



LSC TRANSPORTATION CONSULTANTS, INC.

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July 29, 2016

Mr. Michael Bosma  
1035 Pearl Street, #205  
Boulder, CO 80302

Re: Mapleton Hill  
Boulder, CO  
(LSC #150520)

Dear Mr. Bosma:

In response to your request, LSC Transportation Consultants, Inc. has prepared this traffic impact analysis for the proposed Mapleton Hill redevelopment. As shown on Figure 1, the site is located at north of Mapleton Avenue and west of 4<sup>th</sup> Street in Boulder, Colorado.

## **REPORT CONTENTS**

The report contains the following: the existing roadway and traffic conditions in the vicinity of the site including the lane geometries, traffic controls, posted speed limits, etc.; the existing weekday peak-hour traffic volumes; the existing daily traffic volumes in the area; existing queue lengths; the typical weekday site-generated traffic volume projections for the site; the assignment of the projected traffic volumes to the area roadways; the projected short-term background and resulting total traffic volumes on the area roadways; the site's projected traffic impacts; and any recommended roadway improvements to mitigate the site's traffic impacts or impacts from growth in background traffic.

## **PROPOSED LAND USE AND ACCESS**

The existing hospital campus is proposed to be redeveloped as about 147 independent living units and 63 memory care, subacute rehab, skilled nursing, and assisted living beds located in the proposed wellness center. There will also be two caretaker units. The conceptual site plan is shown in Figure 2. The existing use and current structures on the site are approximately 184,355 square feet and could be remodeled/refinished as medical/dental office space. Vehicular access to the site is proposed from existing full movement access intersections to both 4<sup>th</sup> Street and Mapleton Avenue.

## **ROADWAY AND TRAFFIC CONDITIONS**

### **Area Roadways**

The major roadways in the site's vicinity are shown on Figure 1 and are described below.

- **Mapleton Avenue** is an east-west, two-lane, minor arterial roadway south of the site. The intersection with 4<sup>th</sup> Street is all-way stop-sign controlled. The posted speed limit in the vicinity of the site is 25 mph.
- **4<sup>th</sup> Street** is a north-south, two-lane roadway east of the site. The intersection with Mapleton Avenue is all-way stop-sign controlled. The posted speed limit in the vicinity of the site is 25 mph.

### **Traffic Volumes and Lane Geometry**

Figure 3a shows the existing peak-hour traffic, lane geometries, and traffic controls in the site's vicinity on a typical weekday. Figure 3b shows the 2015 and existing 2016 daily traffic volumes. The weekday peak-hour traffic volumes and daily traffic counts are from the attached traffic counts conducted by Counter Measures in 2015 and June, 2016. These volumes show the drop in existing daily traffic volumes from the closing of the hospital use.

### **2018 Background Traffic**

Figure 4 shows the estimated 2018 background traffic. The projected 2018 background traffic volumes are based on an annual growth rate of about one percent for two years.

### **Existing and 2018 Background Levels of Service**

Level of service (LOS) is a quantitative measure of the level of congestion or delay at an intersection. Level of service is indicated on a scale from "A" to "F." LOS A is indicative of little congestion or delay and LOS F is indicative of a high level of congestion or delay. Attached are specific level of service definitions for signalized and unsignalized intersections.

The intersections in Figures 3a, 3b, and 4 were analyzed as appropriate to determine the existing and 2018 background levels of service using Synchro. Table 1 shows the level of service analysis results. The level of service reports are attached.

- **4<sup>th</sup> Street/E. Site Access/Maxwell Avenue:** All movements at this stop-sign controlled intersection currently operate at LOS "A" during both morning and afternoon peak-hours and are expected to continue to do so through 2018.
- **4<sup>th</sup> Street/Mapleton Avenue:** All movements at this stop-sign controlled intersection currently operate at LOS "A" during both morning and afternoon peak-hours and are expected to continue to do so through 2018.
- **Mapleton Avenue/S. Site Access:** All movements at this stop-sign controlled intersection currently operate at LOS "B" or better during both morning and afternoon peak-hours and are expected to continue to do so through 2018.
- **9<sup>th</sup> Street/Maxwell Avenue:** All movements at this stop-sign controlled intersection currently operate at LOS "C" or better during both morning and afternoon peak-hours and are expected to continue to do so through 2018.

- **9<sup>th</sup> Street/Mapleton Avenue:** All movements at this stop-sign controlled intersection currently operate at LOS “D” or better during both morning and afternoon peak-hours and are expected to continue to do so through 2018.

### **ALTERNATIVE TRAVEL MODES**

An alternate travel mode reduction of 20 percent is assumed in this analysis. The site is well positioned to take advantage of the City’s extensive network of bike lanes, bike routes, existing transit routes and bus stops in the area. A separate Travel Demand Management (TDM) Plan has been completed and is attached for reference.

### **TRIP GENERATION**

Table 2 shows the estimated typical weekday, morning peak-hour, and afternoon peak-hour trip generation for the site as well as for the previously proposed college land use and the prior hospital land use based on the rates from *Trip Generation, 9<sup>th</sup> Edition, 2012*, by the Institute of Transportation Engineers (ITE).

The prior hospital could be re-purposed as medical office buildings which would have the potential to generate about 5,858 vehicle-trips on the average weekday, with about half entering and half exiting the site during a 24-hour period. During the morning peak-hour, which generally occurs for one hour between 6:30 and 8:30 a.m., about 278 vehicles could enter and about 74 vehicles could exit the site. During the afternoon peak-hour, which generally occurs for one hour between 4:00 and 6:30 p.m., about 113 vehicles could enter and about 291 vehicles could exit the site.

The proposed land use on the site is projected to generate about 554 vehicle-trips on the average weekday, with about half entering and half exiting the site during a 24-hour period. During the morning peak-hour, which generally occurs for one hour between 6:30 and 8:30 a.m., about 14 vehicles would enter and about 19 vehicles would exit the site. During the afternoon peak-hour, which generally occurs for one hour between 4:00 and 6:30 p.m., about 24 vehicles would enter and about 21 vehicles would exit the site.

### **TRIP DISTRIBUTION**

Figure 5 shows the estimated directional distribution of the site-generated traffic volumes on the area roadways. The estimates were based on the location of the site with respect to the regional population, employment, and activity centers; and the site’s proposed land use.

### **TRIP ASSIGNMENT**

Figure 6 shows the estimated site-generated traffic volumes which are the directional distribution percentages (from Figure 5) applied to the trip generation estimate (from Table 2).

## 2018 TOTAL TRAFFIC

Figure 7 shows the 2018 total traffic which is the sum of the 2018 background traffic volumes (from Figure 4) and the site-generated traffic volumes (from Figure 6). Figure 7 also shows the recommended 2018 lane geometry and traffic control.

## PROJECTED LEVELS OF SERVICE

The intersections in Figure 7 were analyzed to determine the 2018 total levels of service. Table 1 shows the level of service analysis results. The level of service reports are attached.

- **4<sup>th</sup> Street/E. Site Access/Maxwell Avenue:** All movements at this stop-sign controlled intersection are expected to operate at LOS “B” or better during both morning and afternoon peak-hours through 2018.
- **4<sup>th</sup> Street/Mapleton Avenue:** All movements at this stop-sign controlled intersection are expected to operate at LOS “A” during both morning and afternoon peak-hours through 2018.
- **Mapleton Avenue/S. Site Access:** All movements at this stop-sign controlled intersection are expected to operate at LOS “B” or better during both morning and afternoon peak-hours through 2018.
- **9<sup>th</sup> Street/Maxwell Avenue:** All movements at this stop-sign controlled intersection are expected to operate at LOS “C” or better during both morning and afternoon peak-hours through 2018.
- **9<sup>th</sup> Street/Mapleton Avenue:** All movements at this stop-sign controlled intersection are expected to operate at LOS “D” or better during both morning and afternoon peak-hours through 2018.

## PARKING GENERATION

Table 3 shows the estimated parking demand for the site based on the rates from *Parking Generation*, 4<sup>th</sup> Edition, 2010, by the Institute of Transportation Engineers (ITE). The 33<sup>rd</sup> percentile parking demand for the proposed redevelopment is about 107 parking spaces; the average parking demand is about 115 spaces; and the 85<sup>th</sup> percentile parking demand is about 135 parking spaces.

## CONCLUSIONS AND RECOMMENDATIONS

### Trip Generation

1. The proposed land use on the site is projected to generate about 554 vehicle-trips on the average weekday, with about half entering and half exiting the site during a 24-hour period. During the morning peak-hour, about 14 vehicles would enter and about 19 vehicles would exit the site. During the afternoon peak-hour, about 24 vehicles would enter and about 21 vehicles would exit the site. This assumes a 20 percent alternative

travel mode reduction which is supported by a separate Travel Demand Management (TDM) plan. This trip generation potential is considerably lower than the prior hospital use on the site.

**Projected Levels of Service**

- 2. All movements at all the intersections analyzed are expected to operate at LOS "D" or better during both peak-hours through 2018.

**Conclusions**

- 3. The impact of the Mapleton Hill redevelopment can be accommodated by the existing roadway network with the recommended improvements below.

**Recommended Improvements**

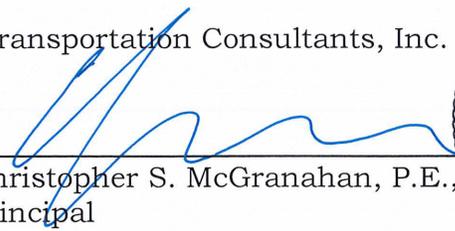
- 4. The applicant should implement Travel Demand Management (TDM) strategies as detailed in the separate Travel Demand Management (TDM) plan included in the appendix.

\* \* \* \* \*

We trust this information will assist you in planning for the proposed Mapleton Hill redevelopment.

Respectfully submitted,

LSC Transportation Consultants, Inc.

By:   
Christopher S. McGranahan, P.E.,  
Principal



7-29-16

CSM/wc

- Enclosure:
- Tables 1 - 3
  - Figures 1 - 7
  - Traffic Counts
  - Level of Service Definitions
  - LOS Printouts
  - Mapleton Hill TDM Plan

**Table 1  
Intersection Levels of Service Analysis  
Mapleton Hill  
Boulder, Colorado  
LSC #150520; July, 2016**

Intersection Location	Traffic Control	Existing Traffic				2018 Background Traffic				2018 Total Traffic			
		Level of Service	Movement Delay	Level of Service	Movement Delay	Level of Service	Movement Delay	Level of Service	Movement Delay	Level of Service	Movement Delay	Level of Service	Movement Delay
			AM		PM		AM		PM		AM		PM
<u>4th Street/E. Site Access/Maxwell Avenue</u>	TWSC												
NB Approach		A	7.3	A	7.4	A	7.3	A	7.4	A	7.3	A	7.4
EB Approach		A	9.3	A	9.6	A	9.3	A	9.7	A	9.6	B	10.0
WB Approach		A	9.4	A	9.6	A	9.4	A	9.6	A	9.7	B	10.2
SB Approach		A	7.4	A	7.4	A	7.4	A	7.4	A	7.4	A	7.4
Critical Movement Delay			9.4		9.6		9.4		9.7		9.7		10.2
<u>4th Street/Mapleton Avenue</u>	AWSC												
NB Approach		A	7.9	A	8.4	A	8.0	A	8.5	A	8.0	A	8.5
EB Left		A	8.4	A	8.5	A	8.4	A	8.5	A	8.4	A	8.5
EB Through/Right		A	8.7	A	8.6	A	8.8	A	8.7	A	8.8	A	8.7
WB Approach		A	8.4	A	9.1	A	8.4	A	9.1	A	8.5	A	9.3
SB Approach		A	7.9	A	8.3	A	7.9	A	8.3	A	8.1	A	8.5
Critical Movement Delay			8.7		9.1		8.8		9.1		8.8		9.3
<u>Mapleton Avenue/S. Site Access</u>	TWSC												
EB Approach		A	7.5	A	7.7	A	7.5	A	7.7	A	7.5	A	7.7
SB Approach		A	9.7	B	10.5	A	9.8	B	10.5	A	9.9	B	10.5
Critical Movement Delay			9.7		10.5		9.8		10.5		9.9		10.5
<u>9th Street/Maxwell Avenue</u>	AWSC												
NB Approach		B	11.7	B	14.0	B	11.9	B	14.4	B	12.4	B	14.9
EB Approach		A	9.9	A	9.8	A	9.9	A	9.9	B	10.2	B	10.2
WB Approach		A	9.9	A	9.8	A	10.0	A	9.9	B	10.1	B	10.1
SB Approach		C	15.6	B	11.6	C	16.1	B	11.9	C	16.8	B	12.3
Critical Movement Delay			15.6		14.0		16.1		14.4		16.8		14.9
<u>9th Street/Mapleton Avenue</u>	TWSC												
NB Approach		A	8.7	A	8.2	A	8.8	A	8.2	A	8.8	A	8.3
EB Approach		D	28.1	C	21.4	D	30.4	C	22.6	D	33.4	C	24.5
WB Approach		C	24.4	C	24.7	D	25.4	D	25.9	D	26.6	D	27.9
SB Approach		A	7.8	A	8.2	A	7.8	A	8.2	A	7.8	A	8.2
Critical Movement Delay			28.1		24.7		30.4		25.9		33.4		27.9

**Table 2**  
**ESTIMATED TRAFFIC GENERATION COMPARISON**  
**Mapleton Hill**  
**Boulder, CO**  
**(LSC #150520; July, 2016)**

Trip Generating Category	Quantity	Trip Generation Rates <sup>(1)</sup>				Vehicle - Trips Generated						
		Average Weekday	AM Peak Hour In	PM Peak Hour Out	PM Peak Hour In	Out	Average Weekday	AM Peak Hour In	PM Peak Hour Out	PM Peak Hour In	Out	
<b>Previously Assumed Land Use (June 18, 2013 311 Mapleton Parking and Traffic Assessment by Fox Tuttle)</b>												
University/College							2,349	No peak-hour data provided				
<b>Prior Use Trip Generation Potential</b>												
Medical-Dental Office <sup>(2)</sup>	184.355 KSF <sup>(3)</sup>	39.72	1.888	0.502	0.767	1.974	7,323	348	93	141	364	
							20% Alternative Mode Reduction =	1,465	70	19	28	73
							<b>Net External Trips =</b>	<b>5,858</b>	<b>278</b>	<b>74</b>	<b>113</b>	<b>291</b>
<b>Currently Proposed Land Use</b>												
Independent Living <sup>(4)</sup>	147 DU <sup>(5)</sup>	3.44	0.068	0.132	0.135	0.115	506	10	19	20	17	
Memory Care, Subacute Rehab, Skilled Nursing, Assisted Living <sup>(6)</sup>	63 Beds	2.74	0.122	0.058	0.145	0.145	173	8	4	9	9	
Caretaker Units <sup>(7)</sup>	2 DU	6.65	0.102	0.408	0.403	0.217	13	0	1	1	0	
							Total =	692	18	24	30	26
							20% Alternative Mode Reduction =	138	4	5	6	5
							<b>Net External Trips =</b>	<b>554</b>	<b>14</b>	<b>19</b>	<b>24</b>	<b>21</b>

Notes:

- (1) Source: *Trip Generation*, Institute of Transportation Engineers, 9th Edition, 2012.
- (2) ITE Land Use No. 720 - Medical-Dental Office Building - formula rates where available
- (3) KSF = 1,000 square feet
- (4) ITE Land Use No. 252 - Senior Adult Housing - Attached
- (5) DU = dwelling unit
- (6) ITE Land Use No. 254 - Assisted Living
- (7) ITE Land Use No. 220 - Apartment

**Table 3**  
**ESTIMATED PARKING GENERATION**  
**Mapleton Hill**  
**Boulder, CO**  
**LSC #150520; July, 2016**

Trip Generating Category	Quantity	Parking Generation Rates <sup>(1)</sup>			Theoretical Parking Demand		
		33rd Percentile Rate	Average Rate	85th Percentile Rate	33rd Percentile Demand	Average Demand	85th Percentile Demand
<b>Proposed Land Use</b>							
Independent Living <sup>(2)</sup>	147 DU <sup>(3)</sup>	0.58	0.59	0.66	85	87	97
Assisted Living <sup>(4)</sup>	63 Beds	0.34	0.41	0.54	21	26	34
Apartment <sup>(5)</sup>	2 DU	0.68	1.23	1.94	1	2	4
				<b>Total =</b>	<b>107</b>	<b>115</b>	<b>135</b>

Notes:

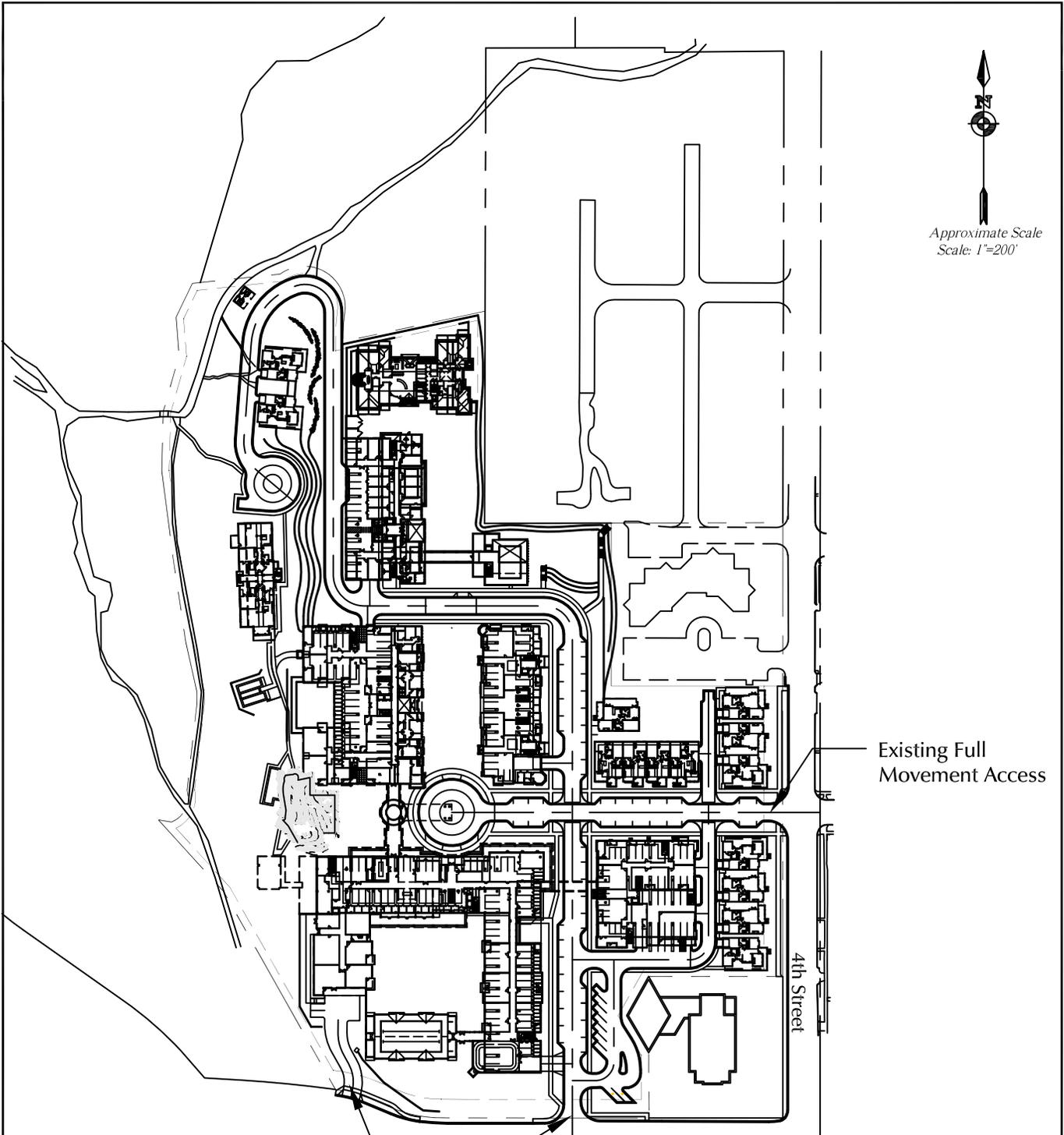
- (1) Source: *Parking Generation*, Institute of Transportation Engineers, 4th Edition, 2010.
- (2) ITE Land Use No. 252 - Senior Adult Housing - Attached
- (3) DU = Dwelling Unit
- (4) Land Use No. 254 - Assisted Living
- (5) Land Use No. 221 - Low/Mid-Rise Apartment



Approximate Scale  
Scale: 1"=300'

Figure 1  
**Vicinity  
Map**

Mapleton Hill Redevelopment (LSC #150520)



North Arrow  
Approximate Scale  
Scale: 1"=200'

Existing Full  
Movement Access

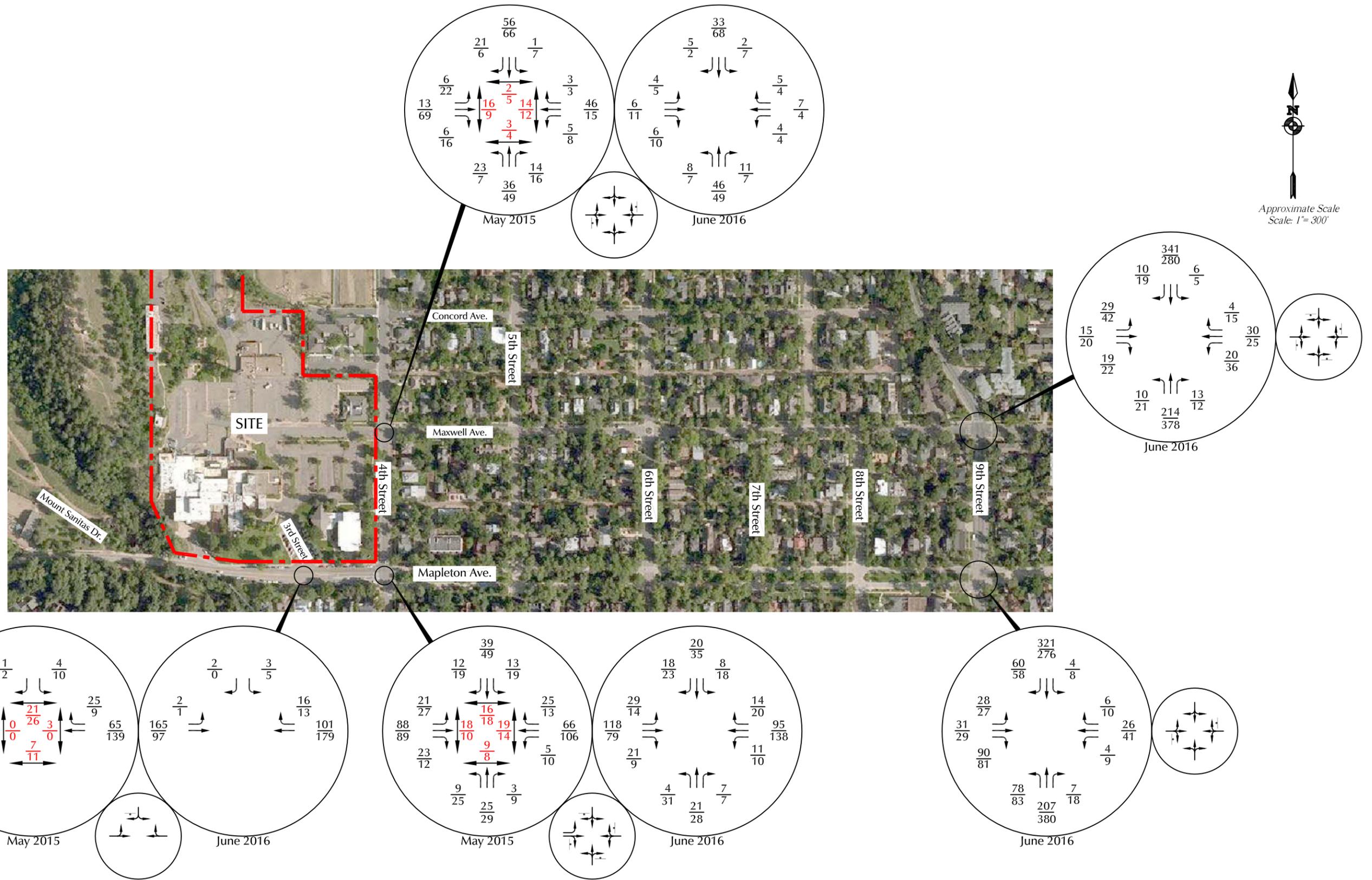
4th Street

Mapleton Avenue

Existing Full  
Movement Access



Figure 2  
**Site Plan**  
Mapleton Hill (LSC #150520)



Approximate Scale  
Scale: 1" = 300'

LEGEND:

- ⊥ = Stop Sign
- $\frac{26}{35}$  = AM Peak Hour Traffic / PM Peak Hour Traffic
- $\frac{26}{35}$  = AM Peak Hour Pedestrian Traffic / PM Peak Hour Pedestrian Traffic



Figure 3a  
**Existing Peak-Hour Traffic,  
Lane Geometry and Traffic Control**  
Mapleton Hill (LSC #150520)

**1** Northwest Access west of Maxwell Building

Wednesday	5-11-16	153vpd
Thursday	5-12-16	152vpd
Friday	5-13-16	155vpd
Saturday	5-14-16	109vpd
Sunday	5-15-16	128vpd
Monday	5-16-16	115vpd
Tuesday	5-17-16	73vpd

**2** Maxwell Avenue west of 4th Street

Wednesday	5-27-15	2,614vpd
Wednesday	5-11-16	727vpd
Thursday	5-12-16	703vpd
Friday	5-13-16	702vpd
Saturday	5-14-16	654vpd
Sunday	5-15-16	440vpd
Monday	5-16-16	589vpd
Tuesday	5-17-16	667vpd

**3** Hospital East Access north of Mapleton Avenue

Wednesday	5-27-15	722vpd
Wednesday	5-11-16	399vpd
Thursday	5-12-16	415vpd
Friday	5-13-16	483vpd
Saturday	5-14-16	303vpd
Sunday	5-15-16	270vpd
Monday	5-16-16	261vpd
Tuesday	5-17-16	301vpd

**4** Hospital West Access north of Mapleton Avenue

Wednesday	5-11-16	173vpd
Thursday	5-12-16	106vpd
Friday	5-13-16	131vpd
Saturday	5-14-16	58vpd
Sunday	5-15-16	83vpd
Monday	5-16-16	159vpd
Tuesday	5-17-16	122vpd

**5** Mapleton Avenue west of 4th Street

Wednesday	5-27-15	4,002vpd
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

**6** 4th Street south of Maxwell Avenue

Wednesday	5-27-15	2,549vpd
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

**7** Mapleton Avenue east of 4th Street

Tuesday	6-21-16	3,702vpd
Wednesday	6-22-16	3,670vpd
Thursday	6-23-16	3,877vpd
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

**8** Maxwell Avenue east of 4th Street

Tuesday	6-21-16	658vpd
Wednesday	6-22-16	705vpd
Thursday	6-23-16	611vpd
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

**9** 4th Street north of Maxwell Avenue

Tuesday	6-21-16	1,756vpd
Wednesday	6-22-16	1,581vpd
Thursday	6-23-16	1,717vpd
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

**10** 4th Street south of Mapleton Avenue

Tuesday	6-21-16	1,814vpd
Wednesday	6-22-16	1,838vpd
Thursday	6-23-16	2,017vpd
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Note: The 2015 counts were conducted when the prior hospital was still partially active on the site.

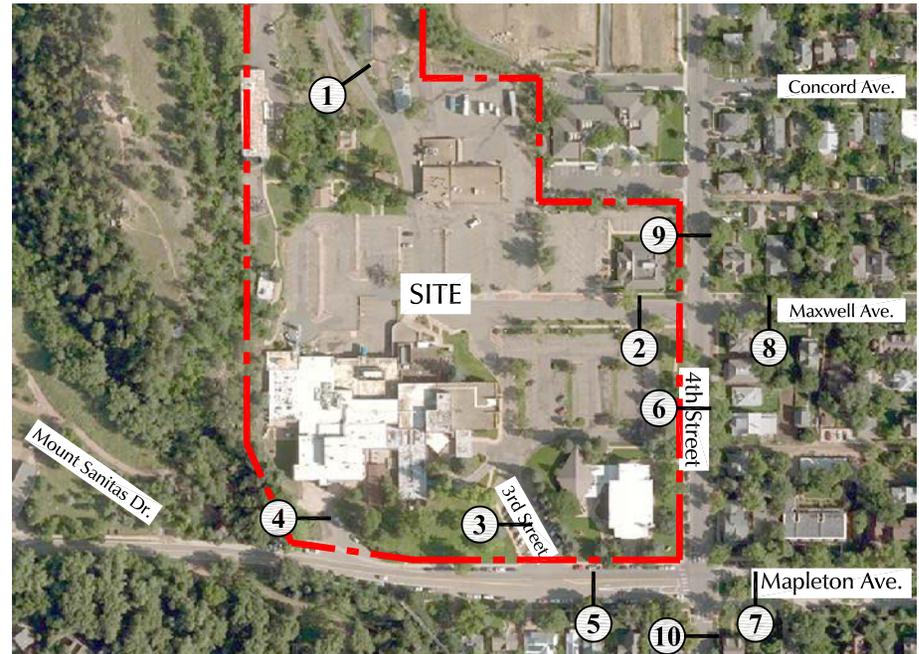
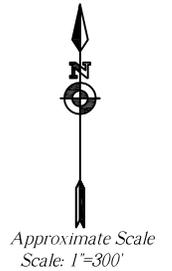


Figure 3b  
**Existing Daily  
 Traffic Volumes**  
 Mapleton Hill (LSC #150520)



LEGEND:

- ⊥ = Stop Sign
- $\frac{26}{35}$  = AM Peak Hour Traffic / PM Peak Hour Traffic
- 2,500 = Average Daily Traffic

Note: Assumes a conservative annual growth rate of one percent for two years.



Figure 4  
**Year 2018 Background Traffic,  
Lane Geometry and Traffic Control**  
Mapleton Hill (LSC #150520)



Figure 5

# Directional Distribution of Site-Generated Traffic

Mapleton Hill Redevelopment (LSC #150520)

LEGEND:

↔ = Percent Directional Distribution  
65%



Approximate Scale  
Scale: 1" = 300'

LEGEND:

- $\frac{26}{35}$  = AM Peak Hour Traffic
- $\frac{35}{35}$  = PM Peak Hour Traffic
- 2,500 = Average Daily Traffic



Figure 6  
**Assignment of Site-Generated Traffic**  
Mapleton Hill (LSC #150520)



LEGEND:

- ⊥ = Stop Sign
- $\frac{26}{35}$  = AM Peak Hour Traffic / PM Peak Hour Traffic



Figure 7  
**Year 2018 Total Traffic,  
 Lane Geometry and Traffic Control**  
 Mapleton Hill (LSC #150520)

COUNTER MEASURES INC.

1889 YORK ST  
DENVER, COLORADO  
303-333-7409

N/S STREET: 4TH ST  
E/W STREET: MAPLETON AVE  
CITY: BOULDER  
COUNTY: BOULDER

File Name : 4THSMAPL3  
Site Code : 00000001  
Start Date : 5/28/2015  
Page No : 1

Groups Printed- VEHICLES

Start Time	4TH ST Southbound				MAPLETON AVE Westbound				4TH ST Northbound				MAPLETON AVE Eastbound				Int. Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:30 AM	0	3	0	6	0	5	0	5	0	3	0	0	0	5	1	1	29
06:45 AM	3	2	0	3	3	10	4	2	3	1	0	5	5	13	0	6	60
Total	3	5	0	9	3	15	4	7	3	4	0	5	5	18	1	7	89
07:00 AM	2	1	3	5	1	15	3	7	1	5	0	0	2	13	2	3	63
07:15 AM	0	1	1	3	0	6	3	1	1	5	0	3	3	17	3	2	49
07:30 AM	1	9	1	2	2	14	6	3	0	4	0	5	3	16	3	5	74
07:45 AM	4	9	5	3	0	14	7	4	2	6	0	1	3	24	8	1	91
Total	7	20	10	13	3	49	19	15	4	20	0	9	11	70	16	11	277
08:00 AM	3	8	3	5	3	16	7	7	3	9	1	1	10	23	7	7	113
08:15 AM	5	13	3	6	0	22	5	5	4	6	2	2	5	25	5	5	113
Total	8	21	6	11	3	38	12	12	7	15	3	3	15	48	12	12	226
04:00 PM	4	7	6	4	2	22	7	4	6	7	2	0	4	17	1	1	94
04:15 PM	6	10	5	1	3	23	4	1	11	9	2	1	9	21	2	4	112
04:30 PM	5	8	6	3	4	30	4	2	3	6	4	5	3	22	4	2	111
04:45 PM	4	19	6	2	1	18	4	3	5	10	2	1	8	21	3	1	108
Total	19	44	23	10	10	93	19	10	25	32	10	7	24	81	10	8	425
05:00 PM	4	12	2	12	2	35	1	8	6	4	1	1	7	25	3	3	126
05:15 PM	10	4	5	6	0	31	2	4	7	12	1	0	1	21	5	3	112
05:30 PM	1	7	5	3	3	27	2	3	3	8	1	5	3	16	1	8	96
05:45 PM	3	6	3	4	0	24	6	3	8	9	1	1	6	19	3	5	101
Total	18	29	15	25	5	117	11	18	24	33	4	7	17	81	12	19	435
Grand Total	55	119	54	68	24	312	65	62	63	104	17	31	72	298	51	57	1452
Apprch %	18.6	40.2	18.2	23.0	5.2	67.4	14.0	13.4	29.3	48.4	7.9	14.4	15.1	62.3	10.7	11.9	
Total %	3.8	8.2	3.7	4.7	1.7	21.5	4.5	4.3	4.3	7.2	1.2	2.1	5.0	20.5	3.5	3.9	

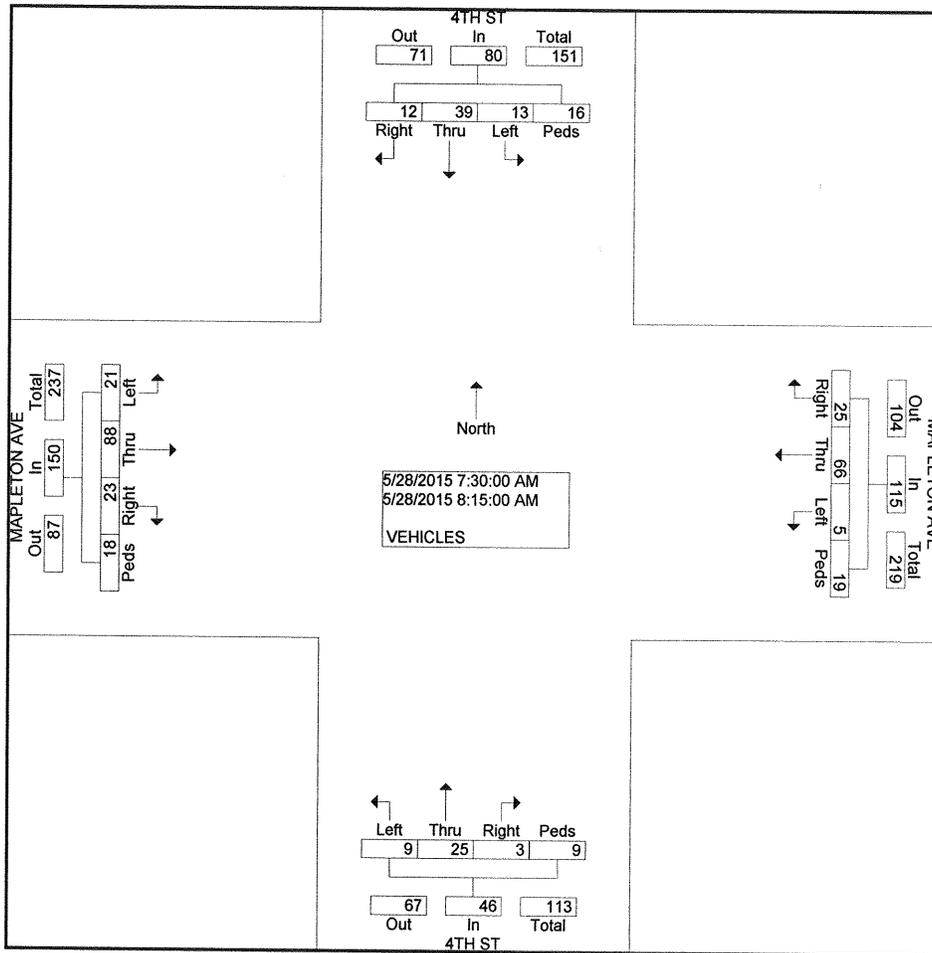
**COUNTER MEASURES INC.**

1889 YORK ST  
DENVER, COLORADO  
303-333-7409

N/S STREET: 4TH ST  
E/W STREET: MAPLETON AVE  
CITY: BOULDER  
COUNTY: BOULDER

File Name : 4THSMAPL3  
Site Code : 00000001  
Start Date : 5/28/2015  
Page No : 2

Start Time	4TH ST Southbound					MAPLETON AVE Westbound					4TH ST Northbound					MAPLETON AVE Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour From 06:30 AM to 08:30 AM - Peak 1 of 1																					
Intersection																					
07:30 AM																					
Volume	13	39	12	16	80	5	66	25	19	115	9	25	3	9	46	21	88	23	18	150	391
Percent	16.3	48.8	15.0	20.0		4.3	57.4	21.7	16.5		19.6	54.3	6.5	19.6		14.0	58.7	15.3	12.0		
08:15																					
Volume	5	13	3	6	27	0	22	5	5	32	4	6	2	2	14	5	25	5	5	40	113
Peak Factor																					
High Int.	0.741					0.871					0.821					0.798					
08:15 AM						08:00 AM					08:00 AM					08:00 AM					
Volume	5	13	3	6	27	3	16	7	7	33	3	9	1	1	14	10	23	7	7	47	
Peak Factor																					



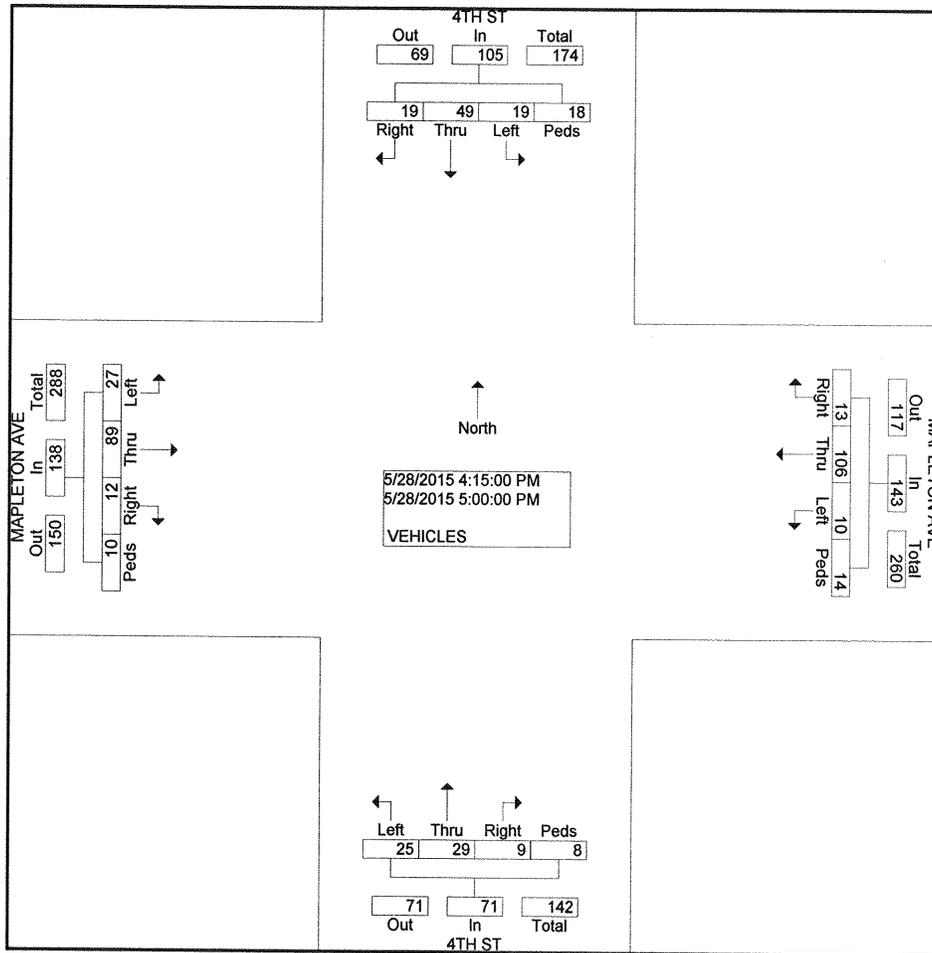
**COUNTER MEASURES INC.**

1889 YORK ST  
DENVER, COLORADO  
303-333-7409

N/S STREET: 4TH ST  
E/W STREET: MAPLETON AVE  
CITY: BOULDER  
COUNTY: BOULDER

File Name : 4THSMAPL3  
Site Code : 00000001  
Start Date : 5/28/2015  
Page No : 2

Start Time	4TH ST Southbound					MAPLETON AVE Westbound					4TH ST Northbound					MAPLETON AVE Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	04:15 PM																				
Volume	19	49	19	18	105	10	106	13	14	143	25	29	9	8	71	27	89	12	10	138	457
Percent	18.1	46.7	18.1	17.1		7.0	74.1	9.1	9.8		35.2	40.8	12.7	11.3		19.6	64.5	8.7	7.2		
05:00 Volume	4	12	2	12	30	2	35	1	8	46	6	4	1	1	12	7	25	3	3	38	126
Peak Factor																					0.907
High Int.	04:45 PM																				
Volume	4	19	6	2	31	05:00 PM					04:15 PM					05:00 PM					
Peak Factor	0.847										0.777										0.908



**COUNTER MEASURES INC.**

1889 YORK ST  
DENVER, COLORADO  
303-333-7409

N/S STREET: 4TH ST  
E/W STREET: MAXWELL AVE  
CITY: BOULDER  
COUNTY: BOULDER

File Name : 4THSMAXW3  
Site Code : 00000002  
Start Date : 5/28/2015  
Page No : 1

Groups Printed- VEHICLES

Start Time	4TH ST Southbound				MAXWELL AVE Westbound				4TH ST Northbound				MAXWELL AVE Eastbound				Int. Total	
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds		
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:30 AM	0	2	1	3	0	6	2	5	1	2	0	1	0	0	0	0	1	24
06:45 AM	0	2	6	1	1	10	0	2	4	6	2	0	1	0	1	5	41	
Total	0	4	7	4	1	16	2	7	5	8	2	1	1	0	1	6	65	
07:00 AM	0	6	4	1	0	7	2	3	0	9	1	2	0	0	0	7	42	
07:15 AM	0	1	7	4	1	9	1	2	2	8	1	2	0	0	0	5	43	
07:30 AM	0	9	4	1	1	10	2	2	6	5	1	1	0	0	1	0	43	
07:45 AM	1	13	5	0	4	12	1	3	5	7	5	2	3	6	2	2	71	
Total	1	29	20	6	6	38	6	10	13	29	8	7	3	6	3	14	199	
08:00 AM	0	16	4	1	0	8	0	6	8	17	2	0	2	3	1	8	76	
08:15 AM	0	18	8	0	0	16	0	3	4	7	6	0	1	4	2	6	75	
Total	0	34	12	1	0	24	0	9	12	24	8	0	3	7	3	14	151	
04:00 PM	1	9	2	1	3	2	0	3	3	14	1	1	6	21	5	1	73	
04:15 PM	0	17	2	0	2	7	0	0	3	16	3	0	5	19	2	4	80	
04:30 PM	2	16	0	0	2	3	0	4	1	7	5	1	4	13	5	3	66	
04:45 PM	2	22	1	4	3	2	2	6	2	16	6	2	7	15	4	2	96	
Total	5	64	5	5	10	14	2	13	9	53	15	4	22	68	16	10	315	
05:00 PM	3	11	3	1	1	3	1	2	1	10	2	1	6	22	5	0	72	
05:15 PM	0	10	1	5	2	2	2	3	1	14	0	0	5	5	9	6	65	
05:30 PM	1	11	2	1	1	3	0	4	0	11	1	1	1	10	1	6	54	
05:45 PM	0	8	0	0	2	0	1	7	3	15	3	0	0	9	0	4	52	
Total	4	40	6	7	6	8	4	16	5	50	6	2	12	46	15	16	243	
Grand Total	10	171	50	23	23	100	14	55	44	164	39	14	41	127	38	60	973	
Apprch %	3.9	67.3	19.7	9.1	12.0	52.1	7.3	28.6	16.9	62.8	14.9	5.4	15.4	47.7	14.3	22.6		
Total %	1.0	17.6	5.1	2.4	2.4	10.3	1.4	5.7	4.5	16.9	4.0	1.4	4.2	13.1	3.9	6.2		

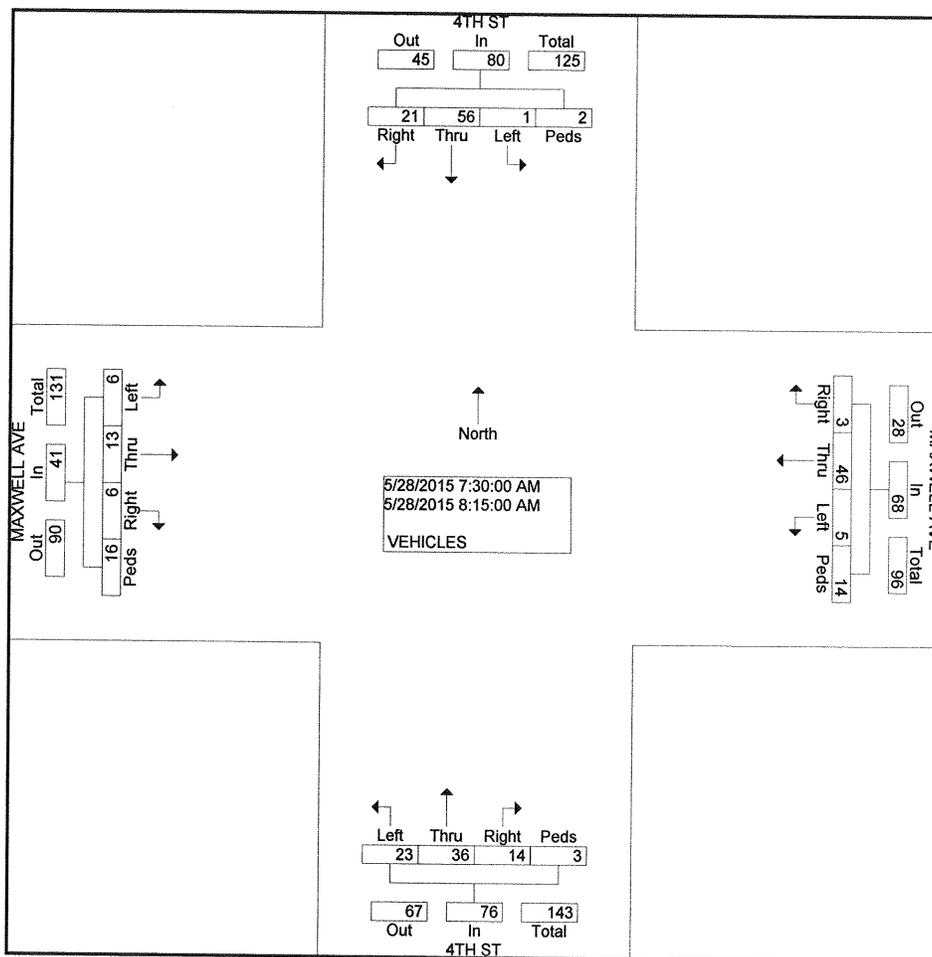
**COUNTER MEASURES INC.**

1889 YORK ST  
DENVER, COLORADO  
303-333-7409

N/S STREET: 4TH ST  
E/W STREET: MAXWELL AVE  
CITY: BOULDER  
COUNTY: BOULDER

File Name : 4THSMAXW3  
Site Code : 00000002  
Start Date : 5/28/2015  
Page No : 2

Start Time	4TH ST Southbound					MAXWELL AVE Westbound					4TH ST Northbound					MAXWELL AVE Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour From 06:30 AM to 08:30 AM - Peak 1 of 1																					
Intersection	07:30 AM																				
Volume	1	56	21	2	80	5	46	3	14	68	23	36	14	3	76	6	13	6	16	41	265
Percent	1.3	70.0	26.3	2.5		7.4	67.6	4.4	20.6		30.3	47.4	18.4	3.9		14.6	31.7	14.6	39.0		
08:00 Volume	0	16	4	1	21	0	8	0	6	14	8	17	2	0	27	2	3	1	8	14	76
Peak Factor																					0.872
High Int.	08:15 AM																				
Volume	0	18	8	0	26	4	12	1	3	20	8	17	2	0	27	2	3	1	8	14	
Peak Factor	0.769					0.850					0.704					0.732					



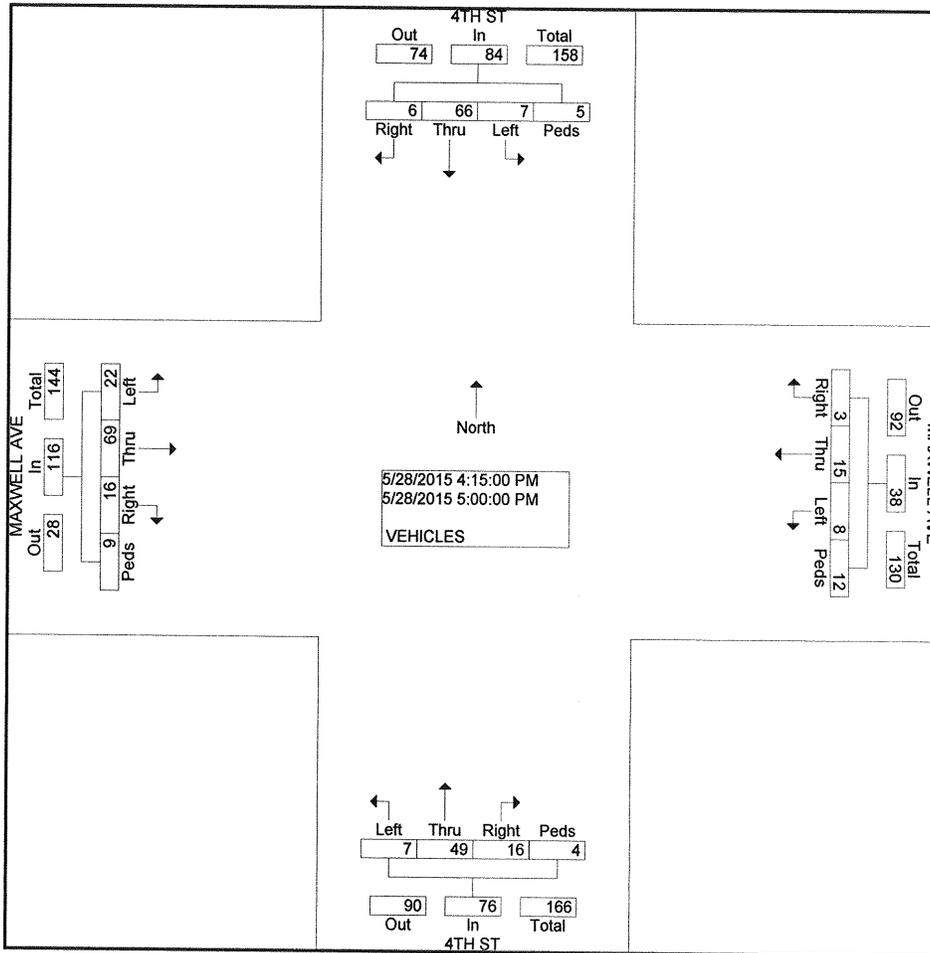
### COUNTER MEASURES INC.

1889 YORK ST  
DENVER, COLORADO  
303-333-7409

N/S STREET: 4TH ST  
E/W STREET: MAXWELL AVE  
CITY: BOULDER  
COUNTY: BOULDER

File Name : 4THSMAXW3  
Site Code : 00000002  
Start Date : 5/28/2015  
Page No : 2

Start Time	4TH ST Southbound					MAXWELL AVE Westbound					4TH ST Northbound					MAXWELL AVE Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour From 04:15 PM to 05:00 PM - Peak 1 of 1																					
Intersection	04:15 PM																				
Volume	7	66	6	5	84	8	15	3	12	38	7	49	16	4	76	22	69	16	9	116	314
Percent	8.3	78.6	7.1	6.0		21.1	39.5	7.9	31.6		9.2	64.5	21.1	5.3		19.0	59.5	13.8	7.8		
04:45 Volume	2	22	1	4	29	3	2	2	6	13	2	16	6	2	26	7	15	4	2	28	96
Peak Factor																					0.818
High Int.	04:45 PM																				
Volume	2	22	1	4	29	3	2	2	6	13	2	16	6	2	26	6	22	5	0	33	
Peak Factor	0.724					0.731					0.731					0.879					



**COUNTER MEASURES INC.**

1889 YORK ST  
DENVER, COLORADO  
303-333-7409

N/S STREET: HOSPITAL ACCESS  
E/W STREET: MAPLETON AVE  
CITY: BOULDER  
COUNTY: BOULDER

File Name : HOSPMAPL  
Site Code : 00000020  
Start Date : 5/28/2015  
Page No : 1

Groups Printed- VEHICLES

Start Time	HOSPITAL ACCESS Southbound				MAPLETON AVE Westbound				Northbound				MAPLETON AVE Eastbound				Int. Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:30 AM	0	0	0	7	0	3	1	1	0	0	0	0	0	6	0	0	18
06:45 AM	1	0	0	4	0	8	6	1	0	0	0	2	0	19	0	0	41
Total	1	0	0	11	0	11	7	2	0	0	0	2	0	25	0	0	59
07:00 AM	0	0	2	9	0	15	5	2	0	0	0	1	0	16	0	0	50
07:15 AM	3	0	0	8	0	3	4	1	0	0	0	3	0	20	0	0	42
07:30 AM	0	0	0	1	0	12	5	2	0	0	0	2	2	23	0	0	47
07:45 AM	1	0	1	5	0	17	5	0	0	0	0	1	0	38	0	0	68
Total	4	0	3	23	0	47	19	5	0	0	0	7	2	97	0	0	207
08:00 AM	0	0	0	6	0	14	10	1	0	0	0	3	0	41	0	0	75
08:15 AM	3	0	0	9	0	22	5	0	0	0	0	1	1	33	0	0	74
Total	3	0	0	15	0	36	15	1	0	0	0	4	1	74	0	0	149
04:00 PM	4	0	1	3	0	35	1	0	0	0	0	4	1	21	0	1	71
04:15 PM	3	0	0	5	0	35	3	0	0	0	0	2	0	27	0	0	75
04:30 PM	2	0	1	4	0	36	2	0	0	0	0	6	0	26	0	0	77
04:45 PM	2	0	0	5	0	27	2	0	0	0	0	2	1	27	0	0	66
Total	11	0	2	17	0	133	8	0	0	0	0	14	2	101	0	1	289
05:00 PM	3	0	1	12	0	41	2	0	0	0	0	1	2	33	0	0	95
05:15 PM	2	0	1	7	0	41	2	0	0	0	0	1	0	25	0	0	79
05:30 PM	1	0	1	6	0	34	1	0	0	0	0	4	0	16	0	0	63
05:45 PM	2	0	0	8	0	38	0	0	0	0	0	2	0	25	0	0	75
Total	8	0	3	33	0	154	5	0	0	0	0	8	2	99	0	0	312
Grand Total	27	0	8	99	0	381	54	8	0	0	0	35	7	396	0	1	1016
Apprch %	20.1	0.0	6.0	73.9	0.0	86.0	12.2	1.8	0.0	0.0	0.0	100.0	1.7	98.0	0.0	0.2	
Total %	2.7	0.0	0.8	9.7	0.0	37.5	5.3	0.8	0.0	0.0	0.0	3.4	0.7	39.0	0.0	0.1	

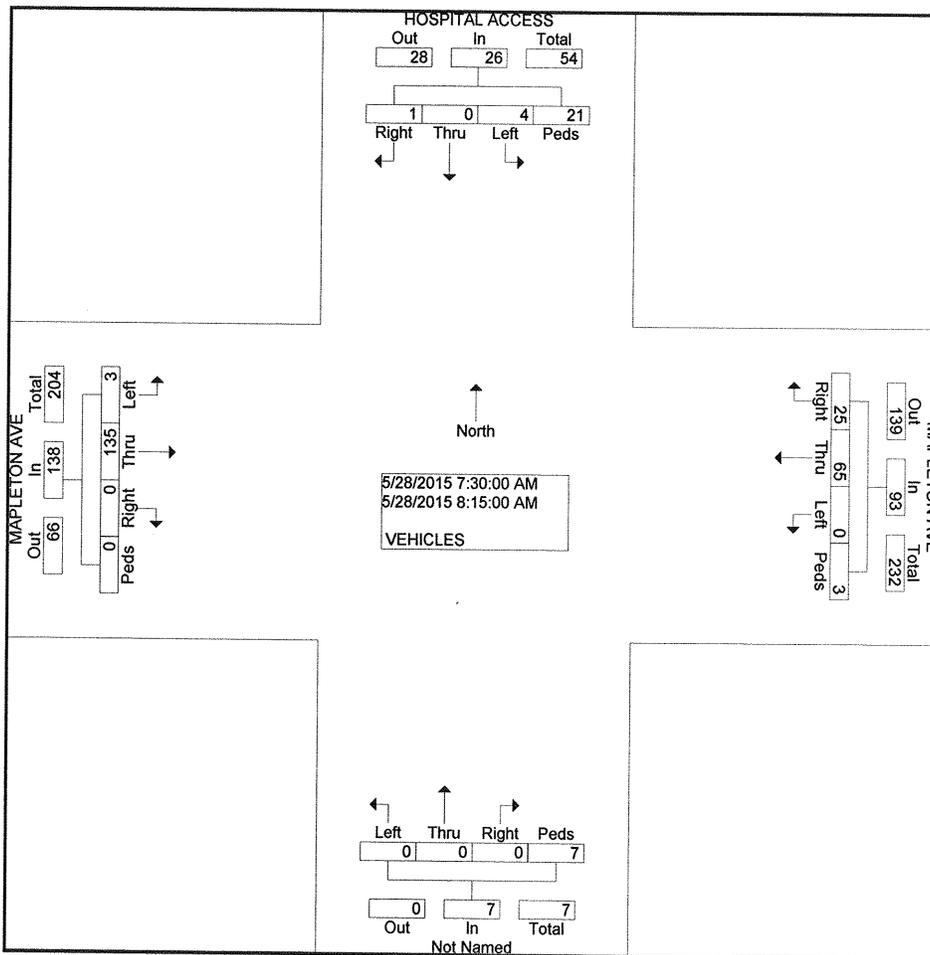
**COUNTER MEASURES INC.**

1889 YORK ST  
DENVER, COLORADO  
303-333-7409

N/S STREET: HOSPITAL ACCESS  
E/W STREET: MAPLETON AVE  
CITY: BOULDER  
COUNTY: BOULDER

File Name : HOSPMAPL  
Site Code : 0000020  
Start Date : 5/28/2015  
Page No : 2

Start Time	HOSPITAL ACCESS Southbound					MAPLETON AVE Westbound					Northbound					MAPLETON AVE Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour From 06:30 AM to 08:30 AM - Peak 1 of 1																					
Intersection	07:30 AM																				
Volume	4	0	1	21	26	0	65	25	3	93	0	0	0	7	7	3	135	0	0	138	264
Percent	15.4	0.0	3.8	80.8		0.0	69.9	26.9	3.2		0.0	0.0	0.0	100.0		2.2	97.8	0.0	0.0		
08:00 Volume	0	0	0	6	6	0	14	10	1	25	0	0	0	3	3	0	41	0	0	41	75
Peak Factor																					
High Int. Factor	0.880																				
08:15 AM	08:15 AM																				
Volume	3	0	0	9	12	0	22	5	0	27	0	0	0	3	3	0	41	0	0	41	
Peak Factor	0.542					0.861					0.583					0.841					



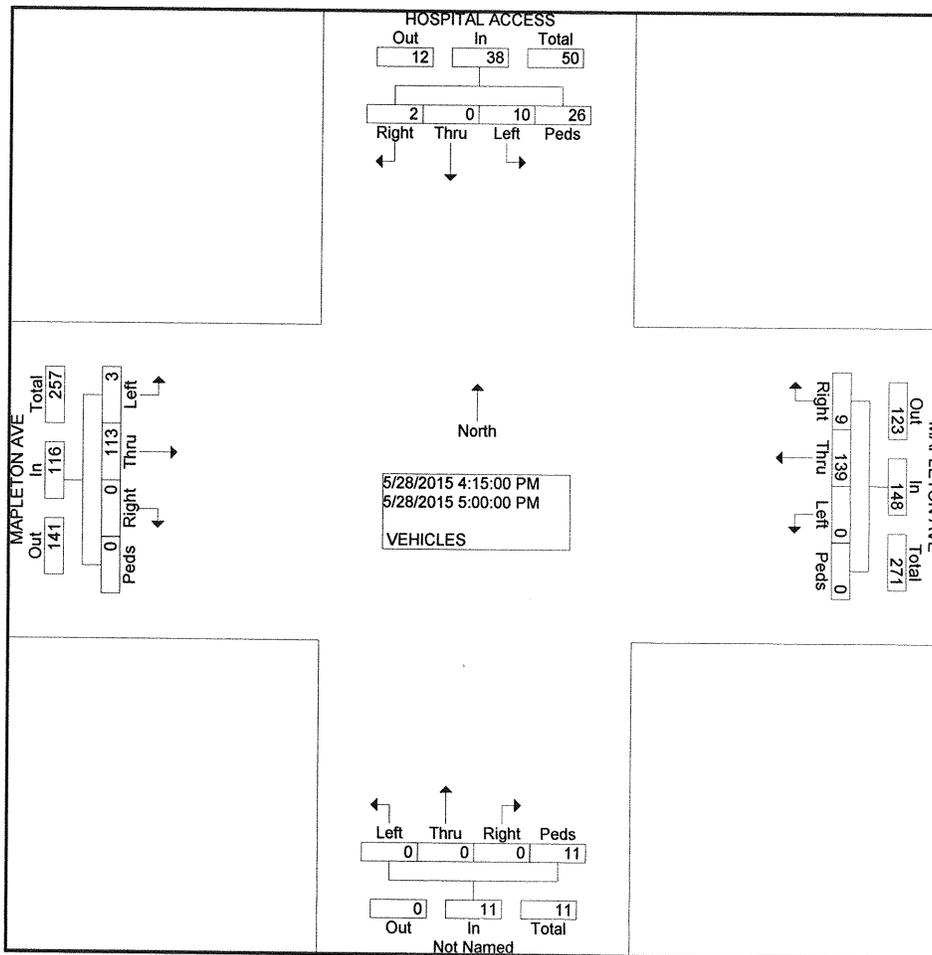
**COUNTER MEASURES INC.**

1889 YORK ST  
DENVER, COLORADO  
303-333-7409

N/S STREET: HOSPITAL ACCESS  
EW STREET: MAPLETON AVE  
CITY: BOULDER  
COUNTY: BOULDER

File Name : HOSPMAPL  
Site Code : 0000020  
Start Date : 5/28/2015  
Page No : 2

Start Time	HOSPITAL ACCESS Southbound					MAPLETON AVE Westbound					Northbound					MAPLETON AVE Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour From 04:15 PM to 05:00 PM - Peak 1 of 1																					
Intersection	04:15 PM																				
Volume	10	0	2	26	38	0	139	9	0	148	0	0	0	11	11	3	113	0	0	116	313
Percent	26.3	0.0	5.3	68.4		0.0	93.9	6.1	0.0		0.0	0.0	0.0	100.0		2.6	97.4	0.0	0.0		
05:00 Peak Factor	0.824																				
High Int. Volume	05:00 PM					05:00 PM					04:30 PM					05:00 PM					
Peak Factor	3	0	1	12	16	0	41	2	0	43	0	0	0	6	6	2	33	0	0	35	95
	0.594					0.860					0.458					0.829					



# COUNTER MEASURES INC.

**Location:** MAPLETON AVE W/O 4TH ST  
**City:** BOULDER  
**County:** BOULDER  
**Direction:** EASTBOUND-WESTBOUND

1889 YORK ST  
 DENVER, COLORADO 80206  
 303-333-7409

**Site Code:** 052612

Start Time	27-May-15 Wed	EB	WB	Total
12:00 AM		2	8	10
01:00		3	5	8
02:00		2	2	4
03:00		1	4	5
04:00		7	6	13
05:00		9	12	21
06:00		52	42	94
07:00		116	68	184
08:00		156	108	264
09:00		153	134	287
10:00		150	<b>148</b>	298
11:00		<b>182</b>	131	<b>313</b>
12:00 PM		136	125	261
01:00		140	136	276
02:00		139	131	270
03:00		134	138	272
04:00		125	150	275
05:00		<b>162</b>	<b>221</b>	<b>383</b>
06:00		110	159	269
07:00		84	116	200
08:00		70	70	140
09:00		37	31	68
10:00		33	34	67
11:00		6	14	20
Total		2009	1993	4002
Percent		50.2%	49.8%	
AM Peak		11:00	10:00	11:00
Vol.		182	148	313
PM Peak		17:00	17:00	17:00
Vol.		162	221	383
Grand Total		2009	1993	400
Percent		50.2%	49.8%	
ADT		Not Calculated		

# COUNTER MEASURES INC.

Location: 3RD ST (HOSPITAL) N/O MAPLETON  
 City: BOULDER  
 County: BOULDER  
 Direction: NORTHBOUND-SOUTHBOUND

1889 YORK ST  
 DENVER, COLORADO 80206  
 303-333-7409

Site Code: 052616

Start Time	27-May-15 Wed	NB	SB	Total
12:00 AM		1	1	2
01:00		0	0	0
02:00		2	2	4
03:00		0	0	0
04:00		0	0	0
05:00		2	2	4
06:00		8	6	14
07:00		26	24	50
08:00		27	22	49
09:00		30	27	57
10:00		<b>38</b>	<b>32</b>	<b>70</b>
11:00		28	23	51
12:00 PM		32	31	63
01:00		26	25	51
02:00		22	20	42
03:00		20	22	42
04:00		<b>34</b>	33	67
05:00		34	<b>36</b>	<b>70</b>
06:00		17	16	33
07:00		12	12	24
08:00		9	10	19
09:00		4	4	8
10:00		0	0	0
11:00		1	1	2
<b>Total</b>		<b>373</b>	<b>349</b>	<b>722</b>
<b>Percent</b>		<b>51.7%</b>	<b>48.3%</b>	
<b>AM Peak</b>		10:00	10:00	10:00
<b>Vol.</b>		38	32	70
<b>PM Peak</b>		16:00	17:00	17:00
<b>Vol.</b>		34	36	70
<b>Grand Total</b>		<b>373</b>	<b>349</b>	<b>722</b>
<b>Percent</b>		<b>51.7%</b>	<b>48.3%</b>	
<b>ADT</b>		Not Calculated		

# COUNTER MEASURES INC.

Location: 4TH ST S/O MAXWELL AVE  
 City: BOULDER  
 County: BOULDER  
 Direction: NORTHBOUND-SOUTHBOUND

1889 YORK ST  
 DENVER, COLORADO 80206  
 303-333-7409

Site Code: 052618

Start Time	27-May-15 Wed	NB	SB	Total
12:00 AM		7	3	10
01:00		1	1	2
02:00		1	1	2
03:00		0	3	3
04:00		4	4	8
05:00		3	2	5
06:00		16	10	26
07:00		56	41	97
08:00		90	76	166
09:00		92	84	176
10:00		<b>114</b>	<b>109</b>	<b>223</b>
11:00		98	84	182
12:00 PM		92	86	178
01:00		120	98	218
02:00		91	86	177
03:00		87	109	196
04:00		118	111	229
05:00		<b>134</b>	<b>142</b>	<b>276</b>
06:00		66	74	140
07:00		44	44	88
08:00		38	32	70
09:00		28	26	54
10:00		6	8	14
11:00		7	2	9
<b>Total</b>		<b>1313</b>	<b>1236</b>	<b>2549</b>
<b>Percent</b>		<b>51.5%</b>	<b>48.5%</b>	
AM Peak		10:00	10:00	10:00
Vol.		114	109	223
PM Peak		17:00	17:00	17:00
Vol.		134	142	276
<b>Grand Total</b>		<b>1313</b>	<b>1236</b>	<b>2549</b>
<b>Percent</b>		<b>51.5%</b>	<b>48.5%</b>	
ADT		Not Calculated		

# COUNTER MEASURES INC.

Location: MAXWELL AVE W/O 4TH ST  
 City: BOULDER  
 County: BOULDER  
 Direction: EASTBOUND-WESTBOUND

1889 YORK ST  
 DENVER, COLORADO 80206  
 303-333-7409

Site Code: 052613

Start Time	27-May-15 Wed	EB	WB	Total
12:00 AM		3	3	6
01:00		0	0	0
02:00		1	1	2
03:00		0	0	0
04:00		4	4	8
05:00		9	10	19
06:00		31	33	64
07:00		78	78	156
08:00		90	93	183
09:00		<b>110</b>	108	218
10:00		108	<b>112</b>	<b>220</b>
11:00		89	89	178
12:00 PM		106	104	210
01:00		86	84	170
02:00		130	122	252
03:00		112	106	218
04:00		130	<b>124</b>	254
05:00		<b>131</b>	124	<b>255</b>
06:00		46	46	92
07:00		26	26	52
08:00		6	6	12
09:00		15	16	31
10:00		2	4	6
11:00		4	4	8
<b>Total</b>		1317	1297	2614
<b>Percent</b>		50.4%	49.6%	
<b>AM Peak</b>		09:00	10:00	10:00
Vol.		110	112	220
<b>PM Peak</b>		17:00	16:00	17:00
Vol.		131	124	255
<b>Grand Total</b>		1317	1297	2614
<b>Percent</b>		50.4%	49.6%	
<b>ADT</b>		Not Calculated		

# COUNTER MEASURES INC.

Location: MAPLETON HILL MED PLZ W/O 4TH  
 City: BOULDER  
 County: BOULDER  
 Direction: EASTBOUND-WESTBOUND

1889 YORK ST  
 DENVER, COLORADO 80206  
 303-333-7409

Site Code: 052617

Start Time	27-May-15 Wed	EB	WB	Total
12:00 AM		0	0	0
01:00		0	0	0
02:00		0	0	0
03:00		0	0	0
04:00		0	0	0
05:00		0	0	0
06:00		3	4	7
07:00		8	6	14
08:00		15	16	31
09:00		<b>61</b>	<b>54</b>	<b>115</b>
10:00		46	49	95
11:00		39	50	89
12:00 PM		<b>52</b>	<b>55</b>	<b>107</b>
01:00		34	40	74
02:00		30	33	63
03:00		21	22	43
04:00		26	32	58
05:00		18	22	40
06:00		7	8	15
07:00		1	1	2
08:00		3	4	7
09:00		8	8	16
10:00		0	0	0
11:00		0	0	0
Total		372	404	776
Percent		47.9%	52.1%	
AM Peak		09:00	09:00	09:00
Vol.		61	54	115
PM Peak		12:00	12:00	12:00
Vol.		52	55	107
Grand Total		372	404	776
Percent		47.9%	52.1%	

ADT

Not Calculated

# COUNTER MEASURES INC.

Location: CONCORD AVE ACCESS W/O 4TH ST  
 City: BOULDER  
 County: BOULDER  
 Direction: EASTBOUND-WESTBOUND

1889 YORK ST  
 DENVER, COLORADO 80206  
 303-333-7409

Site Code: 052615

Start Time	27-May-15 Wed	EB	WB	Total
12:00 AM		1	1	2
01:00		0	0	0
02:00		0	0	0
03:00		0	0	0
04:00		0	0	0
05:00		0	0	0
06:00		0	0	0
07:00		<b>6</b>	<b>7</b>	<b>13</b>
08:00		5	6	11
09:00		4	4	8
10:00		6	6	12
11:00		2	2	4
12:00 PM		3	4	7
01:00		4	4	8
02:00		2	2	4
03:00		3	3	6
04:00		<b>6</b>	<b>7</b>	<b>13</b>
05:00		5	6	11
06:00		3	3	6
07:00		1	1	2
08:00		1	1	2
09:00		2	2	4
10:00		0	0	0
11:00		0	0	0
<b>Total</b>		<b>54</b>	<b>59</b>	<b>113</b>
<b>Percent</b>		<b>47.8%</b>	<b>52.2%</b>	
AM Peak		07:00	07:00	07:00
Vol.		6	7	13
PM Peak		16:00	16:00	16:00
Vol.		6	7	13
<b>Grand Total</b>		<b>54</b>	<b>59</b>	<b>113</b>
<b>Percent</b>		<b>47.8%</b>	<b>52.2%</b>	
ADT		Not Calculated		

## LEVEL OF SERVICE DEFINITIONS

From *Highway Capacity Manual*, Transportation Research Board, 2010

### UNSIGNALIZED INTERSECTION LEVEL OF SERVICE (LOS)

Applicable to Two-Way Stop Control, All-Way Stop Control, and Roundabouts

LOS	Average Vehicle Control Delay	<u>Operational Characteristics</u>
A	<10 seconds	Normally, vehicles on the stop-controlled approach only have to wait up to 10 seconds before being able to clear the intersection. Left-turning vehicles on the uncontrolled street do not have to wait to make their turn.
B	10 to 15 seconds	Vehicles on the stop-controlled approach will experience delays before being able to clear the intersection. <u>The delay could be up to 15 seconds.</u> Left-turning vehicles on the uncontrolled street may have to wait to make their turn.
C	15 to 25 seconds	Vehicles on the stop-controlled approach can expect delays in the range of 15 to 25 seconds before clearing the intersection. Motorists may begin to take chances due to the long delays, thereby posing a safety risk to through traffic. <u>Left-turning vehicles on the uncontrolled street will now be required to wait to make their turn causing a queue to be created in the turn lane.</u>
D	25 to 35 seconds	<u>This is the point at which a traffic signal may be warranted for this intersection.</u> The delays for the stop-controlled intersection are not considered to be excessive. The length of the queue may begin to block other public and private access points.
E	35 to 50 seconds	The delays for all critical traffic movements are considered to be unacceptable. The length of the queues for the stop-controlled approaches as well as the left-turn movements are extremely long. <u>There is a high probability that this intersection will meet traffic signal warrants.</u> The ability to install a traffic signal is affected by the location of other existing traffic signals. Consideration may be given to restricting the accesses by eliminating the left-turn movements from and to the stop-controlled approach.
F	>50 seconds	The delay for the critical traffic movements are probably in excess of 100 seconds. The length of the queues are extremely long. Motorists are selecting alternative routes due to the long delays. <u>The only remedy for these long delays is installing a traffic signal or restricting the accesses.</u> The potential for accidents at this intersection are extremely high due to motorist taking more risky chances. If the median permits, motorists begin making two-stage left-turns.

HCM 2010 TWSC  
3: 4th Street & East Site Access/Maxwell Avenue

Existing  
AM Peak

Intersection												
Intersection Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	6	6	4	7	5	8	46	11	2	33	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	7	7	5	9	6	10	56	13	2	40	6
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	138	137	43	137	133	63	46	0	0	70	0	0
Stage 1	48	48	-	82	82	-	-	-	-	-	-	-
Stage 2	90	89	-	55	51	-	-	-	-	-	-	-
Follow-up Headway	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	833	754	1027	834	758	1002	1562	-	-	1531	-	-
Stage 1	965	855	-	926	827	-	-	-	-	-	-	-
Stage 2	917	821	-	957	852	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	816	748	1027	817	752	1002	1562	-	-	1531	-	-
Mov Capacity-2 Maneuver	816	748	-	817	752	-	-	-	-	-	-	-
Stage 1	958	854	-	920	821	-	-	-	-	-	-	-
Stage 2	896	815	-	941	851	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	9.3		9.4			0.9			0.4			
HCM LOS	A		A									
Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1562	-	-	853	834	1531	-	-				
HCM Lane V/C Ratio	0.006	-	-	0.023	0.023	0.002	-	-				
HCM Control Delay (s)	7.319	0	-	9.3	9.4	7.355	0	-				
HCM Lane LOS	A	A	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0.019	-	-	0.07	0.072	0.005	-	-				

Notes

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

**Intersection**

Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	29	118	21	11	95	14	4	21	7	8	20	18
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	139	25	13	112	16	5	25	8	9	24	21
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	8.6	8.4	7.9	7.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	12%	100%	0%	9%	17%
Vol Thru, %	66%	0%	85%	79%	43%
Vol Right, %	22%	0%	15%	12%	39%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	32	29	139	120	46
LT Vol	21	0	118	95	20
Through Vol	7	0	21	14	18
RT Vol	4	29	0	11	8
Lane Flow Rate	38	34	164	141	54
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.049	0.05	0.212	0.173	0.069
Departure Headway (Hd)	4.681	5.374	4.766	4.419	4.566
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	768	670	757	815	787
Service Time	2.694	3.074	2.466	2.433	2.579
HCM Lane V/C Ratio	0.049	0.051	0.217	0.173	0.069
HCM Control Delay	7.9	8.4	8.7	8.4	7.9
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.2	0.2	0.8	0.6	0.2

**Notes**

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

**Intersection**

Intersection Delay, s/veh 0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	2	165	101	16	3	2
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	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	181	111	18	3	2

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	129	0	120
Stage 1	-	-	120
Stage 2	-	-	186
Follow-up Headway	2.218	-	3.318
Pot Capacity-1 Maneuver	1457	-	931
Stage 1	-	-	905
Stage 2	-	-	846
Time blocked-Platoon, %	-	-	-
Mov Capacity-1 Maneuver	1457	-	931
Mov Capacity-2 Maneuver	-	-	685
Stage 1	-	-	905
Stage 2	-	-	844

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	9.7
HCM LOS			A

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1457	-	-	-	766
HCM Lane V/C Ratio	0.002	-	-	-	0.007
HCM Control Delay (s)	7.475	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.005	-	-	-	0.022

**Notes**

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

Intersection												
Intersection Delay, s/veh	13.4											
Intersection LOS	B											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	29	15	19	20	30	4	10	214	13	6	341	10
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	39	20	25	27	40	5	13	285	17	8	455	13
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.9	9.9	11.7	15.6
HCM LOS	A	A	B	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	46%	37%	2%
Vol Thru, %	90%	24%	56%	96%
Vol Right, %	5%	30%	7%	3%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	237	63	54	357
LT Vol	214	15	30	341
Through Vol	13	19	4	10
RT Vol	10	29	20	6
Lane Flow Rate	316	84	72	476
Geometry Grp	1	1	1	1
Degree of Util (X)	0.43	0.138	0.121	0.627
Departure Headway (Hd)	5.009	5.913	6.06	4.739
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	724	610	595	752
Service Time	3.009	3.918	4.065	2.83
HCM Lane V/C Ratio	0.436	0.138	0.121	0.633
HCM Control Delay	11.7	9.9	9.9	15.6
HCM Lane LOS	B	A	A	C
HCM 95th-tile Q	2.2	0.5	0.4	4.5

Notes

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

Intersection												
Intersection Delay, s/veh	6.7											
<b>Movement</b>	<b>EBL</b>	<b>EBT</b>	<b>EBR</b>	<b>WBL</b>	<b>WBT</b>	<b>WBR</b>	<b>NBL</b>	<b>NBT</b>	<b>NBR</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>
Vol, veh/h	28	31	90	4	26	6	78	207	7	4	321	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	36	40	117	5	34	8	101	269	9	5	417	78
<b>Major/Minor</b>	<b>Minor2</b>		<b>Minor1</b>			<b>Major1</b>			<b>Major2</b>			
Conflicting Flow All	963	947	456	1021	981	273	495	0	0	278	0	0
Stage 1	466	466	-	476	476	-	-	-	-	-	-	-
Stage 2	497	481	-	545	505	-	-	-	-	-	-	-
Follow-up Headway	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	235	261	604	215	249	766	1069	-	-	1285	-	-
Stage 1	577	562	-	570	557	-	-	-	-	-	-	-
Stage 2	555	554	-	523	540	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	187	231	604	137	220	766	1069	-	-	1285	-	-
Mov Capacity-2 Maneuver	187	231	-	137	220	-	-	-	-	-	-	-
Stage 1	512	559	-	506	495	-	-	-	-	-	-	-
Stage 2	455	492	-	389	537	-	-	-	-	-	-	-
<b>Approach</b>	<b>EB</b>		<b>WB</b>			<b>NB</b>			<b>SB</b>			
HCM Control Delay, s	28.1		24.4			2.3			0.1			
HCM LOS	D		C									
<b>Minor Lane / Major Mvmt</b>	<b>NBL</b>	<b>NBT</b>	<b>NBR</b>	<b>EBLn1</b>	<b>WBLn1</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>				
Capacity (veh/h)	1069	-	-	344	232	1285	-	-				
HCM Lane V/C Ratio	0.095	-	-	0.563	0.202	0.004	-	-				
HCM Control Delay (s)	8.72	0	-	28.1	24.4	7.813	0	-				
HCM Lane LOS	A	A	-	D	C	A	A	-				
HCM 95th %tile Q(veh)	0.313	-	-	3.284	0.734	0.012	-	-				
<b>Notes</b>												
~ : Volume Exceeds Capacity; \$ : Delay Exceeds 300 Seconds; Error : Computation Not Defined												

HCM 2010 TWSC  
 3: 4th Street & East Site Access/Maxwell Avenue

Existing  
 PM Peak

Intersection												
Intersection Delay, s/veh	2.6											
<b>Movement</b>	<b>EBL</b>	<b>EBT</b>	<b>EBR</b>	<b>WBL</b>	<b>WBT</b>	<b>WBR</b>	<b>NBL</b>	<b>NBT</b>	<b>NBR</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>
Vol, veh/h	5	11	10	4	4	4	7	49	7	7	68	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	13	12	5	5	5	8	58	8	8	80	2
<b>Major/Minor</b>	<b>Minor2</b>		<b>Minor1</b>			<b>Major1</b>			<b>Major2</b>			
Conflicting Flow All	181	180	81	188	177	62	82	0	0	66	0	0
Stage 1	98	98	-	78	78	-	-	-	-	-	-	-
Stage 2	83	82	-	110	99	-	-	-	-	-	-	-
Follow-up Headway	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	781	714	979	772	717	1003	1515	-	-	1536	-	-
Stage 1	908	814	-	931	830	-	-	-	-	-	-	-
Stage 2	925	827	-	895	813	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	768	707	979	746	710	1003	1515	-	-	1536	-	-
Mov Capacity-2 Maneuver	768	707	-	746	710	-	-	-	-	-	-	-
Stage 1	903	810	-	926	826	-	-	-	-	-	-	-
Stage 2	911	823	-	866	809	-	-	-	-	-	-	-
<b>Approach</b>	<b>EB</b>		<b>WB</b>			<b>NB</b>			<b>SB</b>			
HCM Control Delay, s	9.6		9.6			0.8			0.7			
HCM LOS	A		A									
<b>Minor Lane / Major Mvmt</b>	<b>NBL</b>	<b>NBT</b>	<b>NBR</b>	<b>EBLn1</b>	<b>WBLn1</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>				
Capacity (veh/h)	1515	-	-	805	801	1536	-	-				
HCM Lane V/C Ratio	0.005	-	-	0.038	0.018	0.005	-	-				
HCM Control Delay (s)	7.389	0	-	9.6	9.6	7.356	0	-				
HCM Lane LOS	A	A	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0.016	-	-	0.118	0.054	0.016	-	-				

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

**Intersection**

Intersection Delay, s/veh	8.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	14	79	9	10	138	20	31	28	7	18	35	23
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	93	11	12	162	24	36	33	8	21	41	27
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	8.6	9.1	8.4	8.3
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	47%	100%	0%	6%	24%
Vol Thru, %	42%	0%	90%	82%	46%
Vol Right, %	11%	0%	10%	12%	30%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	66	14	88	168	76
LT Vol	28	0	79	138	35
Through Vol	7	0	9	20	23
RT Vol	31	14	0	10	18
Lane Flow Rate	78	16	104	198	89
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.104	0.026	0.145	0.249	0.116
Departure Headway (Hd)	4.83	5.605	5.03	4.527	4.653
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	741	639	712	793	769
Service Time	2.867	3.337	2.762	2.556	2.688
HCM Lane V/C Ratio	0.105	0.025	0.146	0.25	0.116
HCM Control Delay	8.4	8.5	8.6	9.1	8.3
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.3	0.1	0.5	1	0.4

**Notes**

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

**Intersection**

Intersection Delay, s/veh 0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	97	179	13	5	0
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	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	111	206	15	6	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	221	0	213
Stage 1	-	-	-
Stage 2	-	-	-
Follow-up Headway	2.218	-	3.318
Pot Capacity-1 Maneuver	1348	-	827
Stage 1	-	-	-
Stage 2	-	-	-
Time blocked-Platoon, %	-	-	-
Mov Capacity-1 Maneuver	1348	-	827
Mov Capacity-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	10.5
HCM LOS			B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1348	-	-	-	666
HCM Lane V/C Ratio	0.001	-	-	-	0.009
HCM Control Delay (s)	7.673	0	-	-	10.5
HCM Lane LOS	A	A			B
HCM 95th %tile Q(veh)	0.003	-	-	-	0.026

**Notes**

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

Intersection												
Intersection Delay, s/veh	12.4											
Intersection LOS	B											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	42	20	22	36	25	15	21	378	12	5	280	19
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	44	21	23	38	26	16	22	394	13	5	292	20
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.8	9.8	14	11.6
HCM LOS	A	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	50%	47%	2%
Vol Thru, %	92%	24%	33%	92%
Vol Right, %	3%	26%	20%	6%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	411	84	76	304
LT Vol	378	20	25	280
Through Vol	12	22	15	19
RT Vol	21	42	36	5
Lane Flow Rate	428	88	79	317
Geometry Grp	1	1	1	1
Degree of Util (X)	0.567	0.142	0.13	0.428
Departure Headway (Hd)	4.768	5.85	5.902	4.97
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	745	616	610	728
Service Time	2.862	3.854	3.906	2.97
HCM Lane V/C Ratio	0.574	0.143	0.13	0.435
HCM Control Delay	14	9.8	9.8	11.6
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	3.6	0.5	0.4	2.2

Notes

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

Intersection												
Intersection Delay, s/veh	5.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	27	29	81	9	41	10	83	380	18	8	276	58
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	28	31	85	9	43	11	87	400	19	8	291	61
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	949	932	321	980	952	409	352	0	0	419	0	0
Stage 1	338	338	-	584	584	-	-	-	-	-	-	-
Stage 2	611	594	-	396	368	-	-	-	-	-	-	-
Follow-up Headway	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	240	266	720	229	259	642	1207	-	-	1140	-	-
Stage 1	676	641	-	498	498	-	-	-	-	-	-	-
Stage 2	481	493	-	629	621	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	187	239	720	168	233	642	1207	-	-	1140	-	-
Mov Capacity-2 Maneuver	187	239	-	168	233	-	-	-	-	-	-	-
Stage 1	612	635	-	451	451	-	-	-	-	-	-	-
Stage 2	388	447	-	523	615	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	21.4		24.7			1.4			0.2			
HCM LOS	C		C									
Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1207	-	-	362	245	1140	-	-				
HCM Lane V/C Ratio	0.072	-	-	0.398	0.258	0.007	-	-				
HCM Control Delay (s)	8.215	0	-	21.4	24.7	8.181	0	-				
HCM Lane LOS	A	A	-	C	C	A	A	-				
HCM 95th %tile Q(veh)	0.234	-	-	1.859	0.998	0.022	-	-				

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

Intersection												
Intersection Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	6	6	4	7	5	8	47	11	2	34	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	7	7	5	9	6	10	57	13	2	41	6
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	140	139	45	141	136	64	48	0	0	71	0	0
Stage 1	49	49	-	84	84	-	-	-	-	-	-	-
Stage 2	91	90	-	57	52	-	-	-	-	-	-	-
Follow-up Headway	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	830	752	1025	829	755	1000	1559	-	-	1529	-	-
Stage 1	964	854	-	924	825	-	-	-	-	-	-	-
Stage 2	916	820	-	955	852	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	813	746	1025	812	749	1000	1559	-	-	1529	-	-
Mov Capacity-2 Maneuver	813	746	-	812	749	-	-	-	-	-	-	-
Stage 1	957	853	-	918	819	-	-	-	-	-	-	-
Stage 2	895	814	-	939	851	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	9.3		9.4			0.9			0.4			
HCM LOS	A		A									
Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1559	-	-	850	830	1529	-	-				
HCM Lane V/C Ratio	0.006	-	-	0.023	0.024	0.002	-	-				
HCM Control Delay (s)	7.324	0	-	9.3	9.4	7.358	0	-				
HCM Lane LOS	A	A	-	A	A	A	A	-				
HCM 95th %tile Q(veh)	0.019	-	-	0.07	0.072	0.005	-	-				

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

Intersection												
Intersection Delay, s/veh	8.4											
Intersection LOS	A											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	30	120	21	11	97	14	4	21	7	8	20	18
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	35	141	25	13	114	16	5	25	8	9	24	21
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	8.7	8.4	8	7.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	12%	100%	0%	9%	17%
Vol Thru, %	66%	0%	85%	80%	43%
Vol Right, %	22%	0%	15%	11%	39%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	32	30	141	122	46
LT Vol	21	0	120	97	20
Through Vol	7	0	21	14	18
RT Vol	4	30	0	11	8
Lane Flow Rate	38	35	166	144	54
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.049	0.052	0.215	0.176	0.069
Departure Headway (Hd)	4.695	5.376	4.77	4.424	4.58
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	765	670	756	814	785
Service Time	2.708	3.076	2.47	2.438	2.592
HCM Lane V/C Ratio	0.05	0.052	0.22	0.177	0.069
HCM Control Delay	8	8.4	8.8	8.4	7.9
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.2	0.2	0.8	0.6	0.2

Notes

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

**Intersection**

Intersection Delay, s/veh 0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	2	168	103	16	3	2
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	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	185	113	18	3	2

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	131	0	122
Stage 1	-	-	-
Stage 2	-	-	-
Follow-up Headway	2.218	-	3.318
Pot Capacity-1 Maneuver	1454	-	929
Stage 1	-	-	-
Stage 2	-	-	-
Time blocked-Platoon, %	-	-	-
Mov Capacity-1 Maneuver	1454	-	929
Mov Capacity-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	9.8
HCM LOS			A

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1454	-	-	-	762
HCM Lane V/C Ratio	0.002	-	-	-	0.007
HCM Control Delay (s)	7.48	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.005	-	-	-	0.022

**Notes**

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

Intersection												
Intersection Delay, s/veh	13.7											
Intersection LOS	B											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	30	15	19	20	31	4	10	218	13	6	348	10
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	40	20	25	27	41	5	13	291	17	8	464	13
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.9	10	11.9	16.1
HCM LOS	A	A	B	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	47%	36%	2%
Vol Thru, %	90%	23%	56%	96%
Vol Right, %	5%	30%	7%	3%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	241	64	55	364
LT Vol	218	15	31	348
Through Vol	13	19	4	10
RT Vol	10	30	20	6
Lane Flow Rate	321	85	73	485
Geometry Grp	1	1	1	1
Degree of Util (X)	0.44	0.141	0.124	0.641
Departure Headway (Hd)	5.036	5.963	6.106	4.757
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	720	604	590	747
Service Time	3.036	3.968	4.11	2.853
HCM Lane V/C Ratio	0.446	0.141	0.124	0.649
HCM Control Delay	11.9	9.9	10	16.1
HCM Lane LOS	B	A	A	C
HCM 95th-tile Q	2.3	0.5	0.4	4.7

Notes

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

**Intersection**

Intersection Delay, s/veh 7.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	29	32	92	4	27	6	80	211	7	4	327	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	42	119	5	35	8	104	274	9	5	425	79

Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	983	966	464	1041	1000	279	504	0	0	283	0	0
Stage 1	475	475	-	486	486	-	-	-	-	-	-	-
Stage 2	508	491	-	555	514	-	-	-	-	-	-	-
Follow-up Headway	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	228	255	598	208	243	760	1061	-	-	1279	-	-
Stage 1	570	557	-	563	551	-	-	-	-	-	-	-
Stage 2	547	548	-	516	535	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-	-	-	-
Mov Capacity-1 Maneuver	180	224	598	130	214	760	1061	-	-	1279	-	-
Mov Capacity-2 Maneuver	180	224	-	130	214	-	-	-	-	-	-	-
Stage 1	504	554	-	498	487	-	-	-	-	-	-	-
Stage 2	444	484	-	380	532	-	-	-	-	-	-	-

Approach	EB		WB			NB			SB		
HCM Control Delay, s	30.4		25.4			2.4			0.1		
HCM LOS	D		D								

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1061	-	-	334	224	1279	-	-
HCM Lane V/C Ratio	0.098	-	-	0.595	0.215	0.004	-	-
HCM Control Delay (s)	8.761	0	-	30.4	25.4	7.826	0	-
HCM Lane LOS	A	A	-	D	D	A	A	-
HCM 95th %tile Q(veh)	0.325	-	-	3.628	0.791	0.012	-	-

**Notes**

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

**Intersection**

Intersection Delay, s/veh 2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	5	11	10	4	4	4	7	50	7	7	69	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	13	12	5	5	5	8	59	8	8	81	2

Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	183	183	82	190	179	63	84	0	0	67	0	0
Stage 1	99	99	-	79	79	-	-	-	-	-	-	-
Stage 2	84	84	-	111	100	-	-	-	-	-	-	-
Follow-up Headway	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	778	711	978	770	715	1002	1513	-	-	1535	-	-
Stage 1	907	813	-	930	829	-	-	-	-	-	-	-
Stage 2	924	825	-	894	812	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-	-	-	-
Mov Capacity-1 Maneuver	765	704	978	744	708	1002	1513	-	-	1535	-	-
Mov Capacity-2 Maneuver	765	704	-	744	708	-	-	-	-	-	-	-
Stage 1	902	809	-	925	825	-	-	-	-	-	-	-
Stage 2	910	821	-	865	808	-	-	-	-	-	-	-

Approach	EB		WB			NB			SB		
HCM Control Delay, s	9.7		9.6			0.8			0.7		
HCM LOS	A		A								

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1513	-	-	803	799	1535	-	-
HCM Lane V/C Ratio	0.005	-	-	0.038	0.018	0.005	-	-
HCM Control Delay (s)	7.392	0	-	9.7	9.6	7.358	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0.016	-	-	0.119	0.054	0.016	-	-

**Notes**

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

Intersection	
Intersection Delay, s/veh	8.8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	14	81	9	10	141	20	32	28	7	18	36	23
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	95	11	12	166	24	38	33	8	21	42	27
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	8.7	9.1	8.5	8.3
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	48%	100%	0%	6%	23%
Vol Thru, %	42%	0%	90%	82%	47%
Vol Right, %	10%	0%	10%	12%	30%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	67	14	90	171	77
LT Vol	28	0	81	141	36
Through Vol	7	0	9	20	23
RT Vol	32	14	0	10	18
Lane Flow Rate	79	16	106	201	91
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.106	0.026	0.148	0.254	0.118
Departure Headway (Hd)	4.849	5.615	5.042	4.537	4.671
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	738	638	710	791	766
Service Time	2.886	3.349	2.776	2.568	2.707
HCM Lane V/C Ratio	0.107	0.025	0.149	0.254	0.119
HCM Control Delay	8.5	8.5	8.7	9.1	8.3
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.4	0.1	0.5	1	0.4

Notes

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

**Intersection**

Intersection Delay, s/veh 0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	99	183	13	5	0
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	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	114	210	15	6	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	225	0	334
Stage 1	-	-	218
Stage 2	-	-	116
Follow-up Headway	2.218	-	3.518
Pot Capacity-1 Maneuver	1344	-	822
Stage 1	-	-	818
Stage 2	-	-	909
Time blocked-Platoon, %	-	-	-
Mov Capacity-1 Maneuver	1344	-	822
Mov Capacity-2 Maneuver	-	-	660
Stage 1	-	-	818
Stage 2	-	-	908

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	10.5
HCM LOS			B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1344	-	-	-	660
HCM Lane V/C Ratio	0.001	-	-	-	0.009
HCM Control Delay (s)	7.681	0	-	-	10.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.003	-	-	-	0.026

**Notes**

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

Intersection												
Intersection Delay, s/veh	12.7											
Intersection LOS	B											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	43	20	22	37	26	15	21	386	12	5	286	19
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	45	21	23	39	27	16	22	402	13	5	298	20
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.9	9.9	14.4	11.9
HCM LOS	A	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	51%	47%	2%
Vol Thru, %	92%	24%	33%	92%
Vol Right, %	3%	26%	19%	6%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	419	85	78	310
LT Vol	386	20	26	286
Through Vol	12	22	15	19
RT Vol	21	43	37	5
Lane Flow Rate	436	89	81	323
Geometry Grp	1	1	1	1
Degree of Util (X)	0.581	0.145	0.134	0.439
Departure Headway (Hd)	4.79	5.902	5.953	4.999
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	742	611	605	727
Service Time	2.888	3.907	3.958	2.999
HCM Lane V/C Ratio	0.588	0.146	0.134	0.444
HCM Control Delay	14.4	9.9	9.9	11.9
HCM Lane LOS	B	A	A	B
HCM 95th-tile Q	3.8	0.5	0.5	2.2

Notes

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

Intersection												
Intersection Delay, s/veh	5.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	28	30	83	9	42	10	85	388	18	8	282	59
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	32	87	9	44	11	89	408	19	8	297	62
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	969	951	328	1001	973	418	359	0	0	427	0	0
Stage 1	345	345	-	597	597	-	-	-	-	-	-	-
Stage 2	624	606	-	404	376	-	-	-	-	-	-	-
Follow-up Headway	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	233	260	713	222	252	635	1200	-	-	1132	-	-
Stage 1	671	636	-	490	491	-	-	-	-	-	-	-
Stage 2	473	487	-	623	616	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	179	232	713	161	225	635	1200	-	-	1132	-	-
Mov Capacity-2 Maneuver	179	232	-	161	225	-	-	-	-	-	-	-
Stage 1	605	630	-	442	443	-	-	-	-	-	-	-
Stage 2	378	439	-	515	610	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	22.6		25.9			1.4			0.2			
HCM LOS	C		D									
Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1200	-	-	351	236	1132	-	-				
HCM Lane V/C Ratio	0.075	-	-	0.423	0.272	0.007	-	-				
HCM Control Delay (s)	8.242	0	-	22.6	25.9	8.204	0	-				
HCM Lane LOS	A	A	-	C	D	A	A	-				
HCM 95th %tile Q(veh)	0.241	-	-	2.035	1.068	0.022	-	-				

Notes  
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**Intersection**

Intersection Delay, s/veh 3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	5	16	12	4	14	5	12	47	11	2	34	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	6	20	15	5	17	6	15	57	13	2	41	7

Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	155	150	45	160	147	64	49	0	0	71	0	0
Stage 1	50	50	-	93	93	-	-	-	-	-	-	-
Stage 2	105	100	-	67	54	-	-	-	-	-	-	-
Follow-up Headway	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	812	742	1025	806	744	1000	1558	-	-	1529	-	-
Stage 1	963	853	-	914	818	-	-	-	-	-	-	-
Stage 2	901	812	-	943	850	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-	-	-	-
Mov Capacity-1 Maneuver	786	734	1025	772	736	1000	1558	-	-	1529	-	-
Mov Capacity-2 Maneuver	786	734	-	772	736	-	-	-	-	-	-	-
Stage 1	953	852	-	905	810	-	-	-	-	-	-	-
Stage 2	868	804	-	907	849	-	-	-	-	-	-	-

Approach	EB		WB			NB			SB		
HCM Control Delay, s	9.6		9.7			1.3			0.4		
HCM LOS	A		A								

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1558	-	-	828	788	1529	-	-
HCM Lane V/C Ratio	0.009	-	-	0.049	0.036	0.002	-	-
HCM Control Delay (s)	7.333	0	-	9.6	9.7	7.358	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0.028	-	-	0.153	0.111	0.005	-	-

**Notes**

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**Intersection**

Intersection Delay, s/veh	8.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	30	122	21	11	99	17	4	22	7	13	21	18
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	35	144	25	13	116	20	5	26	8	15	25	21
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	8.7	8.5	8	8.1
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	12%	100%	0%	9%	25%
Vol Thru, %	67%	0%	85%	78%	40%
Vol Right, %	21%	0%	15%	13%	35%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	33	30	143	127	52
LT Vol	22	0	122	99	21
Through Vol	7	0	21	17	18
RT Vol	4	30	0	11	13
Lane Flow Rate	39	35	168	149	61
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.051	0.052	0.219	0.184	0.079
Departure Headway (Hd)	4.728	5.406	4.801	4.439	4.644
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	759	666	752	810	774
Service Time	2.744	3.106	2.501	2.454	2.658
HCM Lane V/C Ratio	0.051	0.053	0.223	0.184	0.079
HCM Control Delay	8	8.4	8.8	8.5	8.1
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.2	0.2	0.8	0.7	0.3

**Notes**

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**Intersection**

Intersection Delay, s/veh 0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	2	168	103	18	5	2
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	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	185	113	20	5	2

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	133	0	123
Stage 1	-	-	-
Stage 2	-	-	-
Follow-up Headway	2.218	-	3.318
Pot Capacity-1 Maneuver	1452	-	928
Stage 1	-	-	-
Stage 2	-	-	-
Time blocked-Platoon, %	-	-	-
Mov Capacity-1 Maneuver	1452	-	928
Mov Capacity-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	9.9
HCM LOS			A

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1452	-	-	-	736
HCM Lane V/C Ratio	0.002	-	-	-	0.01
HCM Control Delay (s)	7.483	0	-	-	9.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.005	-	-	-	0.032

**Notes**

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Intersection												
Intersection Delay, s/veh	14.2											
Intersection LOS	B											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	34	19	21	20	34	4	11	218	13	6	348	13
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	45	25	28	27	45	5	15	291	17	8	464	17
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.2	10.1	12.4	16.8
HCM LOS	B	B	B	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	46%	34%	2%
Vol Thru, %	90%	26%	59%	95%
Vol Right, %	5%	28%	7%	4%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	242	74	58	367
LT Vol	218	19	34	348
Through Vol	13	21	4	13
RT Vol	11	34	20	6
Lane Flow Rate	323	99	77	489
Geometry Grp	1	1	1	1
Degree of Util (X)	0.458	0.165	0.133	0.654
Departure Headway (Hd)	5.105	6.018	6.177	4.936
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	707	597	582	739
Service Time	3.123	4.041	4.2	2.936
HCM Lane V/C Ratio	0.457	0.166	0.132	0.662
HCM Control Delay	12.4	10.2	10.1	16.8
HCM Lane LOS	B	B	B	C
HCM 95th-tile Q	2.4	0.6	0.5	4.9

Notes

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

Intersection												
Intersection Delay, s/veh	8											
<b>Movement</b>	<b>EBL</b>	<b>EBT</b>	<b>EBR</b>	<b>WBL</b>	<b>WBT</b>	<b>WBR</b>	<b>NBL</b>	<b>NBT</b>	<b>NBR</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>
Vol, veh/h	29	36	95	4	30	6	82	212	7	4	329	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	47	123	5	39	8	106	275	9	5	427	79
<b>Major/Minor</b>	<b>Minor2</b>		<b>Minor1</b>			<b>Major1</b>			<b>Major2</b>			
Conflicting Flow All	993	974	467	1055	1010	280	506	0	0	284	0	0
Stage 1	477	477	-	493	493	-	-	-	-	-	-	-
Stage 2	516	497	-	562	517	-	-	-	-	-	-	-
Follow-up Headway	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	224	252	596	204	240	759	1059	-	-	1278	-	-
Stage 1	569	556	-	558	547	-	-	-	-	-	-	-
Stage 2	542	545	-	512	534	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	173	221	596	123	210	759	1059	-	-	1278	-	-
Mov Capacity-2 Maneuver	173	221	-	123	210	-	-	-	-	-	-	-
Stage 1	501	553	-	492	482	-	-	-	-	-	-	-
Stage 2	434	480	-	369	531	-	-	-	-	-	-	-
<b>Approach</b>	<b>EB</b>		<b>WB</b>			<b>NB</b>			<b>SB</b>			
HCM Control Delay, s	33.4		26.6			2.4			0.1			
HCM LOS	D		D									
<b>Minor Lane / Major Mvmt</b>	<b>NBL</b>	<b>NBT</b>	<b>NBR</b>	<b>EBLn1</b>	<b>WBLn1</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>				
Capacity (veh/h)	1059	-	-	327	218	1278	-	-				
HCM Lane V/C Ratio	0.101	-	-	0.635	0.238	0.004	-	-				
HCM Control Delay (s)	8.779	0	-	33.4	26.6	7.828	0	-				
HCM Lane LOS	A	A	-	D	D	A	A	-				
HCM 95th %tile Q(veh)	0.334	-	-	4.101	0.9	0.012	-	-				
<b>Notes</b>												
~ : Volume Exceeds Capacity; \$ : Delay Exceeds 300 Seconds; Error : Computation Not Defined												

**Intersection**

Intersection Delay, s/veh 3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	6	23	15	4	16	4	15	50	7	7	69	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	27	18	5	19	5	18	59	8	8	81	4

Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	209	201	83	220	199	63	85	0	0	67	0	0
Stage 1	99	99	-	98	98	-	-	-	-	-	-	-
Stage 2	110	102	-	122	101	-	-	-	-	-	-	-
Follow-up Headway	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	748	695	976	736	697	1002	1512	-	-	1535	-	-
Stage 1	907	813	-	908	814	-	-	-	-	-	-	-
Stage 2	895	811	-	882	811	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-	-	-	-
Mov Capacity-1 Maneuver	719	683	976	692	685	1002	1512	-	-	1535	-	-
Mov Capacity-2 Maneuver	719	683	-	692	685	-	-	-	-	-	-	-
Stage 1	896	809	-	897	804	-	-	-	-	-	-	-
Stage 2	860	801	-	833	807	-	-	-	-	-	-	-

Approach	EB		WB			NB			SB		
HCM Control Delay, s	10		10.2			1.5			0.7		
HCM LOS	B		B								

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1512	-	-	767	724	1535	-	-
HCM Lane V/C Ratio	0.012	-	-	0.067	0.039	0.005	-	-
HCM Control Delay (s)	7.409	0	-	10	10.2	7.358	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.035	-	-	0.217	0.122	0.016	-	-

**Notes**

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

Intersection	
Intersection Delay, s/veh	8.9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	14	84	9	10	144	27	32	29	7	22	37	23
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	99	11	12	169	32	38	34	8	26	44	27
Number of Lanes	1	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	8.7	9.3	8.5	8.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	47%	100%	0%	6%	27%
Vol Thru, %	43%	0%	90%	80%	45%
Vol Right, %	10%	0%	10%	15%	28%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	68	14	93	181	82
LT Vol	29	0	84	144	37
Through Vol	7	0	9	27	23
RT Vol	32	14	0	10	22
Lane Flow Rate	80	16	109	213	96
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.109	0.026	0.154	0.269	0.127
Departure Headway (Hd)	4.895	5.648	5.077	4.544	4.729
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	730	633	706	790	756
Service Time	2.935	3.385	2.814	2.577	2.767
HCM Lane V/C Ratio	0.11	0.025	0.154	0.27	0.127
HCM Control Delay	8.5	8.5	8.7	9.3	8.5
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.4	0.1	0.5	1.1	0.4

Notes

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**Intersection**

Intersection Delay, s/veh 0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	99	183	16	8	0
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	87	87	87	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	114	210	18	9	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	229	0	336
Stage 1	-	-	220
Stage 2	-	-	116
Follow-up Headway	2.218	-	3.518
Pot Capacity-1 Maneuver	1339	-	659
Stage 1	-	-	817
Stage 2	-	-	909
Time blocked-Platoon, %	-	-	-
Mov Capacity-1 Maneuver	1339	-	658
Mov Capacity-2 Maneuver	-	-	658
Stage 1	-	-	817
Stage 2	-	-	908

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	10.5
HCM LOS			B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1339	-	-	-	658
HCM Lane V/C Ratio	0.001	-	-	-	0.014
HCM Control Delay (s)	7.691	0	-	-	10.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.003	-	-	-	0.042

**Notes**

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Intersection												
Intersection Delay, s/veh	13.1											
Intersection LOS	B											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	47	24	26	37	31	15	23	386	12	5	286	24
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	49	25	27	39	32	16	24	402	13	5	298	25
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.2	10.1	14.9	12.3
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	48%	45%	2%
Vol Thru, %	92%	25%	37%	91%
Vol Right, %	3%	27%	18%	8%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	421	97	83	315
LT Vol	386	24	31	286
Through Vol	12	26	15	24
RT Vol	23	47	37	5
Lane Flow Rate	439	101	86	328
Geometry Grp	1	1	1	1
Degree of Util (X)	0.592	0.167	0.145	0.461
Departure Headway (Hd)	4.98	5.947	6.027	5.056
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	728	604	597	715
Service Time	2.98	3.97	4.05	3.073
HCM Lane V/C Ratio	0.603	0.167	0.144	0.459
HCM Control Delay	14.9	10.2	10.1	12.3
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	3.9	0.6	0.5	2.4

Notes

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Intersection												
Intersection Delay, s/veh	5.9											
<b>Movement</b>	<b>EBL</b>	<b>EBT</b>	<b>EBR</b>	<b>WBL</b>	<b>WBT</b>	<b>WBR</b>	<b>NBL</b>	<b>NBT</b>	<b>NBR</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>
Vol, veh/h	28	34	86	9	48	10	89	390	18	10	284	59
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	36	91	9	51	11	94	411	19	11	299	62
<b>Major/Minor</b>	<b>Minor2</b>		<b>Minor1</b>			<b>Major1</b>			<b>Major2</b>			
Conflicting Flow All	989	968	330	1021	989	420	361	0	0	429	0	0
Stage 1	351	351	-	607	607	-	-	-	-	-	-	-
Stage 2	638	617	-	414	382	-	-	-	-	-	-	-
Follow-up Headway	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	226	254	712	215	247	633	1198	-	-	1130	-	-
Stage 1	666	632	-	483	486	-	-	-	-	-	-	-
Stage 2	465	481	-	616	613	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	167	225	712	151	219	633	1198	-	-	1130	-	-
Mov Capacity-2 Maneuver	167	225	-	151	219	-	-	-	-	-	-	-
Stage 1	597	624	-	433	436	-	-	-	-	-	-	-
Stage 2	363	431	-	501	606	-	-	-	-	-	-	-
<b>Approach</b>	<b>EB</b>		<b>WB</b>			<b>NB</b>			<b>SB</b>			
HCM Control Delay, s	24.5		27.9			1.5			0.2			
HCM LOS	C		D									
<b>Minor Lane / Major Mvmt</b>	<b>NBL</b>	<b>NBT</b>	<b>NBR</b>	<b>EBLn1</b>	<b>WBLn1</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>				
Capacity (veh/h)	1198	-	-	337	227	1130	-	-				
HCM Lane V/C Ratio	0.078	-	-	0.462	0.311	0.009	-	-				
HCM Control Delay (s)	8.26	0	-	24.5	27.9	8.216	0	-				
HCM Lane LOS	A	A	-	C	D	A	A	-				
HCM 95th %tile Q(veh)	0.254	-	-	2.338	1.27	0.028	-	-				
<b>Notes</b>												
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# **Travel Demand Management Plan**

## **Mapleton Hill**

**Boulder, Colorado**

Prepared for

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July 29, 2016  
(LSC #150520)

## **Introduction**

This Travel Demand Management (TDM) Plan has been prepared for the Mapleton Hill redevelopment in Boulder, Colorado. The site is located north of Mapleton Avenue and west of 4<sup>th</sup> Street. The site is proposed to include about 147 independent senior living units, about 63 memory care, subacute rehab, skilled nursing, and assisted living rooms located in the proposed wellness center, and two caretaker units. The existing use and current structures on the site are approximately 184,355 square feet and could alternatively be remodeled/ refinished as medical/dental office space. Vehicular access to the site is proposed from existing accesses to Mapleton Avenue and 4<sup>th</sup> Street. The location of the site with respect to the surrounding land uses and roadway system is shown in Figure 1. The conceptual site plan is shown in Figure 2. This TDM Plan supports a 20 percent alternative mode share.

## **Existing Alternate Modes Description**

The following existing conditions contribute to the transportation demand management goals of the City of Boulder. The Mapleton Hill site is well-positioned to make good use of these existing opportunities.

### Existing Transit Service

The Regional Transportation District (RTD) is the governing body responsible for fixed-route transit (public transportation) service throughout the Denver metropolitan area, including Boulder. Figure 3 shows the existing bus stops and transit routes within the vicinity of the site, including the following routes:

- 205
- 208
- N
- SKIP
- Y

Demand-responsive services are available to both seniors and persons with disabilities through Via (formerly Special Transit). Established in 1979, this non-profit provides safe and affordable rides in accessible buses to people with limited mobility. Rides are scheduled in advance, and have a 30-minute pick-up window.



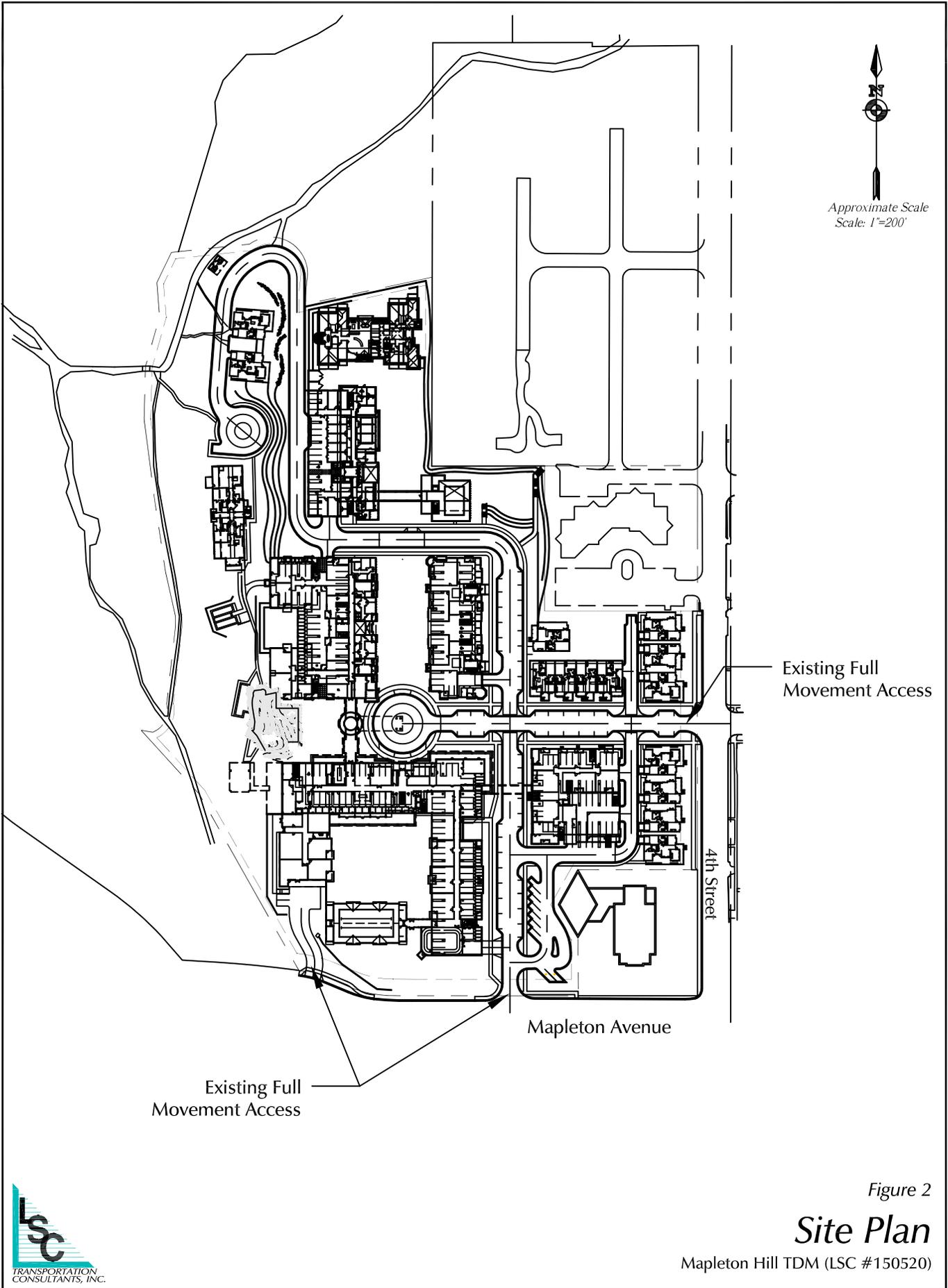
Approximate Scale  
Scale: 1"=300'

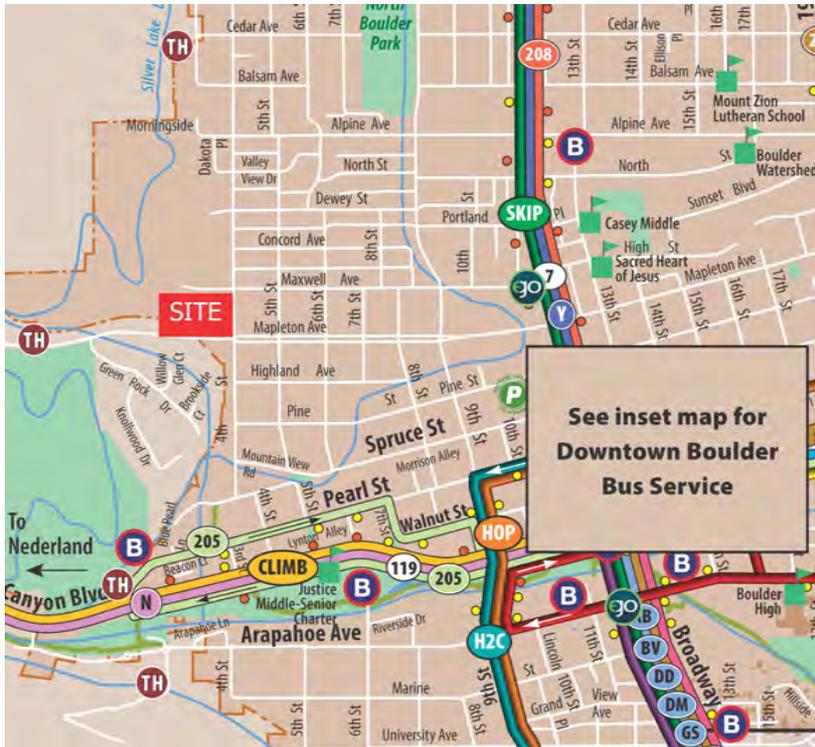


Figure 1  
**Vicinity  
Map**

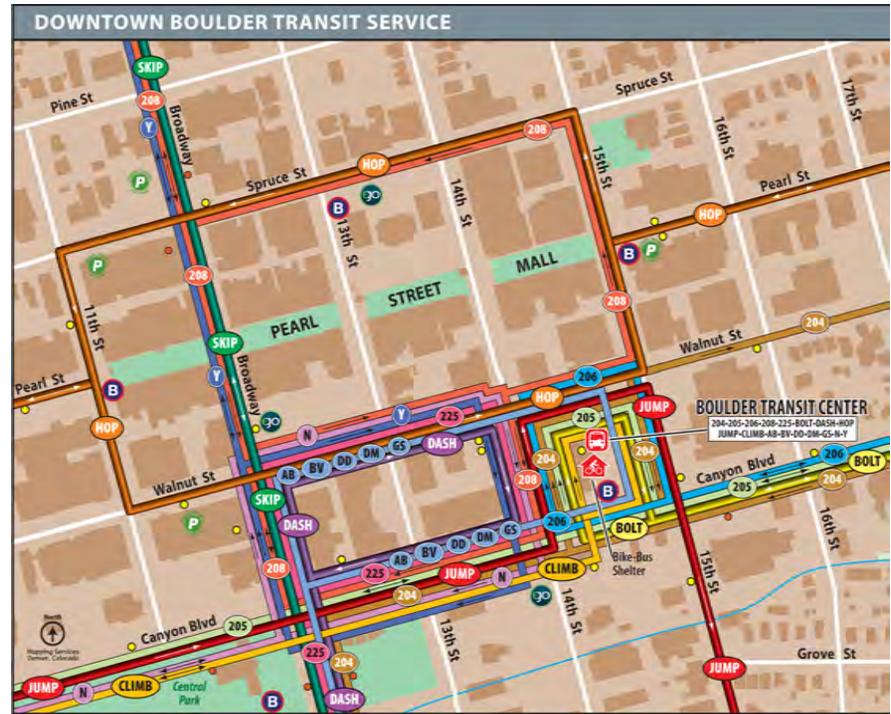
Mapleton Hill Redevelopment TDM Plan (LSC #150520)







See inset map for  
Downtown Boulder  
Bus Service



-  = Trail Head
-  = B-cycle Location
-  = eGo Car Share Location

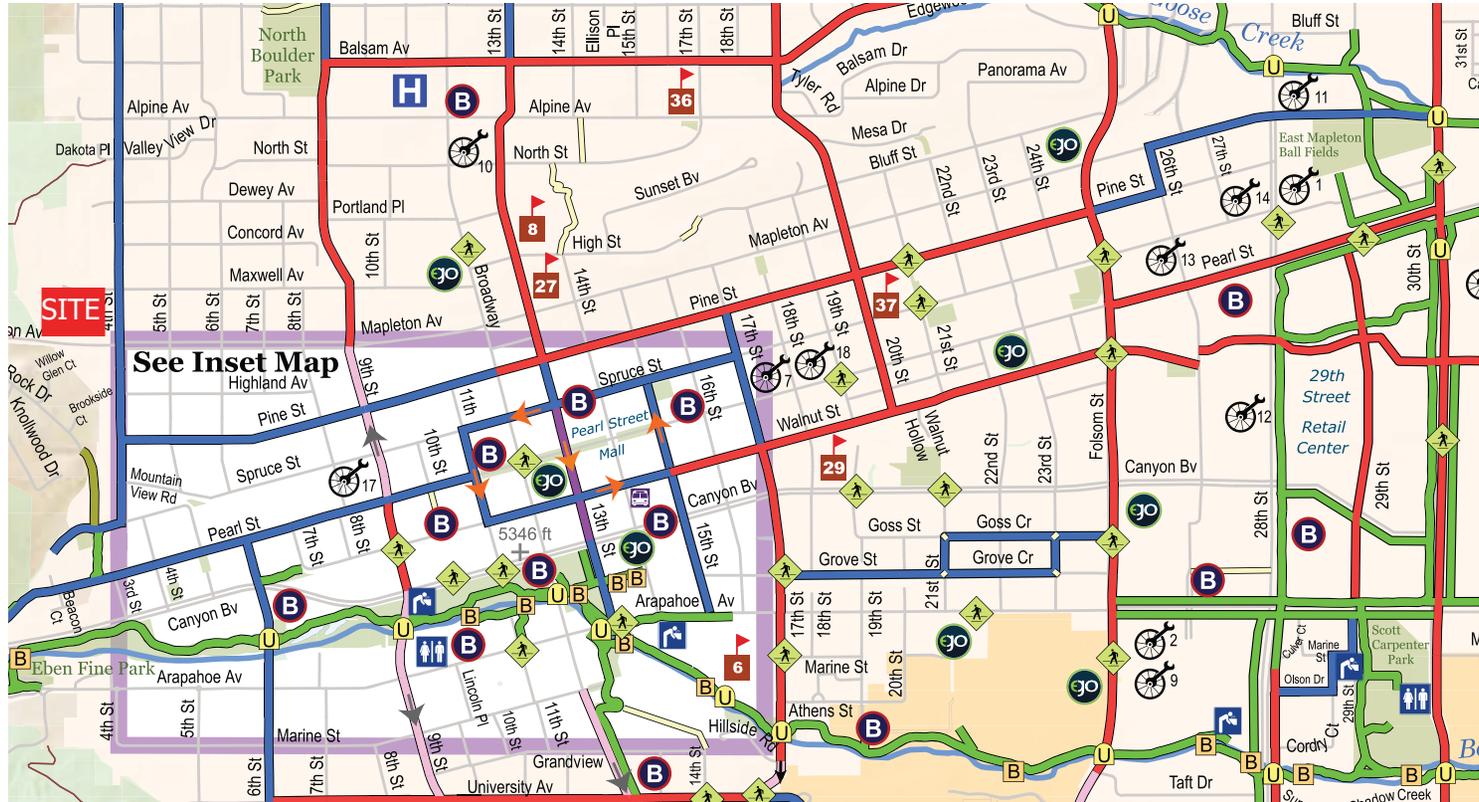
Figure 3

## Existing Bus Stops and Transit Routes

Mapleton Hill Redevelopment TDM Plan (LSC #150520)

### Existing Bicycle and Pedestrian Network

The City of Boulder maintains an extensive bicycle and pedestrian network throughout the City. Figure 4 shows bicycle and pedestrian routes within the vicinity of the site. In addition, many of the streets in the project vicinity have attached or detached sidewalks.



**LEGEND:**

- On-Street Bike Lane
- Designated Bike Route
- Multi-Use Path

- B = Bridge
  - U = Underpass
  - eGo = eGo Car Share Location
  - B = B-cycle Location
  - B = Bike Shop
- B = Bridge
  - U = Underpass
  - eGo = eGo Car Share Location
  - B = B-cycle Location
  - B = Bike Shop

Figure 4  
*Existing Bike and Pedestrian Routes*

Mapleton Hill Redevelopment TDM Plan (LSC #150520)

### Transportation Demand Management (TDM) Strategy for Mult-Family Residential Units

The City of Boulder's draft residential development toolkit packages are shown below in Table 1. The site includes about 147 independent senior living units. The site is located within the CTN Buffer. The "core elements" section of the table shows elements required of all new residential developments, including orientation packets, participation in TDM evaluation programs, and pedestrian, bike, and transit enhancements.

Two "package elements" are available under City of Boulder standards, Package A and Package B. Package A appears to be the most advantageous for the site, requiring the participation in the NECO bus pass program, meeting the short- and long-term bicycle parking code, and the consideration of managed on-street parking.

Table 2 shows the actions that the Mapleton Hill developer intends to take to increase the percentage of alternative travel modes utilized by the site. An alternative travel mode reduction of 20 percent is expected due to the site's proposed land use and location.

### Transportation Demand Management (TDM) Strategy for Commercial Space

The City of Boulder's draft commercial development toolkit packages are shown below in Table 3. The site includes about 63 memory care, subacute rehab, skilled nursing, and assisted living rooms located in the proposed wellness center, and two caretaker units. The site is located within the CTN Buffer. The "core elements" section of the table shows elements required of all new commercial developments, including meeting the short- and long-term bicycle parking code; participation in eGo car share and B-Cycle bike share where appropriate, pedestrian and bicycle enhancements; consideration of showers and changing facilities; and establishing a transportation information center.

Three toolkit options are available under City of Boulder standards, Packages A, B, and C. Based on the existing alternate modes available around the site, Package A is the most advantageous for the site, requiring the establishment of a BECO bus pass participation program.

Table 4 shows the actions that the Mapleton Hill developer intends to take to fulfill the intent of the Site Review and TDM Plan processes.

**Table 1  
City of Boulder Residential Development Toolkit Packages**

TDM Toolkit Element		Residential Toolkit Packages							
		Single Family ≤10 Units		Single Family 11 or More Units		Multi-Family ≤10 Units		Multi-Family 11 or More Units	
		Pkg A	Pkg B	Pkg A	Pkg B	Pkg A	Pkg B	Pkg A	Pkg B
<b>CORE ELEMENTS</b>	Orientation Packets	✓	✓	✓	✓	✓	✓	✓	✓
	Evaluation	✓	✓	✓	✓	✓	✓	✓	✓
	Pedestrian Enhancements	✓	✓	✓	✓	✓	✓	✓	✓
	Bike Enhancements	✓	✓	✓	✓	✓	✓	✓	✓
	Transit Enhancements	✓	✓	✓	✓	✓	✓	✓	✓
<b>PACKAGE ELEMENTS</b>	Alternative Transportation Subsidy Fund	✓			✓	✓			✓
	Carshare Subsidy		✓		✓		✓		✓
	Bikeshare Subsidy		✓		✓		✓		✓
	NECO Pass Program Participation			✓				✓	
<b>MULTI-FAMILY ELEMENTS</b>	Meet Short-Term Bicycle Parking Code					✓	✓	✓	✓
	Exceed Short-Term Bicycle Parking Code						✓		✓
	Meet Long-Term Bicycle Parking Code					✓	✓	✓	✓
	Exceed Long-Term Bicycle Parking Code						✓		✓
	Managed On-Street Parking					✓	✓	✓	✓
	Unbundled Parking						✓		✓

**Table 2  
Mapleton Hill TDM Plan - Residential**

TDM Toolkit Element		Actions for Package A
<b>CORE ELEMENTS</b>	Orientation Packets	An orientation packet will be provided to each new resident which includes brochures, maps, and other resources to inform residents of their transportation options. This packet will include RTD bus information, the City of Boulder bicycle and pedestrian map (or similar), and information on special events. This packet will be provided initially by the developer at the time of sale or by a lessor thereafter.
	Evaluation	Through sales or lease agreement, the site's residents will agree to participate in annual on-line or paper surveys regarding their use and satisfaction with transportation demand management programs. The evaluation is expected to be administered by the City of Boulder using Survey Monkey or similar on-line tools. The developer will secure agreement to participate, with the expectation that 10-20% of residents will actually participate based on typical survey return rates. The City of Boulder will be responsible for data analysis and summarization.
	Pedestrian Enhancements	The site currently has connectivity to the existing sidewalks on 4th Street, Mapleton Avenue, and Maxwell Avenue.
	Bike Enhancements	4th Street is a designated bike route adjacent to the site.
	Transit Enhancements	Information about transit service will be provided in the orientation packets, also described above. The applicant will provide a private on-call shuttle bus for residents and will establish an electric vehicle car-sharing program for residents.
<b>PACKAGE ELEMENTS</b>	NECO Pass Program Participation	The applicant <u>does not</u> propose a NECO pass program for residents because many will not be able to walk to the nearest bus stops. The applicant proposes to provide a private on-call shuttle bus for residents, plans to establish an electric vehicle car-sharing program, and plans to locate a B-cycle station on-site.
<b>MULTI-FAMILY ELEMENTS</b>	Meet Short-Term Bicycle Parking	The site is required to provide a total of 18 short-term bicycle parking spaces for the overall site. The applicant is providing 32 short-term bicycle parking spaces.
	Meet Long-Term Bicycle Parking	The site is required to provide a total of 54 long-term bicycle parking spaces for the overall site. The applicant is providing 100 long-term secured bicycle parking spaces.
	Managed On-Street Parking	The proposed site will have a total of 366 vehicle parking spaces. The on-site parking spaces will be unbundled. There are no plans to manage on-street parking.

**Table 3  
Commercial Development Toolkit Matrix of Packages  
Business Development - Developer**

TDM Toolkit Element		Commercial Toolkit Packages - Multiple Business/Developer									
		Within CTN Buffer			Outside CTN Buffer			CAGID	Uni-Hill		
		Pkg A	Pkg B	Pkg C	Pkg A	Pkg B	Pkg C	Pkg A	Pkg A	Pkg B	Pkg C
<b>CORE ELEMENTS</b>	Meet Short-Term Bicycle Parking Code	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Meet Long-Term Bicycle Parking Code	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Ratio of MOV Mode Share	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Pedestrian Enhancements	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Bike Enhancements	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Showers - Conditional	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Changing Facilities - Conditional	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Transportation Information Center/ Access/Employee Transportation Coordinator (ETC) Network	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>PACKAGE ELEMENTS</b>	Transit Enhancements - Conditional		✓	✓		✓	✓			✓	✓
	Business Eco Pass Program (BECO Pass) - 3 years	✓			✓			✓*	✓		
	Alternative Transportation Subsidy Fund		✓			✓				✓	
	Lease Requirements for BECO Pass - 3 years			✓			✓				✓
	Managed Off-Street Parking - Conditional	✓	✓	✓	✓	✓	✓				

CTN = community transportation network, and refers to a set of high-frequency bus routes defined by the City of Boulder.

\*Note: Business Eco Pass already provided by RTD for Uni-Hill.

Source: City of Boulder, 2011.

**Table 4  
Mapleton Hill TDM Plan - Commercial**

TDM Toolkit Element		Within CTN Buffer Package A
<b>CORE ELEMENTS</b>	Meet Short-Term Bicycle Parking Code	The site is required to provide a total of 18 short-term bicycle parking spaces for the overall site. The applicant is providing 32 short-term bicycle parking spaces.
	Meet Long-Term Bicycle Parking Code	The site is required to provide a total of 54 long-term bicycle parking spaces for the overall site. The applicant is providing 100 long-term secured bicycle parking spaces.
	Ratio of MOV Mode Share	The site will include ridesharing information in its employee orientation packets. This may include eGo Car sharing, B-Cycle bike sharing, and/or DRCOG's RideArrangers. The nearest existing eGO car share site is east of the site at Broadway/Maxwell Avenue. The nearest B-Cycle location is south of the site at 6th/Canyon Boulevard. The applicant proposes to provide a B-Cycle location on site, establish an electric vehicle car-sharing program for residents, and provide a private on-call shuttle bus for residents.
	Pedestrian Enhancements	The site currently has connectivity to the existing sidewalks on 4th Street, Mapleton Avenue, and Maxwell Avenue.
	Bike Enhancements	4th Street is a designated bike route adjacent to the site and the applicant is providing more bicycle parking than required by code.
	Showers - Conditional	The existing buildings have showers/changing facilities.
	Changing Facilities - Conditional	The existing buildings have showers/changing facilities.
	Transportation Information Center/ Access/Employee Transportation Coordinator (ETC) Network	The site will include transportation information in its employee packets/employee orientation process. The information will also be available in interior brochure racks within the building. The developer proposes to provide an on-site employee transportation coordinator (ETC).
<b>PACKAGE ELEMENTS</b>	BECO Pass Participation	The project proposes to participate in the BECO Pass Program for employees. The applicant will need feedback from City staff to determine the appropriate size of the program.