc.

T=thru movement, R=right-turn movement, etc.

(S) = Signalized intersection

(U) = Unsignalized intersection

Mitigation for Intersections 3 and 4 are analyzed to assume signalization of the intersection with protected left turns where applicable.

Table 8 also shows that with signalization, these intersections could be made to work at an acceptable level of service. However, for the purpose of this study, one option was chosen as a possible method of improving the operations.

Roadway Segments

Table 9 shows that all of the project area roadway segments analyzed will operate at LOS B or better.

CUMULATIVE PROJECT (2019) TRAFFIC ANALYSIS

The City of Riverside's Planning Department was contacted to determine a list of cumulative projects to be included in this traffic analysis. Information on 3 projects within a 1.5 mile radius of the project, for which permits had been issued, was provided. The following projects were considered for the cumulative analysis:

- 925-975 Marlborough Avenue – 62,000sf of warehouse/industrial land use
- Northeast corner of Stacy Court and Paige Drive – 3,008sf vehicle repair facility
- 1080 Marlborough Avenue – 5 warehouse buildings ranging in size from 10,000sf – 13,850sf

In addition, this addendum includes another project that was not included in the original traffic impact analysis. The following project has been added to the original cumulative projects:

- Columbia Business Park – 3 Project Buildings A, B, and C

Trip generation was performed for each of the original 3 projects and the trip generation calculated in the Columbia Business Park Traffic Impact Analysis, dated November 18, 2014 was used. The cumulative trips were distributed to the project area intersections and roadways based on anticipated trip distribution patterns. Trip generation and traffic assignment figures can be found in **Appendix F**. The cumulative traffic volumes were then added to the existing + ambient + project traffic volumes. **Exhibit 10** shows the existing + ambient + cumulative + project traffic volumes (Year 2019).

EXISTING + AMBIENT + CUMULATIVE + PROJECT OPERATIONS (2019)

Signalized Intersections

Table 10 shows that all project area signalized intersections are anticipated to operate at LOS D or better during the AM and PM peak hours.

Un-signalized Intersections

Table 10 shows that all project area signalized intersections are anticipated to operate at LOS D or better during the AM and PM peak hours, with the exception of the following:

- Interchange Street / W La Cadena Drive / I-215 SB Ramps – LOS E during AM Peak Hour and LOS F during PM Peak Hour

TABLE 9
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING + AMBIENT + PROJECT ROADWAY SEGMENT OPERATIONS (2019)

STREET SEGMENT	EXISTING CLASSIFICATION	EX + AMB + PROJ VOLUME		
		Capacity ^a	ADT	V/C LOS
1 Columbia Avenue, Primer Street to E La Cadena Drive	100' ARTERIAL	33,000	22,439	0.68 B
2 Columbia Avenue, E La Cadena Drive to Chicago Avenue	110' ARTERIAL	33,000	25,915	0.79 B
3 Columbia Avenue, Chicago Avenue to Iowa Avenue	110' ARTERIAL	33,000	16,694	0.51 A
4 Columbia Avenue, Iowa Avenue to Northgate Street	110' ARTERIAL	33,000	9,288	0.28 A
5 Columbia Avenue, Research Park Drive to Michigan Avenue	100' ARTERIAL	33,000	3,587	0.11 A
6 Michigan Avenue, Columbia Avenue to Palmyrita Avenue	66' COLLECTOR	12,500	3,371	0.27 A
7 Marlborough Avenue, Chicago Avenue to Atlanta Avenue	66' COLLECTOR	12,500	3,223	0.26 A
8 Marlborough Avenue, Atlanta Avenue to Iowa Avenue	66' COLLECTOR	12,500	3,260	0.26 A
9 Marlborough Avenue, Iowa Avenue to Rustin Avenue	66' COLLECTOR	12,500	3,536	0.28 A
10 Marlborough Avenue, Rustin Avenue to Northgate Street	66' COLLECTOR	12,500	5,104	0.41 A
11 Chicago Avenue, Marlborough Avenue to Columbia Avenue	110' ARTERIAL	33,000	11,927	0.36 A
12 Iowa Avenue, Marlborough Avenue to Columbia Avenue	110' ARTERIAL	33,000	24,428	0.74 B
13 Northgate Street, Marlborough Avenue to Columbia Avenue	66' COLLECTOR	12,500	3,446	0.28 A
14 Research Park Drive, South of Columbia Avenue	LOCAL	3,100	2,230	0.72 B

Footnote:

a. LOS A and LOS B capacity thresholds were derived; City of Riverside deems anything better than LOS C as acceptable.

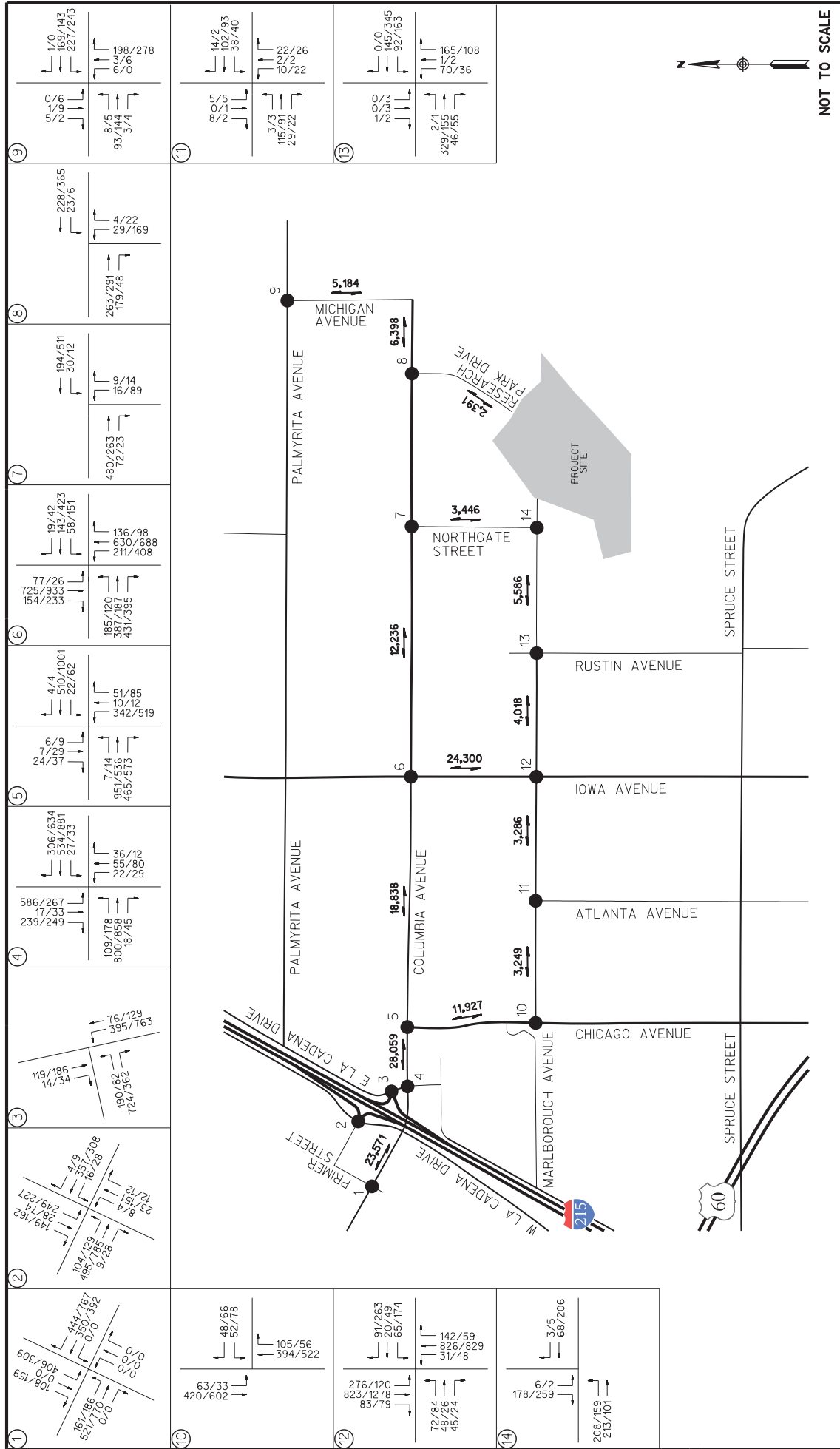


EXHIBIT 10
EXISTING + AMBIENT + PROJECT + CUMULATIVE VOLUMES (2019)

MARLBOROUGH INDUSTRIAL PROJECT

XXX/XXX = AM/PM PEAK HOUR
X,XXX = AVERAGE DAILY TRAFFIC VOLUME

TABLE 10
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING + AMBIENT + PROJECT + CUM PROJECTS (2019)
INTERSECTION OPERATIONS

INTERSECTION		DELAY	LOS	SIGNIFICANT IMPACT	MITIGATION	
					DELAY	LOS
1 Columbia Avenue / Primer Street (S)	AM peak	20.6	B	-		
	PM peak	20.4	B	-		
2 Interchange Street / W La Cadena Drive / I-215 SB Ramps (U)	AM peak					
	EBL	35.2	E	Y	54.9	D
	PM peak					
	EBL	101.0	F	Y	54.6	D
3 E La Cadena Drive / I-215 NB Ramps (U)	AM peak					
	EBL	200.0+	F	Y	7.8	A
	PM peak					
	EBL	200.0+	F	Y	10.0	B
4 Columbia Avenue / E La Cadena Drive (S)	AM peak					
		43.3	D	-		
	PM peak					
		39.5	D	-		
5 Columbia Avenue / Chicago Avenue (S)	AM peak					
		30.7	C	-		
	PM peak					
		31.3	C	-		
6 Columbia Avenue / Iowa Avenue (S)	AM peak					
		54.8	D	-		
	PM peak					
		54.6	D	-		
7 Columbia Avenue / Northgate Street (U)	AM peak					
	NBL	18.3	C	-		
	PM peak					
	NBL	17.7	C	-		
8 Columbia Avenue / Research Park Drive (U)	AM peak					
	NBL	13.0	B	-		
	PM peak					
	NBL	30.8	D	-		
9 Palmyrita Avenue / Michigan Avenue (U)	AM peak					
	SBL	11.3	B	-		
	PM peak					
	SBL	26.9	D	-		
10 Marlborough Avenue / Chicago Avenue (U)	AM peak					
	WBL	28.7	D	-		
	PM peak					
	WBL	28.8	D	-		

TABLE 10
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING + AMBIENT + PROJECT + CUM PROJECTS (2019)
INTERSECTION OPERATIONS

INTERSECTION			DELAY	LOS	SIGNIFICANT IMPACT	MITIGATION	
						DELAY	LOS
11 Marlborough Avenue / Atlanta Avenue (U)	AM peak						
	NBL	10.6	B	-			
	PM peak						
12 Marlborough Avenue / Iowa Avenue (S)	NBL	11.1	B	-			
	AM peak						
		49.6	D	-			
13 Marlborough Avenue / Rustin Avenue (U)	PM peak	50.8	D	-			
	AM peak						
	NBL	28.2	D	-			
14 Marlborough Avenue / Northgate Street (U)	PM peak	29.1	D	-			
	AM peak						
	SBL	11.9	B	-			
	PM peak						
	SBL	12.5	B	-			

- Delays and Level of Service calculated utilizing the methodologies described in Chapters 18 & 19 of the 2010 Highway Capacity Manual (HCM).

DELAY is measured in seconds

LOS = Level of Service

NB = Northbound, SB = Southbound, etc.

T=thru movement, R=right-turn movement, etc.

(S) = Signalized intersection

(U) = Unsignalized intersection

Mitigation for Intersections 3 and 4 are analyzed to assume signalization of the intersection with protected left turns where applicable.

- E La Cadena Drive / I-215 NB Ramps – LOS F during AM/PM Peak Hour

Table 10 also shows that with signalization, these intersections could be made to work at an acceptable level of service. For the purpose of this study, one option was chosen as a possible method of improving the operations.

Roadway Segments

Table 11 shows that most of the project area roadway segments analyzed will operate at LOS B or better.

CONCLUSIONS/RECOMMENDATIONS

The study evaluated any potential traffic impacts due to the proposed Project. The project is anticipated to be constructed by 2019, and is anticipated to generate a total of 1,468 new daily trips with 274 trips (216 inbound/58 outbound) during the AM peak hour and 335 trips (105 inbound/230 outbound) during the PM peak hour.

Interchange Street/W La Cadena Drive/I-215 SB Ramps

As shown, the intersection of Interchange Street/W La Cadena Drive/I-215 SB Ramps is currently operating below acceptable levels of service and is anticipated to operate unacceptably with the addition of project traffic. The following recommendations are proposed for the intersection that will fall below the level of acceptable thresholds based on the City of Riverside Guidelines:

This intersection is expected to operate an LOS F with the addition of project traffic. The addition of project traffic to the intersection increases the intersection delay by more than 15 seconds in the PM peak hour as indicated on **Table 6**, in the current configuration.

For the intersection to operate at an LOS D or better, at Buildout (with the addition of project traffic), the intersection would need to be signalized. A signal is determined to be warranted as shown in the calculations provided in **Appendix G**. With the current lane configuration the signal would have to provide split phases for all directions. The intersection would operate acceptably per the City of Riverside's Guidelines once these mitigation measures are implemented. There are currently no plans by the City of Riverside to improve this intersection. The fair-share contribution is calculated to be 6%. Refer to **Appendix H** for Fair-share calculations.

I-215 NB Ramps/E La Cadena Drive

As shown, the intersection of I-215 NB Ramps/E La Cadena Drive is currently operating below acceptable levels of service and is anticipated to operate unacceptably with the addition of project traffic. The following recommendations are proposed for the intersection that will fall below the level of acceptable thresholds based on the City of Riverside Guidelines:

This intersection is expected to operate an LOS F with the addition of project traffic. The addition of project traffic to the intersection increases the intersection delay by more than 30 seconds in the AM and PM peak hours as indicated on **Table 6**, in the current configuration.

TABLE 11
MARLBOROUGH INDUSTRIAL PROJECT
EXISTING + AMBIENT + PROJECT + CUMULATIVE ROADWAY SEGMENT OPERATIONS (2019)

STREET SEGMENT	EXISTING CLASSIFICATION	EX + AMB + PROJ + CUM VOLUME		
		Capacity ^a	ADT	V/C LOS
1 Columbia Avenue, Primer Street to E La Cadena Drive	100' ARTERIAL	33,000	23,571	0.71 B
2 Columbia Avenue, E La Cadena Drive to Chicago Avenue	110' ARTERIAL	33,000	28,059	0.85 C
3 Columbia Avenue, Chicago Avenue to Iowa Avenue	110' ARTERIAL	33,000	18,838	0.57 B
4 Columbia Avenue, Iowa Avenue to Northgate Street	110' ARTERIAL	33,000	12,236	0.37 A
5 Columbia Avenue, Research Park Drive to Michigan Avenue	100' ARTERIAL	33,000	6,400	0.19 A
6 Michigan Avenue, Columbia Avenue to Palmyrita Avenue	66' COLLECTOR	12,500	5,184	0.41 A
7 Marlborough Avenue, Chicago Avenue to Atlanta Avenue	66' COLLECTOR	12,500	3,249	0.26 A
8 Marlborough Avenue, Atlanta Avenue to Iowa Avenue	66' COLLECTOR	12,500	3,286	0.26 A
9 Marlborough Avenue, Iowa Avenue to Rustin Avenue	66' COLLECTOR	12,500	4,018	0.32 A
10 Marlborough Avenue, Rustin Avenue to Northgate Street	66' COLLECTOR	12,500	5,586	0.45 A
11 Chicago Avenue, Marlborough Avenue to Columbia Avenue	110' ARTERIAL	33,000	11,927	0.36 A
12 Iowa Avenue, Marlborough Avenue to Columbia Avenue	110' ARTERIAL	33,000	25,856	0.78 B
13 Northgate Street, Marlborough Avenue to Columbia Avenue	66' COLLECTOR	12,500	3,446	0.28 A
14 Research Park Drive, South of Columbia Avenue	LOCAL	3,100	2,391	0.77 B

Footnote:

a. LOS A and LOS B capacity thresholds were derived; City of Riverside deems anything better than LOS C as acceptable.

For the intersection to operate at an LOS D or better, at Buildout (with the addition of project traffic), the intersection would need to be signalized. A signal is determined to be warranted as shown in the calculations provided in **Appendix G**. With the current lane configuration the signal would have to provide permissive phases for the northbound and southbound movements and a split phase for the eastbound traffic off the freeway. The intersection would operate acceptably per the City of Riverside's Guidelines once these mitigation measures are implemented. There are currently no plans by the City of Riverside to improve this intersection. The fair-share contribution is calculated to be 6.5%. Refer to **Appendix H** for Fair-share calculations.

REFERENCES

1. Caltrans Division of Traffic Operations, California Manual on Uniform Traffic Control Devices, Sacramento, CA, 2014.
2. City of Riverside, Master Plan of Roadways (Circulation Element Figure CCM-4), Riverside, CA, 2007.
3. City of Riverside, Traffic Impact Analysis Preparation Guide, Riverside, CA, 2014.
4. Trafficware, SYNCHRO, Version 9, Build 805, Sugar Land, Texas, 2013.
5. Transportation Research Board, Highway Capacity Manual, Washington, D.C., 2010.



Noise Study

750 Marlborough Drive Warehouse Project

prepared for

Guthrie Pericles, LLC

1451 Research Park Drive, Suite 200

Riverside, California 92507-2154

prepared by

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December 2017



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Appendices

Appendix A Noise Measurement Data

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1 Project Description

This report is an analysis of the potential noise impacts of the proposed warehouse located at the end of Marlborough Avenue, south of Research Park Drive, in Riverside, California. Rincon Consultants, Inc. prepared this report under contract to Guthrie Pericles, LLC, for use by the City of Riverside, in support of the environmental documentation being prepared pursuant to the California Environmental Quality Act (CEQA). The purpose of this report is to analyze the proposed project's noise impacts related to both temporary construction activity and long-term operation of the project.

The project involves construction of an approximately 339,510 square foot warehouse, 6,820 square feet of office space, and 86,698 square feet of vehicular parking, including 375 standard vehicular parking spaces and 4 trailer parking spaces on an approximately 22.34-acre site. Adjacent land uses include light industrial buildings to the north and west, a vacant lot to the northeast, and Box Springs Mountain Reserve Park to the south and east Figure 1. Primary vehicular and truck access to the project site would be provided by an entrance located at the eastern end of Marlborough Avenue, on the western border of the site. An additional entrance is located at the norther border of the site at the Research Park Drive cul-de-sac for employee and visitor vehicle access.

The project also includes the development of a 10-foot-wide multi-use trail, made of decomposed granite material as specified by City of Riverside Parks and Recreation Department, which will run along the southern and eastern sides of the project. The trail will be sloped to a drainage ditch/channel that generally runs along the southern and eastern side of the trail for storm water protection. As the trail is needed for fire protection, the trail will provide a 12-foot clearance for fire service vehicles and designed to keep the maximum slope no greater than 15 percent where feasible. The trail will also be used for maintenance purposes to help maintain the proposed graded slopes and the storm water protection system, which consists of the drainage ditch/channel adjacent to the trail and the proposed storm drain that is proposed under the trail. Lastly the trail will be used as a public recreational trail as part of the City of Riverside trail network.

Figure 1 Existing Site Conditions



2 Background

2.1 Overview of Sound Measurement

Noise level (or volume) is generally measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels to be consistent with that of human hearing response, which is most sensitive to frequencies around 4,000 Hertz (about the highest note on a piano) and less sensitive to low frequencies (below 100 Hertz).

Sound pressure level is measured on a logarithmic scale with the 0 dBA level based on the lowest detectable sound pressure level that people can perceive (an audible sound that is not zero sound pressure level). Based on the logarithmic scale, a doubling of sound energy is equivalent to an increase of 3 dBA, and a sound that is 10 dBA less than the ambient sound level has no effect on ambient noise. Because of the nature of the human ear, a sound must be about 10 dBA greater than the ambient noise level to be judged as twice as loud. In general, a 3 dBA change in the ambient noise level is noticeable, while 1-2 dBA changes generally are not perceived. Quiet suburban areas typically have noise levels in the range of 40-50 dBA, while areas adjacent to arterial streets are typically in the 50-60+ dBA range. Normal conversational levels are usually in the 60-65 dBA range, and ambient noise levels greater than 65 dBA can interrupt conversations.

Noise levels from point sources, such as those from individual pieces of machinery, typically attenuate (or drop off) at a rate of 6 dBA per doubling of distance from the noise source. Noise levels from lightly traveled roads typically attenuate at a rate of about 4.5 dBA per doubling of distance. Noise levels from heavily traveled roads typically attenuate at about 3 dBA per doubling of distance. Noise levels may also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces noise levels by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA (Federal Transit Administration [FTA] 2006). The manner in which homes in California are constructed generally provides a reduction of exterior-to-interior noise levels of approximately 20 to 25 dBA with closed windows (FTA 2006).

In addition to the instantaneous measurement of sound levels, the duration of sound is important since sounds that occur over a long period of time are more likely to be an annoyance or cause direct physical damage or environmental stress. One of the most frequently used noise metrics that considers both duration and sound power level is the equivalent noise level (Leq). The Leq is defined as the single steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time (essentially, the average noise level). Typically, Leq is summed over a one-hour period. Lmax is the highest RMS (root mean squared) sound pressure level within the measurement period, and Lmin is the lowest RMS sound pressure level within the measurement period.

The time period in which noise occurs is also important since nighttime noise tends to disturb people more than daytime noise. Community noise is usually measured using Day-Night Average Level (Ldn), which is the 24-hour average noise level with a 10-dBA penalty for noise occurring during nighttime (10 PM to 7 AM) hours, or Community Noise Equivalent Level (CNEL), which is the 24-hour average noise level with a 5 dBA penalty for noise occurring from 7 PM to 10 PM and a 10

dBA penalty for noise occurring from 10 PM to 7 AM. Noise levels described by Ldn and CNEL typically do not differ by more than 1 dBA. In practice, CNEL and Ldn are often used interchangeably.

The relationship between peak hourly Leq values and associated Ldn/CNEL values depends on the distribution of traffic over the entire day. There is no precise way to convert a peak hour Leq to Ldn or CNEL. However, in urban areas near heavy traffic, the peak hour Leq is typically 2-4 dBA lower than the daily Ldn/CNEL. In less heavily developed areas, such as suburban areas, the peak hour Leq is often roughly equal to the daily Ldn/CNEL. For rural areas with little nighttime traffic, the peak hour Leq will often be 3-4 dBA greater than the daily Ldn/CNEL value (California State Water Resources Control Board [SWRCB] 1999). The project site is located in a suburban area; therefore, the Ldn/CNEL in the area would be roughly equal to the peak hour Leq.

Vibration refers to groundborne noise and perceptible motion. Vibration is a unique form of noise because its energy is carried through buildings, structures, and the ground, whereas noise is simply carried through the air. Thus, vibration is generally felt rather than heard. Some vibration effects can be caused by noise; e.g., the rattling of windows from passing trucks. This phenomenon is caused by the coupling of the acoustic energy at frequencies that are close to the resonant frequency of the material being vibrated. Typically, groundborne vibration generated by manmade activities attenuates rapidly as distance from the source of the vibration increases. The ground motion caused by vibration is measured as particle velocity in inches per second and is referenced as vibration decibels (VdB) in the U.S.

The background vibration velocity level in residential areas is usually around 50 VdB. The vibration velocity level threshold of perception for humans is approximately 65 VdB. A vibration velocity of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people. The range of interest is from approximately 50 VdB, which is the typical background vibration velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Most perceptible indoor vibration is caused by sources within buildings such as operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel wheeled trains, and traffic on rough roads.

2.1.1 Existing Project Area Noise Levels

The primary off-site noise sources in the project area are motor vehicles (e.g., automobiles, buses, and trucks) along Marlborough Avenue, located west of the project site, and along Columbia Avenue located approximately 1,000 feet north of the project site. Motor vehicle noise is of concern because it is characterized by a high number of individual events, which often create sustained noise levels. Ambient noise levels would be expected to be highest during the daytime and rush hour unless congestion slows speeds substantially.

To determine ambient noise levels in the project site vicinity, four 15-minute noise measurements were taken using an ANSI Type II integrating sound level meter between 4:00 PM and 6:30 PM on May 4, 2017, (refer to Appendix A for noise measurement data) and two additional 15-minute noise measurements were taken between 6:00 AM and 7:00 AM on August 16, 2017. Noise measurement 1 was taken to represent the existing noise level at the project site, measurement 2 was taken to compare the noise level at a nearby, existing warehouse, and measurements 3 and 4 were taken to represent that ambient noise levels at sensitive receptors in the project vicinity which would be most likely to be impacted by an increase in traffic. The additional measurements (5 and 6), were

taken adjacent to Box Springs Mountain Reserve Park to estimate ambient noise levels at the sensitive receptor most likely to be impacted by operational noise. See Table 1 lists the ambient noise levels (Leqs) measured at these locations. Figure 2 for the locations of noise measurements.

Table 1 Project Noise Monitoring Results

Measurement Location	Measurement Location	Sample Times	Approximate Distance to Primary Noise Source	Leq[15] (dBA) ¹
1	Onsite	4:18 PM – 4:33 PM	200 feet ²	50.7
2	Existing warehouse in vicinity (comparison)	6:06 PM – 6:21 PM	400 feet ³	51.3
3	Off-site at Hunter Park on Iowa Avenue	5:40 PM – 5:55 PM	30 feet ⁴	70.0
4	Off-site Residences on Columbia Avenue	4:50 PM – 5:05 PM	50 feet ⁵	73.0
5	Onsite approximately 150 feet from Box Springs Mountain Reserve Park	6:30 – 6:45 AM	100 feet ⁶	49.4
6	Off-site on Research Park Drive	6:03 – 6:18 AM	50 feet ⁷	56.0

See Appendix A for noise monitoring data.

See Figure 2 for a map of Noise Measurement Locations.

¹ The equivalent noise level (Leq) is defined as the single steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time (essentially, the average noise level). For this measurement, the Leq was over a 15-minute period (Leq[15]).

² Approximate distance to Marlborough Avenue.

³ Approximate distance to rooftop equipment noise.

⁴ Distance to centerline of Iowa Avenue.

⁵ Distance to centerline of Columbia Avenue.

⁶ Distance to nearby warehouse (primary noise source).

⁷ Distance to centerline of Research Park Drive.

Source: Rincon Consultants, field measurements on May 4, 2017 (measurements 1-4) and August 16, 2017 (measurements 5-6) field using ANSI Type II Integrating sound level meter.

Figure 2 Noise Measurement Locations



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Fig 2 Noise Measurements

2.1.2 Sensitive Receptors

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with those uses. The Noise Element of the Riverside General Plan 2025 identifies noise-sensitive land uses as residences, hospitals, schools, churches, outdoor speculative sports facilities, performing arts facilities, and hotels and motels. The closest sensitive receptor, as defined in the City's Noise Element, is a residential neighborhood located approximately 2,500 feet south of the project site on the opposite side of Box Springs Mountain Reserve Park. A ridgeline separates this neighborhood from the project site, which eliminates the potential for noise from the project site to affect the neighborhood.

Though not included in the Riverside General Plan 2025 Noise Element as a noise sensitive receptor, Box Springs Mountain Reserve Park is considered a sensitive receptor pursuant to the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). Proposed noise generating land uses affecting the MSHCP Conservation Area shall incorporate setbacks, berms or walls to minimize the effects of noise on MSHCP Conservation Area resources pursuant to applicable rules, regulations and guidelines related to land use noise standards. For planning purposes, wildlife within the MSHCP Conservation Area should not be subject to noise that would exceed residential noise standards (MSHCP 2003). The southern and eastern boundaries of the project site are abutting the northern side of the Box Springs Mountain Reserve Park hills. These hills act as a natural buffer to the rest of the reserve area.

Noise measurement #4 was taken along Columbia Avenue, approximately 1.25 miles west of the site, near residences that would be most impacted by increased vehicle trips, and therefore increased vehicular noise, generated by the project. Noise measurements #5 and #6 were taken to establish the ambient noise levels for the adjacent reserve. Light industrial buildings, which are not typically considered noise-sensitive, are located directly adjacent to the northern and western site boundary.

2.2 Regulatory Setting

2.2.1 City of Riverside General Plan and Noise Element

The Noise Element of the Riverside General Plan (2007) identifies sources of noise and provides objectives and policies designed to incorporate noise control in the planning process. To ensure different land uses are developed in compatible noise environments, the City's Noise Element establishes noise guidelines for land use planning, shown in Table 2.

The Noise Element requires protection of sensitive receptors from excessive noise associated with commercial and industrial businesses and agricultural activities. During the preliminary stage of the development process, potential noise impacts and appropriate mitigation are to be identified.

The Noise Element includes specific policies to reduce noise that apply to new development:

- **Policy N-1.3.** Enforce that the City of Riverside Noise Control Code to ensure that stationary noise and noise emanating from construction activities, private developments/residences, and special events are minimized.
- **Policy N-1.4.** Incorporate noise considerations into the site plan review process, particularly with regard to parking and loading areas, ingress/egress points and refuse collection areas.

- **Policy N-1.5.** Avoid locating noise-sensitive land uses in existing and anticipated noise-impacted areas.
- **Policy N-1.8.** Continue to consider noise concerns in evaluating all proposed development decisions and roadway projects

Table 2 Noise/Land Use Noise Compatibility Criteria

Land Use Category	Community Noise Equivalent Level (CNEL) or Day-Night Leven (Ldn), dBA			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Conditionally Unacceptable
Single Family Residential	60	65	70	90
Infill Single Family Residential	65	75	80	90
Commercial (Motels, Hotels, Lodging)	60	70	80	90
Schools, Libraries, Churches, Hospitals, Nursing Homes	60	70	80	90
Amphitheatres, Concert Hall, Auditorium, Meeting Hall	N/A	65	N/A	90
Sports Arenas, Outdoor Spectator Sports	N/A	70	N/A	90
Playgrounds, Neighborhood Parks	70	N/A	75	90
Golf Courses, Riding Stables, Water Rec., Cemeteries	70	N/A	80	90
Office Buildings, Business, Commercial, Professional	65	75	90	N/A
Industrial, Manufacturing, Utilities, Agriculture	70	80	90	N/A
Freeway Adjacent Commercial, Office, and Industrial Uses	65	80	90	N/A

Source: Riverside General Plan 2025 (adopted 2007).

2.2.2 City of Riverside Municipal Code Title 7, Noise Control

The City of Riverside Municipal Code sets forth the City's standards, guidelines, and procedures concerning the regulation of operational noise. Specifically, Title 7, Noise Control, of the Code regulates noise levels in the City. These regulations are intended to implement the goals, objectives, and policies of the General Plan, protect the public health, safety, and welfare of the City, and to control unnecessary, excessive, and/or annoying noise in the City.

Section 7.25.010 of the Municipal Code establishes exterior noise standards for various land use categories over certain periods of time. Per the Municipal Code, noise from operations at any land use cannot exceed the exterior noise limit of another land use, as measured at the property line. City exterior noise standards are shown in Table 3.

Table 3 City of Riverside Exterior Noise Standards

Land Use Category	Time Period	Noise Level
Residential	Night (10 PM to 7 AM)	45 dBA
	Day (7 AM to 10 PM)	55 dBA
Office/Commercial	Anytime	65 dBA
Industrial	Anytime	70 dBA
Community Support	Anytime	60 dBA
Public Recreation Facility	Anytime	65 dBA
Nonurban	Anytime	70 dBA

Source: City of Riverside Municipal Code, Table 7.25.010A

Any noise exceeding the following is prohibited:

- The exterior noise standard of the applicable land use category, plus up to five decibels, for a cumulative period of more than thirty minutes in any hour; or
- The exterior noise standard of the applicable land use category, plus five decibels for a cumulative period of more than fifteen minutes in any hour; or
- The exterior noise standard of the applicable land use category, plus ten decibels, for a cumulative period of more than five minutes in any hour; or
- The exterior noise standard of the applicable land use category, plus fifteen decibels, for a cumulative period of more than one minute in any hour; or
- The exterior noise standard for the applicable land use category, plus twenty decibels or the maximum measured ambient noise level, for any period of time.

2.2.3 City Groundborne Vibration Regulations

The City has not adopted any thresholds for construction or operational groundborne vibration impacts. However, the California Department of Transportation (Caltrans) has set vibration criteria for various land uses, as shown in Table 5.

Table 4 Federal Transit Administration Vibration Impact Criteria

Land Use Category	Vibration Impact Level for Frequent Events (VdB) ¹	Vibration Impact Level for Infrequent Events (VdB) ²
Building where low ambient vibration is essential for interior operations	65	65
Residences and buildings where people normally sleep	72	80
Institutional land uses with primary daytime use	75	83

Source: Transportation and Construction Vibration Guidance Manual 2013, Caltrans

¹Frequent events are defined as more than 70 events per day

² Infrequent events are defined as fewer than 70 events per day.

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3 Impact Analysis

3.1.1 Methodology and Significance Thresholds

Construction noise levels are estimated using the FHWA Roadway Construction Noise Model (RCNM). Construction noise level estimates do not account for the presence of intervening structures or topography, which could reduce noise levels at receptor locations. Therefore, the noise levels presented herein represent a conservative estimate of actual construction noise.

Impacts associated with on-site activity (primarily loading docks and truck activity, HVAC systems and trash, and delivery trucks) were evaluated based on a loading dock noise study conducted by Charles M. Salter Associate Inc. (Salter 2014), noise levels reported by the U.S. Environmental Protection Agency (USEPA), and the distance to nearby receptors. Traffic noise was estimated based on traffic estimates from the Institute of Transportation Engineers (ITE).

Riverside has adopted noise standards as described in Tables 3 and 4 above.

3.1.2 Impact Analysis

Construction Noise

Construction of a warehouse would generate temporary noise that exceeds existing ambient noise levels in the project site vicinity, but would cease upon project completion. Noise impacts associated with construction activity are a function of the noise generated by construction equipment, the location and sensitivity of nearby land uses, and the timing and duration of the noise-generating activities. Table 5 shows typical peak noise levels associated with various types of heavy construction equipment expected during each construction phase along with their noise levels at 25 feet, representing the distance to adjacent industrial and open space uses. While noise levels would increase at adjacent business properties, industrial uses are not generally considered sensitive. The Riverside Municipal Code Section 7.35.020.G exempts noise associated with construction. However, the increase in noise levels from construction would affect Box Springs Mountain Reserve Park.

Table 5 Typical Noise Levels Generated by Construction Equipment

Equipment	Type	Typical Lmax (dBA) 25 Feet from the Source
Air Compressor	Stationary	87
Backhoe	Mobile	86
Concrete Mixer	Stationary	91
Dozer	Mobile	88
Front End Loader	Mobile	85
Grader	Mobile	89
Paver	Mobile	95

Equipment	Type	Typical Lmax (dBA) 25 Feet from the Source
Roller	Mobile	86
Saw	Stationary	76
Scraper	Mobile	95
Source: FHWA 2006		

As shown in Table 6 below, operation of equipment during various phases of construction could generate Leqs of approximately 80-91 dBA and maximum (Lmax) noise levels of approximately 84-96 dBA at the adjacent Box Springs Mountain Reserve Park, along the southern border of the project site. Construction noise levels at the closest residences 2,500 feet south of the site could reach approximately 40-51 dBA Leq and 44-56 dBA Lmax. Equipment noise levels are based on a standard noise attenuation rate of 6 dBA per doubling of distance from the highest-volume individual pieces of equipment.

Table 6 Construction Noise Levels by Phase

Construction Phase	Equipment	Estimated Noise at 25 feet (dBA Lmax)	Estimated Noise at 25 feet (dBA Leq)	Estimated Noise at 2,500 feet (dBA Lmax)	Estimated Noise at 2,500 feet (dBA Leq)
Site Preparation	Grader, Loader, Backhoe, Scraper	91	90	51	50
Grading	Saw, Dozer, Loader, Backhoe	96	91	56	51
Building Construction	Crane, Forklift, Loader, Backhoe	87	85	47	45
Architectural Coating	Air Compressor	84	80	44	40
Paving	Concrete and Mortar Mixers, Paver, Roller, Loader, Backhoe	87	88	47	48

Source: See Appendix B for equipment noise impact data sheets and assumptions.

As noted in Section 2.2.2 above, the City of Riverside Municipal Code Section 7.35.010 restricts construction to between the hours of 7:00 AM and 7:00 PM on weekdays and 8:00 AM and 5:00 PM on Saturdays, and prohibits construction on Sundays and federal holidays. Construction noise could exceed acceptable noise levels of 55 dBA during the day and 45 dBA at night at the adjacent Box Springs Reserve Park. However, noise sources associated with permitted construction, repair, remodeling, or grading activities that comply with the Municipal Code construction hour restrictions are exempt from these noise standards pursuant to Riverside Municipal Code Section 7.35.020.G. Regardless, in order to reduce construction noise at the nearby Reserve Park, the following recommendations should be implemented:

- **Construction Management Plan.** Prior to the issuance of grading permits, the applicant should submit a Construction Management Plan satisfactory to the City of Riverside. The Building Official, or appropriately assigned City staff member, should be responsible for enforcing noise attenuating construction requirements. The Construction Management Plan should include, but not be limited to, the following:
 - *Excavation, grading, and other construction activities.* These activities should be restricted to the hours allowed under Riverside Municipal Code Section 7.35.010. Any deviations from these standards shall comply with the provisions in Title 7 (Noise Control).
 - *Staging Area.* Provide staging areas on-site to minimize off-site transportation of heavy construction equipment. These areas should be located to maximize the distance between activity and sensitive receptors, as feasible. This would reduce noise levels associated with most types of idling construction equipment.
 - *Avoid Operating Equipment Simultaneously.* Whenever feasible, ensure that construction activities are scheduled so as to avoid operating several pieces of equipment simultaneously, which causes high noise levels.
 - *Inspections.* The contractor should inspect construction equipment to ensure that such equipment is in proper operating condition and fitted with standard factory silencing features. Construction equipment should utilize all standard factory silencing features, such as equipment mufflers, enclosures, and barriers.
- **Construction Noise Reduction.** The following measures shall be followed during construction of the proposed project and associated site improvements:
 - *Newest Power Construction Equipment.* Use the newest available power construction equipment with standard recommended noise shielding and muffling devices, as available.
 - *Mufflers.* During project grading and construction, all equipment, fixed or mobile, should be operated with closed engine doors and should be equipped with properly operating and maintained mufflers consistent with manufacturers' standards. Use of manufacturer-certified mufflers associated with construction equipment has been shown to reduce noise levels by 8 to 10 dBA.
 - *Smart Back-up Alarms.* Mobile construction equipment should have smart back-up alarms that automatically adjust the sound level of the alarm in response to ambient noise levels. Alternatively, back-up alarms should be disabled and replaced with human spotters to ensure safety when mobile construction equipment is moving the reverse direction.
 - *Idling.* All construction vehicles, such as bulldozers and haul trucks, should be prohibited from idling in excess of five minutes, which is consistent with recommended strategies to reduce and/or eliminate diesel idling for warehouse distribution facilities according to the City's *Good Neighbor Guidelines* (2008).

With implementation of the above recommendations, construction noise would be reduced to the extent feasible.

Vibration

Vibration refers to groundborne noise and perceptible motion. Groundborne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors, where the motion may be discernible, but without the effects associated with the shaking of a building, there is

less adverse reaction. The background vibration velocity level in residential areas is usually around 50 VdB. The vibration velocity level threshold of perception for humans is approximately 65 VdB (Federal Transit Administration, 2006). A vibration velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people. The range of interest is from approximately 50 VdB to 100 VdB. 100 VdB is the threshold where minor damage to fragile buildings may occur. The general human response to different levels of groundborne vibration velocity levels is described in Table 7.

Table 7 Human Response to Different Levels of Groundborne Vibration

Vibration Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception for many people.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.
Source: Federal Transit Administration, 2006.	

Construction activity associated with the project would create groundborne vibration. Buildings in the vicinity of a construction site respond to vibration to varying degrees ranging from imperceptible effects at the lowest levels, to low rumbling sounds and perceptible vibrations at moderate levels, and up to minor damage at the highest vibrations levels. Table 8 lists groundborne vibration levels from various types of construction equipment.

Table 8 Vibration Source Levels for Construction Equipment

Equipment	Approximate VdB at Nearest Receptors	
	25 Feet	2500 Feet
Large Bulldozer	87	27
Loaded Trucks	86	26
Small Bulldozer	58	N/A
Source: Federal Railroad Administration, High-Speed Ground Transportation Noise and Vibration Impact Assessment, 2012.		

Vibration levels attenuate quickly over distance, so vibration would not be noticeable at receptors outside of the immediate site vicinity. Vibration could exceed 85 VdB at adjacent industrial and open space properties 25 feet to the east and south. However, such events would be intermittent and temporary and vibration would not reach levels that could cause building damage (100 VdB). Moreover, the adjacent uses are not vibration sensitive. Groundborne vibration at the residences 2,500 feet south of the project site would be far below the 65 VdB threshold.

Operational Noise

As discussed in Section 2.1.2 above, though not included in the Riverside General Plan 2025 Noise Element as a noise sensitive receptor, Box Springs Mountain Reserve Park is considered a sensitive receptor pursuant to the Western Riverside County MSHCP. The southern and eastern boundaries of the project site are abutting the northern side of the Box Springs Mountain Reserve Park hills. These hills act as a natural buffer to the rest of the reserve area. For planning purposes, wildlife within the MSHCP Conservation Area should not be subject to noise that would exceed residential noise standards (MSHCP 2003). The portion of the Box Springs Mountain Reserve Park that is

adjacent to the subject project does not provide picnicking or camping facilities, nor does it allow for nighttime access. The use of the Reserve by people would be limited to the hiking trail that traverses the southern and eastern property line. Noise impacts to people would be infrequent and limited in duration and therefore, would be less than significant. The discussion below focuses on potential wildlife noise exposure.

LOADING DOCKS AND TRUCK ACTIVITY

There are many variables related to potential operational noise levels. At this time, there is not a known tenant for the proposed building and therefore, the actual hours of operation and total number of trucks that may operate at any given time, either during the day or at night, is unknown. The proposed building would include 34 loading docks on the western side of the warehouse and 15 loading docks on the southern side of the warehouse. Operation of the project would primarily involve loading and unloading operations of heavy-duty container trucks. Loading and unloading operations would include noises related to airbrakes, backup alarms, and idling. The southern and eastern boundaries of the project site are abutting the northern side of the Box Springs Mountain Reserve Park hills, which are considered a sensitive receptor to noise.

Noise from the western docks would be attenuated by the warehouse building itself and would not result in any impacts to the Box Springs Mountain Reserve Park. Noise from the southern docks would cause impacts to the Reserve. The nearest noise inducing operational activity (accelerating from a stop) would be located a minimum 95 feet from the Reserve. The majority of operational activities (noise associated with loading/unloading activities) would take place 190 feet or more from the sensitive receptor. Pass by trips (arrivals and departures) would occur approximately 230 feet from the sensitive receptor. The elevation of the hillside begins to climb while still on the subject property and would act as a natural buffer to the rest of the reserve area. Furthermore, the project would incorporate a 6- to 21-foot tall retaining wall along the eastern property boundary that would reduce the noise from the warehouse operations. Figure 3 and Table 9 below detail the assumed sound level of each type of noise that would be expected from operation of the distribution facility along the southern docks.

It is assumed that each of the noise sources would be short in duration and would occur sporadically throughout the day and/or night. As discussed in Section 2.2.2, noise levels may exceed the base standard in incremental amounts over shortening amounts of time each hour as follows:

- Up to five decibels for a cumulative period of up to 30 minutes in any hour; or
- Plus five decibels for a cumulative period of up to 15 minutes in any hour; or
- Plus 10 decibels for a cumulative period of up to five minutes in any hour; or
- Plus 15 decibels for a cumulative period of up to one minute in any hour; or
- No more than 20 decibels for any period of time.

Figure 3 Noise Source Location in Relation to the Nearest Sensitive Receptor

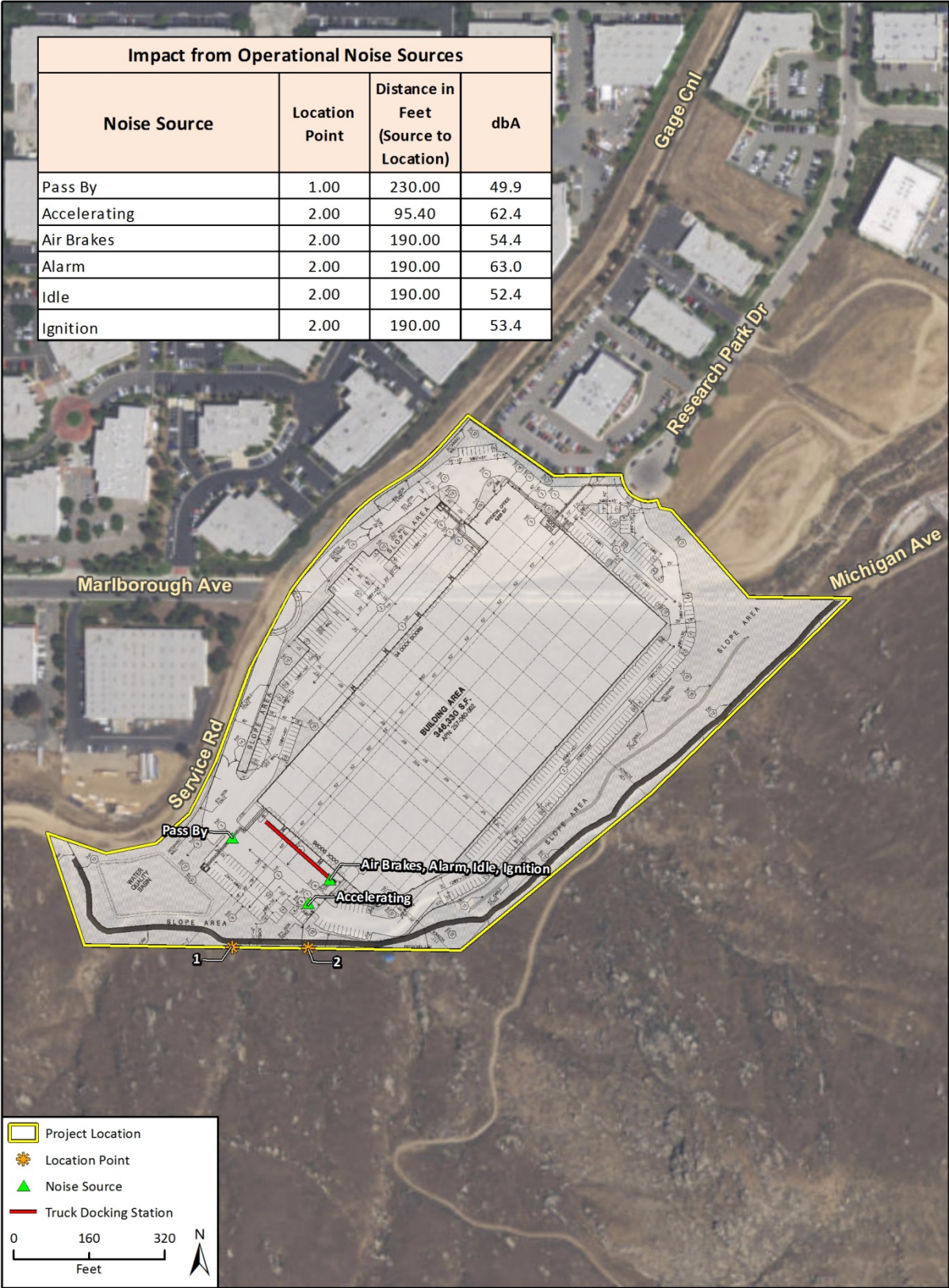


Table 9 Noise from Loading/Unloading Operations

Truck-related Noise Source	Assumed Sound Level	Nearest Distance to Sensitive Receptor ¹	Assumed Sound Level at Sensitive Receptor	Potentially Exceeds Daytime Threshold of 55 dBA?	Potentially Exceeds Nighttime Threshold of 45 dBA?
Pass-by ²	68 dBA at 30 ft ³	230 ft	49.9 dBA	No	Yes
Airbrakes	72 dBA at 25 ft	190 ft	54.4 dBA	No	Yes
Backup Alarm	79 dBA at 30 ft	190 ft	63.0 dBA	Yes	Yes
Brief Idle before Engine Shutoff	70 dBA at 25 ft	190 ft	52.4 dBA	No	Yes
Engine Ignition + Airbrakes	71 dBA at 25 ft	190 ft	53.4 dBA	No	Yes
Accelerating from Stop	74 dBA at 25 ft	95 ft	62.4 dBA	Yes	Yes

Source: Adapted from Midpoint at 237, Loading Dock Noise Study. Charles M. Salter Associates, Inc. 2014.

¹ Box Springs Mountain Reserve Park

² Arrivals and departures

³ ft = feet

DAYTIME OPERATIONAL NOISE

Despite the proposed building setbacks and a six- to 21-foot tall retaining wall along the eastern project boundary, daytime operational noise involving backup alarms and general acceleration of trucks on the south side of the building would still exceed base acceptable noise levels of 55 dBA at the adjacent Box Springs Reserve Park. However, the City noise ordinance allows noise of up to 10 dBA over the 55 dBA daytime residential standard for events lasting less than five cumulative minutes over one hour. It is presumed that backup alarms and acceleration of the trucks at the nearest points to the sensitive receptor would occur infrequently, would be cumulatively less than five minutes in duration in any given hour, and would therefore meet the standards of the City noise ordinance. Noise reducing measures would not be necessary during daytime operation.

NIGHTTIME OPERATIONAL NOISE

Nighttime operational noise from all anticipated noise sources would exceed acceptable noise levels of 45 dBA. As shown in Table 1, the existing onsite noise level prior to 7 AM is approximately 49.4 dBA, which indicates that the ambient nighttime noise level already exceeds the City's threshold of 45 dBA. As discussed in Section 2.2.2 and on the page above, City regulations that allow an exceedance of noise level thresholds for specified amounts of time, apply to the 45 dBA threshold, despite ambient noise levels. Therefore, on-site ambient noise currently exceeds the allowed "Up to five decibels for a cumulative period of up to 30 minutes in any hour". As a result, any nighttime operation along the southern portion of the proposed building would produce noise at plus 5 decibels above threshold (50 to 55 dBA), limiting operations along the south-facing loading docks to no more than 15 minutes per hour (the allowed "Plus 5 decibels for a cumulative period of up to 15 minutes in any hour").

The noise produced from back up alarms and truck acceleration at locations nearest to Box Springs Mountain would produce noise at more than 20 decibels above threshold (60+ dBA), which is prohibited for any duration. Accelerating truck noise falls below maximum allowed noise levels (60

dBA) at 125 feet from the source. Back up alarms fall below maximum allowed noise levels (60 dBA) at 270 feet from the source. Therefore, nighttime operations along the south-facing loading docks would have to be significantly limited, with only one or two of the westernmost south-facing bays in operation, in order to reduce nighttime noise impacts to below maximum allowed noise levels. In addition, the noise produced cumulatively from the back up alarms and truck acceleration would be limited to no more than one minute per hour ("Plus 15 decibels for a cumulative period of up to one minute in any hour"), further limiting truck activity. Construction of a barrier (i.e. solid wall) to mitigate noise impacts would be infeasible due to the clearance required for truck movement which, in turn, would place the barrier too far from the noise source to effectively capture the impact. Implementing continuous nighttime noise monitoring to ensure noise levels stay below thresholds is not practical and would be difficult to enforce.

Therefore, in order to ensure nighttime operations at the project site avoid potential nighttime noise impacts to wildlife in the Box Springs Mountain Reserve Park, the following noise control measure should be implemented:

- **Restricted Loading Dock Use.** Prohibit the use of the south-facing loading docks between the hours of 10 PM and 7 AM.

With implementation of the above recommendation, south-facing nighttime operational noise would be eliminated and nighttime operation of the project would not exceed City thresholds.

ROOFTOP MOUNTED EQUIPMENT

Rooftop ventilation and heating systems would result in some onsite noise. Noise levels from commercial heating, ventilation and air conditioning (HVAC) equipment can reach 100 dBA at a distance of three feet without shielding (EPA 1971). However, HVAC equipment typically includes noise shielding cabinets placed on the roof or is located within mechanical equipment rooms. If HVAC equipment is placed in the interior of the building the noise would not be perceptible to nearby noise sensitive receptors.

The nearest portion of the proposed rooftop is approximately 100 feet west of Box Springs Mountain Reserve Park. Conservatively assuming the HVAC equipment is placed on this portion of the roof, noise from HVAC equipment would be approximately 56.5 dBA Leq at 100 feet from the source (EPA 1971). Therefore, unshielded HVAC equipment could exceed noise level standards at Box Springs Mountain Reserve Park for both daytime standards (55 dBA) and nighttime standards (45 dBA). As designed however, it is assumed that rooftop HVAC equipment would be placed above the office portion of the building, nearly 600 feet west of Box Springs Mountain Reserve Park. Noise from this location would be 40.9 dBA, well below thresholds. Since the ultimate location of rooftop equipment is undetermined at this time, the following noise control measure is recommended in order to ensure that rooftop equipment would not impact the nearby sensitive receptor if placed at the nearest location to the Box Springs Mountain Reserve Park (100 feet away):

- **Rooftop Mechanical Equipment Shielding.** A noise-attenuating barrier shall be installed around any new rooftop mechanical equipment to reduce operational noise at Box Springs Mountain Reserve Park to equal to or less than pre-project ambient noise of 49.4 dBA.

With implementation of the above recommendation, operational noise from rooftop mechanical equipment would be reduced to below City thresholds.

TRASH AND DELIVERY TRUCKS

Operation of the project would include delivery and trash hauling trucks going to and from the project site. Maximum noise levels generated by passage of medium duty trucks generally range from 61 to 70 dBA Leq at a distance of 25 feet, depending on the speed at which the truck is driving (Olson 1972). The minimum distance between the assumed delivery and trash truck routes and delivery points (i.e. office entrances) and the adjacent sensitive receptor would be 75 feet. Therefore, noise from delivery and trash truck movement through the site would be a maximum of 65 dBA. The adjacent Box Springs Mountain Reserve Park restricts noise impacts to no more than 55 dBA during daytime hours when delivery and trash trucks would be in operation. The City noise ordinance allows noise of up to 10 dBA over the 55 dBA daytime residential standard for events lasting less than five cumulative minutes over one hour. It is presumed that deliveries and trash hauling activities would occur infrequently, would be cumulatively less than five minutes in duration in any given hour, and would therefore meet the standards of the City noise ordinance.

OFF SITE TRAFFIC NOISE

As discussed in the overview of sound measurement (Section 2.1), a doubling of sound energy is equivalent to an increase of 3 dBA. In general, a 3 dBA change in the ambient noise level is noticeable, while 1-2 dBA changes generally are not perceived. Areas adjacent to arterial streets are typically in the 50-60+ dBA range. As indicated in Table 1, noise measurements from Locations 3, 4, and 6 were collected from off-site locations, along Iowa Avenue, Columbia Avenue, and Research Park Drive, respectively, in order to establish ambient noise levels from traffic.

In order to determine potential changes in noise levels based on project trip generation, the Traffic Impact Analysis prepared by Rick Engineering Company (December 2017) was reviewed. The proposed project would generate approximately 1,468 total daily trips. This analysis assumes that a majority of project trips would access and leave the site via Marlborough Avenue (approximately 1,100 trips), with the remaining trips accessing and leaving the site via Research Park Drive (approximately 370 trips). The daily trip increase has been calculated for Columbia Avenue because nearly 70 percent of the project-generated trips ultimately utilize the route to access Interstate 215 and briefly pass through a residential neighborhood. Trips along Iowa Avenue were analyzed because the road passes by Hunter Park. In addition, traffic increases along Research Park Drive were analyzed since that route is adjacent to Box Springs Mountain Reserve Park. Trips along Marlborough Avenue were not analyzed for traffic noise increases because the impacted stretch of the road is not in the vicinity of sensitive receptors.

Based on the Traffic Impact Analysis review of existing plus cumulative plus project conditions, there will be an estimated 24,300 trips on Iowa Avenue, 25,880 on Columbia Avenue, and 2,355 trips on Research Park Drive (Rick Engineering 2017). Table 10 shows project trip generation in relation to future cumulative conditions.

Table 10 Change in Traffic Noise in the Vicinity of Sensitive Receptors

Road Segment	Future Cumulative Conditions	Net Trips Generated by Project	Percent Change in Trips, Associated with the Project	Change in dBA
Columbia Avenue	25,880	1,013	4%	0.4
Iowa Avenue	24,300	749	3%	0.4

Research Business Park	2,355	367	20%	0.8
Source: Rick Engineering TIA 2017.				

The traffic volume increase of four percent along Columbia Avenue and the increase of three percent along Iowa Avenue would increase the overall noise level on those streets by 0.4 dBA, and the increase of 20 percent along Research Business Park would increase the overall noise level by 0.8 dBA. These noise level increases resulting from the increase based on project traffic would be below a perceivable increase in noise levels. There would not be a noticeable increase in traffic noise along these routes and therefore, the impacts to sensitive receptors related to increased traffic noise levels would be less than significant.

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4 Conclusions

The proposed project would generate both temporary construction-related noise and long-term noise associated with operation of the project. Construction noise is exempt from the City's noise standards, pursuant to Riverside Municipal Code Section 7.35.020.G. Regardless, recommendations to reduce construction noise impacts include the submittal of a Construction Management Plan prior to grading permit issuance and the implementation of several construction noise reduction measures (such as the use of equipment mufflers and limited truck idling times).

Daytime operational noise impacts would meet the standards of the City's noise ordinance, though the shielding of rooftop mechanical equipment is recommended to ensure building noise does not impact nearby sensitive receptors in Box Springs Mountain Reserve Park. The noise control measure recommended to eliminate nighttime operational noise impact entails use restriction of the south-facing loading docks. Implementation of the recommended measures would ensure project operational noise remains below City thresholds.

Off-site traffic noise was also analyzed in order to determine the incremental increase in noise based on project trips. Project-generated trips would increase ambient traffic noise by less than 1 dBA, which is not perceivable. Therefore, traffic noise would not be noticeable along roads in the vicinity of the project site.

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5 References

Bibliography

- California Department of Transportation (Caltrans). 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. Accessed March 2017 at:
http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf.
- California State Water Resources Control Board (SWRCB). 1999. General Waste Discharge Requirements for Biosolids Land Application Draft Statewide Program EIR – Appendix G. Background Information on Acoustics. Accessed March 2017 at:
http://www.waterboards.ca.gov/water_issues/programs/biosolids/deir/appendices/app_g.pdf.
- Federal Railroad Administration. 2012. High-Speed Ground Transportation Noise and Vibration Impact Assessment. Accessed March 2017 at: <https://www.fra.dot.gov/eLib/Details/L04090>.
- Federal Transit Administration (FTA). 2006. Transit Noise and Vibration Impact Assessment. Accessed March 2017 at:
https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Noise_and_Vibration_Manual.pdf.
- Federal Highway Administration (FWA). Noise Barrier Design Handbook. Accessed March 2017 at:
https://www.fhwa.dot.gov/environment/noise/noise_barriers/design_construction/design/design03.cfm
- Institute of Transportation Engineers, Trip Generation Manual 9th Edition, 20. [Document]
- Olson, N. (1972) Survey of motor vehicle noise. J. Acoustical Soc. Amer. 52, 1291–1306.
- Rick Engineering Company. 2017. Traffic Impact Analysis. December 2017.
- Riverside, City of. General Plan 2025, Noise Element. Adopted 2007. Accessed April and August 2017. http://www.riversideca.gov/planning/gp2025program/GP/11_Noise_Element.pdf
- Riverside, City of. 2008. City of Riverside Good Neighbor Guidelines for Siting New and/or Modified Warehouse Distribution Facilities. <https://www.riversideca.gov/planning/pdf/good-neighbor-guidelines.pdf>. Accessed October 2017.
- Riverside, City of. Municipal Code, Noise Control. 2012. Accessed April and August 2017. <http://www.riversideca.gov/municode/pdf/07/title-7.pdf>
- Riverside County. 2003 (June). Final Western Riverside County Multiple Species Habitat Conservation Plan. Available at: www.wrc-rca.org
- Salter, Charles M., Associates Inc. 2014. Midpoint at 237 Loading Dock Noise Study. San Jose, CA. March 2014. Accessed August 2017.
<https://www.sanjoseca.gov/DocumentCenter/View/28907>

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Noise Appendix A

Noise Measurement Data

Data Logger
Location 1

Leq: 50.7
 L(10): 53.0
 L(50): 48.6
 L(90): 45.8
 LMax: 66.9
 LMin: 42.8
 Peak: 111.8

A
 FAST
 40-100

2017/05/04 16:27:13

No.s	Date Time	dB
1	2017/05/04 16:15:52	45.8
2	2017/05/04 16:15:53	45.9
3	2017/05/04 16:15:54	45.2
4	2017/05/04 16:15:55	45.4
5	2017/05/04 16:15:56	46.8
6	2017/05/04 16:15:57	45.5
7	2017/05/04 16:15:58	45.6
8	2017/05/04 16:15:59	46.5
9	2017/05/04 16:16:00	46.6
10	2017/05/04 16:16:01	47.0
11	2017/05/04 16:16:02	46.4
12	2017/05/04 16:16:03	46.7
13	2017/05/04 16:16:04	47.8
14	2017/05/04 16:16:05	47.4
15	2017/05/04 16:16:06	46.8
16	2017/05/04 16:16:07	46.5
17	2017/05/04 16:16:08	46.6
18	2017/05/04 16:16:09	45.9
19	2017/05/04 16:16:10	46.1
20	2017/05/04 16:16:11	46.7
21	2017/05/04 16:16:12	46.9
22	2017/05/04 16:16:13	47.9
23	2017/05/04 16:16:14	47.4
24	2017/05/04 16:16:15	49.2
25	2017/05/04 16:16:16	47.3
26	2017/05/04 16:16:17	48.3
27	2017/05/04 16:16:18	47.0
28	2017/05/04 16:16:19	47.0
29	2017/05/04 16:16:20	47.7
30	2017/05/04 16:16:21	46.2
31	2017/05/04 16:16:22	47.2
32	2017/05/04 16:16:23	46.2
33	2017/05/04 16:16:24	46.0
34	2017/05/04 16:16:25	46.1
35	2017/05/04 16:16:26	46.5
36	2017/05/04 16:16:27	47.0
37	2017/05/04 16:16:28	46.5
38	2017/05/04 16:16:29	45.7
39	2017/05/04 16:16:30	47.8
40	2017/05/04 16:16:31	46.6
41	2017/05/04 16:16:32	48.2
42	2017/05/04 16:16:33	50.3
43	2017/05/04 16:16:34	48.8
44	2017/05/04 16:16:35	47.2
45	2017/05/04 16:16:36	46.9

GuthrieRiverside_Loc1_05042017.s1mm

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47	2017/05/04	16:16:38	47.2
48	2017/05/04	16:16:39	46.9
49	2017/05/04	16:16:40	46.1
50	2017/05/04	16:16:41	46.7
51	2017/05/04	16:16:42	47.0
52	2017/05/04	16:16:43	47.0
53	2017/05/04	16:16:44	47.2
54	2017/05/04	16:16:45	48.7
55	2017/05/04	16:16:46	48.3
56	2017/05/04	16:16:47	47.3
57	2017/05/04	16:16:48	47.2
58	2017/05/04	16:16:49	48.3
59	2017/05/04	16:16:50	47.7
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62	2017/05/04	16:16:53	46.4
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94	2017/05/04	16:17:25	44.3
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96	2017/05/04	16:17:27	46.0
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GuthrieRiverside_Loc1_05042017.s1mm

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GuthrieRiverside_Loc1_05042017.s1mm

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306	2017/05/04	16:20:57	51.8
307	2017/05/04	16:20:58	50.1
308	2017/05/04	16:20:59	49.6
309	2017/05/04	16:21:00	54.5
310	2017/05/04	16:21:01	55.1
311	2017/05/04	16:21:02	54.4
312	2017/05/04	16:21:03	53.3
313	2017/05/04	16:21:04	52.9
314	2017/05/04	16:21:05	54.4
315	2017/05/04	16:21:06	55.2
316	2017/05/04	16:21:07	55.3
317	2017/05/04	16:21:08	51.5
318	2017/05/04	16:21:09	49.8
319	2017/05/04	16:21:10	48.0
320	2017/05/04	16:21:11	48.3
321	2017/05/04	16:21:12	46.5
322	2017/05/04	16:21:13	48.5
323	2017/05/04	16:21:14	49.2
324	2017/05/04	16:21:15	49.1
325	2017/05/04	16:21:16	48.9
326	2017/05/04	16:21:17	49.1
327	2017/05/04	16:21:18	47.9
328	2017/05/04	16:21:19	48.4
329	2017/05/04	16:21:20	49.4
330	2017/05/04	16:21:21	49.2
331	2017/05/04	16:21:22	48.4
332	2017/05/04	16:21:23	47.9
333	2017/05/04	16:21:24	51.7
334	2017/05/04	16:21:25	48.7
335	2017/05/04	16:21:26	48.4
336	2017/05/04	16:21:27	48.2
337	2017/05/04	16:21:28	48.1
338	2017/05/04	16:21:29	50.6
339	2017/05/04	16:21:30	50.4
340	2017/05/04	16:21:31	47.9
341	2017/05/04	16:21:32	46.3
342	2017/05/04	16:21:33	47.4
343	2017/05/04	16:21:34	46.6
344	2017/05/04	16:21:35	45.2
345	2017/05/04	16:21:36	47.7
346	2017/05/04	16:21:37	46.3
347	2017/05/04	16:21:38	48.3
348	2017/05/04	16:21:39	45.2
349	2017/05/04	16:21:40	46.1
350	2017/05/04	16:21:41	45.0
351	2017/05/04	16:21:42	45.2
352	2017/05/04	16:21:43	45.2
353	2017/05/04	16:21:44	44.9
354	2017/05/04	16:21:45	46.6
355	2017/05/04	16:21:46	45.2
356	2017/05/04	16:21:47	44.8
357	2017/05/04	16:21:48	44.9
358	2017/05/04	16:21:49	45.9
359	2017/05/04	16:21:50	45.4
360	2017/05/04	16:21:51	46.4

GuthrieRiverside_Loc1_05042017.s1mm

361	2017/05/04	16:21:52	48.9
362	2017/05/04	16:21:53	47.0
363	2017/05/04	16:21:54	47.7
364	2017/05/04	16:21:55	46.9
365	2017/05/04	16:21:56	49.2
366	2017/05/04	16:21:57	46.9
367	2017/05/04	16:21:58	47.8
368	2017/05/04	16:21:59	46.7
369	2017/05/04	16:22:00	48.0
370	2017/05/04	16:22:01	49.1
371	2017/05/04	16:22:02	48.3
372	2017/05/04	16:22:03	48.3
373	2017/05/04	16:22:04	47.5
374	2017/05/04	16:22:05	48.0
375	2017/05/04	16:22:06	47.7
376	2017/05/04	16:22:07	47.2
377	2017/05/04	16:22:08	46.9
378	2017/05/04	16:22:09	46.9
379	2017/05/04	16:22:10	47.4
380	2017/05/04	16:22:11	48.1
381	2017/05/04	16:22:12	48.9
382	2017/05/04	16:22:13	48.8
383	2017/05/04	16:22:14	50.2
384	2017/05/04	16:22:15	50.9
385	2017/05/04	16:22:16	48.4
386	2017/05/04	16:22:17	48.0
387	2017/05/04	16:22:18	47.8
388	2017/05/04	16:22:19	48.2
389	2017/05/04	16:22:20	49.6
390	2017/05/04	16:22:21	48.7
391	2017/05/04	16:22:22	48.0
392	2017/05/04	16:22:23	51.1
393	2017/05/04	16:22:24	49.3
394	2017/05/04	16:22:25	49.1
395	2017/05/04	16:22:26	51.1
396	2017/05/04	16:22:27	49.9
397	2017/05/04	16:22:28	49.2
398	2017/05/04	16:22:29	49.0
399	2017/05/04	16:22:30	49.6
400	2017/05/04	16:22:31	52.8
401	2017/05/04	16:22:32	51.4
402	2017/05/04	16:22:33	53.2
403	2017/05/04	16:22:34	51.6
404	2017/05/04	16:22:35	51.9
405	2017/05/04	16:22:36	52.2
406	2017/05/04	16:22:37	51.5
407	2017/05/04	16:22:38	52.6
408	2017/05/04	16:22:39	51.6
409	2017/05/04	16:22:40	51.8
410	2017/05/04	16:22:41	50.0
411	2017/05/04	16:22:42	51.8
412	2017/05/04	16:22:43	52.4
413	2017/05/04	16:22:44	53.3
414	2017/05/04	16:22:45	54.3
415	2017/05/04	16:22:46	52.6
416	2017/05/04	16:22:47	53.7
417	2017/05/04	16:22:48	51.2
418	2017/05/04	16:22:49	49.9
419	2017/05/04	16:22:50	51.6
420	2017/05/04	16:22:51	52.5
421	2017/05/04	16:22:52	52.3
422	2017/05/04	16:22:53	52.3
423	2017/05/04	16:22:54	52.6

GuthrieRiverside_Loc1_05042017.s1mm

424	2017/05/04	16:22:55	53.3
425	2017/05/04	16:22:56	51.1
426	2017/05/04	16:22:57	52.4
427	2017/05/04	16:22:58	50.0
428	2017/05/04	16:22:59	50.1
429	2017/05/04	16:23:00	50.8
430	2017/05/04	16:23:01	53.2
431	2017/05/04	16:23:02	58.3
432	2017/05/04	16:23:03	50.1
433	2017/05/04	16:23:04	48.8
434	2017/05/04	16:23:05	48.8
435	2017/05/04	16:23:06	49.7
436	2017/05/04	16:23:07	49.0
437	2017/05/04	16:23:08	50.2
438	2017/05/04	16:23:09	49.0
439	2017/05/04	16:23:10	48.8
440	2017/05/04	16:23:11	49.2
441	2017/05/04	16:23:12	51.1
442	2017/05/04	16:23:13	50.6
443	2017/05/04	16:23:14	53.1
444	2017/05/04	16:23:15	49.7
445	2017/05/04	16:23:16	51.1
446	2017/05/04	16:23:17	51.3
447	2017/05/04	16:23:18	50.1
448	2017/05/04	16:23:19	50.8
449	2017/05/04	16:23:20	51.5
450	2017/05/04	16:23:21	51.6
451	2017/05/04	16:23:22	51.2
452	2017/05/04	16:23:23	51.3
453	2017/05/04	16:23:24	49.1
454	2017/05/04	16:23:25	47.9
455	2017/05/04	16:23:26	48.2
456	2017/05/04	16:23:27	49.3
457	2017/05/04	16:23:28	49.4
458	2017/05/04	16:23:29	49.4
459	2017/05/04	16:23:30	48.9
460	2017/05/04	16:23:31	48.9
461	2017/05/04	16:23:32	48.3
462	2017/05/04	16:23:33	48.7
463	2017/05/04	16:23:34	49.3
464	2017/05/04	16:23:35	49.0
465	2017/05/04	16:23:36	49.3
466	2017/05/04	16:23:37	49.4
467	2017/05/04	16:23:38	48.8
468	2017/05/04	16:23:39	48.6
469	2017/05/04	16:23:40	49.0
470	2017/05/04	16:23:41	48.3
471	2017/05/04	16:23:42	48.3
472	2017/05/04	16:23:43	48.7
473	2017/05/04	16:23:44	48.0
474	2017/05/04	16:23:45	47.7
475	2017/05/04	16:23:46	48.2
476	2017/05/04	16:23:47	47.3
477	2017/05/04	16:23:48	47.3
478	2017/05/04	16:23:49	47.9
479	2017/05/04	16:23:50	48.9
480	2017/05/04	16:23:51	48.4
481	2017/05/04	16:23:52	48.4
482	2017/05/04	16:23:53	47.5
483	2017/05/04	16:23:54	47.1
484	2017/05/04	16:23:55	46.4
485	2017/05/04	16:23:56	47.4
486	2017/05/04	16:23:57	47.7

GuthrieRiverside_Loc1_05042017.s1mm

487	2017/05/04	16:23:58	46.0
488	2017/05/04	16:23:59	47.5
489	2017/05/04	16:24:00	45.8
490	2017/05/04	16:24:01	46.2
491	2017/05/04	16:24:02	46.0
492	2017/05/04	16:24:03	47.8
493	2017/05/04	16:24:04	47.7
494	2017/05/04	16:24:05	47.2
495	2017/05/04	16:24:06	46.3
496	2017/05/04	16:24:07	45.8
497	2017/05/04	16:24:08	48.3
498	2017/05/04	16:24:09	47.4
499	2017/05/04	16:24:10	48.5
500	2017/05/04	16:24:11	48.6
501	2017/05/04	16:24:12	48.6
502	2017/05/04	16:24:13	49.3
503	2017/05/04	16:24:14	47.8
504	2017/05/04	16:24:15	48.2
505	2017/05/04	16:24:16	47.3
506	2017/05/04	16:24:17	48.3
507	2017/05/04	16:24:18	47.1
508	2017/05/04	16:24:19	45.9
509	2017/05/04	16:24:20	46.0
510	2017/05/04	16:24:21	47.1
511	2017/05/04	16:24:22	47.5
512	2017/05/04	16:24:23	50.1
513	2017/05/04	16:24:24	48.5
514	2017/05/04	16:24:25	51.2
515	2017/05/04	16:24:26	49.6
516	2017/05/04	16:24:27	49.7
517	2017/05/04	16:24:28	47.5
518	2017/05/04	16:24:29	50.7
519	2017/05/04	16:24:30	50.5
520	2017/05/04	16:24:31	46.8
521	2017/05/04	16:24:32	47.6
522	2017/05/04	16:24:33	46.6
523	2017/05/04	16:24:34	48.3
524	2017/05/04	16:24:35	46.6
525	2017/05/04	16:24:36	46.6
526	2017/05/04	16:24:37	46.6
527	2017/05/04	16:24:38	44.4
528	2017/05/04	16:24:39	44.5
529	2017/05/04	16:24:40	44.8
530	2017/05/04	16:24:41	45.6
531	2017/05/04	16:24:42	46.7
532	2017/05/04	16:24:43	47.3
533	2017/05/04	16:24:44	48.7
534	2017/05/04	16:24:45	46.9
535	2017/05/04	16:24:46	50.3
536	2017/05/04	16:24:47	47.0
537	2017/05/04	16:24:48	46.6
538	2017/05/04	16:24:49	46.4
539	2017/05/04	16:24:50	48.6
540	2017/05/04	16:24:51	49.0
541	2017/05/04	16:24:52	48.3
542	2017/05/04	16:24:53	48.1
543	2017/05/04	16:24:54	46.7
544	2017/05/04	16:24:55	47.1
545	2017/05/04	16:24:56	44.8
546	2017/05/04	16:24:57	45.5
547	2017/05/04	16:24:58	47.9
548	2017/05/04	16:24:59	47.5
549	2017/05/04	16:25:00	46.8

GuthrieRiverside_Loc1_05042017.s1mm

550	2017/05/04	16:25:01	48.3
551	2017/05/04	16:25:02	47.5
552	2017/05/04	16:25:03	49.0
553	2017/05/04	16:25:04	49.6
554	2017/05/04	16:25:05	49.4
555	2017/05/04	16:25:06	50.5
556	2017/05/04	16:25:07	47.2
557	2017/05/04	16:25:08	45.1
558	2017/05/04	16:25:09	45.0
559	2017/05/04	16:25:10	44.3
560	2017/05/04	16:25:11	44.4
561	2017/05/04	16:25:12	45.5
562	2017/05/04	16:25:13	47.5
563	2017/05/04	16:25:14	45.8
564	2017/05/04	16:25:15	46.6
565	2017/05/04	16:25:16	49.0
566	2017/05/04	16:25:17	49.0
567	2017/05/04	16:25:18	49.0
568	2017/05/04	16:25:19	48.8
569	2017/05/04	16:25:20	48.6
570	2017/05/04	16:25:21	49.2
571	2017/05/04	16:25:22	47.4
572	2017/05/04	16:25:23	48.5
573	2017/05/04	16:25:24	51.0
574	2017/05/04	16:25:25	52.3
575	2017/05/04	16:25:26	49.8
576	2017/05/04	16:25:27	49.2
577	2017/05/04	16:25:28	49.7
578	2017/05/04	16:25:29	48.7
579	2017/05/04	16:25:30	48.1
580	2017/05/04	16:25:31	50.0
581	2017/05/04	16:25:32	48.4
582	2017/05/04	16:25:33	49.0
583	2017/05/04	16:25:34	47.8
584	2017/05/04	16:25:35	48.1
585	2017/05/04	16:25:36	48.7
586	2017/05/04	16:25:37	51.9
587	2017/05/04	16:25:38	49.9
588	2017/05/04	16:25:39	48.7
589	2017/05/04	16:25:40	48.8
590	2017/05/04	16:25:41	51.0
591	2017/05/04	16:25:42	52.7
592	2017/05/04	16:25:43	50.4
593	2017/05/04	16:25:44	53.4
594	2017/05/04	16:25:45	51.0
595	2017/05/04	16:25:46	54.2
596	2017/05/04	16:25:47	50.7
597	2017/05/04	16:25:48	53.3
598	2017/05/04	16:25:49	52.7
599	2017/05/04	16:25:50	52.8
600	2017/05/04	16:25:51	49.9
601	2017/05/04	16:25:52	52.2
602	2017/05/04	16:25:53	53.4
603	2017/05/04	16:25:54	50.9
604	2017/05/04	16:25:55	48.3
605	2017/05/04	16:25:56	51.7
606	2017/05/04	16:25:57	50.7
607	2017/05/04	16:25:58	51.1
608	2017/05/04	16:25:59	50.0
609	2017/05/04	16:26:00	52.0
610	2017/05/04	16:26:01	52.9
611	2017/05/04	16:26:02	51.2
612	2017/05/04	16:26:03	50.9

GuthrieRiverside_Loc1_05042017.s1mm

613	2017/05/04	16:26:04	48.9
614	2017/05/04	16:26:05	50.1
615	2017/05/04	16:26:06	49.5
616	2017/05/04	16:26:07	49.3
617	2017/05/04	16:26:08	52.2
618	2017/05/04	16:26:09	52.9
619	2017/05/04	16:26:10	49.7
620	2017/05/04	16:26:11	49.5
621	2017/05/04	16:26:12	49.7
622	2017/05/04	16:26:13	53.4
623	2017/05/04	16:26:14	56.5
624	2017/05/04	16:26:15	54.7
625	2017/05/04	16:26:16	50.7
626	2017/05/04	16:26:17	50.6
627	2017/05/04	16:26:18	60.5
628	2017/05/04	16:26:19	55.6
629	2017/05/04	16:26:20	53.8
630	2017/05/04	16:26:21	53.5
631	2017/05/04	16:26:22	52.2
632	2017/05/04	16:26:23	49.6
633	2017/05/04	16:26:24	49.7
634	2017/05/04	16:26:25	49.4
635	2017/05/04	16:26:26	50.5
636	2017/05/04	16:26:27	58.3
637	2017/05/04	16:26:28	56.3
638	2017/05/04	16:26:29	56.3
639	2017/05/04	16:26:30	58.7
640	2017/05/04	16:26:31	52.4
641	2017/05/04	16:26:32	54.5
642	2017/05/04	16:26:33	52.6
643	2017/05/04	16:26:34	50.3
644	2017/05/04	16:26:35	49.8
645	2017/05/04	16:26:36	50.5
646	2017/05/04	16:26:37	51.7
647	2017/05/04	16:26:38	52.9
648	2017/05/04	16:26:39	52.2
649	2017/05/04	16:26:40	52.2
650	2017/05/04	16:26:41	50.0
651	2017/05/04	16:26:42	48.8
652	2017/05/04	16:26:43	51.1
653	2017/05/04	16:26:44	49.2
654	2017/05/04	16:26:45	52.4
655	2017/05/04	16:26:46	50.6
656	2017/05/04	16:26:47	50.8
657	2017/05/04	16:26:48	51.7
658	2017/05/04	16:26:49	50.7
659	2017/05/04	16:26:50	49.5
660	2017/05/04	16:26:51	51.3
661	2017/05/04	16:26:52	50.4
662	2017/05/04	16:26:53	54.5
663	2017/05/04	16:26:54	54.4
664	2017/05/04	16:26:55	53.2
665	2017/05/04	16:26:56	50.6
666	2017/05/04	16:26:57	49.1
667	2017/05/04	16:26:58	50.4
668	2017/05/04	16:26:59	48.8
669	2017/05/04	16:27:00	48.3
670	2017/05/04	16:27:01	48.4
671	2017/05/04	16:27:02	55.2
672	2017/05/04	16:27:03	58.9
673	2017/05/04	16:27:04	52.8
674	2017/05/04	16:27:05	49.3
675	2017/05/04	16:27:06	48.8

GuthrieRiverside_Loc1_05042017.s1mm

676	2017/05/04	16:27:07	54.7
677	2017/05/04	16:27:08	54.7
678	2017/05/04	16:27:09	49.9
679	2017/05/04	16:27:10	48.5
680	2017/05/04	16:27:11	47.6
681	2017/05/04	16:27:12	53.3
682	2017/05/04	16:27:13	58.2
683	2017/05/04	16:27:14	63.4
684	2017/05/04	16:27:15	49.8
685	2017/05/04	16:27:16	48.2
686	2017/05/04	16:27:17	49.2
687	2017/05/04	16:27:18	51.6
688	2017/05/04	16:27:19	48.3
689	2017/05/04	16:27:20	48.3
690	2017/05/04	16:27:21	49.2
691	2017/05/04	16:27:22	50.4
692	2017/05/04	16:27:23	48.6
693	2017/05/04	16:27:24	48.1
694	2017/05/04	16:27:25	47.4
695	2017/05/04	16:27:26	47.2
696	2017/05/04	16:27:27	47.2
697	2017/05/04	16:27:28	47.2
698	2017/05/04	16:27:29	49.1
699	2017/05/04	16:27:30	47.9
700	2017/05/04	16:27:31	48.1
701	2017/05/04	16:27:32	48.2
702	2017/05/04	16:27:33	48.3
703	2017/05/04	16:27:34	48.3
704	2017/05/04	16:27:35	47.5
705	2017/05/04	16:27:36	47.8
706	2017/05/04	16:27:37	47.7
707	2017/05/04	16:27:38	47.7
708	2017/05/04	16:27:39	47.5
709	2017/05/04	16:27:40	47.8
710	2017/05/04	16:27:41	48.3
711	2017/05/04	16:27:42	48.3
712	2017/05/04	16:27:43	48.3
713	2017/05/04	16:27:44	48.6
714	2017/05/04	16:27:45	50.5
715	2017/05/04	16:27:46	49.3
716	2017/05/04	16:27:47	49.2
717	2017/05/04	16:27:48	51.3
718	2017/05/04	16:27:49	51.5
719	2017/05/04	16:27:50	51.4
720	2017/05/04	16:27:51	49.9
721	2017/05/04	16:27:52	49.6
722	2017/05/04	16:27:53	48.6
723	2017/05/04	16:27:54	50.7
724	2017/05/04	16:27:55	48.4
725	2017/05/04	16:27:56	48.1
726	2017/05/04	16:27:57	48.0
727	2017/05/04	16:27:58	49.8
728	2017/05/04	16:27:59	49.3
729	2017/05/04	16:28:00	48.2
730	2017/05/04	16:28:01	48.2
731	2017/05/04	16:28:02	50.2
732	2017/05/04	16:28:03	48.2
733	2017/05/04	16:28:04	47.9
734	2017/05/04	16:28:05	49.7
735	2017/05/04	16:28:06	48.9
736	2017/05/04	16:28:07	48.2
737	2017/05/04	16:28:08	48.3
738	2017/05/04	16:28:09	48.4

GuthrieRiverside_Loc1_05042017.s1mm

739	2017/05/04	16:28:10	48.8
740	2017/05/04	16:28:11	49.3
741	2017/05/04	16:28:12	50.1
742	2017/05/04	16:28:13	49.4
743	2017/05/04	16:28:14	48.0
744	2017/05/04	16:28:15	48.4
745	2017/05/04	16:28:16	48.6
746	2017/05/04	16:28:17	49.7
747	2017/05/04	16:28:18	50.6
748	2017/05/04	16:28:19	49.5
749	2017/05/04	16:28:20	52.0
750	2017/05/04	16:28:21	51.2
751	2017/05/04	16:28:22	50.5
752	2017/05/04	16:28:23	48.0
753	2017/05/04	16:28:24	48.5
754	2017/05/04	16:28:25	46.8
755	2017/05/04	16:28:26	48.1
756	2017/05/04	16:28:27	47.2
757	2017/05/04	16:28:28	46.7
758	2017/05/04	16:28:29	48.0
759	2017/05/04	16:28:30	47.6
760	2017/05/04	16:28:31	48.7
761	2017/05/04	16:28:32	48.6
762	2017/05/04	16:28:33	51.3
763	2017/05/04	16:28:34	48.5
764	2017/05/04	16:28:35	48.2
765	2017/05/04	16:28:36	48.6
766	2017/05/04	16:28:37	48.3
767	2017/05/04	16:28:38	53.0
768	2017/05/04	16:28:39	49.3
769	2017/05/04	16:28:40	49.6
770	2017/05/04	16:28:41	50.2
771	2017/05/04	16:28:42	50.2
772	2017/05/04	16:28:43	48.1
773	2017/05/04	16:28:44	48.9
774	2017/05/04	16:28:45	47.7
775	2017/05/04	16:28:46	47.0
776	2017/05/04	16:28:47	46.9
777	2017/05/04	16:28:48	47.2
778	2017/05/04	16:28:49	46.5
779	2017/05/04	16:28:50	47.5
780	2017/05/04	16:28:51	48.0
781	2017/05/04	16:28:52	48.0
782	2017/05/04	16:28:53	47.7
783	2017/05/04	16:28:54	46.7
784	2017/05/04	16:28:55	48.5
785	2017/05/04	16:28:56	47.3
786	2017/05/04	16:28:57	47.9
787	2017/05/04	16:28:58	47.5
788	2017/05/04	16:28:59	47.4
789	2017/05/04	16:29:00	48.0
790	2017/05/04	16:29:01	48.5
791	2017/05/04	16:29:02	47.6
792	2017/05/04	16:29:03	47.2
793	2017/05/04	16:29:04	50.4
794	2017/05/04	16:29:05	47.3
795	2017/05/04	16:29:06	46.8
796	2017/05/04	16:29:07	49.1
797	2017/05/04	16:29:08	47.9
798	2017/05/04	16:29:09	47.1
799	2017/05/04	16:29:10	47.1
800	2017/05/04	16:29:11	46.6
801	2017/05/04	16:29:12	46.8

GuthrieRiverside_Loc1_05042017.s1mm

802	2017/05/04	16:29:13	47.7
803	2017/05/04	16:29:14	48.4
804	2017/05/04	16:29:15	49.7
805	2017/05/04	16:29:16	48.9
806	2017/05/04	16:29:17	48.7
807	2017/05/04	16:29:18	47.7
808	2017/05/04	16:29:19	47.6
809	2017/05/04	16:29:20	47.2
810	2017/05/04	16:29:21	47.8
811	2017/05/04	16:29:22	47.6
812	2017/05/04	16:29:23	49.5
813	2017/05/04	16:29:24	47.4
814	2017/05/04	16:29:25	52.2
815	2017/05/04	16:29:26	49.2
816	2017/05/04	16:29:27	50.3
817	2017/05/04	16:29:28	49.5
818	2017/05/04	16:29:29	48.4
819	2017/05/04	16:29:30	50.4
820	2017/05/04	16:29:31	48.3
821	2017/05/04	16:29:32	47.4
822	2017/05/04	16:29:33	48.0
823	2017/05/04	16:29:34	47.1
824	2017/05/04	16:29:35	47.1
825	2017/05/04	16:29:36	47.8
826	2017/05/04	16:29:37	48.8
827	2017/05/04	16:29:38	47.5
828	2017/05/04	16:29:39	48.3
829	2017/05/04	16:29:40	48.9
830	2017/05/04	16:29:41	51.1
831	2017/05/04	16:29:42	50.5
832	2017/05/04	16:29:43	47.4
833	2017/05/04	16:29:44	47.0
834	2017/05/04	16:29:45	47.3
835	2017/05/04	16:29:46	46.4
836	2017/05/04	16:29:47	47.2
837	2017/05/04	16:29:48	47.4
838	2017/05/04	16:29:49	48.2
839	2017/05/04	16:29:50	47.8
840	2017/05/04	16:29:51	48.9
841	2017/05/04	16:29:52	47.8
842	2017/05/04	16:29:53	47.7
843	2017/05/04	16:29:54	47.5
844	2017/05/04	16:29:55	48.6
845	2017/05/04	16:29:56	49.0
846	2017/05/04	16:29:57	49.0
847	2017/05/04	16:29:58	48.7
848	2017/05/04	16:29:59	47.8
849	2017/05/04	16:30:00	49.3
850	2017/05/04	16:30:01	49.2
851	2017/05/04	16:30:02	49.7
852	2017/05/04	16:30:03	49.6
853	2017/05/04	16:30:04	48.7
854	2017/05/04	16:30:05	48.6
855	2017/05/04	16:30:06	48.7
856	2017/05/04	16:30:07	49.1
857	2017/05/04	16:30:08	50.7
858	2017/05/04	16:30:09	48.7
859	2017/05/04	16:30:10	49.3
860	2017/05/04	16:30:11	49.2
861	2017/05/04	16:30:12	49.0
862	2017/05/04	16:30:13	48.1
863	2017/05/04	16:30:14	48.4
864	2017/05/04	16:30:15	47.9

GuthrieRiverside_Loc1_05042017.s1mm

865	2017/05/04	16:30:16	47.8
866	2017/05/04	16:30:17	48.0
867	2017/05/04	16:30:18	47.7
868	2017/05/04	16:30:19	48.0
869	2017/05/04	16:30:20	48.7
870	2017/05/04	16:30:21	48.4
871	2017/05/04	16:30:22	49.0
872	2017/05/04	16:30:23	49.5
873	2017/05/04	16:30:24	50.9
874	2017/05/04	16:30:25	49.8
875	2017/05/04	16:30:26	49.3
876	2017/05/04	16:30:27	49.4
877	2017/05/04	16:30:28	53.2
878	2017/05/04	16:30:29	51.3
879	2017/05/04	16:30:30	51.0
880	2017/05/04	16:30:31	54.1
881	2017/05/04	16:30:32	52.2
882	2017/05/04	16:30:33	52.0
883	2017/05/04	16:30:34	51.2
884	2017/05/04	16:30:35	50.6
885	2017/05/04	16:30:36	53.0
886	2017/05/04	16:30:37	53.0
887	2017/05/04	16:30:38	52.0
888	2017/05/04	16:30:39	54.1
889	2017/05/04	16:30:40	51.8
890	2017/05/04	16:30:41	52.3
891	2017/05/04	16:30:42	51.1
892	2017/05/04	16:30:43	50.9
893	2017/05/04	16:30:44	50.6
894	2017/05/04	16:30:45	50.4
895	2017/05/04	16:30:46	51.6
896	2017/05/04	16:30:47	49.8
897	2017/05/04	16:30:48	50.7
898	2017/05/04	16:30:49	50.2
899	2017/05/04	16:30:50	50.2
900	2017/05/04	16:30:51	50.5

Data Logger
Location 2

Leq: 51.3
 L(10): 52.4
 L(50): 48.6
 L(90): 47.0
 LMax: 71.9
 LMin: 43.9
 Peak: 86.1

A
 FAST
 40-100

2017/05/04 18:09:56

No.s	Date Time	dB
1	2017/05/04 18:04:31	49.0
2	2017/05/04 18:04:32	49.1
3	2017/05/04 18:04:33	48.2
4	2017/05/04 18:04:34	48.8
5	2017/05/04 18:04:35	48.7
6	2017/05/04 18:04:36	47.9
7	2017/05/04 18:04:37	47.7
8	2017/05/04 18:04:38	48.1
9	2017/05/04 18:04:39	48.5
10	2017/05/04 18:04:40	46.8
11	2017/05/04 18:04:41	47.0
12	2017/05/04 18:04:42	47.7
13	2017/05/04 18:04:43	47.8
14	2017/05/04 18:04:44	48.6
15	2017/05/04 18:04:45	47.5
16	2017/05/04 18:04:46	48.0
17	2017/05/04 18:04:47	47.3
18	2017/05/04 18:04:48	47.5
19	2017/05/04 18:04:49	48.3
20	2017/05/04 18:04:50	47.6
21	2017/05/04 18:04:51	47.7
22	2017/05/04 18:04:52	47.5
23	2017/05/04 18:04:53	47.3
24	2017/05/04 18:04:54	48.1
25	2017/05/04 18:04:55	47.9
26	2017/05/04 18:04:56	47.8
27	2017/05/04 18:04:57	47.9
28	2017/05/04 18:04:58	48.8
29	2017/05/04 18:04:59	48.3
30	2017/05/04 18:05:00	47.4
31	2017/05/04 18:05:01	50.1
32	2017/05/04 18:05:02	47.7
33	2017/05/04 18:05:03	47.1
34	2017/05/04 18:05:04	47.7
35	2017/05/04 18:05:05	48.3
36	2017/05/04 18:05:06	48.3
37	2017/05/04 18:05:07	47.9
38	2017/05/04 18:05:08	47.2
39	2017/05/04 18:05:09	46.7
40	2017/05/04 18:05:10	47.2
41	2017/05/04 18:05:11	47.1
42	2017/05/04 18:05:12	47.2
43	2017/05/04 18:05:13	48.7
44	2017/05/04 18:05:14	49.0
45	2017/05/04 18:05:15	47.9

GuthrieRiverside_Loc2_05042017.s1mm

46	2017/05/04	18:05:16	47.9
47	2017/05/04	18:05:17	47.8
48	2017/05/04	18:05:18	48.4
49	2017/05/04	18:05:19	47.9
50	2017/05/04	18:05:20	48.6
51	2017/05/04	18:05:21	47.5
52	2017/05/04	18:05:22	48.4
53	2017/05/04	18:05:23	48.9
54	2017/05/04	18:05:24	48.6
55	2017/05/04	18:05:25	48.9
56	2017/05/04	18:05:26	48.9
57	2017/05/04	18:05:27	48.7
58	2017/05/04	18:05:28	48.3
59	2017/05/04	18:05:29	48.4
60	2017/05/04	18:05:30	48.9
61	2017/05/04	18:05:31	48.2
62	2017/05/04	18:05:32	47.7
63	2017/05/04	18:05:33	47.9
64	2017/05/04	18:05:34	48.2
65	2017/05/04	18:05:35	47.8
66	2017/05/04	18:05:36	47.8
67	2017/05/04	18:05:37	48.0
68	2017/05/04	18:05:38	48.2
69	2017/05/04	18:05:39	48.1
70	2017/05/04	18:05:40	47.6
71	2017/05/04	18:05:41	48.3
72	2017/05/04	18:05:42	48.0
73	2017/05/04	18:05:43	48.0
74	2017/05/04	18:05:44	48.4
75	2017/05/04	18:05:45	48.7
76	2017/05/04	18:05:46	48.6
77	2017/05/04	18:05:47	48.6
78	2017/05/04	18:05:48	48.8
79	2017/05/04	18:05:49	48.6
80	2017/05/04	18:05:50	48.9
81	2017/05/04	18:05:51	48.4
82	2017/05/04	18:05:52	48.7
83	2017/05/04	18:05:53	48.1
84	2017/05/04	18:05:54	47.9
85	2017/05/04	18:05:55	47.8
86	2017/05/04	18:05:56	47.6
87	2017/05/04	18:05:57	48.3
88	2017/05/04	18:05:58	48.3
89	2017/05/04	18:05:59	48.8
90	2017/05/04	18:06:00	48.5
91	2017/05/04	18:06:01	48.2
92	2017/05/04	18:06:02	48.8
93	2017/05/04	18:06:03	49.1
94	2017/05/04	18:06:04	55.1
95	2017/05/04	18:06:05	64.3
96	2017/05/04	18:06:06	49.2
97	2017/05/04	18:06:07	48.9
98	2017/05/04	18:06:08	48.8
99	2017/05/04	18:06:09	48.7
100	2017/05/04	18:06:10	48.8
101	2017/05/04	18:06:11	49.1
102	2017/05/04	18:06:12	48.4
103	2017/05/04	18:06:13	48.4
104	2017/05/04	18:06:14	48.6
105	2017/05/04	18:06:15	48.8
106	2017/05/04	18:06:16	48.7
107	2017/05/04	18:06:17	48.4
108	2017/05/04	18:06:18	49.1

GuthrieRiverside_Loc2_05042017.s1mm

109	2017/05/04	18:06:19	49.1
110	2017/05/04	18:06:20	48.3
111	2017/05/04	18:06:21	51.5
112	2017/05/04	18:06:22	49.9
113	2017/05/04	18:06:23	50.5
114	2017/05/04	18:06:24	50.6
115	2017/05/04	18:06:25	53.0
116	2017/05/04	18:06:26	51.9
117	2017/05/04	18:06:27	49.8
118	2017/05/04	18:06:28	49.6
119	2017/05/04	18:06:29	49.1
120	2017/05/04	18:06:30	49.2
121	2017/05/04	18:06:31	49.2
122	2017/05/04	18:06:32	48.2
123	2017/05/04	18:06:33	48.3
124	2017/05/04	18:06:34	47.7
125	2017/05/04	18:06:35	47.6
126	2017/05/04	18:06:36	48.0
127	2017/05/04	18:06:37	48.0
128	2017/05/04	18:06:38	48.6
129	2017/05/04	18:06:39	48.5
130	2017/05/04	18:06:40	48.1
131	2017/05/04	18:06:41	48.0
132	2017/05/04	18:06:42	48.0
133	2017/05/04	18:06:43	48.6
134	2017/05/04	18:06:44	48.8
135	2017/05/04	18:06:45	50.9
136	2017/05/04	18:06:46	49.5
137	2017/05/04	18:06:47	49.2
138	2017/05/04	18:06:48	47.8
139	2017/05/04	18:06:49	48.2
140	2017/05/04	18:06:50	48.6
141	2017/05/04	18:06:51	49.0
142	2017/05/04	18:06:52	48.3
143	2017/05/04	18:06:53	48.9
144	2017/05/04	18:06:54	48.9
145	2017/05/04	18:06:55	48.7
146	2017/05/04	18:06:56	48.2
147	2017/05/04	18:06:57	47.9
148	2017/05/04	18:06:58	47.2
149	2017/05/04	18:06:59	47.5
150	2017/05/04	18:07:00	47.1
151	2017/05/04	18:07:01	47.1
152	2017/05/04	18:07:02	47.7
153	2017/05/04	18:07:03	47.6
154	2017/05/04	18:07:04	48.9
155	2017/05/04	18:07:05	49.0
156	2017/05/04	18:07:06	48.2
157	2017/05/04	18:07:07	48.0
158	2017/05/04	18:07:08	48.4
159	2017/05/04	18:07:09	47.7
160	2017/05/04	18:07:10	47.4
161	2017/05/04	18:07:11	47.1
162	2017/05/04	18:07:12	47.2
163	2017/05/04	18:07:13	47.7
164	2017/05/04	18:07:14	47.6
165	2017/05/04	18:07:15	48.0
166	2017/05/04	18:07:16	48.2
167	2017/05/04	18:07:17	48.1
168	2017/05/04	18:07:18	48.1
169	2017/05/04	18:07:19	47.4
170	2017/05/04	18:07:20	47.1
171	2017/05/04	18:07:21	47.5

GuthrieRiverside_Loc2_05042017.slm

172	2017/05/04	18:07:22	47.7
173	2017/05/04	18:07:23	47.8
174	2017/05/04	18:07:24	52.1
175	2017/05/04	18:07:25	48.2
176	2017/05/04	18:07:26	48.0
177	2017/05/04	18:07:27	48.2
178	2017/05/04	18:07:28	48.6
179	2017/05/04	18:07:29	49.3
180	2017/05/04	18:07:30	48.3
181	2017/05/04	18:07:31	47.6
182	2017/05/04	18:07:32	48.8
183	2017/05/04	18:07:33	50.4
184	2017/05/04	18:07:34	48.7
185	2017/05/04	18:07:35	49.1
186	2017/05/04	18:07:36	48.9
187	2017/05/04	18:07:37	48.1
188	2017/05/04	18:07:38	49.1
189	2017/05/04	18:07:39	49.5
190	2017/05/04	18:07:40	49.7
191	2017/05/04	18:07:41	49.6
192	2017/05/04	18:07:42	49.9
193	2017/05/04	18:07:43	49.5
194	2017/05/04	18:07:44	48.7
195	2017/05/04	18:07:45	49.8
196	2017/05/04	18:07:46	49.9
197	2017/05/04	18:07:47	48.1
198	2017/05/04	18:07:48	48.1
199	2017/05/04	18:07:49	47.8
200	2017/05/04	18:07:50	46.6
201	2017/05/04	18:07:51	48.0
202	2017/05/04	18:07:52	47.4
203	2017/05/04	18:07:53	48.0
204	2017/05/04	18:07:54	47.2
205	2017/05/04	18:07:55	50.7
206	2017/05/04	18:07:56	53.5
207	2017/05/04	18:07:57	48.8
208	2017/05/04	18:07:58	56.4
209	2017/05/04	18:07:59	62.6
210	2017/05/04	18:08:00	55.4
211	2017/05/04	18:08:01	62.8
212	2017/05/04	18:08:02	66.3
213	2017/05/04	18:08:03	69.0
214	2017/05/04	18:08:04	62.7
215	2017/05/04	18:08:05	61.9
216	2017/05/04	18:08:06	54.2
217	2017/05/04	18:08:07	49.2
218	2017/05/04	18:08:08	53.5
219	2017/05/04	18:08:09	53.3
220	2017/05/04	18:08:10	54.5
221	2017/05/04	18:08:11	53.9
222	2017/05/04	18:08:12	54.9
223	2017/05/04	18:08:13	52.2
224	2017/05/04	18:08:14	52.2
225	2017/05/04	18:08:15	53.8
226	2017/05/04	18:08:16	53.3
227	2017/05/04	18:08:17	52.4
228	2017/05/04	18:08:18	53.4
229	2017/05/04	18:08:19	48.9
230	2017/05/04	18:08:20	48.0
231	2017/05/04	18:08:21	48.4
232	2017/05/04	18:08:22	47.6
233	2017/05/04	18:08:23	47.9
234	2017/05/04	18:08:24	48.0

GuthrieRiverside_Loc2_05042017.slm

235	2017/05/04	18:08:25	48.2
236	2017/05/04	18:08:26	48.2
237	2017/05/04	18:08:27	48.1
238	2017/05/04	18:08:28	47.9
239	2017/05/04	18:08:29	47.5
240	2017/05/04	18:08:30	48.4
241	2017/05/04	18:08:31	49.0
242	2017/05/04	18:08:32	48.9
243	2017/05/04	18:08:33	49.9
244	2017/05/04	18:08:34	50.4
245	2017/05/04	18:08:35	49.1
246	2017/05/04	18:08:36	49.8
247	2017/05/04	18:08:37	48.9
248	2017/05/04	18:08:38	48.8
249	2017/05/04	18:08:39	48.5
250	2017/05/04	18:08:40	49.4
251	2017/05/04	18:08:41	49.9
252	2017/05/04	18:08:42	48.6
253	2017/05/04	18:08:43	49.3
254	2017/05/04	18:08:44	49.1
255	2017/05/04	18:08:45	49.8
256	2017/05/04	18:08:46	55.7
257	2017/05/04	18:08:47	53.9
258	2017/05/04	18:08:48	56.0
259	2017/05/04	18:08:49	54.5
260	2017/05/04	18:08:50	59.2
261	2017/05/04	18:08:51	62.0
262	2017/05/04	18:08:52	52.6
263	2017/05/04	18:08:53	52.1
264	2017/05/04	18:08:54	52.1
265	2017/05/04	18:08:55	51.2
266	2017/05/04	18:08:56	51.4
267	2017/05/04	18:08:57	51.9
268	2017/05/04	18:08:58	51.8
269	2017/05/04	18:08:59	51.2
270	2017/05/04	18:09:00	51.8
271	2017/05/04	18:09:01	52.6
272	2017/05/04	18:09:02	51.1
273	2017/05/04	18:09:03	50.2
274	2017/05/04	18:09:04	50.7
275	2017/05/04	18:09:05	50.0
276	2017/05/04	18:09:06	48.7
277	2017/05/04	18:09:07	49.8
278	2017/05/04	18:09:08	49.9
279	2017/05/04	18:09:09	48.9
280	2017/05/04	18:09:10	50.3
281	2017/05/04	18:09:11	49.1
282	2017/05/04	18:09:12	48.0
283	2017/05/04	18:09:13	57.2
284	2017/05/04	18:09:14	54.4
285	2017/05/04	18:09:15	52.2
286	2017/05/04	18:09:16	51.5
287	2017/05/04	18:09:17	51.9
288	2017/05/04	18:09:18	50.1
289	2017/05/04	18:09:19	50.3
290	2017/05/04	18:09:20	61.9
291	2017/05/04	18:09:21	53.1
292	2017/05/04	18:09:22	56.7
293	2017/05/04	18:09:23	54.2
294	2017/05/04	18:09:24	52.5
295	2017/05/04	18:09:25	51.8
296	2017/05/04	18:09:26	52.9
297	2017/05/04	18:09:27	50.0

GuthrieRiverside_Loc2_05042017.s1mm

298	2017/05/04	18:09:28	47.8
299	2017/05/04	18:09:29	49.5
300	2017/05/04	18:09:30	47.6
301	2017/05/04	18:09:31	48.7
302	2017/05/04	18:09:32	48.2
303	2017/05/04	18:09:33	48.2
304	2017/05/04	18:09:34	47.9
305	2017/05/04	18:09:35	48.3
306	2017/05/04	18:09:36	48.0
307	2017/05/04	18:09:37	47.3
308	2017/05/04	18:09:38	47.6
309	2017/05/04	18:09:39	48.9
310	2017/05/04	18:09:40	48.4
311	2017/05/04	18:09:41	49.3
312	2017/05/04	18:09:42	48.5
313	2017/05/04	18:09:43	48.8
314	2017/05/04	18:09:44	49.4
315	2017/05/04	18:09:45	50.1
316	2017/05/04	18:09:46	50.7
317	2017/05/04	18:09:47	50.5
318	2017/05/04	18:09:48	48.8
319	2017/05/04	18:09:49	49.3
320	2017/05/04	18:09:50	48.4
321	2017/05/04	18:09:51	48.2
322	2017/05/04	18:09:52	47.5
323	2017/05/04	18:09:53	52.8
324	2017/05/04	18:09:54	59.7
325	2017/05/04	18:09:55	54.5
326	2017/05/04	18:09:56	71.1
327	2017/05/04	18:09:57	69.6
328	2017/05/04	18:09:58	51.4
329	2017/05/04	18:09:59	48.5
330	2017/05/04	18:10:00	50.3
331	2017/05/04	18:10:01	49.0
332	2017/05/04	18:10:02	49.0
333	2017/05/04	18:10:03	48.2
334	2017/05/04	18:10:04	47.3
335	2017/05/04	18:10:05	48.4
336	2017/05/04	18:10:06	48.3
337	2017/05/04	18:10:07	48.6
338	2017/05/04	18:10:08	47.8
339	2017/05/04	18:10:09	48.2
340	2017/05/04	18:10:10	47.9
341	2017/05/04	18:10:11	48.9
342	2017/05/04	18:10:12	47.2
343	2017/05/04	18:10:13	47.9
344	2017/05/04	18:10:14	48.8
345	2017/05/04	18:10:15	47.9
346	2017/05/04	18:10:16	48.3
347	2017/05/04	18:10:17	47.6
348	2017/05/04	18:10:18	48.8
349	2017/05/04	18:10:19	48.4
350	2017/05/04	18:10:20	49.7
351	2017/05/04	18:10:21	48.5
352	2017/05/04	18:10:22	49.5
353	2017/05/04	18:10:23	48.7
354	2017/05/04	18:10:24	47.9
355	2017/05/04	18:10:25	48.7
356	2017/05/04	18:10:26	48.8
357	2017/05/04	18:10:27	48.5
358	2017/05/04	18:10:28	48.7
359	2017/05/04	18:10:29	48.3
360	2017/05/04	18:10:30	48.4

GuthrieRiverside_Loc2_05042017.s1mm

361	2017/05/04	18:10:31	49.0
362	2017/05/04	18:10:32	48.2
363	2017/05/04	18:10:33	48.3
364	2017/05/04	18:10:34	47.9
365	2017/05/04	18:10:35	48.3
366	2017/05/04	18:10:36	47.7
367	2017/05/04	18:10:37	48.4
368	2017/05/04	18:10:38	48.9
369	2017/05/04	18:10:39	49.6
370	2017/05/04	18:10:40	50.2
371	2017/05/04	18:10:41	51.4
372	2017/05/04	18:10:42	49.9
373	2017/05/04	18:10:43	49.2
374	2017/05/04	18:10:44	49.2
375	2017/05/04	18:10:45	48.9
376	2017/05/04	18:10:46	48.9
377	2017/05/04	18:10:47	48.8
378	2017/05/04	18:10:48	47.7
379	2017/05/04	18:10:49	47.5
380	2017/05/04	18:10:50	47.2
381	2017/05/04	18:10:51	47.7
382	2017/05/04	18:10:52	47.9
383	2017/05/04	18:10:53	47.7
384	2017/05/04	18:10:54	47.5
385	2017/05/04	18:10:55	47.2
386	2017/05/04	18:10:56	47.1
387	2017/05/04	18:10:57	47.4
388	2017/05/04	18:10:58	48.4
389	2017/05/04	18:10:59	47.7
390	2017/05/04	18:11:00	48.4
391	2017/05/04	18:11:01	48.8
392	2017/05/04	18:11:02	48.7
393	2017/05/04	18:11:03	48.3
394	2017/05/04	18:11:04	48.2
395	2017/05/04	18:11:05	48.7
396	2017/05/04	18:11:06	48.2
397	2017/05/04	18:11:07	49.1
398	2017/05/04	18:11:08	48.5
399	2017/05/04	18:11:09	48.0
400	2017/05/04	18:11:10	48.9
401	2017/05/04	18:11:11	48.4
402	2017/05/04	18:11:12	48.8
403	2017/05/04	18:11:13	49.4
404	2017/05/04	18:11:14	50.1
405	2017/05/04	18:11:15	48.4
406	2017/05/04	18:11:16	47.9
407	2017/05/04	18:11:17	49.0
408	2017/05/04	18:11:18	49.2
409	2017/05/04	18:11:19	48.0
410	2017/05/04	18:11:20	49.1
411	2017/05/04	18:11:21	48.1
412	2017/05/04	18:11:22	49.4
413	2017/05/04	18:11:23	49.7
414	2017/05/04	18:11:24	52.5
415	2017/05/04	18:11:25	50.9
416	2017/05/04	18:11:26	52.0
417	2017/05/04	18:11:27	51.7
418	2017/05/04	18:11:28	51.7
419	2017/05/04	18:11:29	56.5
420	2017/05/04	18:11:30	57.0
421	2017/05/04	18:11:31	53.8
422	2017/05/04	18:11:32	52.1
423	2017/05/04	18:11:33	51.0

GuthrieRiverside_Loc2_05042017.s1mm

424	2017/05/04	18:11:34	49.0
425	2017/05/04	18:11:35	49.4
426	2017/05/04	18:11:36	49.5
427	2017/05/04	18:11:37	49.5
428	2017/05/04	18:11:38	49.7
429	2017/05/04	18:11:39	49.7
430	2017/05/04	18:11:40	49.1
431	2017/05/04	18:11:41	48.1
432	2017/05/04	18:11:42	48.9
433	2017/05/04	18:11:43	48.6
434	2017/05/04	18:11:44	49.2
435	2017/05/04	18:11:45	51.1
436	2017/05/04	18:11:46	49.0
437	2017/05/04	18:11:47	50.5
438	2017/05/04	18:11:48	48.7
439	2017/05/04	18:11:49	53.8
440	2017/05/04	18:11:50	49.1
441	2017/05/04	18:11:51	49.5
442	2017/05/04	18:11:52	51.5
443	2017/05/04	18:11:53	51.6
444	2017/05/04	18:11:54	57.1
445	2017/05/04	18:11:55	51.7
446	2017/05/04	18:11:56	52.4
447	2017/05/04	18:11:57	52.7
448	2017/05/04	18:11:58	52.0
449	2017/05/04	18:11:59	51.8
450	2017/05/04	18:12:00	53.1
451	2017/05/04	18:12:01	50.6
452	2017/05/04	18:12:02	50.7
453	2017/05/04	18:12:03	49.7
454	2017/05/04	18:12:04	50.0
455	2017/05/04	18:12:05	50.7
456	2017/05/04	18:12:06	50.4
457	2017/05/04	18:12:07	49.1
458	2017/05/04	18:12:08	49.2
459	2017/05/04	18:12:09	49.7
460	2017/05/04	18:12:10	48.3
461	2017/05/04	18:12:11	48.6
462	2017/05/04	18:12:12	48.5
463	2017/05/04	18:12:13	49.7
464	2017/05/04	18:12:14	49.6
465	2017/05/04	18:12:15	51.0
466	2017/05/04	18:12:16	51.3
467	2017/05/04	18:12:17	50.3
468	2017/05/04	18:12:18	50.6
469	2017/05/04	18:12:19	49.6
470	2017/05/04	18:12:20	50.6
471	2017/05/04	18:12:21	49.6
472	2017/05/04	18:12:22	49.9
473	2017/05/04	18:12:23	50.0
474	2017/05/04	18:12:24	51.1
475	2017/05/04	18:12:25	50.7
476	2017/05/04	18:12:26	51.5
477	2017/05/04	18:12:27	49.8
478	2017/05/04	18:12:28	49.7
479	2017/05/04	18:12:29	50.6
480	2017/05/04	18:12:30	49.4
481	2017/05/04	18:12:31	48.4
482	2017/05/04	18:12:32	48.4
483	2017/05/04	18:12:33	48.8
484	2017/05/04	18:12:34	48.7
485	2017/05/04	18:12:35	48.7
486	2017/05/04	18:12:36	48.9

GuthrieRiverside_Loc2_05042017.s1mm

487	2017/05/04	18:12:37	49.4
488	2017/05/04	18:12:38	48.9
489	2017/05/04	18:12:39	48.0
490	2017/05/04	18:12:40	48.2
491	2017/05/04	18:12:41	48.8
492	2017/05/04	18:12:42	48.1
493	2017/05/04	18:12:43	48.2
494	2017/05/04	18:12:44	48.1
495	2017/05/04	18:12:45	47.5
496	2017/05/04	18:12:46	47.7
497	2017/05/04	18:12:47	49.6
498	2017/05/04	18:12:48	49.4
499	2017/05/04	18:12:49	51.3
500	2017/05/04	18:12:50	52.0
501	2017/05/04	18:12:51	50.2
502	2017/05/04	18:12:52	48.6
503	2017/05/04	18:12:53	48.6
504	2017/05/04	18:12:54	49.1
505	2017/05/04	18:12:55	49.0
506	2017/05/04	18:12:56	47.9
507	2017/05/04	18:12:57	48.5
508	2017/05/04	18:12:58	48.5
509	2017/05/04	18:12:59	47.9
510	2017/05/04	18:13:00	48.5
511	2017/05/04	18:13:01	48.3
512	2017/05/04	18:13:02	48.5
513	2017/05/04	18:13:03	49.1
514	2017/05/04	18:13:04	48.5
515	2017/05/04	18:13:05	49.0
516	2017/05/04	18:13:06	49.2
517	2017/05/04	18:13:07	48.5
518	2017/05/04	18:13:08	48.8
519	2017/05/04	18:13:09	48.7
520	2017/05/04	18:13:10	49.0
521	2017/05/04	18:13:11	49.1
522	2017/05/04	18:13:12	48.4
523	2017/05/04	18:13:13	48.5
524	2017/05/04	18:13:14	50.7
525	2017/05/04	18:13:15	49.1
526	2017/05/04	18:13:16	48.9
527	2017/05/04	18:13:17	48.0
528	2017/05/04	18:13:18	48.5
529	2017/05/04	18:13:19	48.3
530	2017/05/04	18:13:20	47.8
531	2017/05/04	18:13:21	47.5
532	2017/05/04	18:13:22	47.4
533	2017/05/04	18:13:23	47.8
534	2017/05/04	18:13:24	47.9
535	2017/05/04	18:13:25	48.7
536	2017/05/04	18:13:26	49.3
537	2017/05/04	18:13:27	48.3
538	2017/05/04	18:13:28	47.7
539	2017/05/04	18:13:29	49.4
540	2017/05/04	18:13:30	48.3
541	2017/05/04	18:13:31	48.4
542	2017/05/04	18:13:32	48.7
543	2017/05/04	18:13:33	49.0
544	2017/05/04	18:13:34	48.6
545	2017/05/04	18:13:35	48.7
546	2017/05/04	18:13:36	48.8
547	2017/05/04	18:13:37	49.7
548	2017/05/04	18:13:38	49.2
549	2017/05/04	18:13:39	48.5

GuthrieRiverside_Loc2_05042017.s1mm

550	2017/05/04	18:13:40	48.8
551	2017/05/04	18:13:41	48.1
552	2017/05/04	18:13:42	47.5
553	2017/05/04	18:13:43	47.7
554	2017/05/04	18:13:44	47.4
555	2017/05/04	18:13:45	48.9
556	2017/05/04	18:13:46	49.8
557	2017/05/04	18:13:47	50.5
558	2017/05/04	18:13:48	50.8
559	2017/05/04	18:13:49	49.6
560	2017/05/04	18:13:50	49.4
561	2017/05/04	18:13:51	47.8
562	2017/05/04	18:13:52	48.0
563	2017/05/04	18:13:53	47.3
564	2017/05/04	18:13:54	46.5
565	2017/05/04	18:13:55	47.7
566	2017/05/04	18:13:56	47.6
567	2017/05/04	18:13:57	48.6
568	2017/05/04	18:13:58	47.7
569	2017/05/04	18:13:59	48.9
570	2017/05/04	18:14:00	49.0
571	2017/05/04	18:14:01	49.0
572	2017/05/04	18:14:02	50.7
573	2017/05/04	18:14:03	50.2
574	2017/05/04	18:14:04	50.1
575	2017/05/04	18:14:05	51.6
576	2017/05/04	18:14:06	50.9
577	2017/05/04	18:14:07	51.0
578	2017/05/04	18:14:08	51.3
579	2017/05/04	18:14:09	50.5
580	2017/05/04	18:14:10	49.0
581	2017/05/04	18:14:11	48.3
582	2017/05/04	18:14:12	48.3
583	2017/05/04	18:14:13	47.9
584	2017/05/04	18:14:14	47.7
585	2017/05/04	18:14:15	48.0
586	2017/05/04	18:14:16	48.5
587	2017/05/04	18:14:17	49.4
588	2017/05/04	18:14:18	49.0
589	2017/05/04	18:14:19	49.0
590	2017/05/04	18:14:20	48.8
591	2017/05/04	18:14:21	49.0
592	2017/05/04	18:14:22	49.5
593	2017/05/04	18:14:23	51.8
594	2017/05/04	18:14:24	51.5
595	2017/05/04	18:14:25	49.3
596	2017/05/04	18:14:26	49.1
597	2017/05/04	18:14:27	58.7
598	2017/05/04	18:14:28	55.9
599	2017/05/04	18:14:29	49.6
600	2017/05/04	18:14:30	48.7
601	2017/05/04	18:14:31	51.0
602	2017/05/04	18:14:32	51.7
603	2017/05/04	18:14:33	49.2
604	2017/05/04	18:14:34	49.0
605	2017/05/04	18:14:35	47.8
606	2017/05/04	18:14:36	48.9
607	2017/05/04	18:14:37	50.0
608	2017/05/04	18:14:38	48.8
609	2017/05/04	18:14:39	49.0
610	2017/05/04	18:14:40	48.6
611	2017/05/04	18:14:41	48.9
612	2017/05/04	18:14:42	49.4

GuthrieRiverside_Loc2_05042017.s1mm

613	2017/05/04	18:14:43	48.9
614	2017/05/04	18:14:44	48.3
615	2017/05/04	18:14:45	48.5
616	2017/05/04	18:14:46	47.4
617	2017/05/04	18:14:47	47.2
618	2017/05/04	18:14:48	47.4
619	2017/05/04	18:14:49	48.3
620	2017/05/04	18:14:50	47.3
621	2017/05/04	18:14:51	47.1
622	2017/05/04	18:14:52	47.0
623	2017/05/04	18:14:53	47.4
624	2017/05/04	18:14:54	46.7
625	2017/05/04	18:14:55	48.3
626	2017/05/04	18:14:56	47.2
627	2017/05/04	18:14:57	46.9
628	2017/05/04	18:14:58	47.3
629	2017/05/04	18:14:59	47.8
630	2017/05/04	18:15:00	47.1
631	2017/05/04	18:15:01	47.8
632	2017/05/04	18:15:02	47.4
633	2017/05/04	18:15:03	47.3
634	2017/05/04	18:15:04	47.3
635	2017/05/04	18:15:05	48.5
636	2017/05/04	18:15:06	48.8
637	2017/05/04	18:15:07	49.3
638	2017/05/04	18:15:08	48.3
639	2017/05/04	18:15:09	48.5
640	2017/05/04	18:15:10	49.6
641	2017/05/04	18:15:11	48.8
642	2017/05/04	18:15:12	50.1
643	2017/05/04	18:15:13	48.2
644	2017/05/04	18:15:14	48.3
645	2017/05/04	18:15:15	49.1
646	2017/05/04	18:15:16	48.7
647	2017/05/04	18:15:17	49.1
648	2017/05/04	18:15:18	49.6
649	2017/05/04	18:15:19	48.8
650	2017/05/04	18:15:20	47.5
651	2017/05/04	18:15:21	49.5
652	2017/05/04	18:15:22	48.6
653	2017/05/04	18:15:23	48.0
654	2017/05/04	18:15:24	47.6
655	2017/05/04	18:15:25	46.9
656	2017/05/04	18:15:26	47.4
657	2017/05/04	18:15:27	47.7
658	2017/05/04	18:15:28	46.8
659	2017/05/04	18:15:29	49.0
660	2017/05/04	18:15:30	49.3
661	2017/05/04	18:15:31	48.6
662	2017/05/04	18:15:32	50.0
663	2017/05/04	18:15:33	49.0
664	2017/05/04	18:15:34	46.9
665	2017/05/04	18:15:35	46.9
666	2017/05/04	18:15:36	47.1
667	2017/05/04	18:15:37	47.5
668	2017/05/04	18:15:38	47.3
669	2017/05/04	18:15:39	47.1
670	2017/05/04	18:15:40	47.0
671	2017/05/04	18:15:41	48.2
672	2017/05/04	18:15:42	47.5
673	2017/05/04	18:15:43	47.8
674	2017/05/04	18:15:44	47.6
675	2017/05/04	18:15:45	47.2

GuthrieRiverside_Loc2_05042017.slm

676	2017/05/04	18:15:46	46.5
677	2017/05/04	18:15:47	48.3
678	2017/05/04	18:15:48	47.4
679	2017/05/04	18:15:49	47.6
680	2017/05/04	18:15:50	46.5
681	2017/05/04	18:15:51	58.9
682	2017/05/04	18:15:52	46.3
683	2017/05/04	18:15:53	46.7
684	2017/05/04	18:15:54	48.7
685	2017/05/04	18:15:55	51.0
686	2017/05/04	18:15:56	51.4
687	2017/05/04	18:15:57	47.2
688	2017/05/04	18:15:58	46.8
689	2017/05/04	18:15:59	46.2
690	2017/05/04	18:16:00	50.6
691	2017/05/04	18:16:01	46.3
692	2017/05/04	18:16:02	46.4
693	2017/05/04	18:16:03	44.9
694	2017/05/04	18:16:04	46.2
695	2017/05/04	18:16:05	45.0
696	2017/05/04	18:16:06	45.2
697	2017/05/04	18:16:07	46.1
698	2017/05/04	18:16:08	45.8
699	2017/05/04	18:16:09	45.7
700	2017/05/04	18:16:10	44.7
701	2017/05/04	18:16:11	45.4
702	2017/05/04	18:16:12	45.6
703	2017/05/04	18:16:13	53.5
704	2017/05/04	18:16:14	45.4
705	2017/05/04	18:16:15	45.0
706	2017/05/04	18:16:16	58.5
707	2017/05/04	18:16:17	58.3
708	2017/05/04	18:16:18	62.1
709	2017/05/04	18:16:19	57.2
710	2017/05/04	18:16:20	53.3
711	2017/05/04	18:16:21	54.1
712	2017/05/04	18:16:22	55.7
713	2017/05/04	18:16:23	56.5
714	2017/05/04	18:16:24	54.8
715	2017/05/04	18:16:25	51.7
716	2017/05/04	18:16:26	52.3
717	2017/05/04	18:16:27	54.8
718	2017/05/04	18:16:28	52.9
719	2017/05/04	18:16:29	51.3
720	2017/05/04	18:16:30	48.8
721	2017/05/04	18:16:31	52.3
722	2017/05/04	18:16:32	54.5
723	2017/05/04	18:16:33	49.3
724	2017/05/04	18:16:34	45.9
725	2017/05/04	18:16:35	46.1
726	2017/05/04	18:16:36	46.1
727	2017/05/04	18:16:37	48.3
728	2017/05/04	18:16:38	46.1
729	2017/05/04	18:16:39	45.7
730	2017/05/04	18:16:40	46.1
731	2017/05/04	18:16:41	46.0
732	2017/05/04	18:16:42	49.2
733	2017/05/04	18:16:43	55.0
734	2017/05/04	18:16:44	53.2
735	2017/05/04	18:16:45	53.3
736	2017/05/04	18:16:46	52.6
737	2017/05/04	18:16:47	46.1
738	2017/05/04	18:16:48	45.8

GuthrieRiverside_Loc2_05042017.s1mm

739	2017/05/04	18:16:49	47.5
740	2017/05/04	18:16:50	47.5
741	2017/05/04	18:16:51	45.8
742	2017/05/04	18:16:52	46.3
743	2017/05/04	18:16:53	45.9
744	2017/05/04	18:16:54	46.6
745	2017/05/04	18:16:55	46.3
746	2017/05/04	18:16:56	46.3
747	2017/05/04	18:16:57	45.9
748	2017/05/04	18:16:58	46.5
749	2017/05/04	18:16:59	46.5
750	2017/05/04	18:17:00	48.7
751	2017/05/04	18:17:01	47.2
752	2017/05/04	18:17:02	47.4
753	2017/05/04	18:17:03	47.2
754	2017/05/04	18:17:04	46.6
755	2017/05/04	18:17:05	46.6
756	2017/05/04	18:17:06	46.7
757	2017/05/04	18:17:07	46.7
758	2017/05/04	18:17:08	46.3
759	2017/05/04	18:17:09	49.0
760	2017/05/04	18:17:10	62.1
761	2017/05/04	18:17:11	56.8
762	2017/05/04	18:17:12	52.2
763	2017/05/04	18:17:13	47.0
764	2017/05/04	18:17:14	46.4
765	2017/05/04	18:17:15	47.1
766	2017/05/04	18:17:16	46.5
767	2017/05/04	18:17:17	51.9
768	2017/05/04	18:17:18	61.1
769	2017/05/04	18:17:19	58.5
770	2017/05/04	18:17:20	50.1
771	2017/05/04	18:17:21	49.2
772	2017/05/04	18:17:22	47.7
773	2017/05/04	18:17:23	54.5
774	2017/05/04	18:17:24	53.8
775	2017/05/04	18:17:25	52.5
776	2017/05/04	18:17:26	57.6
777	2017/05/04	18:17:27	59.4
778	2017/05/04	18:17:28	51.5
779	2017/05/04	18:17:29	48.9
780	2017/05/04	18:17:30	48.3
781	2017/05/04	18:17:31	48.0
782	2017/05/04	18:17:32	48.0
783	2017/05/04	18:17:33	47.2
784	2017/05/04	18:17:34	47.7
785	2017/05/04	18:17:35	46.7
786	2017/05/04	18:17:36	46.7
787	2017/05/04	18:17:37	48.6
788	2017/05/04	18:17:38	48.0
789	2017/05/04	18:17:39	47.5
790	2017/05/04	18:17:40	50.2
791	2017/05/04	18:17:41	49.0
792	2017/05/04	18:17:42	48.5
793	2017/05/04	18:17:43	48.0
794	2017/05/04	18:17:44	47.3
795	2017/05/04	18:17:45	47.8
796	2017/05/04	18:17:46	48.0
797	2017/05/04	18:17:47	49.9
798	2017/05/04	18:17:48	50.7
799	2017/05/04	18:17:49	50.0
800	2017/05/04	18:17:50	49.1
801	2017/05/04	18:17:51	47.3

GuthrieRiverside_Loc2_05042017.s1mm

802	2017/05/04	18:17:52	46.6
803	2017/05/04	18:17:53	47.6
804	2017/05/04	18:17:54	47.2
805	2017/05/04	18:17:55	46.8
806	2017/05/04	18:17:56	47.2
807	2017/05/04	18:17:57	48.6
808	2017/05/04	18:17:58	47.0
809	2017/05/04	18:17:59	47.3
810	2017/05/04	18:18:00	46.9
811	2017/05/04	18:18:01	47.7
812	2017/05/04	18:18:02	50.4
813	2017/05/04	18:18:03	47.1
814	2017/05/04	18:18:04	47.0
815	2017/05/04	18:18:05	47.0
816	2017/05/04	18:18:06	47.6
817	2017/05/04	18:18:07	47.2
818	2017/05/04	18:18:08	47.5
819	2017/05/04	18:18:09	45.9
820	2017/05/04	18:18:10	46.1
821	2017/05/04	18:18:11	45.5
822	2017/05/04	18:18:12	46.2
823	2017/05/04	18:18:13	46.6
824	2017/05/04	18:18:14	46.9
825	2017/05/04	18:18:15	47.4
826	2017/05/04	18:18:16	47.0
827	2017/05/04	18:18:17	46.9
828	2017/05/04	18:18:18	46.9
829	2017/05/04	18:18:19	47.2
830	2017/05/04	18:18:20	46.0
831	2017/05/04	18:18:21	47.2
832	2017/05/04	18:18:22	46.7
833	2017/05/04	18:18:23	46.7
834	2017/05/04	18:18:24	46.3
835	2017/05/04	18:18:25	46.8
836	2017/05/04	18:18:26	47.0
837	2017/05/04	18:18:27	48.4
838	2017/05/04	18:18:28	49.0
839	2017/05/04	18:18:29	54.1
840	2017/05/04	18:18:30	55.1
841	2017/05/04	18:18:31	54.1
842	2017/05/04	18:18:32	49.1
843	2017/05/04	18:18:33	48.5
844	2017/05/04	18:18:34	47.9
845	2017/05/04	18:18:35	47.9
846	2017/05/04	18:18:36	52.8
847	2017/05/04	18:18:37	54.3
848	2017/05/04	18:18:38	50.3
849	2017/05/04	18:18:39	47.4
850	2017/05/04	18:18:40	47.1
851	2017/05/04	18:18:41	47.0
852	2017/05/04	18:18:42	47.5
853	2017/05/04	18:18:43	46.2
854	2017/05/04	18:18:44	46.1
855	2017/05/04	18:18:45	47.9
856	2017/05/04	18:18:46	46.3
857	2017/05/04	18:18:47	47.4
858	2017/05/04	18:18:48	48.6
859	2017/05/04	18:18:49	47.0
860	2017/05/04	18:18:50	46.5
861	2017/05/04	18:18:51	46.9
862	2017/05/04	18:18:52	47.0
863	2017/05/04	18:18:53	47.1
864	2017/05/04	18:18:54	47.1

GuthrieRiverside_Loc2_05042017.slm

865	2017/05/04	18:18:55	47.7
866	2017/05/04	18:18:56	52.7
867	2017/05/04	18:18:57	50.1
868	2017/05/04	18:18:58	47.8
869	2017/05/04	18:18:59	49.6
870	2017/05/04	18:19:00	56.7
871	2017/05/04	18:19:01	50.8
872	2017/05/04	18:19:02	49.0
873	2017/05/04	18:19:03	54.5
874	2017/05/04	18:19:04	52.6
875	2017/05/04	18:19:05	55.4
876	2017/05/04	18:19:06	53.1
877	2017/05/04	18:19:07	52.4
878	2017/05/04	18:19:08	56.0
879	2017/05/04	18:19:09	54.1
880	2017/05/04	18:19:10	56.9
881	2017/05/04	18:19:11	52.6
882	2017/05/04	18:19:12	50.7
883	2017/05/04	18:19:13	54.4
884	2017/05/04	18:19:14	50.4
885	2017/05/04	18:19:15	50.3
886	2017/05/04	18:19:16	54.5
887	2017/05/04	18:19:17	55.4
888	2017/05/04	18:19:18	50.4
889	2017/05/04	18:19:19	49.3
890	2017/05/04	18:19:20	48.2
891	2017/05/04	18:19:21	49.8
892	2017/05/04	18:19:22	49.0
893	2017/05/04	18:19:23	49.8
894	2017/05/04	18:19:24	48.2
895	2017/05/04	18:19:25	48.7
896	2017/05/04	18:19:26	47.7
897	2017/05/04	18:19:27	52.9
898	2017/05/04	18:19:28	50.2
899	2017/05/04	18:19:29	50.9
900	2017/05/04	18:19:30	50.0

Data Logger
Location 3

Leq: 70.0
 L(10): 72.7
 L(50): 66.4
 L(90): 58.5
 LMax: 83.9
 LMin: 52.8
 Peak: 96.8

A
 FAST
 40-100

2017/05/04 17:41:10

No.s	Date Time	dB
1	2017/05/04 17:38:27	62.7
2	2017/05/04 17:38:28	62.5
3	2017/05/04 17:38:29	62.7
4	2017/05/04 17:38:30	61.3
5	2017/05/04 17:38:31	62.4
6	2017/05/04 17:38:32	68.4
7	2017/05/04 17:38:33	67.6
8	2017/05/04 17:38:34	64.0
9	2017/05/04 17:38:35	59.7
10	2017/05/04 17:38:36	60.2
11	2017/05/04 17:38:37	60.8
12	2017/05/04 17:38:38	66.9
13	2017/05/04 17:38:39	71.7
14	2017/05/04 17:38:40	67.7
15	2017/05/04 17:38:41	67.9
16	2017/05/04 17:38:42	70.6
17	2017/05/04 17:38:43	70.8
18	2017/05/04 17:38:44	67.6
19	2017/05/04 17:38:45	62.2
20	2017/05/04 17:38:46	61.0
21	2017/05/04 17:38:47	61.4
22	2017/05/04 17:38:48	62.7
23	2017/05/04 17:38:49	70.4
24	2017/05/04 17:38:50	73.7
25	2017/05/04 17:38:51	66.7
26	2017/05/04 17:38:52	63.5
27	2017/05/04 17:38:53	58.9
28	2017/05/04 17:38:54	63.8
29	2017/05/04 17:38:55	63.8
30	2017/05/04 17:38:56	65.9
31	2017/05/04 17:38:57	70.1
32	2017/05/04 17:38:58	67.7
33	2017/05/04 17:38:59	62.5
34	2017/05/04 17:39:00	62.0
35	2017/05/04 17:39:01	62.1
36	2017/05/04 17:39:02	63.0
37	2017/05/04 17:39:03	62.9
38	2017/05/04 17:39:04	62.7
39	2017/05/04 17:39:05	61.5
40	2017/05/04 17:39:06	60.1
41	2017/05/04 17:39:07	58.9
42	2017/05/04 17:39:08	58.1
43	2017/05/04 17:39:09	60.7
44	2017/05/04 17:39:10	64.4
45	2017/05/04 17:39:11	61.7

GuthrieRiverside_Loc3_05042017.s1mm

46	2017/05/04	17:39:12	63.8
47	2017/05/04	17:39:13	66.4
48	2017/05/04	17:39:14	70.0
49	2017/05/04	17:39:15	72.9
50	2017/05/04	17:39:16	73.9
51	2017/05/04	17:39:17	69.6
52	2017/05/04	17:39:18	65.9
53	2017/05/04	17:39:19	64.4
54	2017/05/04	17:39:20	67.1
55	2017/05/04	17:39:21	71.0
56	2017/05/04	17:39:22	68.5
57	2017/05/04	17:39:23	68.3
58	2017/05/04	17:39:24	69.3
59	2017/05/04	17:39:25	72.6
60	2017/05/04	17:39:26	75.0
61	2017/05/04	17:39:27	71.9
62	2017/05/04	17:39:28	69.9
63	2017/05/04	17:39:29	69.7
64	2017/05/04	17:39:30	68.9
65	2017/05/04	17:39:31	69.7
66	2017/05/04	17:39:32	69.1
67	2017/05/04	17:39:33	71.2
68	2017/05/04	17:39:34	69.2
69	2017/05/04	17:39:35	68.5
70	2017/05/04	17:39:36	70.0
71	2017/05/04	17:39:37	69.1
72	2017/05/04	17:39:38	68.4
73	2017/05/04	17:39:39	69.4
74	2017/05/04	17:39:40	70.8
75	2017/05/04	17:39:41	68.9
76	2017/05/04	17:39:42	68.6
77	2017/05/04	17:39:43	68.7
78	2017/05/04	17:39:44	70.1
79	2017/05/04	17:39:45	70.6
80	2017/05/04	17:39:46	69.3
81	2017/05/04	17:39:47	72.0
82	2017/05/04	17:39:48	71.6
83	2017/05/04	17:39:49	74.7
84	2017/05/04	17:39:50	73.5
85	2017/05/04	17:39:51	75.6
86	2017/05/04	17:39:52	74.1
87	2017/05/04	17:39:53	72.7
88	2017/05/04	17:39:54	72.3
89	2017/05/04	17:39:55	71.7
90	2017/05/04	17:39:56	72.4
91	2017/05/04	17:39:57	67.3
92	2017/05/04	17:39:58	64.7
93	2017/05/04	17:39:59	66.0
94	2017/05/04	17:40:00	67.1
95	2017/05/04	17:40:01	69.2
96	2017/05/04	17:40:02	69.8
97	2017/05/04	17:40:03	69.7
98	2017/05/04	17:40:04	69.6
99	2017/05/04	17:40:05	67.5
100	2017/05/04	17:40:06	66.4
101	2017/05/04	17:40:07	63.7
102	2017/05/04	17:40:08	61.5
103	2017/05/04	17:40:09	60.8
104	2017/05/04	17:40:10	60.0
105	2017/05/04	17:40:11	60.6
106	2017/05/04	17:40:12	59.2
107	2017/05/04	17:40:13	60.6
108	2017/05/04	17:40:14	62.7

GuthrieRiverside_Loc3_05042017.s1mm

109	2017/05/04	17:40:15	64.3
110	2017/05/04	17:40:16	63.5
111	2017/05/04	17:40:17	65.7
112	2017/05/04	17:40:18	66.3
113	2017/05/04	17:40:19	64.4
114	2017/05/04	17:40:20	60.8
115	2017/05/04	17:40:21	59.9
116	2017/05/04	17:40:22	58.5
117	2017/05/04	17:40:23	68.2
118	2017/05/04	17:40:24	59.8
119	2017/05/04	17:40:25	58.8
120	2017/05/04	17:40:26	58.6
121	2017/05/04	17:40:27	58.4
122	2017/05/04	17:40:28	57.7
123	2017/05/04	17:40:29	58.3
124	2017/05/04	17:40:30	58.3
125	2017/05/04	17:40:31	58.4
126	2017/05/04	17:40:32	58.4
127	2017/05/04	17:40:33	59.8
128	2017/05/04	17:40:34	59.4
129	2017/05/04	17:40:35	59.1
130	2017/05/04	17:40:36	64.4
131	2017/05/04	17:40:37	64.8
132	2017/05/04	17:40:38	65.7
133	2017/05/04	17:40:39	69.1
134	2017/05/04	17:40:40	67.4
135	2017/05/04	17:40:41	71.3
136	2017/05/04	17:40:42	69.7
137	2017/05/04	17:40:43	64.6
138	2017/05/04	17:40:44	62.2
139	2017/05/04	17:40:45	62.6
140	2017/05/04	17:40:46	63.7
141	2017/05/04	17:40:47	63.5
142	2017/05/04	17:40:48	65.4
143	2017/05/04	17:40:49	67.6
144	2017/05/04	17:40:50	70.1
145	2017/05/04	17:40:51	68.4
146	2017/05/04	17:40:52	66.5
147	2017/05/04	17:40:53	64.3
148	2017/05/04	17:40:54	64.9
149	2017/05/04	17:40:55	63.3
150	2017/05/04	17:40:56	64.8
151	2017/05/04	17:40:57	68.7
152	2017/05/04	17:40:58	69.7
153	2017/05/04	17:40:59	70.4
154	2017/05/04	17:41:00	72.1
155	2017/05/04	17:41:01	69.3
156	2017/05/04	17:41:02	67.2
157	2017/05/04	17:41:03	66.4
158	2017/05/04	17:41:04	65.2
159	2017/05/04	17:41:05	66.4
160	2017/05/04	17:41:06	66.3
161	2017/05/04	17:41:07	69.0
162	2017/05/04	17:41:08	74.8
163	2017/05/04	17:41:09	83.4
164	2017/05/04	17:41:10	79.2
165	2017/05/04	17:41:11	73.3
166	2017/05/04	17:41:12	70.2
167	2017/05/04	17:41:13	70.1
168	2017/05/04	17:41:14	70.5
169	2017/05/04	17:41:15	72.7
170	2017/05/04	17:41:16	71.8
171	2017/05/04	17:41:17	70.3

GuthrieRiverside_Loc3_05042017.slm

172	2017/05/04	17:41:18	71.6
173	2017/05/04	17:41:19	72.0
174	2017/05/04	17:41:20	69.3
175	2017/05/04	17:41:21	69.6
176	2017/05/04	17:41:22	69.3
177	2017/05/04	17:41:23	67.6
178	2017/05/04	17:41:24	68.5
179	2017/05/04	17:41:25	65.5
180	2017/05/04	17:41:26	66.6
181	2017/05/04	17:41:27	64.1
182	2017/05/04	17:41:28	62.1
183	2017/05/04	17:41:29	60.2
184	2017/05/04	17:41:30	67.3
185	2017/05/04	17:41:31	65.6
186	2017/05/04	17:41:32	66.4
187	2017/05/04	17:41:33	61.9
188	2017/05/04	17:41:34	64.2
189	2017/05/04	17:41:35	57.5
190	2017/05/04	17:41:36	57.9
191	2017/05/04	17:41:37	63.2
192	2017/05/04	17:41:38	58.5
193	2017/05/04	17:41:39	62.3
194	2017/05/04	17:41:40	59.9
195	2017/05/04	17:41:41	64.5
196	2017/05/04	17:41:42	61.7
197	2017/05/04	17:41:43	60.6
198	2017/05/04	17:41:44	62.7
199	2017/05/04	17:41:45	66.8
200	2017/05/04	17:41:46	66.9
201	2017/05/04	17:41:47	65.4
202	2017/05/04	17:41:48	62.4
203	2017/05/04	17:41:49	60.3
204	2017/05/04	17:41:50	58.4
205	2017/05/04	17:41:51	58.2
206	2017/05/04	17:41:52	58.4
207	2017/05/04	17:41:53	60.4
208	2017/05/04	17:41:54	60.0
209	2017/05/04	17:41:55	64.2
210	2017/05/04	17:41:56	64.2
211	2017/05/04	17:41:57	61.6
212	2017/05/04	17:41:58	57.3
213	2017/05/04	17:41:59	56.8
214	2017/05/04	17:42:00	61.6
215	2017/05/04	17:42:01	58.9
216	2017/05/04	17:42:02	62.3
217	2017/05/04	17:42:03	62.4
218	2017/05/04	17:42:04	68.2
219	2017/05/04	17:42:05	67.4
220	2017/05/04	17:42:06	60.7
221	2017/05/04	17:42:07	60.7
222	2017/05/04	17:42:08	62.2
223	2017/05/04	17:42:09	63.3
224	2017/05/04	17:42:10	65.6
225	2017/05/04	17:42:11	63.1
226	2017/05/04	17:42:12	66.3
227	2017/05/04	17:42:13	64.7
228	2017/05/04	17:42:14	63.9
229	2017/05/04	17:42:15	60.6
230	2017/05/04	17:42:16	59.2
231	2017/05/04	17:42:17	61.5
232	2017/05/04	17:42:18	62.1
233	2017/05/04	17:42:19	65.4
234	2017/05/04	17:42:20	69.7

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235	2017/05/04	17:42:21	70.1
236	2017/05/04	17:42:22	68.3
237	2017/05/04	17:42:23	69.6
238	2017/05/04	17:42:24	68.4
239	2017/05/04	17:42:25	66.8
240	2017/05/04	17:42:26	64.4
241	2017/05/04	17:42:27	63.3
242	2017/05/04	17:42:28	64.4
243	2017/05/04	17:42:29	65.1
244	2017/05/04	17:42:30	65.2
245	2017/05/04	17:42:31	65.5
246	2017/05/04	17:42:32	70.9
247	2017/05/04	17:42:33	75.7
248	2017/05/04	17:42:34	71.9
249	2017/05/04	17:42:35	69.2
250	2017/05/04	17:42:36	65.9
251	2017/05/04	17:42:37	67.4
252	2017/05/04	17:42:38	66.5
253	2017/05/04	17:42:39	69.4
254	2017/05/04	17:42:40	68.9
255	2017/05/04	17:42:41	67.7
256	2017/05/04	17:42:42	72.2
257	2017/05/04	17:42:43	73.8
258	2017/05/04	17:42:44	78.4
259	2017/05/04	17:42:45	72.7
260	2017/05/04	17:42:46	73.7
261	2017/05/04	17:42:47	73.6
262	2017/05/04	17:42:48	72.1
263	2017/05/04	17:42:49	72.3
264	2017/05/04	17:42:50	72.5
265	2017/05/04	17:42:51	74.5
266	2017/05/04	17:42:52	72.1
267	2017/05/04	17:42:53	71.5
268	2017/05/04	17:42:54	72.8
269	2017/05/04	17:42:55	72.3
270	2017/05/04	17:42:56	69.7
271	2017/05/04	17:42:57	70.3
272	2017/05/04	17:42:58	71.6
273	2017/05/04	17:42:59	73.2
274	2017/05/04	17:43:00	73.5
275	2017/05/04	17:43:01	72.6
276	2017/05/04	17:43:02	72.2
277	2017/05/04	17:43:03	72.2
278	2017/05/04	17:43:04	70.0
279	2017/05/04	17:43:05	69.9
280	2017/05/04	17:43:06	69.8
281	2017/05/04	17:43:07	70.9
282	2017/05/04	17:43:08	71.6
283	2017/05/04	17:43:09	72.9
284	2017/05/04	17:43:10	68.2
285	2017/05/04	17:43:11	66.2
286	2017/05/04	17:43:12	67.0
287	2017/05/04	17:43:13	67.3
288	2017/05/04	17:43:14	67.3
289	2017/05/04	17:43:15	67.2
290	2017/05/04	17:43:16	69.6
291	2017/05/04	17:43:17	70.1
292	2017/05/04	17:43:18	70.2
293	2017/05/04	17:43:19	69.1
294	2017/05/04	17:43:20	65.9
295	2017/05/04	17:43:21	64.2
296	2017/05/04	17:43:22	64.7
297	2017/05/04	17:43:23	64.4

GuthrieRiverside_Loc3_05042017.s1mm

298	2017/05/04	17:43:24	62.9
299	2017/05/04	17:43:25	64.8
300	2017/05/04	17:43:26	64.9
301	2017/05/04	17:43:27	65.0
302	2017/05/04	17:43:28	65.4
303	2017/05/04	17:43:29	64.3
304	2017/05/04	17:43:30	63.4
305	2017/05/04	17:43:31	64.4
306	2017/05/04	17:43:32	63.8
307	2017/05/04	17:43:33	65.4
308	2017/05/04	17:43:34	66.8
309	2017/05/04	17:43:35	67.6
310	2017/05/04	17:43:36	66.0
311	2017/05/04	17:43:37	66.1
312	2017/05/04	17:43:38	65.8
313	2017/05/04	17:43:39	65.3
314	2017/05/04	17:43:40	63.3
315	2017/05/04	17:43:41	59.9
316	2017/05/04	17:43:42	57.0
317	2017/05/04	17:43:43	55.7
318	2017/05/04	17:43:44	55.2
319	2017/05/04	17:43:45	54.8
320	2017/05/04	17:43:46	53.5
321	2017/05/04	17:43:47	53.5
322	2017/05/04	17:43:48	54.4
323	2017/05/04	17:43:49	53.2
324	2017/05/04	17:43:50	53.2
325	2017/05/04	17:43:51	53.3
326	2017/05/04	17:43:52	53.2
327	2017/05/04	17:43:53	53.6
328	2017/05/04	17:43:54	54.6
329	2017/05/04	17:43:55	54.5
330	2017/05/04	17:43:56	55.9
331	2017/05/04	17:43:57	57.4
332	2017/05/04	17:43:58	59.4
333	2017/05/04	17:43:59	60.8
334	2017/05/04	17:44:00	61.5
335	2017/05/04	17:44:01	62.7
336	2017/05/04	17:44:02	64.0
337	2017/05/04	17:44:03	63.6
338	2017/05/04	17:44:04	62.5
339	2017/05/04	17:44:05	63.2
340	2017/05/04	17:44:06	63.1
341	2017/05/04	17:44:07	62.0
342	2017/05/04	17:44:08	61.6
343	2017/05/04	17:44:09	61.5
344	2017/05/04	17:44:10	62.2
345	2017/05/04	17:44:11	62.4
346	2017/05/04	17:44:12	63.0
347	2017/05/04	17:44:13	65.9
348	2017/05/04	17:44:14	67.6
349	2017/05/04	17:44:15	66.5
350	2017/05/04	17:44:16	65.8
351	2017/05/04	17:44:17	65.7
352	2017/05/04	17:44:18	69.0
353	2017/05/04	17:44:19	73.7
354	2017/05/04	17:44:20	77.9
355	2017/05/04	17:44:21	70.2
356	2017/05/04	17:44:22	74.5
357	2017/05/04	17:44:23	77.6
358	2017/05/04	17:44:24	76.4
359	2017/05/04	17:44:25	72.8
360	2017/05/04	17:44:26	72.3

GuthrieRiverside_Loc3_05042017.s1mm

361	2017/05/04	17:44:27	74.9
362	2017/05/04	17:44:28	72.6
363	2017/05/04	17:44:29	68.2
364	2017/05/04	17:44:30	66.0
365	2017/05/04	17:44:31	70.6
366	2017/05/04	17:44:32	68.1
367	2017/05/04	17:44:33	65.2
368	2017/05/04	17:44:34	71.5
369	2017/05/04	17:44:35	77.1
370	2017/05/04	17:44:36	71.4
371	2017/05/04	17:44:37	71.3
372	2017/05/04	17:44:38	75.4
373	2017/05/04	17:44:39	73.3
374	2017/05/04	17:44:40	73.7
375	2017/05/04	17:44:41	66.5
376	2017/05/04	17:44:42	64.5
377	2017/05/04	17:44:43	63.8
378	2017/05/04	17:44:44	64.1
379	2017/05/04	17:44:45	70.2
380	2017/05/04	17:44:46	71.8
381	2017/05/04	17:44:47	73.3
382	2017/05/04	17:44:48	69.1
383	2017/05/04	17:44:49	66.5
384	2017/05/04	17:44:50	72.1
385	2017/05/04	17:44:51	70.4
386	2017/05/04	17:44:52	71.3
387	2017/05/04	17:44:53	71.6
388	2017/05/04	17:44:54	68.6
389	2017/05/04	17:44:55	68.7
390	2017/05/04	17:44:56	69.5
391	2017/05/04	17:44:57	70.8
392	2017/05/04	17:44:58	70.3
393	2017/05/04	17:44:59	64.0
394	2017/05/04	17:45:00	66.7
395	2017/05/04	17:45:01	68.3
396	2017/05/04	17:45:02	66.6
397	2017/05/04	17:45:03	62.0
398	2017/05/04	17:45:04	62.0
399	2017/05/04	17:45:05	63.2
400	2017/05/04	17:45:06	69.0
401	2017/05/04	17:45:07	69.6
402	2017/05/04	17:45:08	63.1
403	2017/05/04	17:45:09	64.3
404	2017/05/04	17:45:10	64.6
405	2017/05/04	17:45:11	67.6
406	2017/05/04	17:45:12	76.9
407	2017/05/04	17:45:13	73.6
408	2017/05/04	17:45:14	63.3
409	2017/05/04	17:45:15	62.8
410	2017/05/04	17:45:16	65.4
411	2017/05/04	17:45:17	70.5
412	2017/05/04	17:45:18	69.6
413	2017/05/04	17:45:19	64.6
414	2017/05/04	17:45:20	63.6
415	2017/05/04	17:45:21	65.2
416	2017/05/04	17:45:22	68.6
417	2017/05/04	17:45:23	69.6
418	2017/05/04	17:45:24	67.0
419	2017/05/04	17:45:25	62.5
420	2017/05/04	17:45:26	63.6
421	2017/05/04	17:45:27	59.5
422	2017/05/04	17:45:28	58.1
423	2017/05/04	17:45:29	61.9

GuthrieRiverside_Loc3_05042017.s1mm

424	2017/05/04	17:45:30	59.6
425	2017/05/04	17:45:31	58.8
426	2017/05/04	17:45:32	59.6
427	2017/05/04	17:45:33	61.4
428	2017/05/04	17:45:34	63.7
429	2017/05/04	17:45:35	64.3
430	2017/05/04	17:45:36	66.1
431	2017/05/04	17:45:37	68.2
432	2017/05/04	17:45:38	68.9
433	2017/05/04	17:45:39	66.6
434	2017/05/04	17:45:40	67.1
435	2017/05/04	17:45:41	66.2
436	2017/05/04	17:45:42	64.9
437	2017/05/04	17:45:43	68.6
438	2017/05/04	17:45:44	65.0
439	2017/05/04	17:45:45	63.8
440	2017/05/04	17:45:46	64.9
441	2017/05/04	17:45:47	71.1
442	2017/05/04	17:45:48	70.7
443	2017/05/04	17:45:49	67.4
444	2017/05/04	17:45:50	66.5
445	2017/05/04	17:45:51	63.5
446	2017/05/04	17:45:52	62.7
447	2017/05/04	17:45:53	63.9
448	2017/05/04	17:45:54	62.1
449	2017/05/04	17:45:55	65.3
450	2017/05/04	17:45:56	64.2
451	2017/05/04	17:45:57	63.7
452	2017/05/04	17:45:58	65.0
453	2017/05/04	17:45:59	63.6
454	2017/05/04	17:46:00	64.9
455	2017/05/04	17:46:01	66.3
456	2017/05/04	17:46:02	69.5
457	2017/05/04	17:46:03	73.2
458	2017/05/04	17:46:04	72.2
459	2017/05/04	17:46:05	67.5
460	2017/05/04	17:46:06	69.3
461	2017/05/04	17:46:07	71.5
462	2017/05/04	17:46:08	73.8
463	2017/05/04	17:46:09	77.5
464	2017/05/04	17:46:10	77.6
465	2017/05/04	17:46:11	73.4
466	2017/05/04	17:46:12	72.1
467	2017/05/04	17:46:13	73.1
468	2017/05/04	17:46:14	71.1
469	2017/05/04	17:46:15	70.2
470	2017/05/04	17:46:16	73.3
471	2017/05/04	17:46:17	73.9
472	2017/05/04	17:46:18	71.0
473	2017/05/04	17:46:19	67.5
474	2017/05/04	17:46:20	65.9
475	2017/05/04	17:46:21	63.8
476	2017/05/04	17:46:22	64.7
477	2017/05/04	17:46:23	63.0
478	2017/05/04	17:46:24	59.8
479	2017/05/04	17:46:25	60.2
480	2017/05/04	17:46:26	59.7
481	2017/05/04	17:46:27	59.9
482	2017/05/04	17:46:28	61.0
483	2017/05/04	17:46:29	62.0
484	2017/05/04	17:46:30	61.9
485	2017/05/04	17:46:31	61.5
486	2017/05/04	17:46:32	59.2

GuthrieRiverside_Loc3_05042017.s1mm

487	2017/05/04	17:46:33	61.2
488	2017/05/04	17:46:34	61.3
489	2017/05/04	17:46:35	61.6
490	2017/05/04	17:46:36	64.1
491	2017/05/04	17:46:37	66.2
492	2017/05/04	17:46:38	71.1
493	2017/05/04	17:46:39	79.6
494	2017/05/04	17:46:40	81.0
495	2017/05/04	17:46:41	74.4
496	2017/05/04	17:46:42	71.3
497	2017/05/04	17:46:43	68.7
498	2017/05/04	17:46:44	68.2
499	2017/05/04	17:46:45	68.3
500	2017/05/04	17:46:46	68.5
501	2017/05/04	17:46:47	71.9
502	2017/05/04	17:46:48	75.4
503	2017/05/04	17:46:49	72.3
504	2017/05/04	17:46:50	72.6
505	2017/05/04	17:46:51	70.7
506	2017/05/04	17:46:52	64.2
507	2017/05/04	17:46:53	63.9
508	2017/05/04	17:46:54	67.4
509	2017/05/04	17:46:55	68.8
510	2017/05/04	17:46:56	66.6
511	2017/05/04	17:46:57	66.8
512	2017/05/04	17:46:58	70.2
513	2017/05/04	17:46:59	68.5
514	2017/05/04	17:47:00	62.6
515	2017/05/04	17:47:01	58.2
516	2017/05/04	17:47:02	57.1
517	2017/05/04	17:47:03	55.5
518	2017/05/04	17:47:04	55.7
519	2017/05/04	17:47:05	56.7
520	2017/05/04	17:47:06	60.3
521	2017/05/04	17:47:07	58.0
522	2017/05/04	17:47:08	59.0
523	2017/05/04	17:47:09	58.1
524	2017/05/04	17:47:10	56.4
525	2017/05/04	17:47:11	56.0
526	2017/05/04	17:47:12	56.1
527	2017/05/04	17:47:13	57.5
528	2017/05/04	17:47:14	59.5
529	2017/05/04	17:47:15	58.4
530	2017/05/04	17:47:16	59.9
531	2017/05/04	17:47:17	59.4
532	2017/05/04	17:47:18	61.1
533	2017/05/04	17:47:19	61.0
534	2017/05/04	17:47:20	63.1
535	2017/05/04	17:47:21	70.0
536	2017/05/04	17:47:22	73.8
537	2017/05/04	17:47:23	73.8
538	2017/05/04	17:47:24	73.1
539	2017/05/04	17:47:25	71.8
540	2017/05/04	17:47:26	72.9
541	2017/05/04	17:47:27	72.6
542	2017/05/04	17:47:28	72.6
543	2017/05/04	17:47:29	71.4
544	2017/05/04	17:47:30	70.9
545	2017/05/04	17:47:31	70.0
546	2017/05/04	17:47:32	69.4
547	2017/05/04	17:47:33	67.6
548	2017/05/04	17:47:34	69.7
549	2017/05/04	17:47:35	73.2

GuthrieRiverside_Loc3_05042017.s1mm

550	2017/05/04	17:47:36	71.5
551	2017/05/04	17:47:37	66.7
552	2017/05/04	17:47:38	63.3
553	2017/05/04	17:47:39	64.1
554	2017/05/04	17:47:40	64.3
555	2017/05/04	17:47:41	65.1
556	2017/05/04	17:47:42	65.2
557	2017/05/04	17:47:43	68.4
558	2017/05/04	17:47:44	70.1
559	2017/05/04	17:47:45	68.6
560	2017/05/04	17:47:46	69.1
561	2017/05/04	17:47:47	65.4
562	2017/05/04	17:47:48	66.7
563	2017/05/04	17:47:49	71.1
564	2017/05/04	17:47:50	67.2
565	2017/05/04	17:47:51	64.7
566	2017/05/04	17:47:52	68.8
567	2017/05/04	17:47:53	68.9
568	2017/05/04	17:47:54	69.1
569	2017/05/04	17:47:55	68.2
570	2017/05/04	17:47:56	66.9
571	2017/05/04	17:47:57	67.4
572	2017/05/04	17:47:58	65.0
573	2017/05/04	17:47:59	60.5
574	2017/05/04	17:48:00	58.4
575	2017/05/04	17:48:01	60.1
576	2017/05/04	17:48:02	61.2
577	2017/05/04	17:48:03	61.9
578	2017/05/04	17:48:04	60.3
579	2017/05/04	17:48:05	61.8
580	2017/05/04	17:48:06	62.2
581	2017/05/04	17:48:07	63.9
582	2017/05/04	17:48:08	68.5
583	2017/05/04	17:48:09	70.5
584	2017/05/04	17:48:10	66.4
585	2017/05/04	17:48:11	64.0
586	2017/05/04	17:48:12	63.3
587	2017/05/04	17:48:13	66.4
588	2017/05/04	17:48:14	70.0
589	2017/05/04	17:48:15	74.7
590	2017/05/04	17:48:16	75.3
591	2017/05/04	17:48:17	74.7
592	2017/05/04	17:48:18	66.2
593	2017/05/04	17:48:19	61.2
594	2017/05/04	17:48:20	59.4
595	2017/05/04	17:48:21	58.8
596	2017/05/04	17:48:22	55.5
597	2017/05/04	17:48:23	55.8
598	2017/05/04	17:48:24	57.0
599	2017/05/04	17:48:25	55.3
600	2017/05/04	17:48:26	55.3
601	2017/05/04	17:48:27	55.4
602	2017/05/04	17:48:28	55.5
603	2017/05/04	17:48:29	55.8
604	2017/05/04	17:48:30	57.2
605	2017/05/04	17:48:31	58.0
606	2017/05/04	17:48:32	58.1
607	2017/05/04	17:48:33	59.2
608	2017/05/04	17:48:34	61.8
609	2017/05/04	17:48:35	61.2
610	2017/05/04	17:48:36	61.4
611	2017/05/04	17:48:37	60.2
612	2017/05/04	17:48:38	60.0

GuthrieRiverside_Loc3_05042017.s1mm

613	2017/05/04	17:48:39	61.9
614	2017/05/04	17:48:40	60.0
615	2017/05/04	17:48:41	56.9
616	2017/05/04	17:48:42	59.6
617	2017/05/04	17:48:43	59.0
618	2017/05/04	17:48:44	61.4
619	2017/05/04	17:48:45	64.1
620	2017/05/04	17:48:46	69.7
621	2017/05/04	17:48:47	73.2
622	2017/05/04	17:48:48	70.1
623	2017/05/04	17:48:49	63.8
624	2017/05/04	17:48:50	69.0
625	2017/05/04	17:48:51	73.9
626	2017/05/04	17:48:52	70.7
627	2017/05/04	17:48:53	68.4
628	2017/05/04	17:48:54	70.1
629	2017/05/04	17:48:55	70.4
630	2017/05/04	17:48:56	69.4
631	2017/05/04	17:48:57	71.8
632	2017/05/04	17:48:58	74.6
633	2017/05/04	17:48:59	76.2
634	2017/05/04	17:49:00	74.5
635	2017/05/04	17:49:01	70.7
636	2017/05/04	17:49:02	69.8
637	2017/05/04	17:49:03	67.6
638	2017/05/04	17:49:04	67.8
639	2017/05/04	17:49:05	71.4
640	2017/05/04	17:49:06	72.1
641	2017/05/04	17:49:07	68.7
642	2017/05/04	17:49:08	70.9
643	2017/05/04	17:49:09	69.5
644	2017/05/04	17:49:10	71.4
645	2017/05/04	17:49:11	78.0
646	2017/05/04	17:49:12	70.9
647	2017/05/04	17:49:13	70.9
648	2017/05/04	17:49:14	73.1
649	2017/05/04	17:49:15	67.5
650	2017/05/04	17:49:16	65.0
651	2017/05/04	17:49:17	66.1
652	2017/05/04	17:49:18	65.2
653	2017/05/04	17:49:19	66.4
654	2017/05/04	17:49:20	69.1
655	2017/05/04	17:49:21	72.7
656	2017/05/04	17:49:22	69.1
657	2017/05/04	17:49:23	70.1
658	2017/05/04	17:49:24	69.5
659	2017/05/04	17:49:25	72.0
660	2017/05/04	17:49:26	72.3
661	2017/05/04	17:49:27	67.8
662	2017/05/04	17:49:28	66.6
663	2017/05/04	17:49:29	68.0
664	2017/05/04	17:49:30	71.3
665	2017/05/04	17:49:31	70.9
666	2017/05/04	17:49:32	71.4
667	2017/05/04	17:49:33	68.6
668	2017/05/04	17:49:34	65.1
669	2017/05/04	17:49:35	65.3
670	2017/05/04	17:49:36	61.9
671	2017/05/04	17:49:37	64.6
672	2017/05/04	17:49:38	66.1
673	2017/05/04	17:49:39	66.1
674	2017/05/04	17:49:40	66.6
675	2017/05/04	17:49:41	64.0

GuthrieRiverside_Loc3_05042017.s1mm

676	2017/05/04	17:49:42	62.8
677	2017/05/04	17:49:43	63.0
678	2017/05/04	17:49:44	62.8
679	2017/05/04	17:49:45	62.5
680	2017/05/04	17:49:46	61.7
681	2017/05/04	17:49:47	61.9
682	2017/05/04	17:49:48	61.0
683	2017/05/04	17:49:49	60.9
684	2017/05/04	17:49:50	61.2
685	2017/05/04	17:49:51	60.2
686	2017/05/04	17:49:52	58.5
687	2017/05/04	17:49:53	58.0
688	2017/05/04	17:49:54	56.9
689	2017/05/04	17:49:55	56.3
690	2017/05/04	17:49:56	56.2
691	2017/05/04	17:49:57	55.6
692	2017/05/04	17:49:58	55.6
693	2017/05/04	17:49:59	58.4
694	2017/05/04	17:50:00	57.2
695	2017/05/04	17:50:01	56.3
696	2017/05/04	17:50:02	55.2
697	2017/05/04	17:50:03	55.4
698	2017/05/04	17:50:04	55.7
699	2017/05/04	17:50:05	56.6
700	2017/05/04	17:50:06	58.5
701	2017/05/04	17:50:07	60.6
702	2017/05/04	17:50:08	61.4
703	2017/05/04	17:50:09	62.1
704	2017/05/04	17:50:10	62.3
705	2017/05/04	17:50:11	65.9
706	2017/05/04	17:50:12	69.5
707	2017/05/04	17:50:13	76.6
708	2017/05/04	17:50:14	73.4
709	2017/05/04	17:50:15	69.7
710	2017/05/04	17:50:16	71.6
711	2017/05/04	17:50:17	69.7
712	2017/05/04	17:50:18	68.6
713	2017/05/04	17:50:19	71.2
714	2017/05/04	17:50:20	73.8
715	2017/05/04	17:50:21	73.3
716	2017/05/04	17:50:22	74.0
717	2017/05/04	17:50:23	78.2
718	2017/05/04	17:50:24	78.1
719	2017/05/04	17:50:25	74.0
720	2017/05/04	17:50:26	76.3
721	2017/05/04	17:50:27	72.3
722	2017/05/04	17:50:28	70.1
723	2017/05/04	17:50:29	73.3
724	2017/05/04	17:50:30	71.4
725	2017/05/04	17:50:31	68.7
726	2017/05/04	17:50:32	68.7
727	2017/05/04	17:50:33	66.4
728	2017/05/04	17:50:34	65.6
729	2017/05/04	17:50:35	66.7
730	2017/05/04	17:50:36	71.3
731	2017/05/04	17:50:37	69.4
732	2017/05/04	17:50:38	73.8
733	2017/05/04	17:50:39	70.6
734	2017/05/04	17:50:40	71.3
735	2017/05/04	17:50:41	71.8
736	2017/05/04	17:50:42	70.9
737	2017/05/04	17:50:43	65.2
738	2017/05/04	17:50:44	64.1

GuthrieRiverside_Loc3_05042017.s1mm

739	2017/05/04	17:50:45	68.4
740	2017/05/04	17:50:46	70.8
741	2017/05/04	17:50:47	72.3
742	2017/05/04	17:50:48	68.3
743	2017/05/04	17:50:49	65.6
744	2017/05/04	17:50:50	68.2
745	2017/05/04	17:50:51	72.2
746	2017/05/04	17:50:52	71.9
747	2017/05/04	17:50:53	72.0
748	2017/05/04	17:50:54	72.2
749	2017/05/04	17:50:55	73.3
750	2017/05/04	17:50:56	73.8
751	2017/05/04	17:50:57	74.2
752	2017/05/04	17:50:58	75.0
753	2017/05/04	17:50:59	73.6
754	2017/05/04	17:51:00	72.2
755	2017/05/04	17:51:01	69.3
756	2017/05/04	17:51:02	64.8
757	2017/05/04	17:51:03	64.1
758	2017/05/04	17:51:04	65.5
759	2017/05/04	17:51:05	69.8
760	2017/05/04	17:51:06	73.4
761	2017/05/04	17:51:07	69.4
762	2017/05/04	17:51:08	67.4
763	2017/05/04	17:51:09	68.7
764	2017/05/04	17:51:10	66.2
765	2017/05/04	17:51:11	66.0
766	2017/05/04	17:51:12	69.2
767	2017/05/04	17:51:13	68.0
768	2017/05/04	17:51:14	61.8
769	2017/05/04	17:51:15	60.3
770	2017/05/04	17:51:16	63.9
771	2017/05/04	17:51:17	67.7
772	2017/05/04	17:51:18	69.0
773	2017/05/04	17:51:19	67.0
774	2017/05/04	17:51:20	65.0
775	2017/05/04	17:51:21	66.0
776	2017/05/04	17:51:22	69.1
777	2017/05/04	17:51:23	69.6
778	2017/05/04	17:51:24	67.0
779	2017/05/04	17:51:25	65.0
780	2017/05/04	17:51:26	64.4
781	2017/05/04	17:51:27	67.6
782	2017/05/04	17:51:28	70.6
783	2017/05/04	17:51:29	68.1
784	2017/05/04	17:51:30	69.6
785	2017/05/04	17:51:31	72.1
786	2017/05/04	17:51:32	69.6
787	2017/05/04	17:51:33	66.2
788	2017/05/04	17:51:34	67.5
789	2017/05/04	17:51:35	69.0
790	2017/05/04	17:51:36	68.7
791	2017/05/04	17:51:37	68.5
792	2017/05/04	17:51:38	67.8
793	2017/05/04	17:51:39	65.5
794	2017/05/04	17:51:40	60.6
795	2017/05/04	17:51:41	59.9
796	2017/05/04	17:51:42	58.5
797	2017/05/04	17:51:43	60.3
798	2017/05/04	17:51:44	61.9
799	2017/05/04	17:51:45	63.5
800	2017/05/04	17:51:46	65.1
801	2017/05/04	17:51:47	69.2

GuthrieRiverside_Loc3_05042017.s1mm

802	2017/05/04	17:51:48	67.3
803	2017/05/04	17:51:49	66.0
804	2017/05/04	17:51:50	63.9
805	2017/05/04	17:51:51	65.9
806	2017/05/04	17:51:52	62.6
807	2017/05/04	17:51:53	61.3
808	2017/05/04	17:51:54	60.7
809	2017/05/04	17:51:55	61.6
810	2017/05/04	17:51:56	60.8
811	2017/05/04	17:51:57	60.1
812	2017/05/04	17:51:58	62.1
813	2017/05/04	17:51:59	64.4
814	2017/05/04	17:52:00	64.4
815	2017/05/04	17:52:01	64.9
816	2017/05/04	17:52:02	68.5
817	2017/05/04	17:52:03	72.2
818	2017/05/04	17:52:04	73.0
819	2017/05/04	17:52:05	74.5
820	2017/05/04	17:52:06	77.9
821	2017/05/04	17:52:07	76.7
822	2017/05/04	17:52:08	73.3
823	2017/05/04	17:52:09	73.5
824	2017/05/04	17:52:10	71.8
825	2017/05/04	17:52:11	72.5
826	2017/05/04	17:52:12	74.0
827	2017/05/04	17:52:13	71.3
828	2017/05/04	17:52:14	74.2
829	2017/05/04	17:52:15	76.0
830	2017/05/04	17:52:16	77.3
831	2017/05/04	17:52:17	74.5
832	2017/05/04	17:52:18	72.4
833	2017/05/04	17:52:19	71.9
834	2017/05/04	17:52:20	73.3
835	2017/05/04	17:52:21	70.9
836	2017/05/04	17:52:22	72.2
837	2017/05/04	17:52:23	69.5
838	2017/05/04	17:52:24	69.9
839	2017/05/04	17:52:25	70.5
840	2017/05/04	17:52:26	69.9
841	2017/05/04	17:52:27	70.7
842	2017/05/04	17:52:28	70.9
843	2017/05/04	17:52:29	73.3
844	2017/05/04	17:52:30	68.1
845	2017/05/04	17:52:31	74.0
846	2017/05/04	17:52:32	70.6
847	2017/05/04	17:52:33	63.6
848	2017/05/04	17:52:34	60.2
849	2017/05/04	17:52:35	58.7
850	2017/05/04	17:52:36	57.8
851	2017/05/04	17:52:37	59.8
852	2017/05/04	17:52:38	58.9
853	2017/05/04	17:52:39	59.0
854	2017/05/04	17:52:40	58.9
855	2017/05/04	17:52:41	59.5
856	2017/05/04	17:52:42	63.2
857	2017/05/04	17:52:43	68.8
858	2017/05/04	17:52:44	66.8
859	2017/05/04	17:52:45	66.7
860	2017/05/04	17:52:46	66.8
861	2017/05/04	17:52:47	64.4
862	2017/05/04	17:52:48	64.8
863	2017/05/04	17:52:49	65.9
864	2017/05/04	17:52:50	66.7

GuthrieRiverside_Loc3_05042017.s1mm

865	2017/05/04	17:52:51	71.8
866	2017/05/04	17:52:52	77.0
867	2017/05/04	17:52:53	74.1
868	2017/05/04	17:52:54	71.3
869	2017/05/04	17:52:55	72.0
870	2017/05/04	17:52:56	71.1
871	2017/05/04	17:52:57	68.0
872	2017/05/04	17:52:58	68.2
873	2017/05/04	17:52:59	69.6
874	2017/05/04	17:53:00	68.1
875	2017/05/04	17:53:01	64.4
876	2017/05/04	17:53:02	64.7
877	2017/05/04	17:53:03	66.2
878	2017/05/04	17:53:04	66.0
879	2017/05/04	17:53:05	68.6
880	2017/05/04	17:53:06	68.2
881	2017/05/04	17:53:07	68.3
882	2017/05/04	17:53:08	67.5
883	2017/05/04	17:53:09	67.1
884	2017/05/04	17:53:10	69.9
885	2017/05/04	17:53:11	68.1
886	2017/05/04	17:53:12	66.1
887	2017/05/04	17:53:13	65.6
888	2017/05/04	17:53:14	62.8
889	2017/05/04	17:53:15	61.4
890	2017/05/04	17:53:16	60.8
891	2017/05/04	17:53:17	58.5
892	2017/05/04	17:53:18	59.0
893	2017/05/04	17:53:19	58.3
894	2017/05/04	17:53:20	56.9
895	2017/05/04	17:53:21	58.4
896	2017/05/04	17:53:22	58.8
897	2017/05/04	17:53:23	57.7
898	2017/05/04	17:53:24	57.7
899	2017/05/04	17:53:25	57.3
900	2017/05/04	17:53:26	55.6

Data Logger
Location 4

Leq: 73.0
 L(10): 72.2
 L(50): 66.3
 L(90): 60.6
 LMax: 98.1
 LMin: 56.1
 Peak: 104.8

A
 FAST
 40-100

2017/05/04 17:15:04

No.s	Date Time	dB
1	2017/05/04 17:09:23	68.3
2	2017/05/04 17:09:24	70.0
3	2017/05/04 17:09:25	69.7
4	2017/05/04 17:09:26	69.9
5	2017/05/04 17:09:27	69.9
6	2017/05/04 17:09:28	69.0
7	2017/05/04 17:09:29	68.0
8	2017/05/04 17:09:30	66.3
9	2017/05/04 17:09:31	64.0
10	2017/05/04 17:09:32	62.5
11	2017/05/04 17:09:33	61.8
12	2017/05/04 17:09:34	61.0
13	2017/05/04 17:09:35	59.9
14	2017/05/04 17:09:36	60.0
15	2017/05/04 17:09:37	61.2
16	2017/05/04 17:09:38	60.2
17	2017/05/04 17:09:39	59.8
18	2017/05/04 17:09:40	60.8
19	2017/05/04 17:09:41	67.1
20	2017/05/04 17:09:42	64.5
21	2017/05/04 17:09:43	63.9
22	2017/05/04 17:09:44	66.4
23	2017/05/04 17:09:45	66.0
24	2017/05/04 17:09:46	65.0
25	2017/05/04 17:09:47	64.4
26	2017/05/04 17:09:48	60.6
27	2017/05/04 17:09:49	61.4
28	2017/05/04 17:09:50	60.7
29	2017/05/04 17:09:51	63.7
30	2017/05/04 17:09:52	63.3
31	2017/05/04 17:09:53	63.7
32	2017/05/04 17:09:54	65.7
33	2017/05/04 17:09:55	64.4
34	2017/05/04 17:09:56	65.5
35	2017/05/04 17:09:57	65.8
36	2017/05/04 17:09:58	68.1
37	2017/05/04 17:09:59	70.3
38	2017/05/04 17:10:00	70.5
39	2017/05/04 17:10:01	70.7
40	2017/05/04 17:10:02	74.5
41	2017/05/04 17:10:03	70.7
42	2017/05/04 17:10:04	68.4
43	2017/05/04 17:10:05	65.7
44	2017/05/04 17:10:06	64.8
45	2017/05/04 17:10:07	63.9

GuthrieRiverside_Loc4_05042017.s1mm

46	2017/05/04	17:10:08	64.0
47	2017/05/04	17:10:09	64.9
48	2017/05/04	17:10:10	63.7
49	2017/05/04	17:10:11	69.4
50	2017/05/04	17:10:12	71.5
51	2017/05/04	17:10:13	66.6
52	2017/05/04	17:10:14	71.5
53	2017/05/04	17:10:15	83.8
54	2017/05/04	17:10:16	75.4
55	2017/05/04	17:10:17	76.3
56	2017/05/04	17:10:18	78.6
57	2017/05/04	17:10:19	78.7
58	2017/05/04	17:10:20	85.1
59	2017/05/04	17:10:21	77.5
60	2017/05/04	17:10:22	72.0
61	2017/05/04	17:10:23	73.9
62	2017/05/04	17:10:24	72.4
63	2017/05/04	17:10:25	70.0
64	2017/05/04	17:10:26	72.2
65	2017/05/04	17:10:27	72.8
66	2017/05/04	17:10:28	76.2
67	2017/05/04	17:10:29	73.3
68	2017/05/04	17:10:30	71.6
69	2017/05/04	17:10:31	69.5
70	2017/05/04	17:10:32	69.2
71	2017/05/04	17:10:33	69.5
72	2017/05/04	17:10:34	68.4
73	2017/05/04	17:10:35	68.4
74	2017/05/04	17:10:36	68.1
75	2017/05/04	17:10:37	68.6
76	2017/05/04	17:10:38	68.2
77	2017/05/04	17:10:39	68.6
78	2017/05/04	17:10:40	69.0
79	2017/05/04	17:10:41	66.8
80	2017/05/04	17:10:42	69.5
81	2017/05/04	17:10:43	70.6
82	2017/05/04	17:10:44	68.2
83	2017/05/04	17:10:45	66.2
84	2017/05/04	17:10:46	65.6
85	2017/05/04	17:10:47	65.4
86	2017/05/04	17:10:48	71.2
87	2017/05/04	17:10:49	70.7
88	2017/05/04	17:10:50	71.0
89	2017/05/04	17:10:51	71.4
90	2017/05/04	17:10:52	71.3
91	2017/05/04	17:10:53	69.1
92	2017/05/04	17:10:54	66.8
93	2017/05/04	17:10:55	65.4
94	2017/05/04	17:10:56	65.4
95	2017/05/04	17:10:57	65.5
96	2017/05/04	17:10:58	66.0
97	2017/05/04	17:10:59	67.7
98	2017/05/04	17:11:00	70.0
99	2017/05/04	17:11:01	65.1
100	2017/05/04	17:11:02	66.0
101	2017/05/04	17:11:03	68.8
102	2017/05/04	17:11:04	69.9
103	2017/05/04	17:11:05	66.2
104	2017/05/04	17:11:06	63.9
105	2017/05/04	17:11:07	61.2
106	2017/05/04	17:11:08	60.8
107	2017/05/04	17:11:09	62.3
108	2017/05/04	17:11:10	61.4

GuthrieRiverside_Loc4_05042017.s1mm

109	2017/05/04	17:11:11	61.4
110	2017/05/04	17:11:12	60.7
111	2017/05/04	17:11:13	59.6
112	2017/05/04	17:11:14	59.1
113	2017/05/04	17:11:15	58.8
114	2017/05/04	17:11:16	59.4
115	2017/05/04	17:11:17	60.9
116	2017/05/04	17:11:18	59.6
117	2017/05/04	17:11:19	59.9
118	2017/05/04	17:11:20	60.9
119	2017/05/04	17:11:21	61.8
120	2017/05/04	17:11:22	61.1
121	2017/05/04	17:11:23	61.1
122	2017/05/04	17:11:24	60.7
123	2017/05/04	17:11:25	61.9
124	2017/05/04	17:11:26	61.2
125	2017/05/04	17:11:27	61.6
126	2017/05/04	17:11:28	64.6
127	2017/05/04	17:11:29	68.3
128	2017/05/04	17:11:30	68.7
129	2017/05/04	17:11:31	68.7
130	2017/05/04	17:11:32	69.6
131	2017/05/04	17:11:33	70.2
132	2017/05/04	17:11:34	72.1
133	2017/05/04	17:11:35	69.4
134	2017/05/04	17:11:36	66.8
135	2017/05/04	17:11:37	67.4
136	2017/05/04	17:11:38	67.7
137	2017/05/04	17:11:39	68.7
138	2017/05/04	17:11:40	64.3
139	2017/05/04	17:11:41	61.8
140	2017/05/04	17:11:42	61.4
141	2017/05/04	17:11:43	62.7
142	2017/05/04	17:11:44	63.7
143	2017/05/04	17:11:45	65.3
144	2017/05/04	17:11:46	68.3
145	2017/05/04	17:11:47	66.7
146	2017/05/04	17:11:48	71.2
147	2017/05/04	17:11:49	74.4
148	2017/05/04	17:11:50	77.8
149	2017/05/04	17:11:51	73.2
150	2017/05/04	17:11:52	67.4
151	2017/05/04	17:11:53	64.7
152	2017/05/04	17:11:54	65.2
153	2017/05/04	17:11:55	66.3
154	2017/05/04	17:11:56	66.6
155	2017/05/04	17:11:57	65.4
156	2017/05/04	17:11:58	62.0
157	2017/05/04	17:11:59	60.4
158	2017/05/04	17:12:00	61.9
159	2017/05/04	17:12:01	61.8
160	2017/05/04	17:12:02	60.1
161	2017/05/04	17:12:03	60.1
162	2017/05/04	17:12:04	61.3
163	2017/05/04	17:12:05	63.7
164	2017/05/04	17:12:06	65.0
165	2017/05/04	17:12:07	64.4
166	2017/05/04	17:12:08	67.2
167	2017/05/04	17:12:09	69.4
168	2017/05/04	17:12:10	71.3
169	2017/05/04	17:12:11	71.9
170	2017/05/04	17:12:12	71.3
171	2017/05/04	17:12:13	72.2

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172	2017/05/04	17:12:14	72.8
173	2017/05/04	17:12:15	70.5
174	2017/05/04	17:12:16	71.6
175	2017/05/04	17:12:17	72.4
176	2017/05/04	17:12:18	71.1
177	2017/05/04	17:12:19	69.5
178	2017/05/04	17:12:20	69.5
179	2017/05/04	17:12:21	69.3
180	2017/05/04	17:12:22	70.8
181	2017/05/04	17:12:23	70.9
182	2017/05/04	17:12:24	70.0
183	2017/05/04	17:12:25	66.9
184	2017/05/04	17:12:26	67.6
185	2017/05/04	17:12:27	67.5
186	2017/05/04	17:12:28	69.8
187	2017/05/04	17:12:29	72.8
188	2017/05/04	17:12:30	70.9
189	2017/05/04	17:12:31	72.1
190	2017/05/04	17:12:32	69.5
191	2017/05/04	17:12:33	69.6
192	2017/05/04	17:12:34	68.2
193	2017/05/04	17:12:35	68.1
194	2017/05/04	17:12:36	67.9
195	2017/05/04	17:12:37	65.7
196	2017/05/04	17:12:38	64.4
197	2017/05/04	17:12:39	68.5
198	2017/05/04	17:12:40	74.3
199	2017/05/04	17:12:41	67.5
200	2017/05/04	17:12:42	66.1
201	2017/05/04	17:12:43	65.5
202	2017/05/04	17:12:44	68.6
203	2017/05/04	17:12:45	70.2
204	2017/05/04	17:12:46	70.9
205	2017/05/04	17:12:47	73.3
206	2017/05/04	17:12:48	72.2
207	2017/05/04	17:12:49	71.5
208	2017/05/04	17:12:50	73.7
209	2017/05/04	17:12:51	77.3
210	2017/05/04	17:12:52	77.2
211	2017/05/04	17:12:53	76.2
212	2017/05/04	17:12:54	73.3
213	2017/05/04	17:12:55	69.9
214	2017/05/04	17:12:56	69.2
215	2017/05/04	17:12:57	67.8
216	2017/05/04	17:12:58	68.6
217	2017/05/04	17:12:59	69.6
218	2017/05/04	17:13:00	70.5
219	2017/05/04	17:13:01	71.4
220	2017/05/04	17:13:02	71.1
221	2017/05/04	17:13:03	72.1
222	2017/05/04	17:13:04	69.8
223	2017/05/04	17:13:05	71.9
224	2017/05/04	17:13:06	71.8
225	2017/05/04	17:13:07	68.5
226	2017/05/04	17:13:08	67.7
227	2017/05/04	17:13:09	68.1
228	2017/05/04	17:13:10	68.8
229	2017/05/04	17:13:11	64.4
230	2017/05/04	17:13:12	63.2
231	2017/05/04	17:13:13	62.6
232	2017/05/04	17:13:14	62.3
233	2017/05/04	17:13:15	60.9
234	2017/05/04	17:13:16	60.6

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235	2017/05/04	17:13:17	59.6
236	2017/05/04	17:13:18	58.8
237	2017/05/04	17:13:19	59.9
238	2017/05/04	17:13:20	59.5
239	2017/05/04	17:13:21	60.3
240	2017/05/04	17:13:22	60.0
241	2017/05/04	17:13:23	58.1
242	2017/05/04	17:13:24	58.6
243	2017/05/04	17:13:25	59.3
244	2017/05/04	17:13:26	61.8
245	2017/05/04	17:13:27	64.9
246	2017/05/04	17:13:28	68.6
247	2017/05/04	17:13:29	67.8
248	2017/05/04	17:13:30	62.8
249	2017/05/04	17:13:31	61.1
250	2017/05/04	17:13:32	62.2
251	2017/05/04	17:13:33	58.9
252	2017/05/04	17:13:34	59.2
253	2017/05/04	17:13:35	58.1
254	2017/05/04	17:13:36	58.8
255	2017/05/04	17:13:37	58.7
256	2017/05/04	17:13:38	59.6
257	2017/05/04	17:13:39	61.1
258	2017/05/04	17:13:40	64.1
259	2017/05/04	17:13:41	67.0
260	2017/05/04	17:13:42	67.0
261	2017/05/04	17:13:43	62.1
262	2017/05/04	17:13:44	60.4
263	2017/05/04	17:13:45	59.2
264	2017/05/04	17:13:46	59.2
265	2017/05/04	17:13:47	61.1
266	2017/05/04	17:13:48	62.7
267	2017/05/04	17:13:49	63.3
268	2017/05/04	17:13:50	64.4
269	2017/05/04	17:13:51	66.6
270	2017/05/04	17:13:52	67.2
271	2017/05/04	17:13:53	68.8
272	2017/05/04	17:13:54	69.6
273	2017/05/04	17:13:55	68.5
274	2017/05/04	17:13:56	67.6
275	2017/05/04	17:13:57	68.1
276	2017/05/04	17:13:58	66.7
277	2017/05/04	17:13:59	66.3
278	2017/05/04	17:14:00	65.9
279	2017/05/04	17:14:01	64.1
280	2017/05/04	17:14:02	64.6
281	2017/05/04	17:14:03	65.6
282	2017/05/04	17:14:04	67.2
283	2017/05/04	17:14:05	69.4
284	2017/05/04	17:14:06	70.4
285	2017/05/04	17:14:07	69.9
286	2017/05/04	17:14:08	72.1
287	2017/05/04	17:14:09	70.4
288	2017/05/04	17:14:10	69.0
289	2017/05/04	17:14:11	71.3
290	2017/05/04	17:14:12	68.6
291	2017/05/04	17:14:13	66.4
292	2017/05/04	17:14:14	67.6
293	2017/05/04	17:14:15	67.4
294	2017/05/04	17:14:16	68.4
295	2017/05/04	17:14:17	69.0
296	2017/05/04	17:14:18	71.1
297	2017/05/04	17:14:19	65.4

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298	2017/05/04	17:14:20	65.0
299	2017/05/04	17:14:21	66.6
300	2017/05/04	17:14:22	67.0
301	2017/05/04	17:14:23	64.3
302	2017/05/04	17:14:24	63.4
303	2017/05/04	17:14:25	64.7
304	2017/05/04	17:14:26	66.2
305	2017/05/04	17:14:27	67.6
306	2017/05/04	17:14:28	69.4
307	2017/05/04	17:14:29	70.9
308	2017/05/04	17:14:30	70.1
309	2017/05/04	17:14:31	68.5
310	2017/05/04	17:14:32	65.3
311	2017/05/04	17:14:33	63.2
312	2017/05/04	17:14:34	63.8
313	2017/05/04	17:14:35	67.1
314	2017/05/04	17:14:36	65.1
315	2017/05/04	17:14:37	62.6
316	2017/05/04	17:14:38	62.7
317	2017/05/04	17:14:39	74.3
318	2017/05/04	17:14:40	66.3
319	2017/05/04	17:14:41	65.0
320	2017/05/04	17:14:42	65.0
321	2017/05/04	17:14:43	68.1
322	2017/05/04	17:14:44	73.5
323	2017/05/04	17:14:45	68.1
324	2017/05/04	17:14:46	67.0
325	2017/05/04	17:14:47	73.0
326	2017/05/04	17:14:48	72.9
327	2017/05/04	17:14:49	76.7
328	2017/05/04	17:14:50	73.3
329	2017/05/04	17:14:51	76.3
330	2017/05/04	17:14:52	76.9
331	2017/05/04	17:14:53	78.8
332	2017/05/04	17:14:54	82.5
333	2017/05/04	17:14:55	79.9
334	2017/05/04	17:14:56	83.2
335	2017/05/04	17:14:57	81.9
336	2017/05/04	17:14:58	86.3
337	2017/05/04	17:14:59	87.2
338	2017/05/04	17:15:00	90.1
339	2017/05/04	17:15:01	94.3
340	2017/05/04	17:15:02	91.3
341	2017/05/04	17:15:03	92.9
342	2017/05/04	17:15:04	96.6
343	2017/05/04	17:15:05	84.4
344	2017/05/04	17:15:06	78.1
345	2017/05/04	17:15:07	75.8
346	2017/05/04	17:15:08	64.5
347	2017/05/04	17:15:09	65.5
348	2017/05/04	17:15:10	70.4
349	2017/05/04	17:15:11	71.9
350	2017/05/04	17:15:12	70.2
351	2017/05/04	17:15:13	65.0
352	2017/05/04	17:15:14	67.0
353	2017/05/04	17:15:15	65.1
354	2017/05/04	17:15:16	59.7
355	2017/05/04	17:15:17	60.3
356	2017/05/04	17:15:18	60.6
357	2017/05/04	17:15:19	62.0
358	2017/05/04	17:15:20	60.8
359	2017/05/04	17:15:21	62.2
360	2017/05/04	17:15:22	65.2

GuthrieRiverside_Loc4_05042017.s1mm

361	2017/05/04	17:15:23	64.1
362	2017/05/04	17:15:24	65.1
363	2017/05/04	17:15:25	67.7
364	2017/05/04	17:15:26	69.7
365	2017/05/04	17:15:27	70.8
366	2017/05/04	17:15:28	69.6
367	2017/05/04	17:15:29	68.2
368	2017/05/04	17:15:30	69.5
369	2017/05/04	17:15:31	62.9
370	2017/05/04	17:15:32	62.1
371	2017/05/04	17:15:33	61.2
372	2017/05/04	17:15:34	62.1
373	2017/05/04	17:15:35	63.1
374	2017/05/04	17:15:36	63.7
375	2017/05/04	17:15:37	64.5
376	2017/05/04	17:15:38	64.4
377	2017/05/04	17:15:39	64.1
378	2017/05/04	17:15:40	64.6
379	2017/05/04	17:15:41	65.0
380	2017/05/04	17:15:42	65.1
381	2017/05/04	17:15:43	63.8
382	2017/05/04	17:15:44	64.3
383	2017/05/04	17:15:45	68.3
384	2017/05/04	17:15:46	70.2
385	2017/05/04	17:15:47	67.5
386	2017/05/04	17:15:48	66.4
387	2017/05/04	17:15:49	67.7
388	2017/05/04	17:15:50	67.0
389	2017/05/04	17:15:51	67.7
390	2017/05/04	17:15:52	68.0
391	2017/05/04	17:15:53	70.9
392	2017/05/04	17:15:54	73.3
393	2017/05/04	17:15:55	76.0
394	2017/05/04	17:15:56	78.7
395	2017/05/04	17:15:57	76.6
396	2017/05/04	17:15:58	72.1
397	2017/05/04	17:15:59	69.6
398	2017/05/04	17:16:00	69.2
399	2017/05/04	17:16:01	67.4
400	2017/05/04	17:16:02	69.0
401	2017/05/04	17:16:03	70.5
402	2017/05/04	17:16:04	70.9
403	2017/05/04	17:16:05	70.4
404	2017/05/04	17:16:06	70.3
405	2017/05/04	17:16:07	70.3
406	2017/05/04	17:16:08	67.3
407	2017/05/04	17:16:09	68.3
408	2017/05/04	17:16:10	68.3
409	2017/05/04	17:16:11	67.9
410	2017/05/04	17:16:12	68.2
411	2017/05/04	17:16:13	69.9
412	2017/05/04	17:16:14	68.0
413	2017/05/04	17:16:15	68.1
414	2017/05/04	17:16:16	69.8
415	2017/05/04	17:16:17	76.2
416	2017/05/04	17:16:18	77.4
417	2017/05/04	17:16:19	72.6
418	2017/05/04	17:16:20	73.3
419	2017/05/04	17:16:21	78.2
420	2017/05/04	17:16:22	81.0
421	2017/05/04	17:16:23	80.2
422	2017/05/04	17:16:24	77.0
423	2017/05/04	17:16:25	79.3

GuthrieRiverside_Loc4_05042017.s1mm

424	2017/05/04	17:16:26	77.9
425	2017/05/04	17:16:27	73.1
426	2017/05/04	17:16:28	70.0
427	2017/05/04	17:16:29	65.6
428	2017/05/04	17:16:30	63.3
429	2017/05/04	17:16:31	65.2
430	2017/05/04	17:16:32	68.1
431	2017/05/04	17:16:33	64.0
432	2017/05/04	17:16:34	65.0
433	2017/05/04	17:16:35	65.0
434	2017/05/04	17:16:36	64.2
435	2017/05/04	17:16:37	63.4
436	2017/05/04	17:16:38	63.6
437	2017/05/04	17:16:39	63.8
438	2017/05/04	17:16:40	64.0
439	2017/05/04	17:16:41	65.0
440	2017/05/04	17:16:42	66.4
441	2017/05/04	17:16:43	66.8
442	2017/05/04	17:16:44	66.5
443	2017/05/04	17:16:45	66.8
444	2017/05/04	17:16:46	66.4
445	2017/05/04	17:16:47	65.4
446	2017/05/04	17:16:48	65.3
447	2017/05/04	17:16:49	64.7
448	2017/05/04	17:16:50	63.6
449	2017/05/04	17:16:51	63.2
450	2017/05/04	17:16:52	65.0
451	2017/05/04	17:16:53	67.5
452	2017/05/04	17:16:54	64.5
453	2017/05/04	17:16:55	63.2
454	2017/05/04	17:16:56	63.1
455	2017/05/04	17:16:57	62.6
456	2017/05/04	17:16:58	62.4
457	2017/05/04	17:16:59	62.1
458	2017/05/04	17:17:00	63.7
459	2017/05/04	17:17:01	64.5
460	2017/05/04	17:17:02	64.7
461	2017/05/04	17:17:03	64.2
462	2017/05/04	17:17:04	62.6
463	2017/05/04	17:17:05	63.8
464	2017/05/04	17:17:06	66.2
465	2017/05/04	17:17:07	62.0
466	2017/05/04	17:17:08	61.1
467	2017/05/04	17:17:09	61.4
468	2017/05/04	17:17:10	61.6
469	2017/05/04	17:17:11	61.5
470	2017/05/04	17:17:12	62.8
471	2017/05/04	17:17:13	63.7
472	2017/05/04	17:17:14	61.8
473	2017/05/04	17:17:15	62.5
474	2017/05/04	17:17:16	63.0
475	2017/05/04	17:17:17	64.6
476	2017/05/04	17:17:18	66.7
477	2017/05/04	17:17:19	69.0
478	2017/05/04	17:17:20	68.3
479	2017/05/04	17:17:21	71.1
480	2017/05/04	17:17:22	72.2
481	2017/05/04	17:17:23	70.6
482	2017/05/04	17:17:24	71.1
483	2017/05/04	17:17:25	69.6
484	2017/05/04	17:17:26	71.5
485	2017/05/04	17:17:27	76.2
486	2017/05/04	17:17:28	75.4

GuthrieRiverside_Loc4_05042017.s1mm

487	2017/05/04	17:17:29	69.8
488	2017/05/04	17:17:30	75.7
489	2017/05/04	17:17:31	75.5
490	2017/05/04	17:17:32	72.0
491	2017/05/04	17:17:33	68.9
492	2017/05/04	17:17:34	67.1
493	2017/05/04	17:17:35	66.2
494	2017/05/04	17:17:36	67.2
495	2017/05/04	17:17:37	67.5
496	2017/05/04	17:17:38	67.5
497	2017/05/04	17:17:39	66.4
498	2017/05/04	17:17:40	65.8
499	2017/05/04	17:17:41	64.9
500	2017/05/04	17:17:42	64.0
501	2017/05/04	17:17:43	64.2
502	2017/05/04	17:17:44	64.8
503	2017/05/04	17:17:45	67.4
504	2017/05/04	17:17:46	67.2
505	2017/05/04	17:17:47	66.2
506	2017/05/04	17:17:48	66.9
507	2017/05/04	17:17:49	66.7
508	2017/05/04	17:17:50	66.4
509	2017/05/04	17:17:51	65.8
510	2017/05/04	17:17:52	66.2
511	2017/05/04	17:17:53	72.0
512	2017/05/04	17:17:54	70.4
513	2017/05/04	17:17:55	70.0
514	2017/05/04	17:17:56	66.1
515	2017/05/04	17:17:57	66.1
516	2017/05/04	17:17:58	65.4
517	2017/05/04	17:17:59	67.2
518	2017/05/04	17:18:00	68.3
519	2017/05/04	17:18:01	66.7
520	2017/05/04	17:18:02	65.8
521	2017/05/04	17:18:03	66.6
522	2017/05/04	17:18:04	65.9
523	2017/05/04	17:18:05	67.1
524	2017/05/04	17:18:06	67.1
525	2017/05/04	17:18:07	68.8
526	2017/05/04	17:18:08	68.9
527	2017/05/04	17:18:09	69.6
528	2017/05/04	17:18:10	67.9
529	2017/05/04	17:18:11	67.6
530	2017/05/04	17:18:12	68.2
531	2017/05/04	17:18:13	66.4
532	2017/05/04	17:18:14	63.6
533	2017/05/04	17:18:15	63.9
534	2017/05/04	17:18:16	66.5
535	2017/05/04	17:18:17	70.6
536	2017/05/04	17:18:18	70.2
537	2017/05/04	17:18:19	70.1
538	2017/05/04	17:18:20	71.5
539	2017/05/04	17:18:21	75.5
540	2017/05/04	17:18:22	66.1
541	2017/05/04	17:18:23	62.8
542	2017/05/04	17:18:24	63.5
543	2017/05/04	17:18:25	63.3
544	2017/05/04	17:18:26	62.6
545	2017/05/04	17:18:27	65.3
546	2017/05/04	17:18:28	66.1
547	2017/05/04	17:18:29	68.0
548	2017/05/04	17:18:30	69.0
549	2017/05/04	17:18:31	69.7

GuthrieRiverside_Loc4_05042017.s1mm

550	2017/05/04	17:18:32	70.1
551	2017/05/04	17:18:33	69.6
552	2017/05/04	17:18:34	68.4
553	2017/05/04	17:18:35	65.2
554	2017/05/04	17:18:36	62.7
555	2017/05/04	17:18:37	61.1
556	2017/05/04	17:18:38	60.5
557	2017/05/04	17:18:39	60.8
558	2017/05/04	17:18:40	60.8
559	2017/05/04	17:18:41	61.3
560	2017/05/04	17:18:42	61.5
561	2017/05/04	17:18:43	62.0
562	2017/05/04	17:18:44	60.5
563	2017/05/04	17:18:45	61.2
564	2017/05/04	17:18:46	63.6
565	2017/05/04	17:18:47	66.5
566	2017/05/04	17:18:48	66.9
567	2017/05/04	17:18:49	67.2
568	2017/05/04	17:18:50	62.9
569	2017/05/04	17:18:51	61.7
570	2017/05/04	17:18:52	62.1
571	2017/05/04	17:18:53	63.6
572	2017/05/04	17:18:54	66.6
573	2017/05/04	17:18:55	64.8
574	2017/05/04	17:18:56	60.1
575	2017/05/04	17:18:57	58.9
576	2017/05/04	17:18:58	58.0
577	2017/05/04	17:18:59	57.8
578	2017/05/04	17:19:00	57.6
579	2017/05/04	17:19:01	57.7
580	2017/05/04	17:19:02	57.5
581	2017/05/04	17:19:03	57.9
582	2017/05/04	17:19:04	58.4
583	2017/05/04	17:19:05	58.6
584	2017/05/04	17:19:06	57.1
585	2017/05/04	17:19:07	56.9
586	2017/05/04	17:19:08	58.1
587	2017/05/04	17:19:09	58.3
588	2017/05/04	17:19:10	60.2
589	2017/05/04	17:19:11	60.7
590	2017/05/04	17:19:12	59.2
591	2017/05/04	17:19:13	61.2
592	2017/05/04	17:19:14	61.9
593	2017/05/04	17:19:15	63.7
594	2017/05/04	17:19:16	64.5
595	2017/05/04	17:19:17	66.3
596	2017/05/04	17:19:18	66.7
597	2017/05/04	17:19:19	64.6
598	2017/05/04	17:19:20	64.1
599	2017/05/04	17:19:21	65.5
600	2017/05/04	17:19:22	67.4
601	2017/05/04	17:19:23	66.1
602	2017/05/04	17:19:24	63.4
603	2017/05/04	17:19:25	62.4
604	2017/05/04	17:19:26	62.5
605	2017/05/04	17:19:27	61.4
606	2017/05/04	17:19:28	63.0
607	2017/05/04	17:19:29	66.9
608	2017/05/04	17:19:30	69.0
609	2017/05/04	17:19:31	72.0
610	2017/05/04	17:19:32	68.3
611	2017/05/04	17:19:33	66.5
612	2017/05/04	17:19:34	67.0

GuthrieRiverside_Loc4_05042017.s1mm

613	2017/05/04	17:19:35	66.1
614	2017/05/04	17:19:36	65.6
615	2017/05/04	17:19:37	64.3
616	2017/05/04	17:19:38	64.5
617	2017/05/04	17:19:39	66.1
618	2017/05/04	17:19:40	65.8
619	2017/05/04	17:19:41	68.1
620	2017/05/04	17:19:42	69.8
621	2017/05/04	17:19:43	72.1
622	2017/05/04	17:19:44	73.4
623	2017/05/04	17:19:45	71.4
624	2017/05/04	17:19:46	68.0
625	2017/05/04	17:19:47	66.4
626	2017/05/04	17:19:48	65.8
627	2017/05/04	17:19:49	65.3
628	2017/05/04	17:19:50	63.6
629	2017/05/04	17:19:51	63.6
630	2017/05/04	17:19:52	63.6
631	2017/05/04	17:19:53	63.8
632	2017/05/04	17:19:54	63.9
633	2017/05/04	17:19:55	63.6
634	2017/05/04	17:19:56	64.9
635	2017/05/04	17:19:57	66.2
636	2017/05/04	17:19:58	67.6
637	2017/05/04	17:19:59	69.4
638	2017/05/04	17:20:00	69.5
639	2017/05/04	17:20:01	70.3
640	2017/05/04	17:20:02	70.1
641	2017/05/04	17:20:03	68.9
642	2017/05/04	17:20:04	67.1
643	2017/05/04	17:20:05	67.9
644	2017/05/04	17:20:06	67.2
645	2017/05/04	17:20:07	65.6
646	2017/05/04	17:20:08	66.2
647	2017/05/04	17:20:09	68.4
648	2017/05/04	17:20:10	70.0
649	2017/05/04	17:20:11	68.5
650	2017/05/04	17:20:12	65.7
651	2017/05/04	17:20:13	64.1
652	2017/05/04	17:20:14	65.3
653	2017/05/04	17:20:15	64.6
654	2017/05/04	17:20:16	64.7
655	2017/05/04	17:20:17	64.3
656	2017/05/04	17:20:18	64.3
657	2017/05/04	17:20:19	64.7
658	2017/05/04	17:20:20	66.2
659	2017/05/04	17:20:21	68.8
660	2017/05/04	17:20:22	68.0
661	2017/05/04	17:20:23	63.8
662	2017/05/04	17:20:24	61.5
663	2017/05/04	17:20:25	61.3
664	2017/05/04	17:20:26	63.3
665	2017/05/04	17:20:27	63.5
666	2017/05/04	17:20:28	61.3
667	2017/05/04	17:20:29	63.1
668	2017/05/04	17:20:30	65.6
669	2017/05/04	17:20:31	69.0
670	2017/05/04	17:20:32	71.0
671	2017/05/04	17:20:33	68.6
672	2017/05/04	17:20:34	66.3
673	2017/05/04	17:20:35	67.6
674	2017/05/04	17:20:36	65.7
675	2017/05/04	17:20:37	71.3

GuthrieRiverside_Loc4_05042017.s1mm

676	2017/05/04	17:20:38	73.9
677	2017/05/04	17:20:39	76.5
678	2017/05/04	17:20:40	79.1
679	2017/05/04	17:20:41	81.8
680	2017/05/04	17:20:42	83.9
681	2017/05/04	17:20:43	81.8
682	2017/05/04	17:20:44	77.9
683	2017/05/04	17:20:45	74.8
684	2017/05/04	17:20:46	72.8
685	2017/05/04	17:20:47	71.5
686	2017/05/04	17:20:48	66.8
687	2017/05/04	17:20:49	62.7
688	2017/05/04	17:20:50	61.1
689	2017/05/04	17:20:51	61.1
690	2017/05/04	17:20:52	61.0
691	2017/05/04	17:20:53	60.9
692	2017/05/04	17:20:54	60.5
693	2017/05/04	17:20:55	63.0
694	2017/05/04	17:20:56	63.4
695	2017/05/04	17:20:57	61.0
696	2017/05/04	17:20:58	61.0
697	2017/05/04	17:20:59	62.7
698	2017/05/04	17:21:00	63.2
699	2017/05/04	17:21:01	63.1
700	2017/05/04	17:21:02	65.4
701	2017/05/04	17:21:03	68.4
702	2017/05/04	17:21:04	70.5
703	2017/05/04	17:21:05	72.2
704	2017/05/04	17:21:06	73.2
705	2017/05/04	17:21:07	72.3
706	2017/05/04	17:21:08	71.2
707	2017/05/04	17:21:09	68.1
708	2017/05/04	17:21:10	65.8
709	2017/05/04	17:21:11	64.9
710	2017/05/04	17:21:12	63.2
711	2017/05/04	17:21:13	63.9
712	2017/05/04	17:21:14	64.5
713	2017/05/04	17:21:15	65.9
714	2017/05/04	17:21:16	65.4
715	2017/05/04	17:21:17	67.4
716	2017/05/04	17:21:18	69.4
717	2017/05/04	17:21:19	68.2
718	2017/05/04	17:21:20	67.0
719	2017/05/04	17:21:21	66.5
720	2017/05/04	17:21:22	65.7
721	2017/05/04	17:21:23	63.8
722	2017/05/04	17:21:24	62.4
723	2017/05/04	17:21:25	62.4
724	2017/05/04	17:21:26	62.4
725	2017/05/04	17:21:27	63.4
726	2017/05/04	17:21:28	63.2
727	2017/05/04	17:21:29	62.3
728	2017/05/04	17:21:30	63.5
729	2017/05/04	17:21:31	63.0
730	2017/05/04	17:21:32	62.2
731	2017/05/04	17:21:33	62.6
732	2017/05/04	17:21:34	62.1
733	2017/05/04	17:21:35	62.5
734	2017/05/04	17:21:36	61.6
735	2017/05/04	17:21:37	64.5
736	2017/05/04	17:21:38	63.1
737	2017/05/04	17:21:39	61.8
738	2017/05/04	17:21:40	64.4

GuthrieRiverside_Loc4_05042017.s1mm

739	2017/05/04	17:21:41	64.4
740	2017/05/04	17:21:42	64.5
741	2017/05/04	17:21:43	65.1
742	2017/05/04	17:21:44	66.7
743	2017/05/04	17:21:45	68.6
744	2017/05/04	17:21:46	69.6
745	2017/05/04	17:21:47	70.3
746	2017/05/04	17:21:48	69.2
747	2017/05/04	17:21:49	68.7
748	2017/05/04	17:21:50	69.5
749	2017/05/04	17:21:51	69.2
750	2017/05/04	17:21:52	68.4
751	2017/05/04	17:21:53	69.9
752	2017/05/04	17:21:54	70.6
753	2017/05/04	17:21:55	68.9
754	2017/05/04	17:21:56	68.8
755	2017/05/04	17:21:57	69.9
756	2017/05/04	17:21:58	72.4
757	2017/05/04	17:21:59	79.2
758	2017/05/04	17:22:00	73.8
759	2017/05/04	17:22:01	71.1
760	2017/05/04	17:22:02	69.4
761	2017/05/04	17:22:03	68.8
762	2017/05/04	17:22:04	70.6
763	2017/05/04	17:22:05	72.2
764	2017/05/04	17:22:06	75.6
765	2017/05/04	17:22:07	77.7
766	2017/05/04	17:22:08	74.0
767	2017/05/04	17:22:09	71.9
768	2017/05/04	17:22:10	70.9
769	2017/05/04	17:22:11	71.0
770	2017/05/04	17:22:12	69.6
771	2017/05/04	17:22:13	67.6
772	2017/05/04	17:22:14	68.7
773	2017/05/04	17:22:15	69.4
774	2017/05/04	17:22:16	68.4
775	2017/05/04	17:22:17	68.6
776	2017/05/04	17:22:18	70.2
777	2017/05/04	17:22:19	69.5
778	2017/05/04	17:22:20	67.7
779	2017/05/04	17:22:21	67.5
780	2017/05/04	17:22:22	66.1
781	2017/05/04	17:22:23	64.6
782	2017/05/04	17:22:24	64.5
783	2017/05/04	17:22:25	63.8
784	2017/05/04	17:22:26	65.0
785	2017/05/04	17:22:27	66.7
786	2017/05/04	17:22:28	67.6
787	2017/05/04	17:22:29	67.0
788	2017/05/04	17:22:30	60.9
789	2017/05/04	17:22:31	59.4
790	2017/05/04	17:22:32	59.6
791	2017/05/04	17:22:33	60.7
792	2017/05/04	17:22:34	60.7
793	2017/05/04	17:22:35	61.7
794	2017/05/04	17:22:36	65.2
795	2017/05/04	17:22:37	68.5
796	2017/05/04	17:22:38	68.6
797	2017/05/04	17:22:39	64.9
798	2017/05/04	17:22:40	60.6
799	2017/05/04	17:22:41	58.5
800	2017/05/04	17:22:42	57.0
801	2017/05/04	17:22:43	56.4

GuthrieRiverside_Loc4_05042017.s1mm

802	2017/05/04	17:22:44	57.1
803	2017/05/04	17:22:45	59.5
804	2017/05/04	17:22:46	60.5
805	2017/05/04	17:22:47	62.0
806	2017/05/04	17:22:48	63.4
807	2017/05/04	17:22:49	65.7
808	2017/05/04	17:22:50	65.8
809	2017/05/04	17:22:51	63.9
810	2017/05/04	17:22:52	63.1
811	2017/05/04	17:22:53	63.7
812	2017/05/04	17:22:54	66.5
813	2017/05/04	17:22:55	68.4
814	2017/05/04	17:22:56	69.5
815	2017/05/04	17:22:57	70.2
816	2017/05/04	17:22:58	68.7
817	2017/05/04	17:22:59	70.1
818	2017/05/04	17:23:00	72.8
819	2017/05/04	17:23:01	75.0
820	2017/05/04	17:23:02	75.0
821	2017/05/04	17:23:03	73.7
822	2017/05/04	17:23:04	70.3
823	2017/05/04	17:23:05	67.9
824	2017/05/04	17:23:06	67.2
825	2017/05/04	17:23:07	68.9
826	2017/05/04	17:23:08	69.0
827	2017/05/04	17:23:09	65.2
828	2017/05/04	17:23:10	63.8
829	2017/05/04	17:23:11	61.5
830	2017/05/04	17:23:12	61.7
831	2017/05/04	17:23:13	60.8
832	2017/05/04	17:23:14	60.5
833	2017/05/04	17:23:15	65.1
834	2017/05/04	17:23:16	78.5
835	2017/05/04	17:23:17	72.8
836	2017/05/04	17:23:18	73.9
837	2017/05/04	17:23:19	74.0
838	2017/05/04	17:23:20	69.7
839	2017/05/04	17:23:21	68.6
840	2017/05/04	17:23:22	66.4
841	2017/05/04	17:23:23	61.0
842	2017/05/04	17:23:24	59.9
843	2017/05/04	17:23:25	61.2
844	2017/05/04	17:23:26	62.6
845	2017/05/04	17:23:27	63.6
846	2017/05/04	17:23:28	72.5
847	2017/05/04	17:23:29	75.3
848	2017/05/04	17:23:30	71.2
849	2017/05/04	17:23:31	62.1
850	2017/05/04	17:23:32	60.7
851	2017/05/04	17:23:33	61.1
852	2017/05/04	17:23:34	59.9
853	2017/05/04	17:23:35	68.2
854	2017/05/04	17:23:36	69.2
855	2017/05/04	17:23:37	63.6
856	2017/05/04	17:23:38	64.9
857	2017/05/04	17:23:39	64.6
858	2017/05/04	17:23:40	63.4
859	2017/05/04	17:23:41	59.1
860	2017/05/04	17:23:42	60.8
861	2017/05/04	17:23:43	58.8
862	2017/05/04	17:23:44	59.7
863	2017/05/04	17:23:45	59.3
864	2017/05/04	17:23:46	60.8

GuthrieRiverside_Loc4_05042017.s1mm

865	2017/05/04	17:23:47	57.8
866	2017/05/04	17:23:48	59.9
867	2017/05/04	17:23:49	68.6
868	2017/05/04	17:23:50	68.4
869	2017/05/04	17:23:51	67.9
870	2017/05/04	17:23:52	69.2
871	2017/05/04	17:23:53	70.1
872	2017/05/04	17:23:54	67.9
873	2017/05/04	17:23:55	68.4
874	2017/05/04	17:23:56	60.0
875	2017/05/04	17:23:57	59.2
876	2017/05/04	17:23:58	59.4
877	2017/05/04	17:23:59	60.1
878	2017/05/04	17:24:00	60.4
879	2017/05/04	17:24:01	61.5
880	2017/05/04	17:24:02	62.3
881	2017/05/04	17:24:03	64.0
882	2017/05/04	17:24:04	65.1
883	2017/05/04	17:24:05	67.2
884	2017/05/04	17:24:06	67.4
885	2017/05/04	17:24:07	63.3
886	2017/05/04	17:24:08	61.1
887	2017/05/04	17:24:09	61.1
888	2017/05/04	17:24:10	59.7
889	2017/05/04	17:24:11	60.6
890	2017/05/04	17:24:12	60.7
891	2017/05/04	17:24:13	59.9
892	2017/05/04	17:24:14	59.8
893	2017/05/04	17:24:15	60.3
894	2017/05/04	17:24:16	60.0
895	2017/05/04	17:24:17	59.2
896	2017/05/04	17:24:18	60.5
897	2017/05/04	17:24:19	64.7
898	2017/05/04	17:24:20	60.7
899	2017/05/04	17:24:21	69.8
900	2017/05/04	17:24:22	69.2

Freq Weight : A
 Time Weight : FAST
 Level Range : 40-100
 Max dB : 77.6 - 2017/08/16 06:26:31
 Level Range : 40-100
 SEL : 78.9
 Leq : 49.4

No.s	Date Time	(dB)
1	2017/08/16 06:25:57	45.9
2	2017/08/16 06:26:00	52.6
3	2017/08/16 06:26:03	51.1
4	2017/08/16 06:26:06	50.9
5	2017/08/16 06:26:09	48.4
6	2017/08/16 06:26:12	43.2
7	2017/08/16 06:26:15	43.5
8	2017/08/16 06:26:18	45.6
9	2017/08/16 06:26:21	44.9
10	2017/08/16 06:26:24	48.8
11	2017/08/16 06:26:27	55.5
12	2017/08/16 06:26:30	46.7
13	2017/08/16 06:26:33	48.8
14	2017/08/16 06:26:36	50.5
15	2017/08/16 06:26:39	47.2
16	2017/08/16 06:26:42	48.2
17	2017/08/16 06:26:45	49.4
18	2017/08/16 06:26:48	49.0
19	2017/08/16 06:26:51	48.7
20	2017/08/16 06:26:54	46.7
21	2017/08/16 06:26:57	46.8
22	2017/08/16 06:27:00	51.3
23	2017/08/16 06:27:03	49.4
24	2017/08/16 06:27:06	47.2
25	2017/08/16 06:27:09	44.9
26	2017/08/16 06:27:12	44.4
27	2017/08/16 06:27:15	50.2
28	2017/08/16 06:27:18	49.7
29	2017/08/16 06:27:21	51.3
30	2017/08/16 06:27:24	48.8
31	2017/08/16 06:27:27	51.7
32	2017/08/16 06:27:30	49.1
33	2017/08/16 06:27:33	49.2
34	2017/08/16 06:27:36	53.7
35	2017/08/16 06:27:39	52.2
36	2017/08/16 06:27:42	50.8
37	2017/08/16 06:27:45	49.1
38	2017/08/16 06:27:48	45.5
39	2017/08/16 06:27:51	44.4
40	2017/08/16 06:27:54	46.8
41	2017/08/16 06:27:57	47.9
42	2017/08/16 06:28:00	45.6
43	2017/08/16 06:28:03	47.5
44	2017/08/16 06:28:06	44.8
45	2017/08/16 06:28:09	48.0
46	2017/08/16 06:28:12	47.5
47	2017/08/16 06:28:15	47.5
48	2017/08/16 06:28:18	52.1
49	2017/08/16 06:28:21	44.2
50	2017/08/16 06:28:24	44.0
51	2017/08/16 06:28:27	46.5
52	2017/08/16 06:28:30	47.7
53	2017/08/16 06:28:33	48.4
54	2017/08/16 06:28:36	52.3
55	2017/08/16 06:28:39	54.6
56	2017/08/16 06:28:42	47.2
57	2017/08/16 06:28:45	46.2
58	2017/08/16 06:28:48	49.5
59	2017/08/16 06:28:51	45.1
60	2017/08/16 06:28:54	45.0
61	2017/08/16 06:28:57	47.3
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Max dB : 78.4 - 2017/08/16 06:03:34
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190	2017/08/16	06:09:09	49.6
191	2017/08/16	06:09:12	51.4
192	2017/08/16	06:09:15	53.5
193	2017/08/16	06:09:18	64.8
194	2017/08/16	06:09:21	68.4
195	2017/08/16	06:09:24	56.8
196	2017/08/16	06:09:27	59.8
197	2017/08/16	06:09:30	52.7
198	2017/08/16	06:09:33	49.7
199	2017/08/16	06:09:36	47.4
200	2017/08/16	06:09:39	46.7
201	2017/08/16	06:09:42	44.7
202	2017/08/16	06:09:45	44.0
203	2017/08/16	06:09:48	44.7
204	2017/08/16	06:09:51	48.8
205	2017/08/16	06:09:54	50.9
206	2017/08/16	06:09:57	58.0
207	2017/08/16	06:10:00	55.4
208	2017/08/16	06:10:03	49.3
209	2017/08/16	06:10:06	43.8
210	2017/08/16	06:10:09	43.5
211	2017/08/16	06:10:12	43.3
212	2017/08/16	06:10:15	45.6
213	2017/08/16	06:10:18	44.8
214	2017/08/16	06:10:21	44.1
215	2017/08/16	06:10:24	43.9
216	2017/08/16	06:10:27	43.2
217	2017/08/16	06:10:30	43.6
218	2017/08/16	06:10:33	42.6
219	2017/08/16	06:10:36	43.0
220	2017/08/16	06:10:39	42.7
221	2017/08/16	06:10:42	42.6
222	2017/08/16	06:10:45	43.3
223	2017/08/16	06:10:48	43.5
224	2017/08/16	06:10:51	43.4
225	2017/08/16	06:10:54	42.1
226	2017/08/16	06:10:57	42.5
227	2017/08/16	06:11:00	42.7
228	2017/08/16	06:11:03	42.6
229	2017/08/16	06:11:06	43.2
230	2017/08/16	06:11:09	42.2
231	2017/08/16	06:11:12	42.7
232	2017/08/16	06:11:15	42.5
233	2017/08/16	06:11:18	43.1
234	2017/08/16	06:11:21	43.1
235	2017/08/16	06:11:24	44.7
236	2017/08/16	06:11:27	42.0
237	2017/08/16	06:11:30	43.1
238	2017/08/16	06:11:33	41.5
239	2017/08/16	06:11:36	43.1
240	2017/08/16	06:11:39	41.7
241	2017/08/16	06:11:42	43.3
242	2017/08/16	06:11:45	42.8
243	2017/08/16	06:11:48	41.9
244	2017/08/16	06:11:51	43.0
245	2017/08/16	06:11:54	41.5
246	2017/08/16	06:11:57	42.8
247	2017/08/16	06:12:00	42.6
248	2017/08/16	06:12:03	42.6
249	2017/08/16	06:12:06	43.1
250	2017/08/16	06:12:09	42.9
251	2017/08/16	06:12:12	41.9
252	2017/08/16	06:12:15	42.1
253	2017/08/16	06:12:18	42.2
254	2017/08/16	06:12:21	41.8
255	2017/08/16	06:12:24	42.0
256	2017/08/16	06:12:27	41.6
257	2017/08/16	06:12:30	42.3
258	2017/08/16	06:12:33	43.8
259	2017/08/16	06:12:36	42.4
260	2017/08/16	06:12:39	41.6
261	2017/08/16	06:12:42	41.4
262	2017/08/16	06:12:45	41.8
263	2017/08/16	06:12:48	41.3
264	2017/08/16	06:12:51	41.5
265	2017/08/16	06:12:54	41.2
266	2017/08/16	06:12:57	42.5
267	2017/08/16	06:13:00	43.2
268	2017/08/16	06:13:03	43.1
269	2017/08/16	06:13:06	42.0
270	2017/08/16	06:13:09	43.5
271	2017/08/16	06:13:12	42.6
272	2017/08/16	06:13:15	42.3
273	2017/08/16	06:13:18	42.5
274	2017/08/16	06:13:21	41.9
275	2017/08/16	06:13:24	42.4
276	2017/08/16	06:13:27	42.1
277	2017/08/16	06:13:30	42.0
278	2017/08/16	06:13:33	43.9
279	2017/08/16	06:13:36	42.0
280	2017/08/16	06:13:39	41.7
281	2017/08/16	06:13:42	41.3
282	2017/08/16	06:13:45	41.8
283	2017/08/16	06:13:48	42.0

284	2017/08/16	06:13:51	41.7
285	2017/08/16	06:13:54	40.6
286	2017/08/16	06:13:57	53.7
287	2017/08/16	06:14:00	40.8
288	2017/08/16	06:14:03	42.7
289	2017/08/16	06:14:06	40.8
290	2017/08/16	06:14:09	41.4
291	2017/08/16	06:14:12	40.4
292	2017/08/16	06:14:15	40.4
293	2017/08/16	06:14:18	41.6
294	2017/08/16	06:14:21	40.5
295	2017/08/16	06:14:24	41.1
296	2017/08/16	06:14:27	40.2
297	2017/08/16	06:14:30	40.6
298	2017/08/16	06:14:33	41.1
299	2017/08/16	06:14:36	41.2
300	2017/08/16	06:14:39	42.0

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 05/09/2017
Case Description: Riverside Warehouse - Architectural Coating

**** Receptor #1 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Residences	Residential	73.0	73.0	73.0

Description	Impact Device	Equipment Usage (%)	Spec	Actual	Receptor	Estimated	Shielding
			Lmax	Lmax	Distance	(feet)	(dBA)
Compressor (air)	No	40		77.7	2500.0		0.0

Equipment	Lmax	Leq	Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Calculated (dBA)	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
Compressor (air)	43.7	39.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	43.7	39.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Park	Residential	70.0	70.0	70.0

Description	Impact Device	Equipment Usage (%)	Spec	Actual	Receptor	Estimated	Shielding
			Lmax	Lmax	Distance	(feet)	(dBA)
Compressor (air)	No	40		77.7	3000.0		0.0

Equipment	Lmax	Leq	Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Calculated (dBA)	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night

Exhibit 9 - CEQA Documents

		Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Compressor (air)		54.0	47.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A															
	Total	54.0	49.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A															

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 05/09/2017
Case Description: Riverside Warehouse - Building Construction

**** Receptor #1 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Residences	Residential	73.0	73.0	73.0

Description	Impact Device	Equipment				
		Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16	80.6	2500.0	0.0	
Front End Loader	No	40	79.1	2500.0	0.0	
Backhoe	No	40	77.6	2500.0	0.0	
Man Lift	No	20	74.7	2500.0	0.0	

Equipment	Results						Noise Limits (dBA)								Noise Limit Exceedance (dBA)			
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night					
	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq				
Crane	46.6	38.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	45.1	41.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	43.6	39.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	40.7	33.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	46.6	45.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Park	Residential	70.0	70.0	70.0

Description	Land Use	Equipment			
		Spec	Actual	Receptor	Estimated

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Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 05/09/2017
Case Description: Riverside Warehouse - Grading

**** Receptor #1 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Residences	Residential	73.0	73.0	73.0

Equipment						
Description	Impact Device	Usage (%)	Spec	Actual	Receptor	Estimated
			Lmax	Lmax	Distance	Shielding
			(dBA)	(dBA)	(feet)	(dBA)
Concrete Saw	No	20		89.6	2500.0	0.0
Front End Loader	No	40		79.1	2500.0	0.0
Backhoe	No	40		77.6	2500.0	0.0
Dozer	No	40		81.7	2500.0	0.0

Results														

**** Receptor #2 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Park	Residential	70.0	70.0	70.0

Equipment				
Description	Impact Device	Usage (%)	Spec	Actual
			Lmax	Lmax
			(dBA)	(dBA)

Exhibit 9 - CEQA Documents

Description	Impact Device	Usage (%)	Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Concrete Saw	No	20		89.6	3000.0	0.0
Front End Loader	No	40		79.1	3000.0	0.0
Backhoe	No	40		77.6	3000.0	0.0
Dozer	No	40		81.7	3000.0	0.0

Results

		Noise Limits (dBA)						Noise Limit Exceedance (dBA)							
		Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
		Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq		
Equipment		Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq		
Concrete Saw		54.0	47.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A															
Front End Loader		43.5	39.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A															
Backhoe		42.0	38.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A															
Dozer		46.1	42.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A															
	Total	54.0	49.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A															

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 05/09/2017
Case Description: Riverside Warehouse - Paving

**** Receptor #1 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Residences	Residential	73.0	73.0	73.0

Description	Impact	Equipment				
		Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance Shielding (dBA)
Roller	No	20		80.0	2500.0	0.0
Front End Loader	No	40		79.1	2500.0	0.0
Backhoe	No	40		77.6	2500.0	0.0
Paver	No	50		77.2	2500.0	0.0
Concrete Mixer Truck	No	40		78.8	2500.0	0.0
Concrete Pump Truck	No	20		81.4	2500.0	0.0

Equipment	Results						Noise Limits (dBA)						Noise Limit Exceedance (dBA)			
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night			
	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq		
Roller	46.0	39.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
N/A																
Front End Loader	45.1	41.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A																
Backhoe	43.6	39.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
N/A																
Paver	43.2	40.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
N/A																
Concrete Mixer Truck	44.8	40.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
N/A																
Concrete Pump Truck	47.4	40.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
N/A																
Total	47.4	48.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
N/A																

**** Receptor #2 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night

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Park	Residential	70.0	70.0	70.0

Equipment						
Description	Impact Device	Spec Usage	Actual Lmax	Receptor Lmax	Estimated Distance	Shielding
		(%)	(dBA)	(dBA)	(feet)	(dBA)
Roller	No	20	80.0	3000.0	0.0	
Front End Loader	No	40		79.1	3000.0	0.0
Backhoe	No	40	77.6	3000.0	0.0	
Paver	No	50	77.2	3000.0	0.0	
Concrete Mixer Truck	No	40		78.8	3000.0	0.0
Concrete Pump Truck	No	20		81.4	3000.0	0.0

Results														

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 05/09/2017
Case Description: Riverside Warehouse - Site Prep

**** Receptor #1 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Residences	Residential	73.0	73.0	73.0

Description	Impact Device	Equipment				
		Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Grader	No	40	85.0	2500.0	0.0	
Front End Loader	No	40		79.1	2500.0	0.0
Backhoe	No	40		77.6	2500.0	0.0
Scraper	No	40		83.6	2500.0	0.0

		Results													

		Noise Limits (dBA)						Noise Limit Exceedance (dBA)							
		Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
Equipment		Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Lmax	Leq														
-----		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Grader		51.0	47.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A															
Front End Loader		45.1	41.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A															
Backhoe		43.6	39.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A															
Scraper		49.6	45.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A															
Total		51.0	50.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A															

**** Receptor #2 ****

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Park	Residential	70.0	70.0	70.0

Description	Impact Device	Equipment			
		Spec	Actual	Receptor	Estimated

Exhibit 9 - CEQA Documents

Description	Impact Device	Usage (%)	Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Grader	No	40	85.0		3000.0	0.0
Front End Loader	No	40		79.1	3000.0	0.0
Backhoe	No	40		77.6	3000.0	0.0
Scraper	No	40		83.6	3000.0	0.0

Results

		Noise Limits (dBA)						Noise Limit Exceedance (dBA)							
		Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
		Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq		
Equipment		Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq		
Grader		49.4	45.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
N/A															
Front End Loader		43.5	39.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
N/A															
Backhoe		42.0	38.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
N/A															
Scraper		48.0	44.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
N/A															
	Total	49.4	48.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
N/A															