Transportation Impact Feasibility Study

For

Hogan-Pancost Property

Boulder County, Colorado

May 2010
Revised November 2010

PREPARED FOR:
Boulder Creek Commons, LLC
1526 Spruce St., Suite 260
Boulder, CO 80302
(303) 949-1322
Contact: Michael Boyers

PREPARED BY:
Drexel, Barrell & Co.
1800 38th Street
Boulder, CO 80301
(303) 442-4338
Contact: Ann Bowers, PE, PTOE

Drexel Barrell Project Number: 17706-01BLCV

Transportation Impact Feasibility Study

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Appendices

Traffic Counts (Made by All Traffic Data Services, Inc. and Cutting Edge Traffic Data, LLC dated 4/23/2008 and 9/16/2008)

Background Information

- **City of Boulder TMP Traffic Model Volumes**
- **City of Boulder Project Scoping Document**
- **Existing Traffic Signal Warrant Analysis**
  1. **Manhattan Dr/South Boulder Road**
  2. **55th Street/South Boulder Road**

East Boulder Community Park Traffic Study (Fox-Higgins, 10/2008)

Synchro Calculations, Version 7

1. **Manhattan Dr/S Boulder Road**
2. **55th Street/ S Boulder Road**
3. **Manhattan Dr/ Baseline Road**
4. **55th Street/Baseline Road**
5. **Manhattan Dr/Kewanee Dr**
6. **55th Street/Access**

Accident Summary Sheets

1.0 Project Description

This Transportation Impact Feasibility Study examines the potential project-generated traffic impacts on the surrounding roadway system in the vicinity of the proposed Hogan-Pancost Property residential development. The analysis includes impacts for the projected build-out year - Year 2012 - and long-range planning year - Year 2025. This study was conducted in accordance with the scope outlined by the City of Boulder Transportation staff. This includes Level of Service analyses for the following intersections in the vicinity of the Hogan-Pancost Property:

- South Boulder Road/Manhattan Drive
- South Boulder Road/55th Street
- Baseline Road/Manhattan Drive
- Baseline Road/55th Street
- Kewanee Drive/Manhattan Drive
- Proposed Street Connection to 55th Street

A daily volume analysis of proposed roadways and a Travel Demand Management (TDM) plan will be provided upon finalization of a site plan. The City scoping document can be seen in the **Appendix**.

The site for the proposed Hogan-Pancost Property is a 22.2 acre undeveloped site located between Manhattan Drive and 55th Street, approximately one quarter mile north of South Boulder Road in Boulder County. Annexation into the City of Boulder is anticipated as part of site development. The site location is shown on the following page.

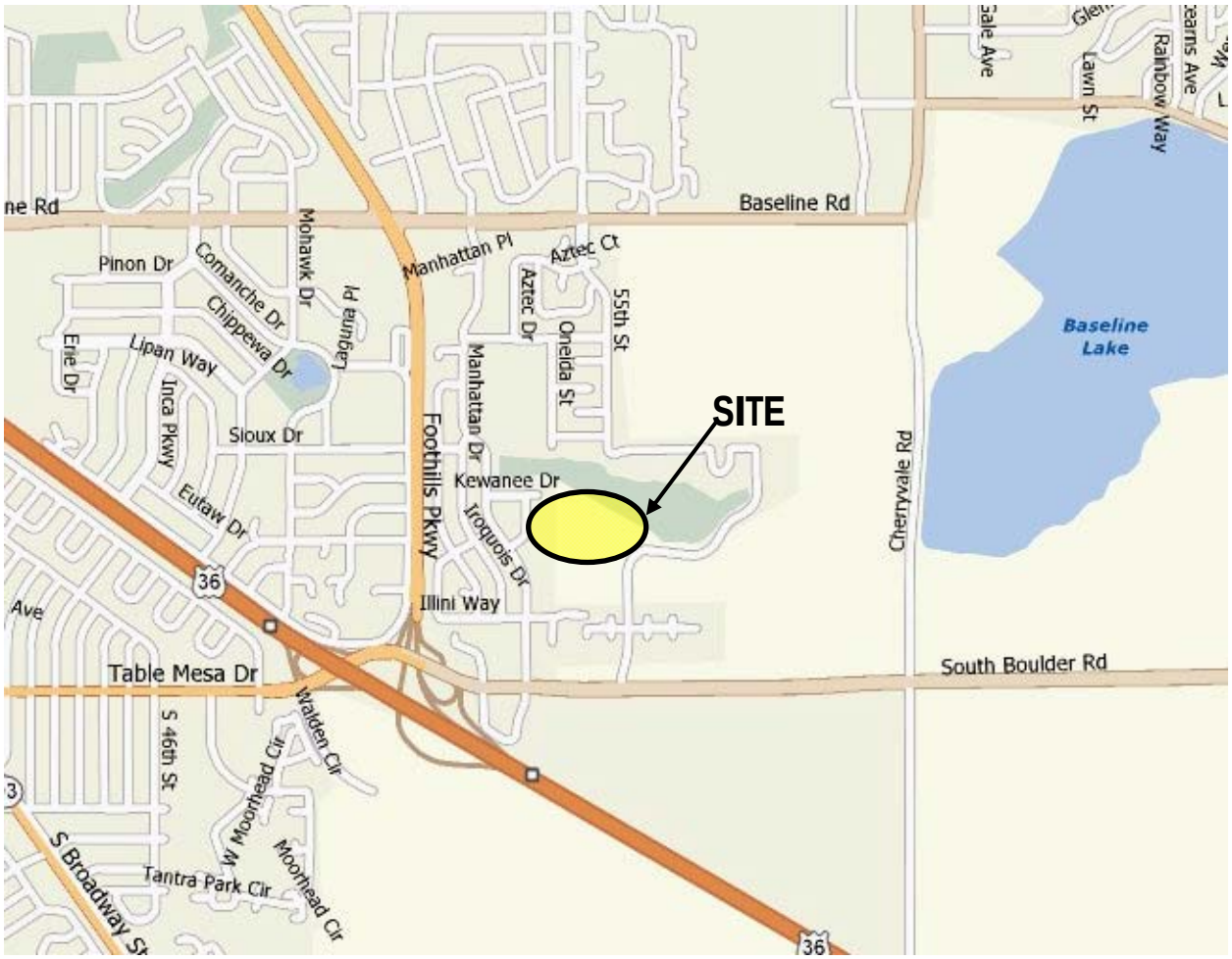
An Existing residential development, Keewaydin Meadows, borders the site to the west, with East Boulder Community Park bordering the development to the north and east. There are two unincorporated Boulder County parcels immediately to the south of the proposed development. South of these parcels include the Greenbelt Meadows development. This study was also coordinated with the "East Boulder Community Park Traffic Study" dated October 6, 2008 by the Fox-Higgins Transportation Group.

The proposed development is currently zoned by Boulder County as "Suburban Residential." A detailed site plan of the proposed Hogan-Pancost Property is illustrated in **Figure 1**.

Access

There are two potential access point scenarios analyzed as part of this study per the direction of City of Boulder Transportation staff; with and without an access to the existing Kewanee Drive. Both access scenarios would also include a primary access point to 55th Street, located north of Ontario Place.

Vicinity map for the proposed Hogan-Pancost Property:



(Not to scale)

BOULDER CREEK COMMONS

DTJ DESIGN

May 5, 2010

Neighborhood Diagram & Conceptual Land Use Diagram

NORTH

0 50 100 200 300

2.0 Existing Conditions

The roadways within the vicinity of the project are detailed below:

Baseline Road:

In the vicinity of Manhattan Drive and 55th Street, Baseline Road is a four-lane, east/west Minor Arterial roadway. Baseline Road becomes a two-lane roadway to the east of its intersection with 55th Street. Baseline Road provides access to Foothills Parkway (SH 157) to the west. The posted speed limit in the vicinity of this proposed development is 35 mph.

South Boulder Road:

In this project vicinity, South Boulder Road is a four-lane, east/west Primary Arterial roadway. It provides access to U.S. Highway 36 to the west and the City of Louisville to the east. South Boulder Road has a posted 35 mph speed limit in the vicinity of the site. The posted speed limit changes from 35 to 45 mph approximately 400 feet to the east of the intersection with 55th Street.

Manhattan Drive:

Manhattan Drive is a north/south Local Roadway. Manhattan Middle School is located on the east side of Manhattan Drive, approximately 0.4 miles to the south of Baseline Road. Keewaydin Meadows Park is located east of Manhattan Drive, immediately south of the school.

The road has a posted 25 mph speed limit in the vicinity of the project and a 20 mph school zone speed limit in the vicinity of Manhattan Middle School. Twenty-four hour volume/speed counts taken September 16, 2008 north of the intersection of Manhattan Dr/S Boulder Road show an 85th percentile speed of 24-25 mph on this roadway. It is generally desirable for the 85th percentile speed to match the posted speed limit, which is the case at this location. This count indicates that approximately 3,000 vehicles use Manhattan in this area per day.

55th Street:

55th Street is a north/south Collector Roadway in the vicinity of the proposed development. 55th Street runs from Baseline Road and becomes Valmont Road north of the intersection with Pearl Parkway. East Boulder Community Park and Recreation Center is located on the west side of 55th Street and on the south side of Sioux Drive. The proposed development would include an access to 55th Street.

The posted speed limit is 25 mph in the vicinity of the project site. Twenty-four hour volume/speed counts taken on 55th Street north of S Boulder Road show an 85th Percentile Speed of 26-28 mph at this location, slightly higher than the posted speed limit. This count also indicates that approximately 1,800 vehicles currently use this roadway per day.

Kewanee Drive:

Kewanee Drive is an east/west community collector roadway that extends east from Manhattan Drive and terminates at the site of the proposed development. This roadway has no posted speed limit, but is assumed to be 25 mph.

Transit:

Route 206, is a local bus route providing connections to both South Boulder and the Downtown Transit Center. This route follows Manhattan Drive in the vicinity of the site. There is a stop for this route adjacent to Kewanee Drive.

Route 203 provides a more direct connection to downtown Boulder via Baseline Road. This route terminates at the East Boulder Community Center.

2.1 Existing Traffic Data

Existing traffic turning movement counts were conducted at the following intersections for the morning peak (7am-9am) and evening peak (4pm-6pm) periods:

- S Boulder Road / Manhattan Drive
- Baseline Road / Manhattan Drive
- Kewanee Drive / Manhattan Drive
- S Boulder Road / 55th Street
- Baseline Road / 55th Street

Twenty-four hour volume and speed data was collected at the following two locations:

- Manhattan Drive, north of S Boulder Road
- 55th Street, north of S Boulder Road

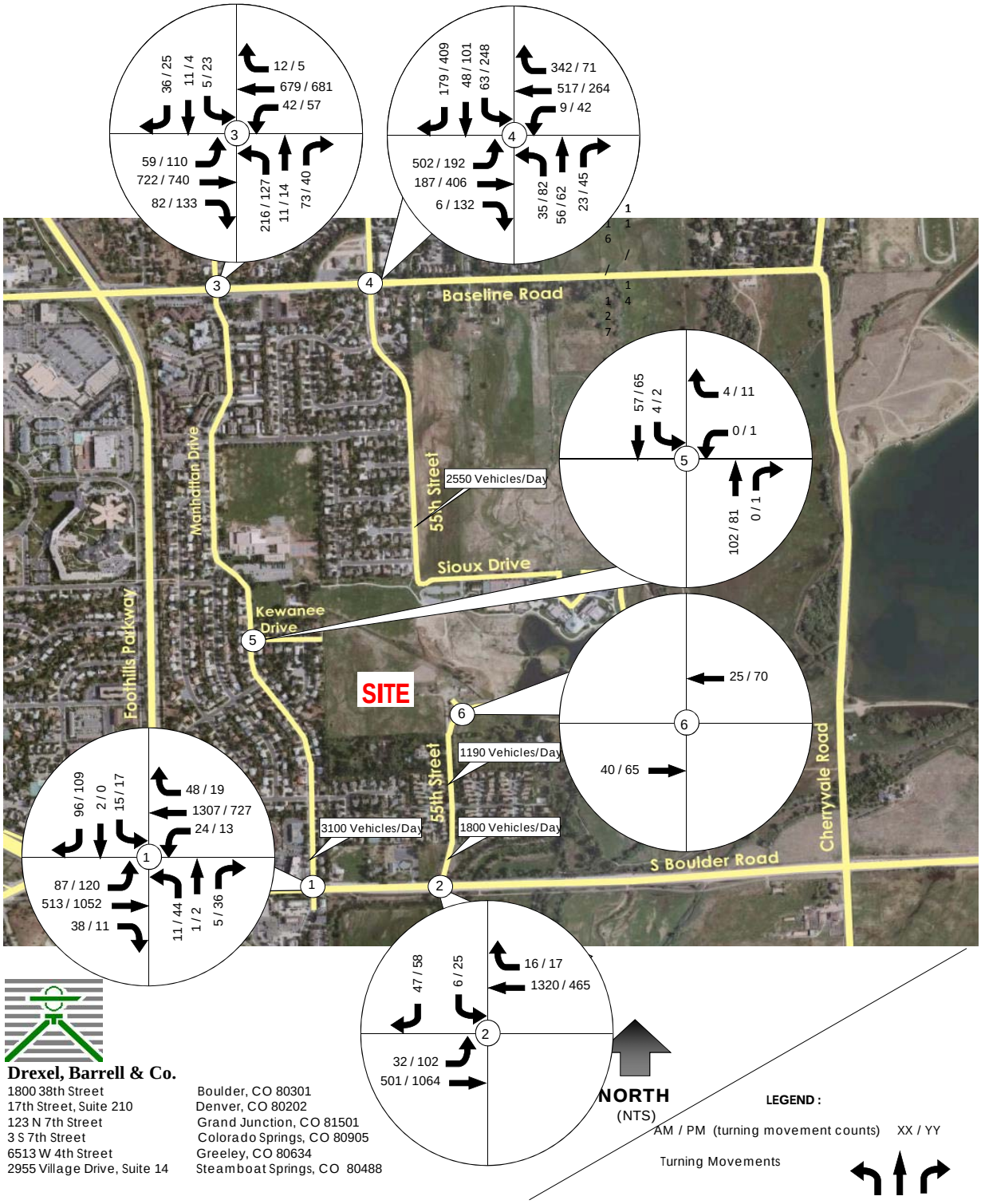
Full week (April 15-22, 2008) volume data were obtained from the Fox Higgins Transportation Group for two additional locations:

- 55th Street, north of Ontario Place
- 55th Street, north of Pueblo Place

The results of all traffic counts can be seen in the **Appendix** of this report. This data is also illustrated in **Figure 2**.

Traffic signal timing plans were obtained from the City of Boulder for the intersections of Manhattan Drive/Baseline Road and 55th Street/Baseline Road on October 5, 2008. The cycle length and signal progression for the South Boulder Road corridor was also obtained. This data can also be seen in the **Appendix.**

Figure 2: Year 2008 Existing Traffic Volumes



Drexel, Barrell & Co.

1800 38th Street	Boulder, CO 80301
17th Street, Suite 210	Denver, CO 80202
123 N 7th Street	Grand Junction, CO 81501
3 S 7th Street	Colorado Springs, CO 80905
6513 W 4th Street	Greeley, CO 80634
2955 Village Drive, Suite 14	Steamboat Springs, CO 80488

2.2 Intersection Levels of Service

Capacity and Level of Service Analyses were performed for existing, background, and total traffic conditions using Synchro 7.0 software package. Synchro utilizes the procedures set forth in the *Highway Capacity Manual, 2000*. The results are reported as Levels of Service (LOS) and can range from LOS A, little or no delay, to LOS F, very high average delay.

SIGNALIZED INTERSECTION

Level of Service	Interpretation	Control Delay (sec/veh)
A	Progress is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may contribute to low delay.	<=10
B	Good progression, short cycle lengths, or both. More vehicles vehicles stop than with LOS A.	>10 and <=20
C	Fair progression, long cycle lengths, or both. The number of	>20 and <=35
D	Longer delays result from some combination of unfavorable progression, long cycle length, or high v/c ratios. Many stop.	>35 and <=55
E	High delay values generally indicate poor progression, long cycle length, and high v/c ratios. Individual cycle failures are frequent occurrences.	>55 and <=80
F	This level often occurs with over saturation when arrival flow rates exceed the capacity of the intersection. Poor progression and long cycle lengths may be major contributing factors to such delay levels.	>80

STOP-CONTROLLED INTERSECTION

LOS	Expected Delay to Minor Street Traffic	Average Control Delay (s/veh)
A	Little or no delay.	0-10
B	Short traffic delays.	>10-15
C	Average traffic delays.	>15-25
D	Long traffic delays.	>25-35
E	Very long traffic delays.	>35-50
F	When volume exceeds the capacity of the lane, extreme delays will be encountered with queuing that may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improving the intersection.	>50

Level of Service information for all conditions analyzed is detailed in **Table 1**. The Existing Conditions Analyses are detailed below. The Background and Total Traffic Conditions analyses are detailed in subsequent sections of this report. Supporting Synchro analysis, including capacity, delay, and queuing analyses can be found in the **Appendix** of this report.

Table 1
Unsignalized Intersection Level of Service Analysis / Delay in Seconds

Intersection		Traffic Control	Year 2008 Existing Traffic AM	Year 2008 Existing Traffic PM	Year 2012 Background Traffic AM	Year 2012 Background Traffic PM	Year 2012 Total Traffic without Kewanee Access AM	Year 2012 Total Traffic without Kewanee Access PM	Year 2012 Total Traffic with Kewanee Access AM	Year 2012 Total Traffic with Kewanee Access PM	Year 2025 Background Traffic AM	Year 2025 Background Traffic PM	Year 2025 Total Traffic without Kewanee Access AM	Year 2025 Total Traffic without Kewanee Access PM	Year 2025 Total Traffic with Kewanee Access AM	Year 2025 Total Traffic with Kewanee Access PM
S Boulder Rd / Manhattan Dr																
(No Changes)	**NB Approach**	N-S	F / 114	F / 639	F / 234	F / 970	F / 259	F / 1018	F / 189	F / 1066	F / 365	F / -	F / 385	F / -	F / 402	F / -
	SB Approach	Stop-Control	F / 120	E / 44	F / 209	F / 105	F / 243	F /114	F / 78	F / 139	F / 362	F / 168	F / 384	F / 182	F / 414	F / 211
	EBL Movement		C / 15	B / 10	C / 15	B / 11	C / 16	B / 11	C / 16	B / 11	C / 17	B / 11	C / 17	B / 11	C / 17	B / 11
	WBL Movement		A / 9	B / 11	A / 9	B / 12	A / 9	B / 12	A / 9	B /12	A / 9	B / 12	A / 9	B / 12	A / 9	B / 12
S Boulder Rd / 55th St																
(No Changes)	**SB Approach**	SB	C / 24	C / 21	D / 32	D / 27	E / 35	D / 29	D / 27	E / 35	E / 38	D / 31	E / 43	D / 34	E / 40	D / 33
	EBL Movement	Stop-Control	B / 13	A / 9	B / 14	A / 9	B / 14	A / 9	B / 14	A / 9	B / 15	A / 9	B / 15	A / 9	B /15	A / 9
Kewanee Dr / Manhattan Dr																
(No Changes)	**WB Approach**	WB	A / 9	A / 9	A / 9	A / 9	-	-	A / 9	A / 9	A / 9	A / 9	-	-	A / 9	A / 9
	SB Approach	Stop-Control	A / 1	A / 0	A / 1	A / 1	-	-	A / 1	A / 2	A / 1	A / 1	-	-	A / 1	A / 2
55th St / Access																
(Proposed Access)	**SB Approach**	SB	-	-	-	-	A / 9	B / 10	A / 9	B / 10	-	-	A / 9	B / 10	A / 9	B / 10
	EB Approach	Stop-Control	-	-	-	-	A / 1	A / 1	A / 1	A / 1	-	-	A / 1	A / 1	A / 1	A / 1
S Boulder Rd / Manhattan Dr																
Add N-S Left Turn Lanes	**NB Approach**	N-S	-	-	F / 166	F / 516	F / 195	F / 541	F / 189	F / 567	F / 246	F / 671	F / 258	F / 702	F / 270	F / 5024
	NBL Movement	Stop-Control	-	-	F / 220	F / 994	F / 257	F / 1043	F / 251	F / 1095	F / 329	F / 1296	F / 347	F / 1357	F / 367	F / -
	NBTR Movement		-	-	F / 87	E / 37	F / 101	E / 38	F / 95	E / 39	F / 120	E / 45	F / 125	E / 47	F / 124	E / 48
	SB Approach		-	-	F / 68	E / 50	F / 81	F / 52	F / 78	F / 56	F / 101	F / 66	F / 106	F / 69	F / 109	F / 75
	SBL Movement		-	-	F / 302	F / 251	F / 369	F / 268	F / 354	F / 287	F / 480	F / 353	F / 506	F / 375	F / 528	F / 407
	SBTR Movement		-	-	E / 35	B / 13	E / 40	B / 13	E / 40	B / 13	E / 47	B / 14	E / 48	B / 14	E / 49	B / 14
	EBL Movement		-	-	C / 15	B / 11	C / 16	B / 11	C / 16	B / 11	C / 17	B / 11	C / 17	B / 11	C / 17	B / 11
	WBL Movement		-	-	A / 9	B / 12	A / 9	B / 12	A / 9	B / 12	A / 9	B / 12	A / 9	B / 12	A / 9	B / 12
S Boulder Rd / 55th St			-	-												
Add SB Left Turn Lane	**SB Approach**	SB	-	-	D / 27	C / 21	D / 31	C / 22	D / 27	C / 25	D / 31	C / 23	D / 32	C / 24	D / 31	C / 24
	SBL Movement	Stop-Control	-	-	F / 75	F / 55	F / 93	F / 61	F / 78	F / 70	F / 93	F / 65	F / 102	F / 73	F / 97	F / 70
	SBR Movement		-	-	C / 17	B / 11	C / 18	B / 11	C / 17	B / 11	C / 18	B / 11	C / 19	B / 11	C / 18	B / 11
	EBL Movement		-	-	B / 14	A / 9	B / 14	A / 9	B /14	A / 9	B / 15	A / 9	C / 15	A / 9	B / 15	A / 9

Table 1 cont.
Signalized Intersection Level of Service Analysis / Delay in Seconds

Intersection		Traffic Control	Year 2008 Existing Traffic AM	Year 2008 Existing Traffic PM	Year 2012 Background Traffic AM	Year 2012 Background Traffic PM	Year 2012 Total Traffic without Kewanee Access AM	Year 2012 Total Traffic without Kewanee Access PM	Year 2012 Total Traffic with Kewanee Access AM	Year 2012 Total Traffic with Kewanee Access PM	Year 2025 Background Traffic AM	Year 2025 Background Traffic PM	Year 2025 Total Traffic without Kewanee Access AM	Year 2025 Total Traffic without Kewanee Access PM	Year 2025 Total Traffic with Kewanee Access AM	Year 2025 Total Traffic with Kewanee Access PM
Baseline Rd / Manhattan Dr	**Overall**		**B / 17**	**B / 11**	**B / 17**	**B / 11**	**B / 17**	**B / 11**	**B / 17**	**B / 11**	**B / 17**	**B / 10**	**B / 17**	**B / 10**	**B / 17**	**B / 11**
	EB Approach	Signal	*A / 7*	*A / 5*	*A / 8*	*A / 5*	*A / 8*	*A / 5*	*A / 8*	*A / 6*	*A / 8*	*A / 6*	*A / 8*	*A / 6*	*A / 8*	*A / 6*
	EBL Movement	Control	A / 7	A / 5	A / 7	A / 6	A / 7	A / 6	A / 7	A / 6	A / 7	A / 7	A / 7	A / 7	A / 7	A / 7
	EBTR Movement		A / 7	A / 5	A / 8	A / 5	A / 8	A / 5	A / 8	A / 6	A / 8	A / 6	A / 8	A / 6	A / 8	A / 6
	WB Approach		*B / 15*	*A / 5*	*B / 15*	*A / 6*	*B / 15*	*A / 6*	*B / 16*	*A / 6*	*B / 15*	*A / 6*	*B / 15*	*A / 7*	*B / 16*	*A / 7*
	WBL Movement		B / 12	A / 5	B / 12	A / 6	B / 12	A / 6	B / 13	A / 6	B / 12	A / 7	B / 12	A / 7	B / 12	A / 7
	WBTR Movement		B / 15	A / 5	B / 16	A / 6	B / 15	A / 6	B / 16	A / 6	B / 15	A / 6	B / 15	A / 7	B / 16	A / 7
	NB Approach		*D / 46*	*D / 53*	*D / 46*	*D / 54*	*D / 46*	*D / 54*	*D / 46*	*D / 54*	*D / 46*	*D / 54*	*D / 46*	*D / 54*	*D / 46*	*D / 54*
	NBL Movement		D / 51	E / 57	D / 52	E / 57	D / 52	E / 57	D / 52	E / 58	D / 52	E / 57	D / 52	E / 57	D / 53	E / 58
	NBTR Movement		C / 31	D / 44	C / 31	D / 44	C / 31	D / 44	C / 31	D / 44	C / 31	D / 44	C / 31	D / 44	C / 31	D / 44
	SB Approach		*C / 31*	*D / 44*	*C / 31*	*D / 44*	*C / 31*	*D/ 44*	*C / 30*	*D / 44*	*C / 31*	*D / 44*	*C / 31*	*D / 44*	*C / 31*	*D / 44*
	SBL Movement		C / 31	D / 45	C / 31	D / 45	C / 31	D / 45	C / 30	D / 44	C / 31	D / 45	C / 31	D / 45	C / 31	D / 44
	SBTR Movement		C / 31	D / 44	C / 31	D / 44	C / 31	D / 44	C / 30	D / 43	C / 31	D / 44	C / 31	D / 44	C / 31	D / 43
Baseline Rd / 55th St	**Overall**		**C / 22**	**C / 25**	**C / 25**	**C / 26**	**C / 25**	**C / 26**	**C / 25**	**C / 26**	**D / 37**	**C / 30**	**D / 37**	**C / 30**	**D / 37**	**C / 30**
	EB Approach	Signal	*B / 13*	*A / 7*	*B / 16*	*A / 8*	*B / 16*	*A / 8*	*B / 17*	*A / 8*	*D / 45*	*A / 9*	*D / 45*	*A / 9*	*D / 45*	*A / 9*
	EBL Movement	Control	B / 17	A / 7	C / 22	A / 7	C / 22	A / 7	C / 23	A / 8	E / 62	A / 9	E / 62	A / 9	E / 62	A / 9
	EBT Movement		A / 1	A / 8	A / 1	A / 9	A / 1	A / 9	A / 1	A / 9	A / 1	B / 10	A / 1	B / 10	A / 1	B / 10
	EBR Movement		A / 0	A / 5	A / 0	A / 6	A / 0	A / 6	A / 0	A / 6	A / 0	A / 7	A / 0	A / 7	A / 0	A / 7
	WB Approach		*C / 24*	*B / 13*	*C / 28*	*B / 14*	*C / 28*	*B / 14*	*C / 28*	*B / 15*	*C / 34*	*B / 15*	*C / 34*	*B / 15*	*C / 34*	*B / 15*
	WBL Movement		B / 17	B / 12	B / 19	B / 13	B / 19	B / 13	B / 19	B / 14	B / 19	B / 15	B / 19	B / 15	B / 19	B / 15
	WBTR Movement		C / 24	B / 13	C / 28	B / 14	C / 28	B / 14	C / 28	B / 15	C / 34	B / 15	C / 34	B / 15	C / 34	B / 15
	NB Approach		*D / 43*	*D / 38*	*D / 43*	*D / 38*	*D / 43*	*D / 38*	*D / 43*	*D / 38*	*D / 42*	*D / 36*	*D / 42*	*D / 36*	*D / 42*	*D / 36*
	NBL Movement		D / 44	D / 39	D / 43	D / 39	D / 44	D / 40	D / 43	D / 39	D / 42	D / 38	D / 43	D / 38	D / 42	D / 38
	NBT Movement		D / 44	D / 37	D / 43	D / 37	D / 44	D / 37	D / 44	D / 37	D / 43	D / 35	D / 43	D / 35	D / 43	D / 35
	NBR Movement		D / 41	D / 36	D / 41	D / 35	D / 41	D / 35	D / 41	D / 35	D / 40	C / 34	D / 40	C / 34	D / 40	C / 34
	SB Approach		*C / 29*	*D / 46*	*C / 28*	*D / 47*	*C / 28*	*D / 47*	*C / 28*	*D / 46*	*C / 28*	*E / 57*	*C / 28*	*E / 57*	*C / 28*	*E / 57*
	SBL Movement		D / 48	E / 72	D / 50	E / 77	D / 50	E / 77	D / 50	E / 77	D / 51	F / 104	D / 51	F / 106	D / 51	F / 106
	SBT Movement		D / 43	D / 38	D / 43	D / 38	D / 43	D / 38	D / 43	D / 38	D / 42	D / 36	D / 42	D / 36	D / 42	D / 36
	SBR Movement		B / 18	C / 32	B / 17	C / 32	B / 17	C / 31	B / 17	C / 30	B / 17	C / 33	B /17	C / 33	B / 17	C / 33
S Boulder Road / Manhattan Dr	**Overall**		**-**	**-**	**A / 6**	**B / 11**	**A / 6**	**B / 11**	**A / 6**	**B / 11**	**A / 6**	**B / 11**	**A / 7**	**B / 11**	**A / 7**	**B / 11**
	EB Approach	Signal	-	-	*A / 6*	*A / 5*	*A / 6*	*A / 5*	*A / 6*	*A / 5*	*A / 6*	*A / 5*	*A / 7*	*A / 5*	*A / 7*	*A / 5*
	EBL Movement	Control	-	-	B / 14	A / 5	B / 16	A / 5	B / 16	A / 5	B / 20	A / 5	C / 21	A / 5	C / 21	A / 5
	EBTR Movement		-	-	A / 4	A / 5	A / 4	A / 5	A / 4	A / 5	A / 4	A / 5	A / 4	A / 5	A / 4	A / 5
	WB Approach		-	-	*A / 3*	*A / 4*	*A / 3*	*A / 4*	*A / 3*	*A / 4*	*A / 3*	*A / 4*	*A / 4*	*A / 4*	*A / 4*	*A / 4*
	WBL Movement		-	-	A / 1	A / 3	A / 1	A / 3	A / 1	A / 3	A / 1	A / 3	A / 1	A / 3	A / 1	A / 3
	WBTR Movement		-	-	A / 3	A / 4	A / 3	A / 4	A / 3	A / 4	A / 4	A / 4	A / 4	A / 4	A / 4	A / 4
	NB Approach		-	-	*D / 38*	*E / 69*	*D / 39*	*E / 69*	*D / 38*	*E / 72*	*D / 38*	*E / 69*	*D / 38*	*E / 69*	*D / 38*	*E / 72*
	SB Approach		-	-	*D / 36*	*E / 79*	*D / 36*	*E / 79*	*D / 37*	*E / 78*	*D / 37*	*E / 79*	*D / 36*	*E / 79*	*D / 37*	*E / 78*
S Boulder Road / 55th Street	**Overall**		**-**	**-**	**A / 5**	**A / 6**	**A / 6**	**A / 6**	**A / 6**	**A / 7**	**A / 5**	**A / 6**	**A / 7**	**A / 7**	**A / 6**	**A / 6**
	EB Approach	Signal	-	-	*A / 3*	*A / 2*	*A / 3*	*A / 2*	*A / 3*	*A / 2*	*A / 3*	*A / 2*	*A / 3*	*A / 3*	*A / 3*	*A / 2*
	EBL Movement	Control	-	-	A / 4	A / 2	A / 5	A / 2	A / 5	A / 3	A / 5	A / 2	A / 7	A / 3	A / 6	A / 3
	EBTR Movement		-	-	A / 3	A / 2	A / 3	A / 2	A / 3	A / 2	A / 3	A / 2	A / 3	A / 3	A / 3	A / 2
	WB Approach		-	-	*A / 4*	*A / 2*	*A / 5*	*A / 2*	*A / 5*	*A / 2*	*A / 5*	*A / 2*	*A / 5*	*A / 3*	*A / 5*	*A / 3*
	WBTR Movement		-	-	A / 4	A / 2	A / 5	A / 2	A / 5	A / 2	A / 5	A / 2	A / 5	A / 3	A / 5	A / 3
	SB Approach		-	-	*D / 43*	*D / 55*	*D / 44*	*D / 53*	*D / 44*	*E / 55*	*D / 43*	*D / 55*	*D / 44*	*D / 53*	*D / 44*	*E / 55*

Intersection Level of Service - Existing Traffic

1. South Boulder Road / Manhattan Drive:

This stop-controlled intersection currently operates at Level of Service F in both the northbound and southbound directions during the AM Peak Hour. During the PM Peak Hour, the northbound approach operates at LOS F while the southbound approach operates at LOS E. The level of delay on the minor leg of the intersection can be attributed to the high through movement volumes on South Boulder Road. Actual delay may be somewhat mitigated by the platooning effect of the traffic signal at the intersections of South Boulder Road/Foothills Parkway and South Boulder Road/Cherryvale Road. The eastbound and westbound left turn movements are operating acceptably for both the AM and PM Peak Hours.

2. South Boulder Road / 55th Street:

This southbound stop-controlled intersection is operating acceptably with Levels of Service C or better for the critical movements.

3. Baseline Road / Manhattan Drive:

This signalized intersection currently operates at an overall Level of Service B during both the AM Peak Hour and the PM Peak Hour. However, the northbound left turning movement is operating at a Level of Service E during the evening peak hour. This LOS E appears to be the result of the 120 second cycle length used during this time period.

4. Baseline Road / 55th Street:

This signalized intersection currently operates at an overall Level of Service C during both the AM Peak Hour and the PM Peak Hours. However, during the PM Peak Hour, the southbound left-turn operates at a Level of Service E.

5. Kewanee Drive / Manhattan Drive:

This westbound stop-controlled intersection is operating acceptably with Levels of Service A.

3.0 Future Background Traffic Conditions

3.1 Background Traffic Volume Projections

The City of Boulder provides several sources of historical and predictive volume data to assist in the development of long-term growth projections. These include base Year 2001 and future Year 2025 predictive traffic models as well as historical growth rates for several arterial roadways.

Per growth predictions from the Boulder TMP Model, A 0.5% growth rate was used for the short-term and long-term planning periods on the through movements of South Boulder Road. Correspondingly, the through movements of Baseline Road and movements associated with the north leg of the 55th Street / Baseline Road intersection were assigned a growth rate of 1.2%.

The Fox Higgins Transportation Group assessed the potential traffic impacts of a proposed addition to the existing East Boulder Community Park. The primary addition is currently expected to consist of athletic fields. Per correspondence with Fox Higgins, the site would be expected to have an impact on evening peak hour traffic. As organized sports are not scheduled during the weekday morning peak hour, the affect of the additional development is expected to have a negligible impact on the morning peak hour. The text of this report can be found in the **Appendix.**

Projected background traffic volumes for Years 2012 and 2025 are illustrated in **Figures 3** and **4,** respectively.

Figure 3: Year 2012 Background Traffic

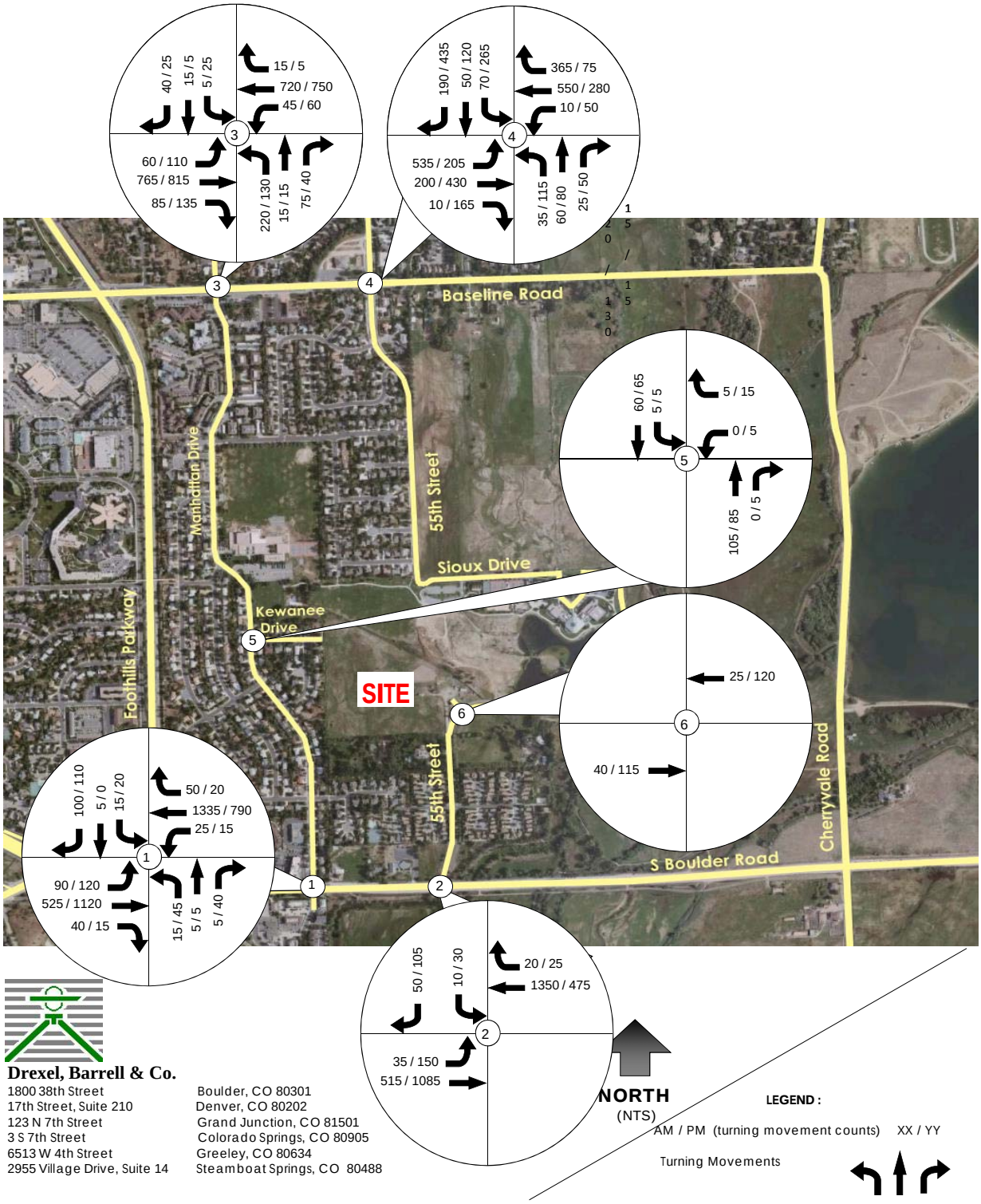


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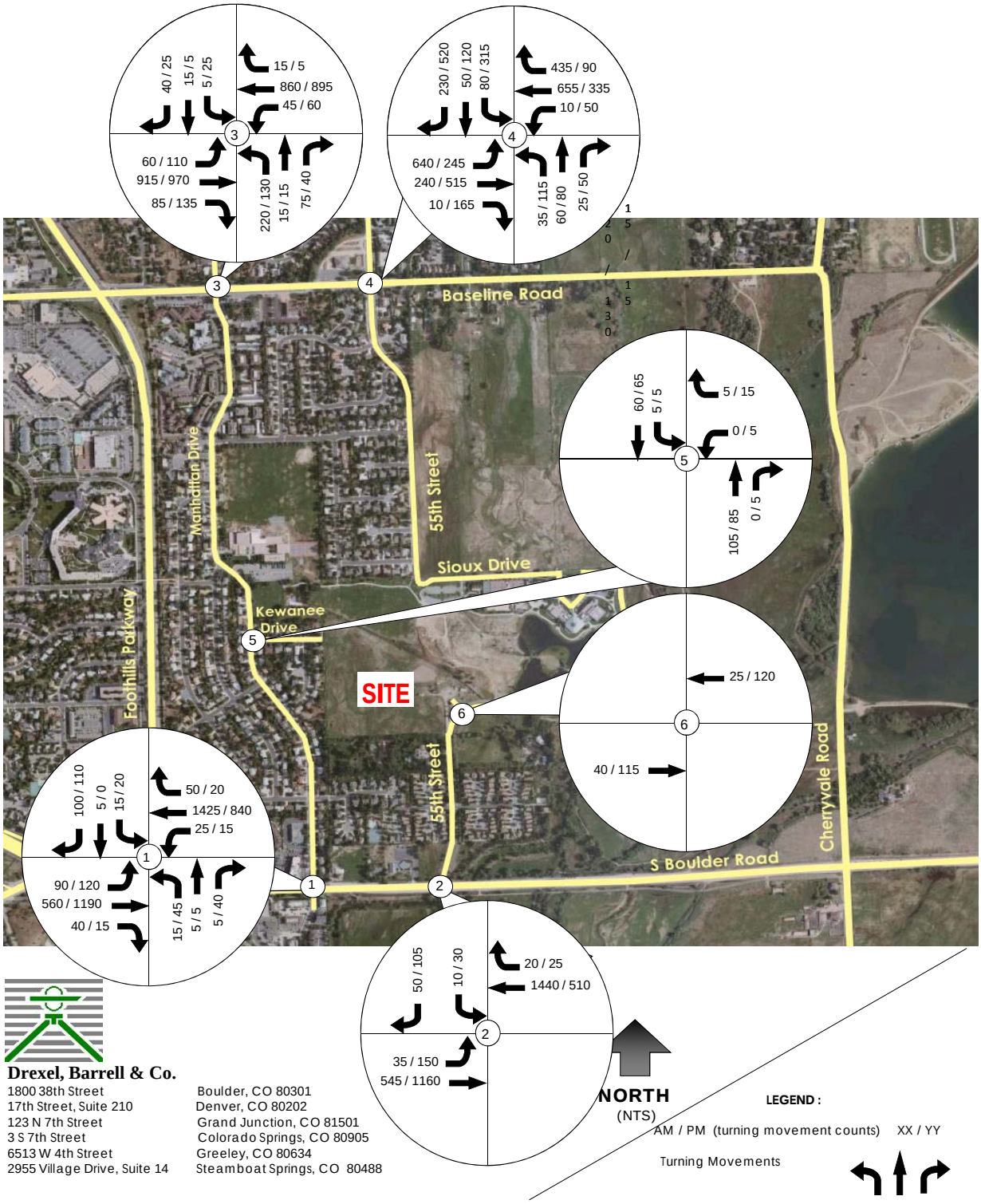
Figure 4: Year 2025 Background Traffic



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3.2 Intersection Level of Service - Background Traffic

Levels of Service analyses were conducted for Year 2012 and year 2025 Background Traffic Volumes. The results of these analyses are detailed below and in **Table 1**. Supporting Synchro analysis, including capacity, delay, and queuing analyses can be found in the Appendix of this report.

1. South Boulder Road / Manhattan Drive:

With the projected increase in background traffic volumes, the delay for the northbound and southbound movements at this intersection will also increase.

In light of the significant delay at this intersection with the projected increase in background traffic volumes, two modifications were reviewed that could potentially improve the operation of the intersection.

The first option would be to stripe separate left and through-right lanes on the northbound and southbound approaches. Adding a left turn lane in each direction of Manhattan Drive would not significantly affect the delay time for left turning vehicles, but would allow for right turning vehicles to move with less impedance. Both the northbound and southbound approaches of this intersection appear to have an existing paved width of approximately 36 feet, which should be adequate for three lanes of traffic. This may also reflect the actual functioning of this intersection under existing conditions. RTD bus stops in both north and southbound directions were observed in close proximity to the north leg of this intersection. Any restriping of this approach may require a minor location shift of these stops to prevent buses from interfering with other traffic.

While the re-striping would slightly improve operations, the Manhattan approaches of this intersection would still be expected to operate with high levels of delay.

The second option would be the installation of a traffic signal. In order for a traffic signal to be installed, one or more of the Traffic Signal Warrant specified in the Manual for Uniform Traffic Control Devices, 2003 (MUTCD) must be met prior to construction. These warrants consist of:

Warrant 1, Eight-Hour Vehicular Volume.
Warrant 2, Four-Hour Vehicular Volume.
Warrant 3, Peak Hour.
Warrant 4, Pedestrian Volume.
Warrant 5, School Crossing.
Warrant 6, Coordinated Signal System.
Warrant 7, Crash Experience.
Warrant 8, Roadway Network.

It should be noted, however, that the satisfaction of a traffic signal warrant does not mean that a signal will definitely be installed, only that a signal is allowed at that location.

Using traffic data for Manhattan Drive north of South Boulder Road taken 9/16/2008 and through traffic from the Boulder Valley Count Station Data collected east of 76th Street, this intersection appears to currently meet both the Four-Hour Vehicular Volume and Peak Hour Vehicular Volume Warrants for the installation of a traffic signal. Volumes are high enough to justify the Eight-hour Vehicular Volume for six of the required eight hours. This volume analysis can be seen in the **Appendix.**

As a signalized intersection, this intersection would be expected to operate with overall Level of Service A and B in the AM and PM Peak Hours, respectively for both Year 2012 and Year 2025 Background Traffic Conditions.

2. South Boulder Road / 55th Street:

This southbound stop-controlled intersection is expected to operate satisfactorily during the peak hours for short range and long range background conditions (including the additional traffic generated by the proposed expansion of East Boulder Community Park). The southbound approach is projected to operate at LOS E during the AM Peak Hour for Year 2025 background conditions. However, the delay is projected to be only 38 seconds per vehicle.

The remedies available to improve conditions for the southbound approach are similar to that of the Manhattan Drive/South Boulder Road intersection, adding a left turn lane or signalizing the intersection. With the addition of a left turn storage bay, this intersection would be expected to operate with less delay for the right-turning vehicles as the left-turning vehicles would be in a separate lane.

It is not anticipated that this intersection will justify signalization, as only the peak hour vehicular volume signal warrant is met. Neither the four hour nor eight hour vehicular volume warrants are expected to be met with the addition of traffic generated by the expansion of East Boulder Community Park. A signal warrant analysis can be seen in the **Appendix**.

3. Baseline Road / Manhattan Drive:

This signalized intersection is expected to operate satisfactorily through the long-term planning horizon.

4. Baseline Road / 55th Street:

This signalized intersection is expected to operate with satisfactory overall Levels of Service through Year 2025 background traffic conditions. Two

movements are projected to experience unsatisfactory conditions prior to Year 2025.

The southbound left-turn movement is expected to reach Level of Service F for Year 2025 background traffic conditions. The eastbound left-turn movement is projected to operate at Level of Service E in Year 2025.

5. Kewanee Drive / Manhattan Drive:

This westbound stop-controlled intersection is expected to maintain Levels of Service A under background conditions.

4.0 Project Generated Traffic and Trip Distribution

4.1 Trip Generation

The traffic to be generated as a result of this project has been estimated based upon trip generation rates contained in the *7th Edition Trip Generation Manual*, published by the Institute of Transportation Engineers, 2003.

This development is anticipated to consist of two different residential land uses. Included in this are 70 single family homes (ITE Land Use Code #210) and 70 senior orientated attached dwellings. While the land use description of these senior units conforms most closely to Congregate Care Facility (ITE Land Use #253), data for this use is extremely limited. However, the Senior Adult Housing-Attached (ITE Land Use #252) also conforms to the proposed land use and the data provided is more acceptable. Therefore, Senior Adult Housing – Attached was used for this analysis.

As is shown in the table, the trips projected to be generated from the Senior Housing land use is significantly lower than the Single Family home land use. This can be attributed to the fact that the residents of these homes do not take as many trips over a given day as a typical single family home. Seniors are often retired and do not have children living with them. Therefore, the typical to/from work trips and to/from school trips are not produced from a Senior Adult housing development.

In discussions with the City of Boulder, 15% discount on generated trips was applied to account for the alternate mode use projected for this development. This discount will more accurately reflect the volumes projected to be generated by this development and reflects the proximity to the Boulder Community Park and the City of Boulder's successful and aggressive alternate modes policies.

The Hogan-Pancost Property development is projected to generate approximately 777 trips over the course of an average weekday. This includes an estimated 55 AM Peak Hour trips and 71 PM Peak Hour trips. These volumes are shown on **Table 2**.

4.2 Project Trip Distribution

The distribution of project-generated vehicular traffic on adjacent roadways is influenced by several factors including the following:

- The location of the site relative to adjacent roadways
- The configuration of the existing and proposed adjacent roadway network
- The anticipated land uses for the site and the surrounding areas

- Existing traffic counts
- Site location within the City of Boulder

Two distribution patterns were developed: A) With a connection to Kewanee Drive and B) Without a connection to Kewanee Drive. The results of applying the previous assumptions to the proposed roadway network result in the percentile distributions illustrated in **Figures 5A** and **5B.**

DREXEL, BARRELL & CO
Engineers - Surveyors
Phone 303-442-4338
Fax 303-442-4373

PROJECT NAME: Hogan-Pancost Property
DATE: 7-Sep-10
REVISED:

PROJECT NUMBER: 17706-01
PREPARED BY: ATB

Table 2
Estimated Project-Generated Traffic[1]

ITE Land Use Code	Size		Trip Generation Rates			Trips Generated Avg. Weekday	Trips Generated AM Peak-Hour					Trips Generated PM Peak-Hour				
							Inbound		Outbound		AM Total	Inbound		Outbound		PM Total
			AM	PM	Avg. Weekday	Trips	% Trips	Trips	% Trips	Trips	Trips	% Trips	Trips	% Trips	Trips	Trips
#210 Single-Family Detached Housing	70	DU	0.75	1.01	9.57	670	25%	14	75%	40	54	63%	45	37%	27	72
#252 Senior Adult Housing - Attached	70	DU	0.13	0.16	3.48	244	45%	5	55%	6	11	61%	7	39%	5	12
					Total Traffic	**914**		**19**		**46**	**65**		**52**		**32**	**84**
					Less 15% Alternate Modes Reduction:	***777***		***16***		***39***	***55***		***44***		***27***	***71***

DU - Dwelling Units

[1] Values obtained from *Trip Generation, 8th Edition, Volume 2* , Institute of Transportation Engineers, 2008

Figure 5A: Traffic Distibution with Kewanee Access

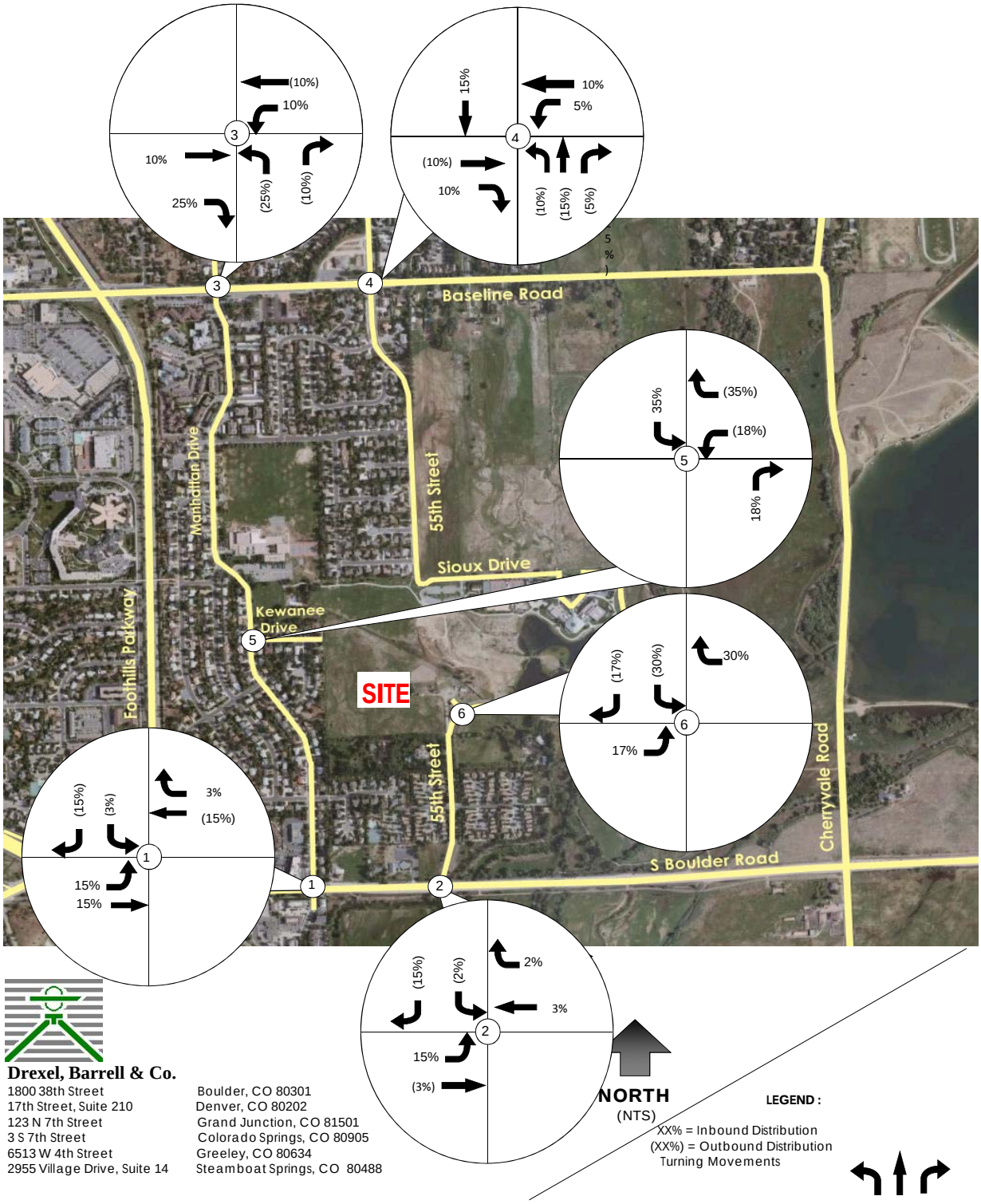

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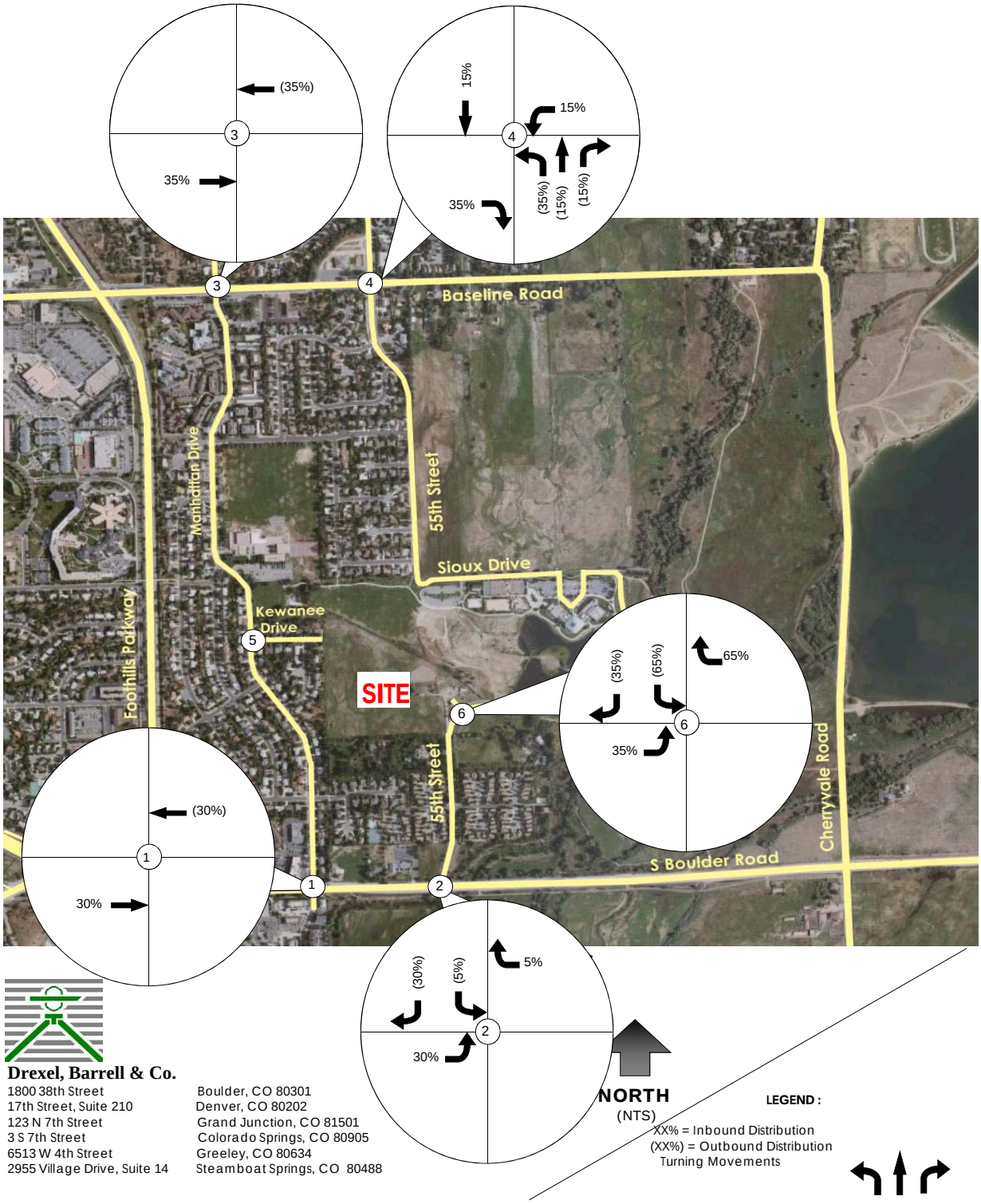
Figure 5B: Traffic Distibution without Kewanee Access



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4.3 Project Trip Assignment

The assignment of project-generated traffic onto the existing roadway network is illustrated in **Figures 6A** and **6B**. The volumes were derived by applying the trip distribution percentages in **Figure 5A** and **5B** to the trip generation estimates in **Table 2**.

Figure 6A: Project Generated Traffic with Kewanee Access

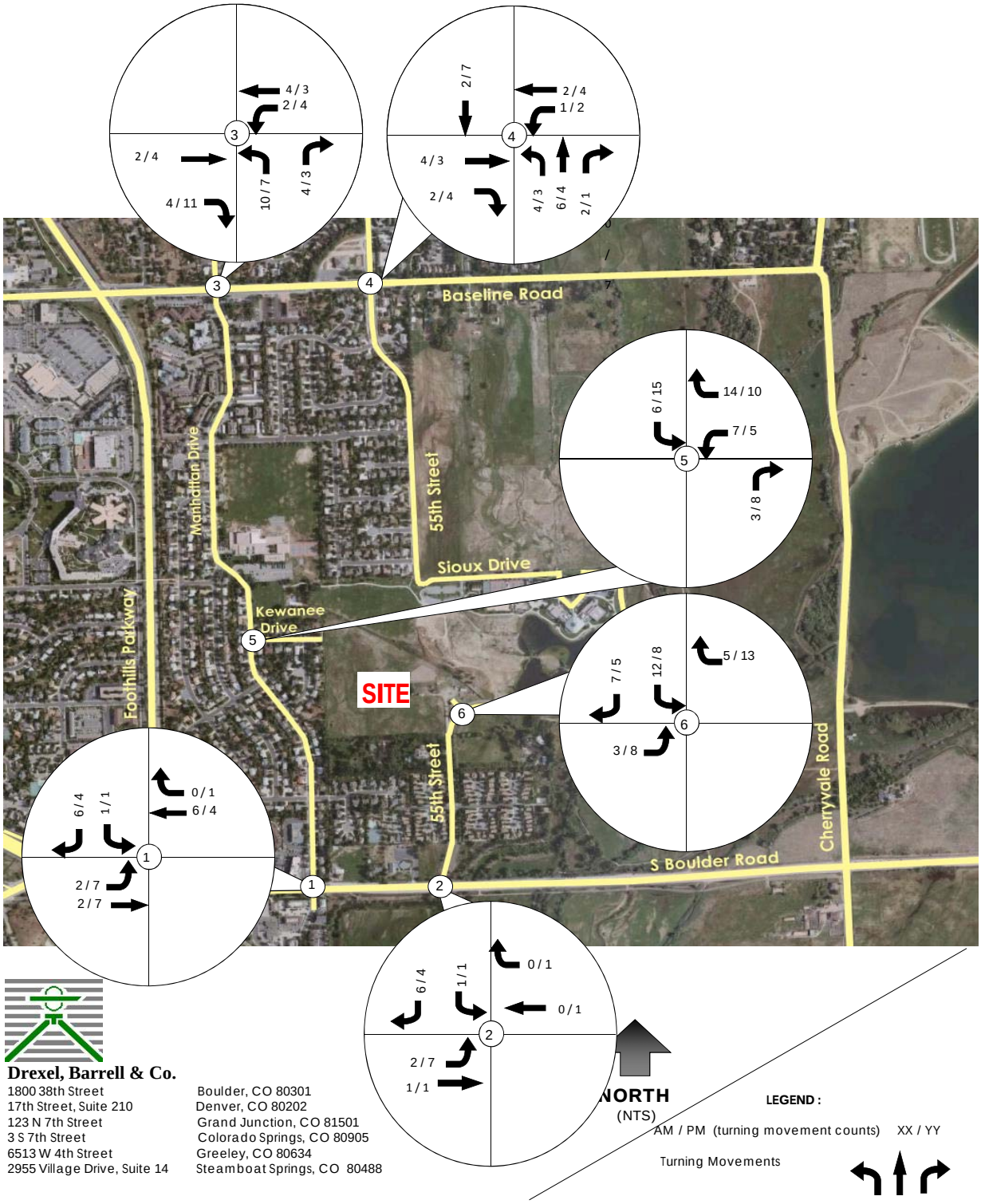

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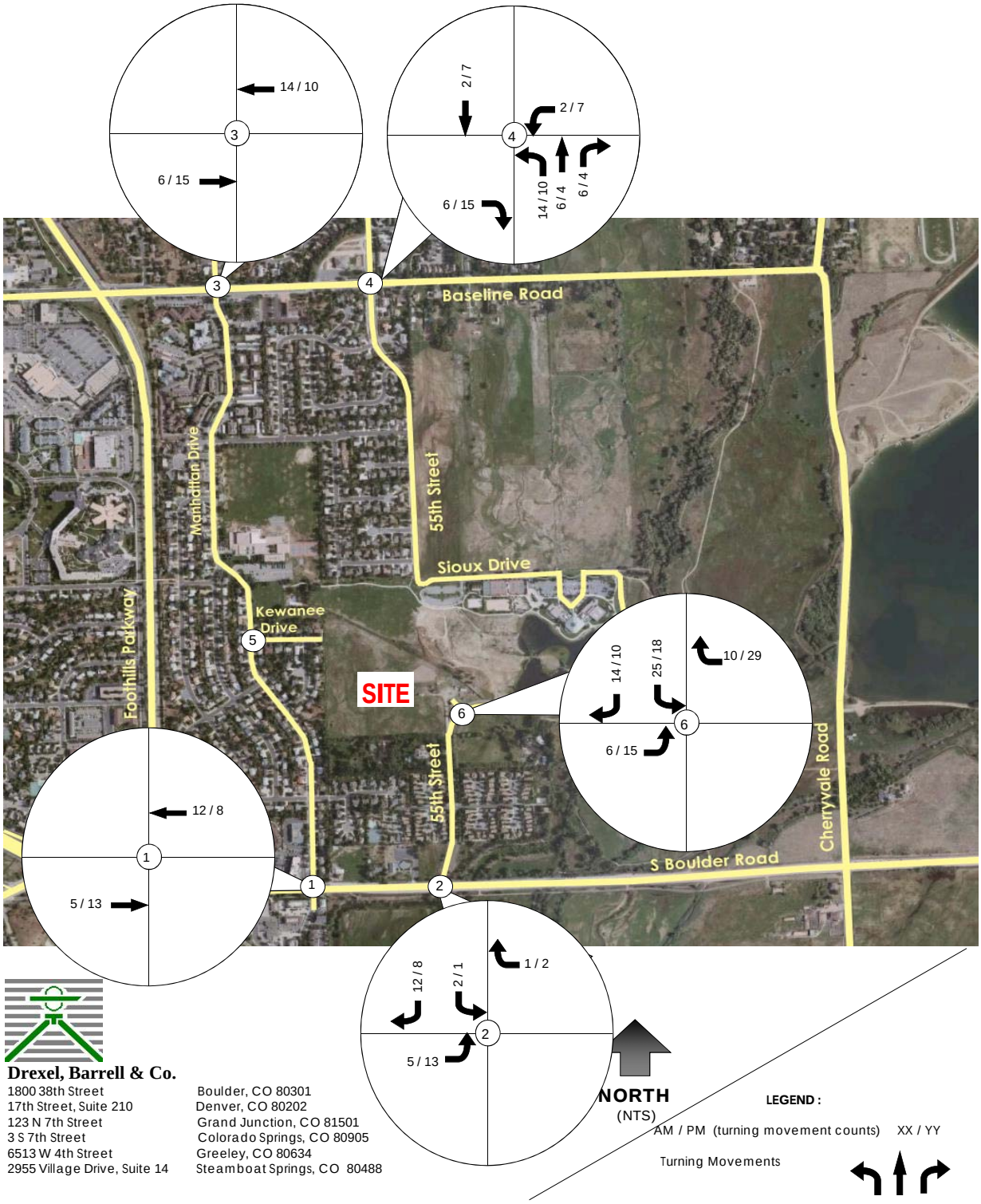
Figure 6B: Project Generated Traffic without Kewanee Access



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5.0 Total Traffic Projections

The background traffic volumes were added to the project-generated traffic to develop total traffic volumes. The Year 2012 and year 2025 Total traffic volumes are shown on **Figures 7A**, **7B**, **8A** and **8B**, respectively.

Figure 7A: Year 2012 Total Traffic with Kewanee Access

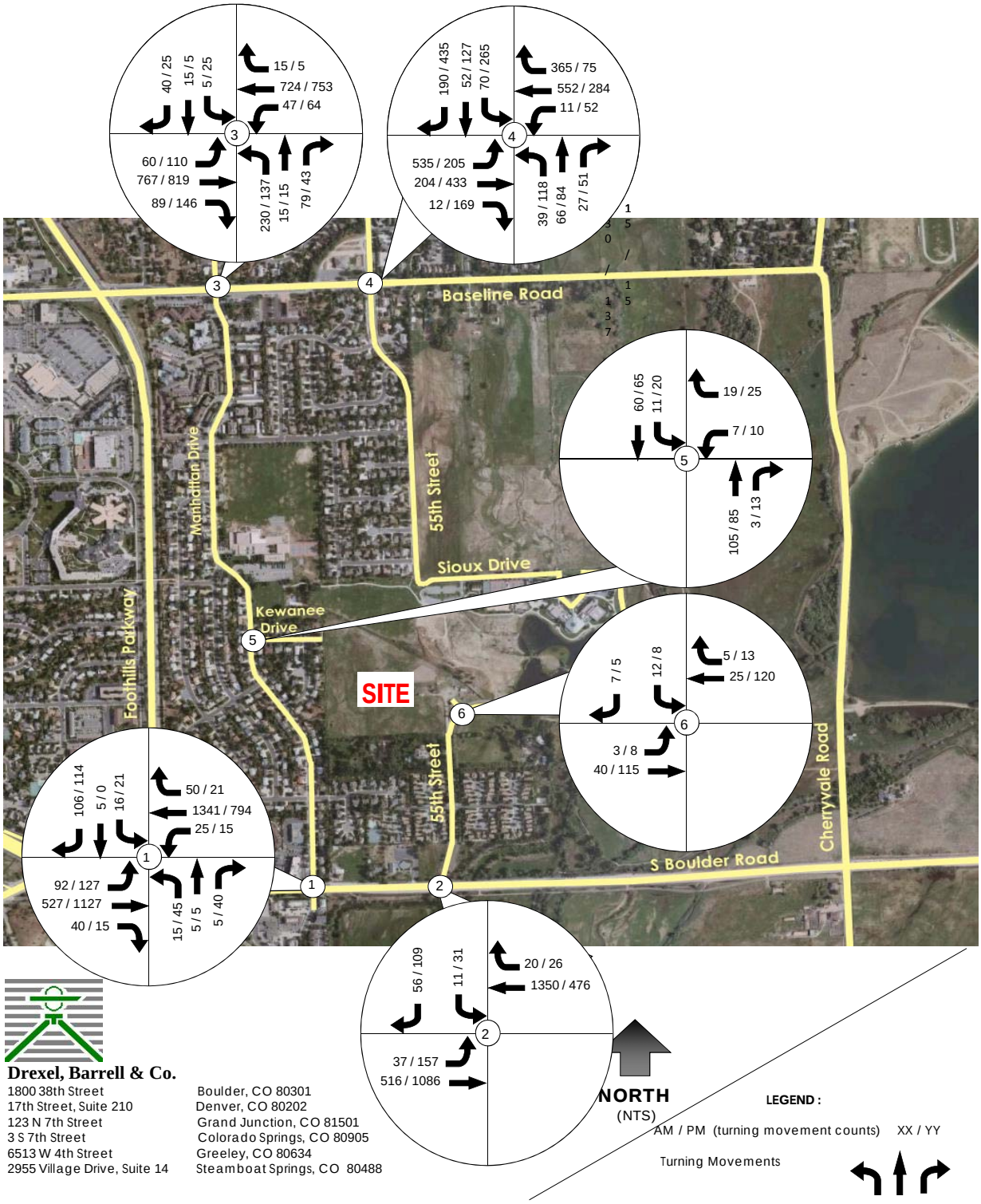

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Figure 7B: Year 2012 Total Traffic without Kewanee Access

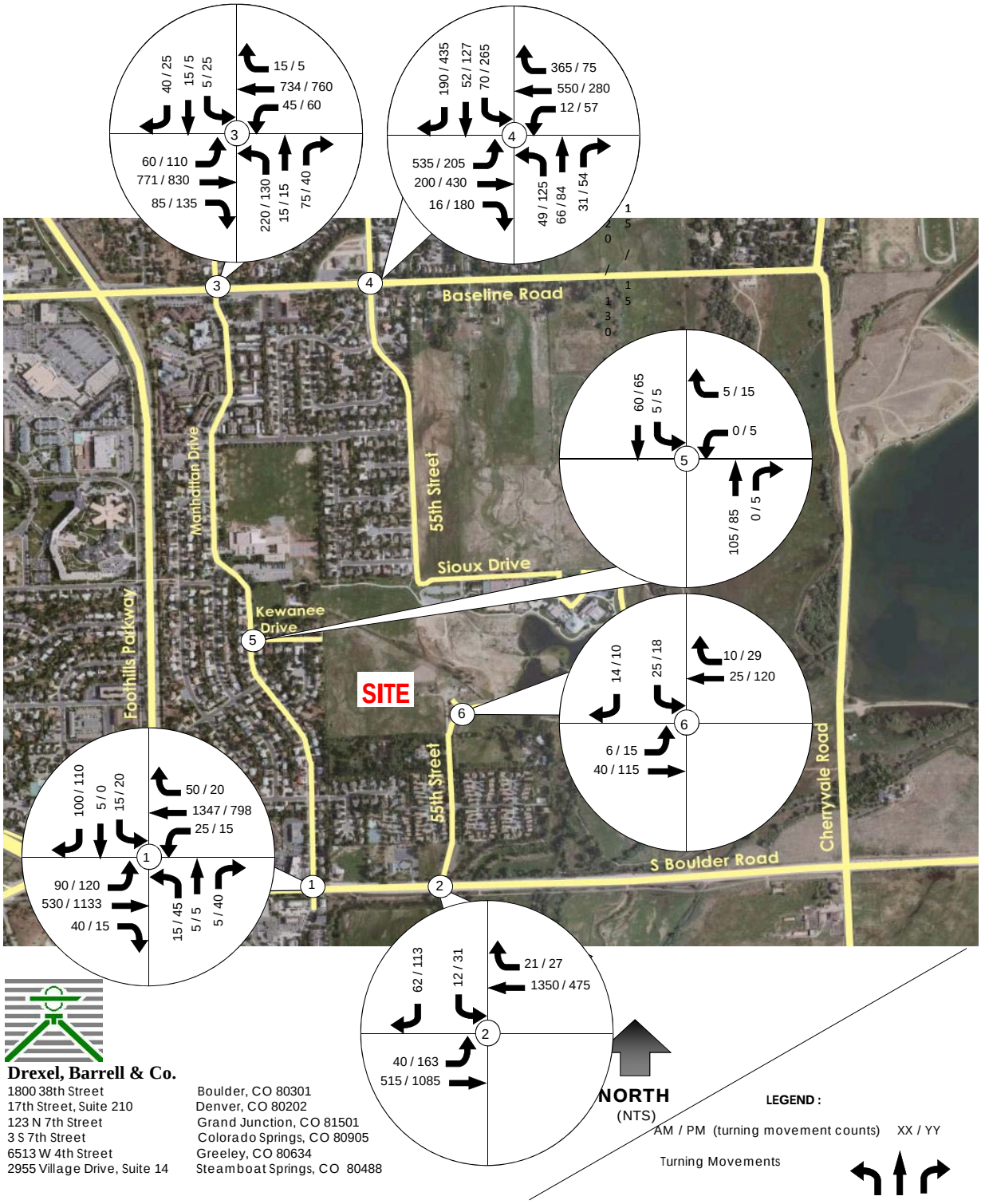

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Figure 8A: Year 2025 Total Traffic with Kewanee Access

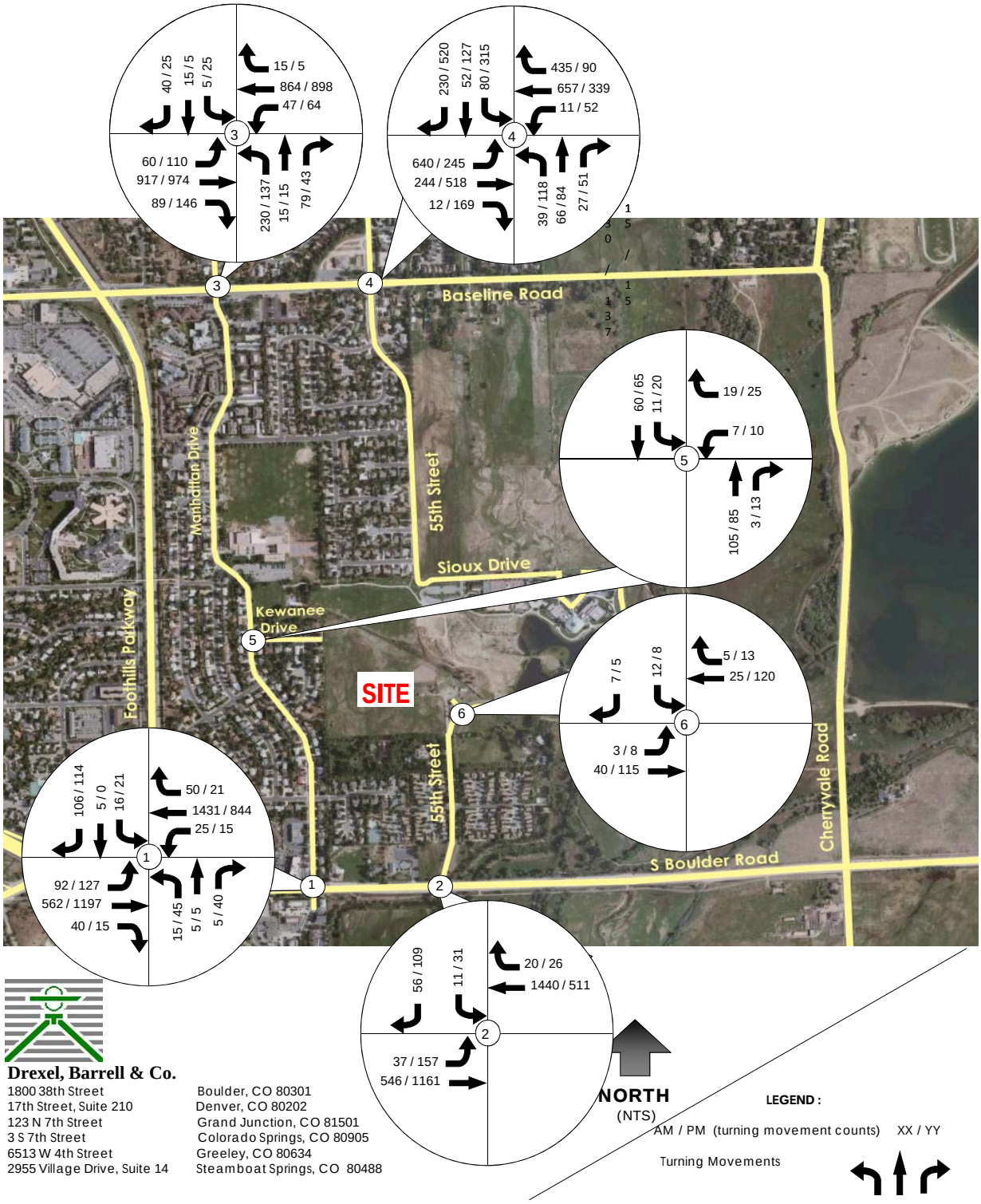

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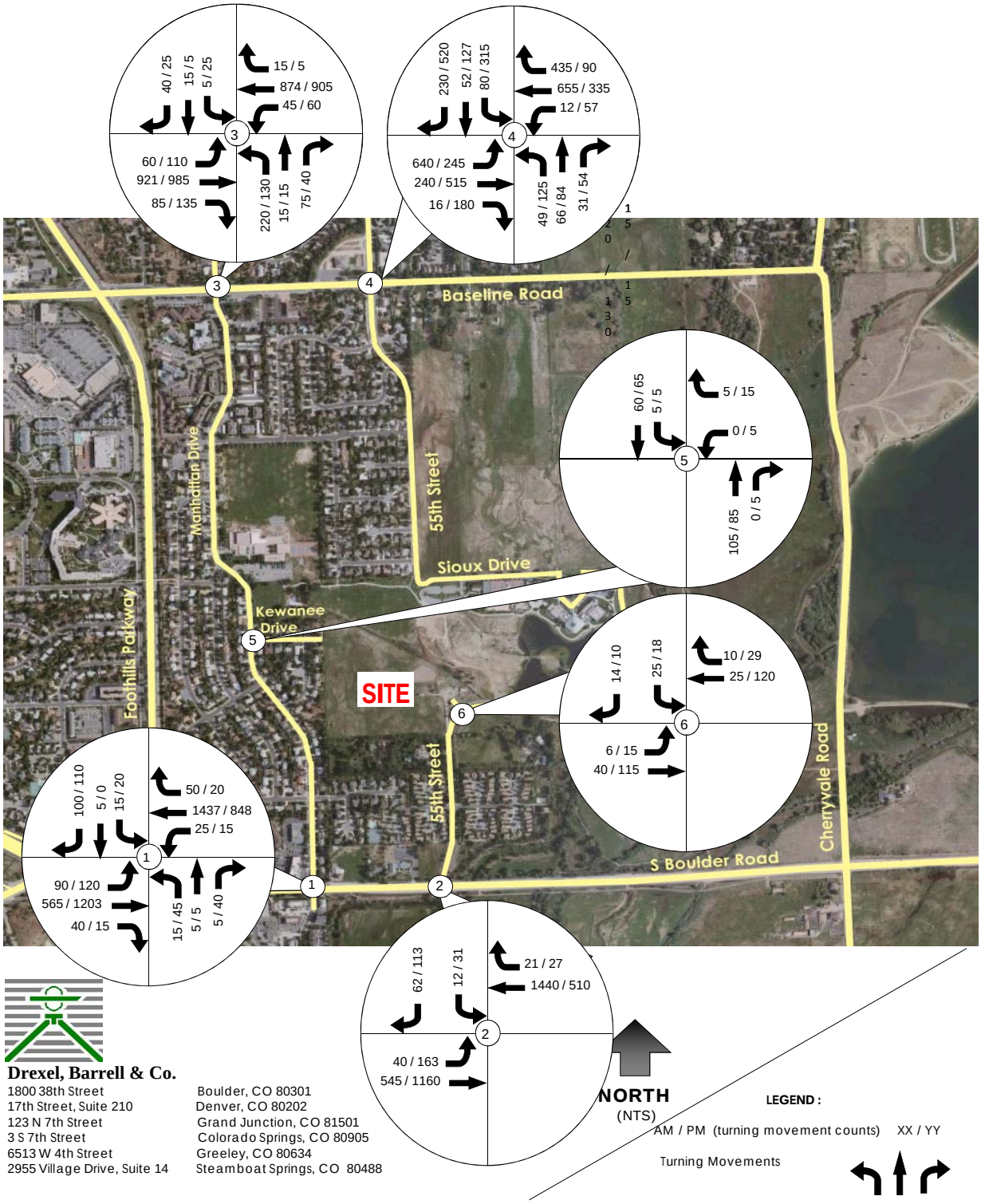
Figure 8B: Year 2025 Total Traffic without Kewanee Access



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6.0 Transportation Impact Analysis

6.1 Project Level of Service Impacts to Surrounding Roadway Network

The potential impacts of the proposed Hogan-Pancost Property development were determined by performing peak-hour analyses utilizing Synchro 7.0. Levels of Service calculations were performed for Year 2012 and Year 2025 total traffic for the study intersections. The results of the analyses are summarized and below in **Table 1.**

Intersection Level of Service – Total Traffic

1. South Boulder Road / Manhattan Drive:

Delay at this north-south stop-controlled intersection would not be significantly affected by project-generated traffic if a connection to Kewanee Drive is not constructed and access is limited to the 55th Street Access.

If the access from the Hogan-Pancost Property to Kewanee Drive is constructed, an additional 7 outbound cars during the morning peak hour and approximately 5 outbound cars during the evening peak hour are expected at this intersection. The majority of these vehicles are expected to turn right (westbound) at this intersection. If the southbound movement is modeled with the existing single lane of traffic, the average delay would increase. Modeling this approach with a dedicated right turn lane makes the increase in delay due to project-generated traffic less significant.

If a traffic signal is installed at this location, it is possible that up to 5 additional project-generated vehicles in the peak hour could turn left onto South Boulder Road, diverted from the intersection of 55th/South Boulder Road. If this intersection is signalized, it is projected to operate acceptably.

2. South Boulder Road / 55th Street:

The southbound movement at this stop-controlled intersection is projected to operate at a Level of Service E when project-generated traffic is added to Year 2012 background traffic. If a separate left turn lane is added in the southbound direction, the delay for the right-turning traffic would be decreased. In Year 2025, the southbound approach is projected to operate at LOS E during the AM Peak Hour and LOS D during the PM Peak Hour. If a separate southbound left-turn lane is striped, the left-turn would still be projected to operate at a LOS F, however queuing would not be expected to regularly exceed 50 feet (two cars) through Year 2025.

It is unlikely that the addition of project-generated traffic would trigger any additional traffic signal warrants beyond the peak hour warrant already triggered.

3. Baseline Road / Manhattan Drive:

Delay at this signalized intersection would not be affected by project-generated traffic if the Hogan-Pancost Property is limited to the 55th Street Access.

Assuming the addition of the Kewanee access, Manhattan Drive is projected to see a maximum of 14 peak hour trips in the vicinity of Baseline Road. Conditions at this intersection are anticipated to remain satisfactory with the addition of project-generated traffic through Year 2025.

4. Baseline Road / 55th Street:

This signalized intersection is anticipated to operate satisfactorily overall through the long-term planning horizon with the addition of project-generated traffic.

The southbound left movement is currently experiencing high delay during the evening peak hour, which is expected to increase in the future under background conditions. The Hogan-Pancost Property is not anticipated to add volume to this movement.

The eastbound left movement is projected to experience delay during the morning peak hour under Year 2025 background conditions. The Hogan-Pancost Property is not expected to traffic to this movement.

5. Kewanee Drive / Manhattan Drive:

This westbound stop-controlled intersection is anticipated to operate satisfactorily with the addition of project-generated traffic, given that full access is given to the Hogan-Pancost Property, through the long-term planning horizon.

6. 55th Street / Access:

This proposed southeast bound stop-controlled intersection is projected to operate satisfactorily with the addition of projected generated traffic through the long-term planning horizon.

6.2 Project Volume Impacts to Surrounding Roadway Network

The following exhibit, **Table 3**, shows the approximate contribution that the Hogan-Pancost Property could make to key locations to the existing traffic volumes. For those locations where less than 24 hours of data was collected, daily traffic was assumed to be 10x that of the evening peak hour.

Table 3 - Estimated Contribution to Existing Traffic at Key Locations

	Morning Peak Hour Traffic	Evening Peak Hour Traffic	Weekday Daily Traffic	Percent of Traffic
Manhattan North of Kewanee				
Year 2008 Existing Traffic	167	159	1590	
Project Traffic w/ Kewanee Access	20	25	110	6.5%
Project Traffic w/o Kewanee Access	0	0	0	0.0%
Manhattan South of Kewanee				
Year 2008 Existing Traffic	57	66	660	
Project Traffic w/ Kewanee Access	10	13	183	21.7%
Project Traffic w/o Kewanee Access	0	0	0	0.0%
Kewanee West of Site Access				
Year 2008 Existing Traffic	8	15	150	
Project Traffic w/ Kewanee Access	30	38	292	66.1%
Project Traffic w/o Kewanee Access	0	0	0	0.0%
55th North of Site Access				
Year 2008 Existing Traffic	56	135	1016	
Project Traffic w/ Kewanee Access	17	21	27	2.6%
Project Traffic w/o Kewanee Access	35	47	137	11.9%
55th South of Site Access				
Year 2008 Existing Traffic	56	135	1016	
Project Traffic w/ Kewanee Access	10	13	594	36.9%
Project Traffic w/o Kewanee Access	20	25	777	43.3%
Baseline Road East of Manhattan				
Year 2008 Existing Traffic	1564	1548	15480	
Project Traffic w/ Kewanee Access	1	2	18	0.1%
Project Traffic w/o Kewanee Access	7	8	91	0.6%
Baseline Road West of Manhattan				
Year 2008 Existing Traffic	1794	1816	18160	
Project Traffic w/ Kewanee Access	7	8	91	0.5%
Project Traffic w/o Kewanee Access	7	8	91	0.5%
Baseline Road East of 55th Street				
Year 2008 Existing Traffic	1141	1076	10760	
Project Traffic w/ Kewanee Access	1	1	9	0.1%
Project Traffic w/o Kewanee Access	1	1	9	0.1%
S Boulder Road West of Manhattan				
Year 2008 Existing Traffic	2052	2063	20630	
Project Traffic w/ Kewanee Access	46	59	640	3.0%
Project Traffic w/o Kewanee Access	46	59	640	3.0%
S Boulder Road East of Manhattan				
Year 2008 Existing Traffic	1912	1864	18640	
Project Traffic w/ Kewanee Access	33	42	457	2.4%
Project Traffic w/o Kewanee Access	46	59	640	3.3%
S Boulder Road East of 55th				
Year 2008 Existing Traffic	1843	1571	15710	
Project Traffic w/ Kewanee Access	10	13	137	0.9%
Project Traffic w/o Kewanee Access	10	13	137	0.9%

Accident Analysis

Accident reports were obtained by the City of Boulder Police Department for the intersections of S. Boulder Road/Manhattan Drive, S. Boulder Road / 55th, Baseline / Manhattan, and Baseline/55th. The data includes accidents from Year 2005 through the available data for Year 2010. Below is a summary by intersection.

South Boulder Road / Manhattan

A total of 17 accidents were reported at this intersection between 2005 and April 2010. One fatality was reported in October, 2007 due to a pedestrian "improperly entering the intersection". Two injury accidents were reported in 2005 – both cited to driver error or careless driving. The details follow:

- **2005:** Four accidents occurred in 2005 and they were all rear-end type accidents. Three of the four occurred on Manhattan.
- **2006:** Three accidents occurred in 2006 and were comprised of one rear-end and two right-angle where the turning vehicle failed to yield the right-of-way. The rear end accident occurred on Manhattan and the right-angle accidents occurred on Boulder Road.
- **2007:** Four accidents occurred in 2007. Two of the four accidents were vehicles hitting the median on Boulder Road. One swerved to avoid an animal and the other was cited as reckless driving. A third accident as a rear-end type accident on Manhattan where a vehicle backed into another. The fourth was a fatality accident where an eastbound vehicle hit a northbound pedestrian that entered the intersection improperly.
- **2008:** Four accidents occurred in 2008. One was a side-swipe on Boulder Road due to icy road conditions. One was a southbound vehicle turning right that collided with a parked vehicle in the westbound direction. The site line was blocked by a fire truck. The third was a rear-end on Manhattan and the fourth was on Boulder Road where two vehicles collided due to an improper lane change.
- **2009:** One accident occurred in 2009. This accident was caused by driver error (driver's dog jumped on him) and the vehicle hit a power pole on Boulder Road.
- **2010:** One accident has occurred this year in which a single vehicle collided with several objects on Boulder Road. Reckless driving was cited.

There does not appear to be a particular trend of accidents that could be corrected by intersection improvements or changes. Most of the accidents over the 5 year –plus period were due to driver error and reckless driving. No roadway or intersection improvements are recommended.

South Boulder Road / 55th

Only one accident was reported at this intersection for the study years. The accident occurred in 2006 and involved one vehicle that collided with the median on Boulder Road. Careless driving was cited. No roadway and /or intersection improvements are warranted.

Baseline / 55th

A total of 31 accidents occurred at this intersection between 2005 and 2009. No fatalities were reported but four injury accidents occurred.

- **2005:** Five accidents occurred in 2005. Four were rear end accidents of which three occurred on 55th Street in the southbound direction. The fifth accident was a right-angle accident on Baseline where the turning vehicle failed to yield the right-of-way.
- **2006:** Six accidents occurred in 2006. Two involved single vehicles – one hit the median on Baseline and one hit a deer. Three were rear end accidents – two on Baseline and one on 55th. The sixth accident was a right-angle on Baseline where the turning vehicle didn't yield the right-of-way
- **2007:** Eight accidents occurred in 2007. Four of the eight accidents were rear end of which three occurred on 55th. A fifth was a sideswipe on Baseline. The other three were right-angle accidents on Baseline where the reason cited was failure to yield right-of-way.
- **2008:** Eight accidents occurred in 2008. Of the eight accidents, five involved vehicles hitting bicyclists. All five occurred during daylight hours - four during the summer months, the other in November. The accidents involved vehicles turning left or right and failing to yield to a bicyclist. Three resulted in injuries. Two of the eight accidents were rear end accidents that occurred on 55th Street. The eighth accident occurred on Baseline and was due to an improper lane change.
- **2009:** Four accidents occurred in 2009. Two involved single vehicles that hit objects due to careless driving. A third was a vehicle that hit a bicyclist, resulting in injury. The vehicle was turning left off of Baseline and hit the bicyclist. The fourth accident was a rear end accident on 55th.

One pattern that is shown at this intersection is the accidents between vehicles and bicyclists. Six accidents involving bicyclists is definitely a pattern and this intersection should be annually reviewed by the City of Boulder to see if there is a safe means to get the bicyclists through the intersection.

Baseline / Manhattan

A total of 14 accidents occurred at this intersection between 2005 and 2009. No fatalities were reported but three injury accidents occurred.

- **2005:** Six accidents occurred in 2005. Four were rear end accidents of which three occurred on Manhattan in the northbound direction. The fifth accident was a right-angle accident where a vehicle turning onto Manhattan failed to yield right-of-way to a vehicle on Manhattan. The sixth accident involved a vehicle that hit a pedestrian. The vehicle was northbound on Manhattan turning left onto Baseline and failed to yield to the pedestrian crossing north on Baseline.
- **2006:** One accident occurred in 2006. The accident was a rear end accident where an eastbound vehicle slowed to turn right onto Manhattan and was rear ended.
- **2007:** Two accidents occurred in 2007 and they technically occurred south of the intersection. One vehicle hit a parked car on Manhattan and the other hit a southbound car as it pulled out of its parking place.
- **2008:** One accident occurred in 2008. It also occurred south of the intersection and involved a vehicle pulling out of a driveway hitting a northbound vehicle.
- **2009:** Four accidents occurred in 2009. One involved an eastbound vehicle hitting a pedestrian crossing Baseline. One involved an eastbound vehicle turning right onto Baseline and hitting a bicyclist. The third was a result of an illegal westbound u-turn hitting an eastbound vehicle. The fourth was a rear end accident on Manhattan where the vehicle failed to stop.

There is no apparent pattern of accidents that appears correctable by intersection modifications.

The projected increase in traffic to the study intersections from the proposed project does not indicate that accidents would increase or that there would be improvements warranted due to accidents.

7.0 Recommendations

7.1 Roadway Improvements

South Boulder Road / Manhattan Drive

It is recommended that this intersection be re-striped to accommodate an exclusive southbound left-turn lane and a shared through/right-turn lane. Analysis indicates that a 75-foot left turn bay and associated taper should be adequate to accommodate Year 2025 volumes.

Using traffic data for Manhattan Drive north of South Boulder Road taken 9/16/2008 and through traffic from the Boulder Valley Count Station Data collected east of 76th Street, this intersection appears to currently meet both the Four-Hour Vehicular Volume and Peak Hour Vehicular Volume Warrants for the installation of a traffic signal. Volumes are high enough to justify the Eight-hour Vehicular Volume for six of the required eight hours. The remaining warrants are not expected to be met at this time.

As a signalized intersection, this intersection would be expected to operate with significantly less delay than as a stop-controlled intersection.

The intersection of Manhattan Drive and South Boulder Road should be considered for signalization, regardless of whether the Hogan-Pancost Property is constructed.

South Boulder Road / 55th Street

It is recommended that the southbound approach be modified to accommodate a separate 50 foot left turn lane and associated taper. With these modifications, this stop-controlled approach as a whole should remain acceptable through Year 2025. It appears that delay can be mitigated through Year 2025 with the addition of a left turn bay. This intersection should be monitored for potential signalization.

8.0 Conclusions

If the recommendations of this report are followed, the transportation network in the vicinity of the Hogan-Pancost Property development can accommodate the addition of project generated traffic.

Appendix:
Traffic Counts

Turning Movement Counts

1. Manhattan Drive and S Boulder Road (9/16/2008)
2. 55th Street and S Boulder Road (9/16/2008 AM, 4/28/2008 PM)
3. Manhattan Drive and Baseline Road (9/16/2008)
4. 55th Street and Baseline Road (9/16/2008 AM, 4/28/2008 PM)
5. Manhattan Drive and Kewanee Drive (9/16/2008)

Volume Counts

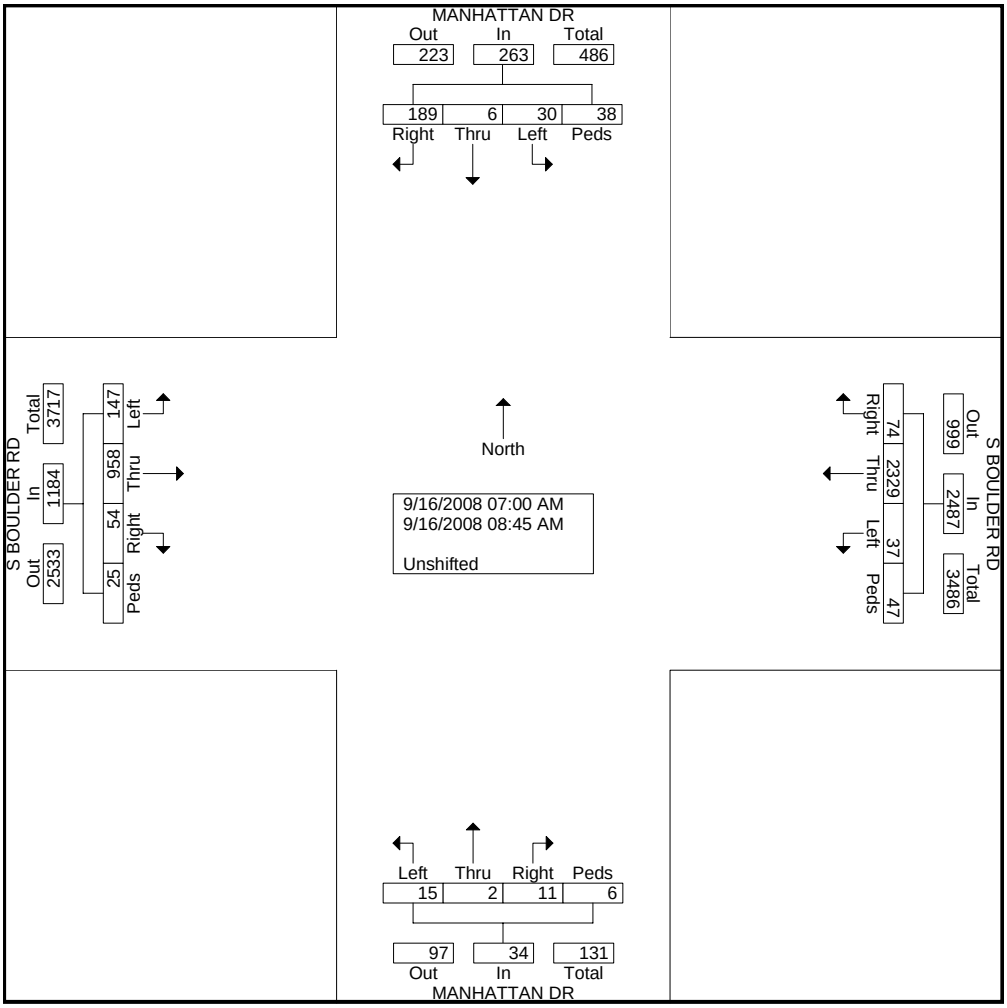
24 Hour Volume/Speed Counts
Manhattan Drive n/o S Boulder Road (9/16/2008)
55th Street n/o S Boulder Road (9/16/2008)

Volume Only Counts
55th Street n/o Ontario Place (4/15/2008-4/22/2008)
55th Street n/o Pueblo Place (4/15/2008-4/22/2008)

File Name : #5 MANHATTAN&BOULDERAM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 1

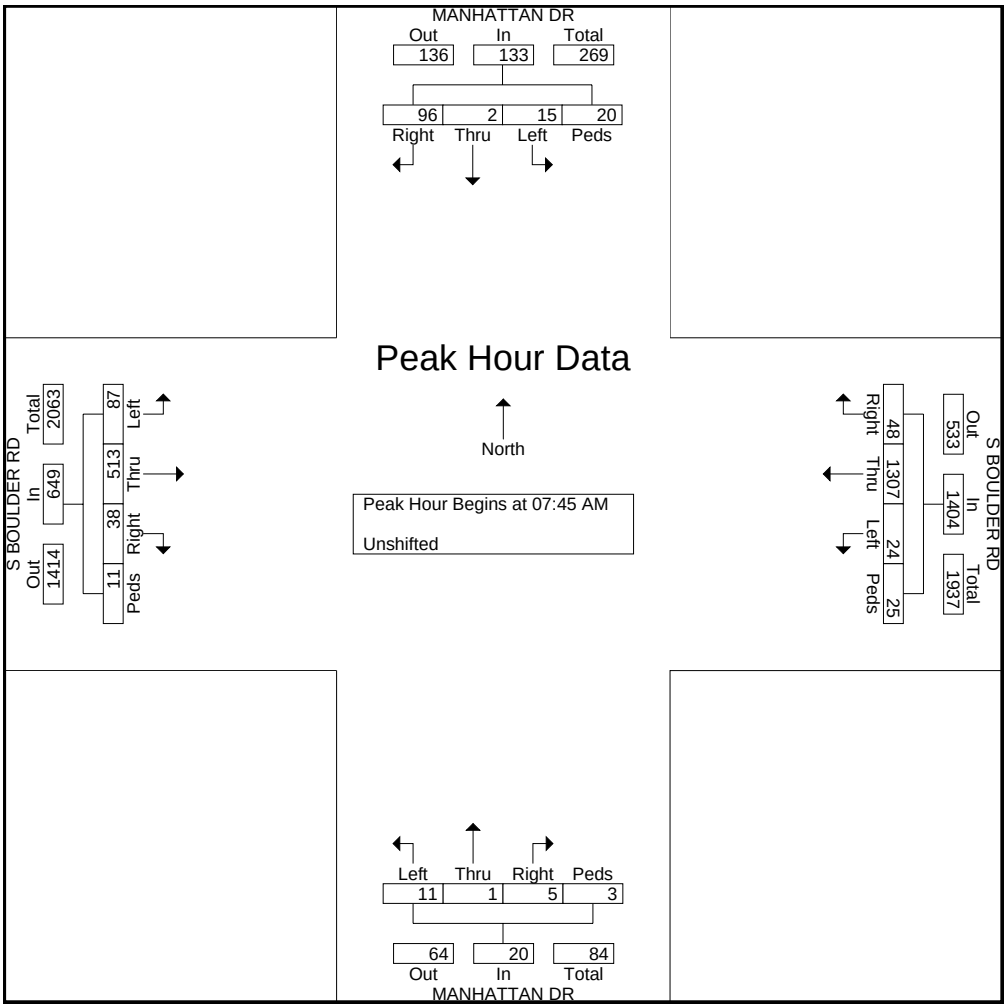
Groups Printed- Unshifted

	MANHATTAN DR Southbound				S BOULDER RD Westbound				MANHATTAN DR Northbound				S BOULDER RD Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	6	0	19	0	2	228	3	10	0	0	3	0	7	97	2	5	382
07:15 AM	2	1	17	9	2	267	10	2	1	0	0	1	17	103	3	4	439
07:30 AM	3	1	32	4	2	315	8	6	2	1	0	1	17	118	4	3	517
07:45 AM	4	1	26	7	7	351	3	11	1	0	0	2	25	145	6	4	593
Total	15	3	94	20	13	1161	24	29	4	1	3	4	66	463	15	16	1931
08:00 AM	2	0	21	6	7	312	12	2	0	1	3	1	23	109	17	4	520
08:15 AM	2	0	31	4	7	323	15	8	5	0	0	0	13	143	9	0	560
08:30 AM	7	1	18	3	3	321	18	4	5	0	2	0	26	116	6	3	533
08:45 AM	4	2	25	5	7	212	5	4	1	0	3	1	19	127	7	2	424
Total	15	3	95	18	24	1168	50	18	11	1	8	2	81	495	39	9	2037
Grand Total	30	6	189	38	37	2329	74	47	15	2	11	6	147	958	54	25	3968
Apprch %	11.4	2.3	71.9	14.4	1.5	93.6	3	1.9	44.1	5.9	32.4	17.6	12.4	80.9	4.6	2.1	
Total %	0.8	0.2	4.8	1	0.9	58.7	1.9	1.2	0.4	0.1	0.3	0.2	3.7	24.1	1.4	0.6	



File Name : #5 MANHATTAN&BOULDERAM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 2

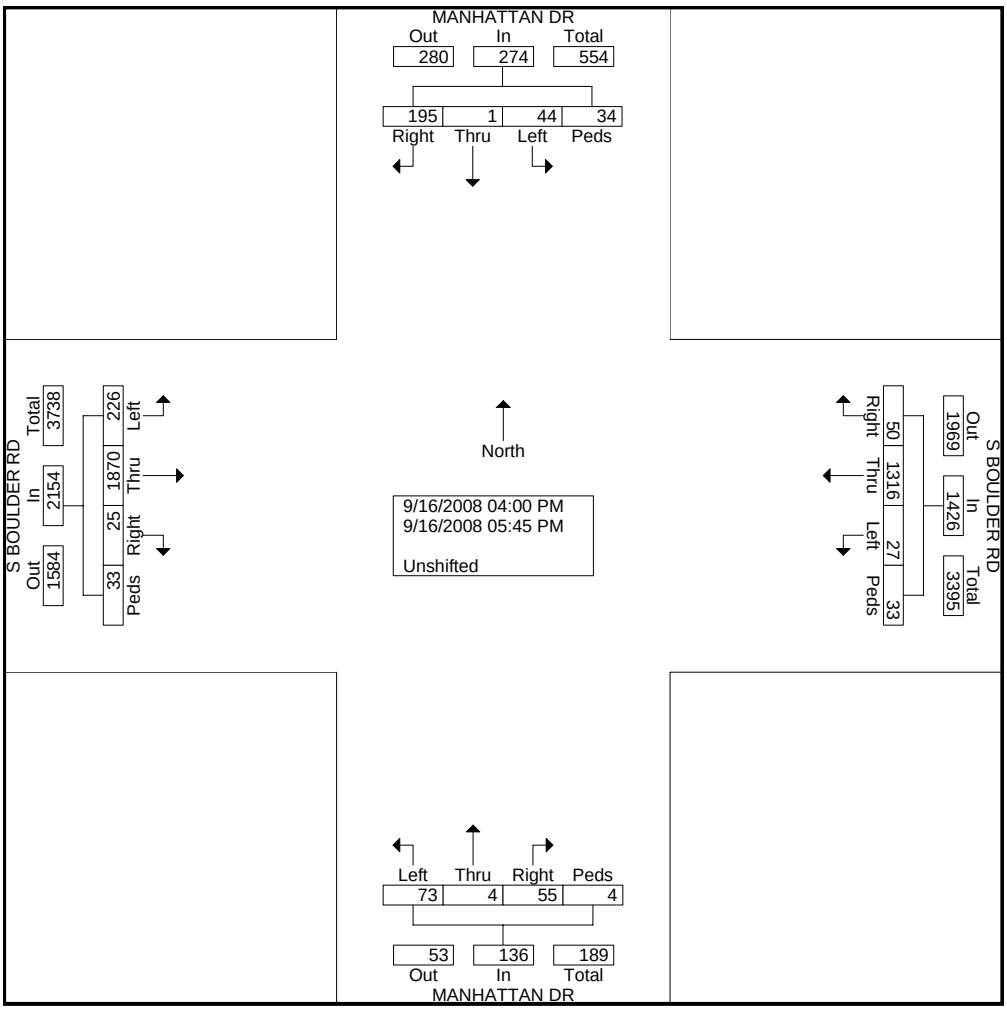
	MANHATTAN DR Southbound					S BOULDER RD Westbound					MANHATTAN DR Northbound					S BOULDER RD Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	4	1	26	7	38	7	351	3	11	372	1	0	0	2	3	25	145	6	4	180	593
08:00 AM	2	0	21	6	29	7	312	12	2	333	0	1	3	1	5	23	109	17	4	153	520
08:15 AM	2	0	31	4	37	7	323	15	8	353	5	0	0	0	5	13	143	9	0	165	560
08:30 AM	7	1	18	3	29	3	321	18	4	346	5	0	2	0	7	26	116	6	3	151	533
Total Volume	15	2	96	20	133	24	1307	48	25	1404	11	1	5	3	20	87	513	38	11	649	2206
% App. Total	11.3	1.5	72.2	15		1.7	93.1	3.4	1.8		55	5	25	15		13.4	79	5.9	1.7		
PHF	.536	.500	.774	.714	.875	.857	.931	.667	.568	.944	.550	.250	.417	.375	.714	.837	.884	.559	.688	.901	.930



File Name : #5 MANHATTAN&BOULDERPM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 1

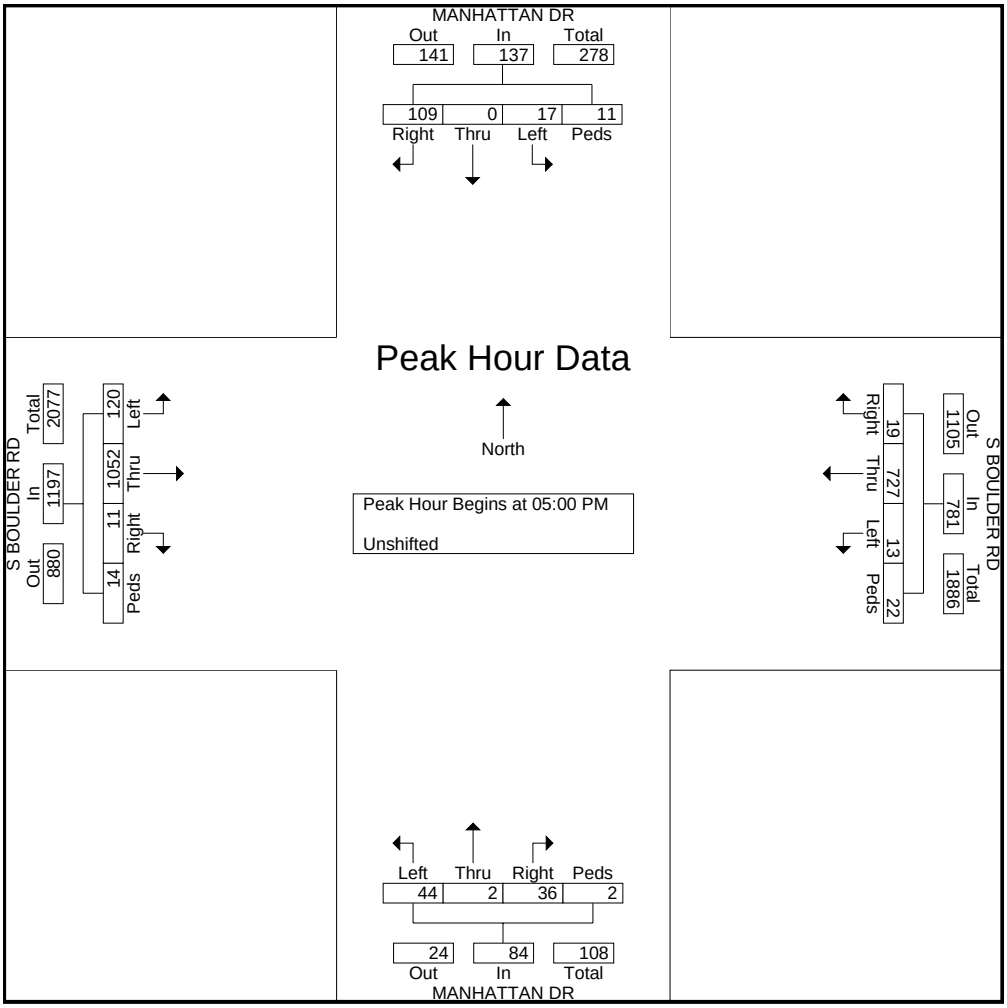
Groups Printed- Unshifted

	MANHATTAN DR Southbound				S BOULDER RD Westbound				MANHATTAN DR Northbound				S BOULDER RD Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
04:00 PM	12	0	22	6	5	132	8	3	6	2	8	0	35	193	3	6	441
04:15 PM	7	0	13	4	3	149	5	3	7	0	2	1	20	207	3	5	429
04:30 PM	4	0	29	8	4	151	10	3	6	0	5	0	26	209	1	2	458
04:45 PM	4	1	22	5	2	157	8	2	10	0	4	1	25	209	7	6	463
Total	27	1	86	23	14	589	31	11	29	2	19	2	106	818	14	19	1791
05:00 PM	7	0	24	5	3	167	5	8	11	1	11	1	27	270	4	3	547
05:15 PM	4	0	44	3	1	197	5	4	13	0	7	1	37	272	1	3	592
05:30 PM	5	0	25	1	4	211	5	6	9	0	11	0	31	254	3	3	568
05:45 PM	1	0	16	2	5	152	4	4	11	1	7	0	25	256	3	5	492
Total	17	0	109	11	13	727	19	22	44	2	36	2	120	1052	11	14	2199
Grand Total	44	1	195	34	27	1316	50	33	73	4	55	4	226	1870	25	33	3990
Apprch %	16.1	0.4	71.2	12.4	1.9	92.3	3.5	2.3	53.7	2.9	40.4	2.9	10.5	86.8	1.2	1.5	
Total %	1.1	0	4.9	0.9	0.7	33	1.3	0.8	1.8	0.1	1.4	0.1	5.7	46.9	0.6	0.8	



File Name : #5 MANHATTAN&BOULDERPM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 2

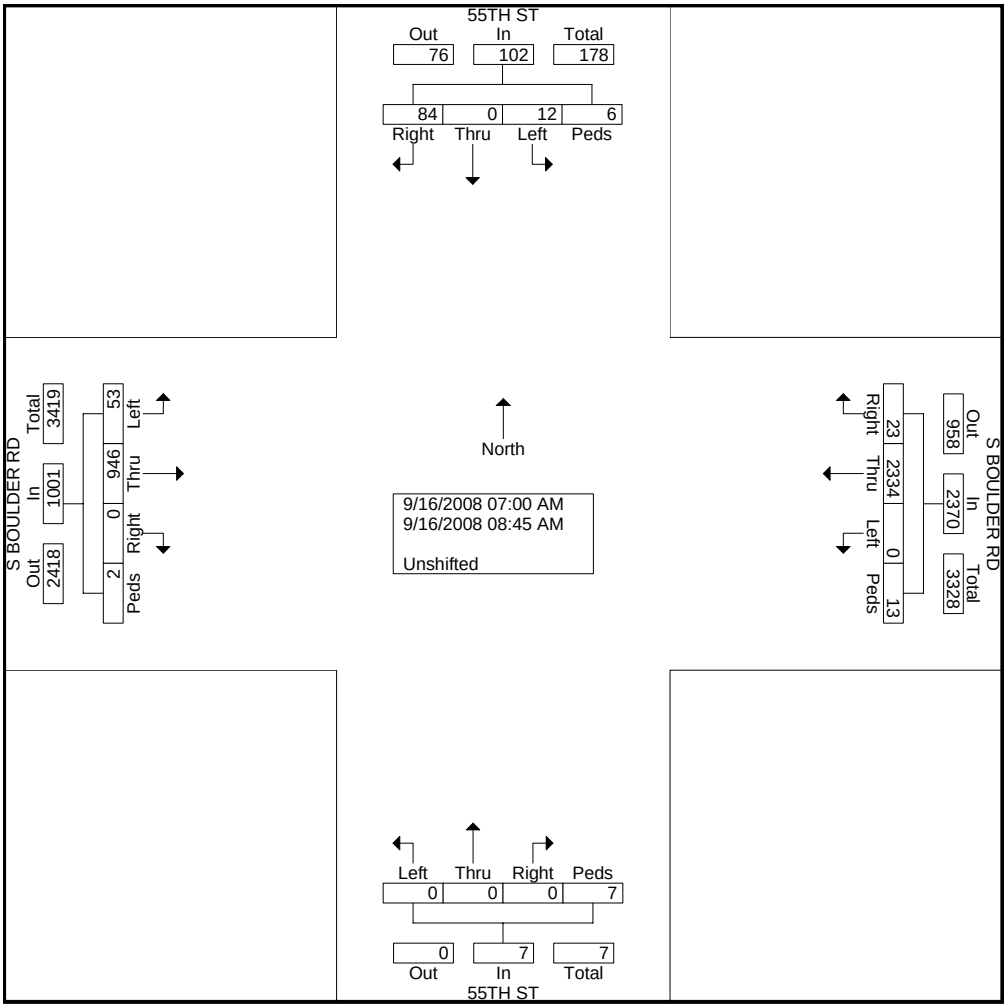
	MANHATTAN DR Southbound					S BOULDER RD Westbound					MANHATTAN DR Northbound					S BOULDER RD Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	7	0	24	5	36	3	167	5	8	183	11	1	11	1	24	27	270	4	3	304	547
05:15 PM	4	0	44	3	51	1	197	5	4	207	13	0	7	1	21	37	272	1	3	313	592
05:30 PM	5	0	25	1	31	4	211	5	6	226	9	0	11	0	20	31	254	3	3	291	568
05:45 PM	1	0	16	2	19	5	152	4	4	165	11	1	7	0	19	25	256	3	5	289	492
Total Volume	17	0	109	11	137	13	727	19	22	781	44	2	36	2	84	120	1052	11	14	1197	2199
% App. Total	12.4	0	79.6	8		1.7	93.1	2.4	2.8		52.4	2.4	42.9	2.4		10	87.9	0.9	1.2		
PHF	.607	.000	.619	.550	.672	.650	.861	.950	.688	.864	.846	.500	.818	.500	.875	.811	.967	.688	.700	.956	.929



File Name : #4 55TH&BOULDERAM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 1

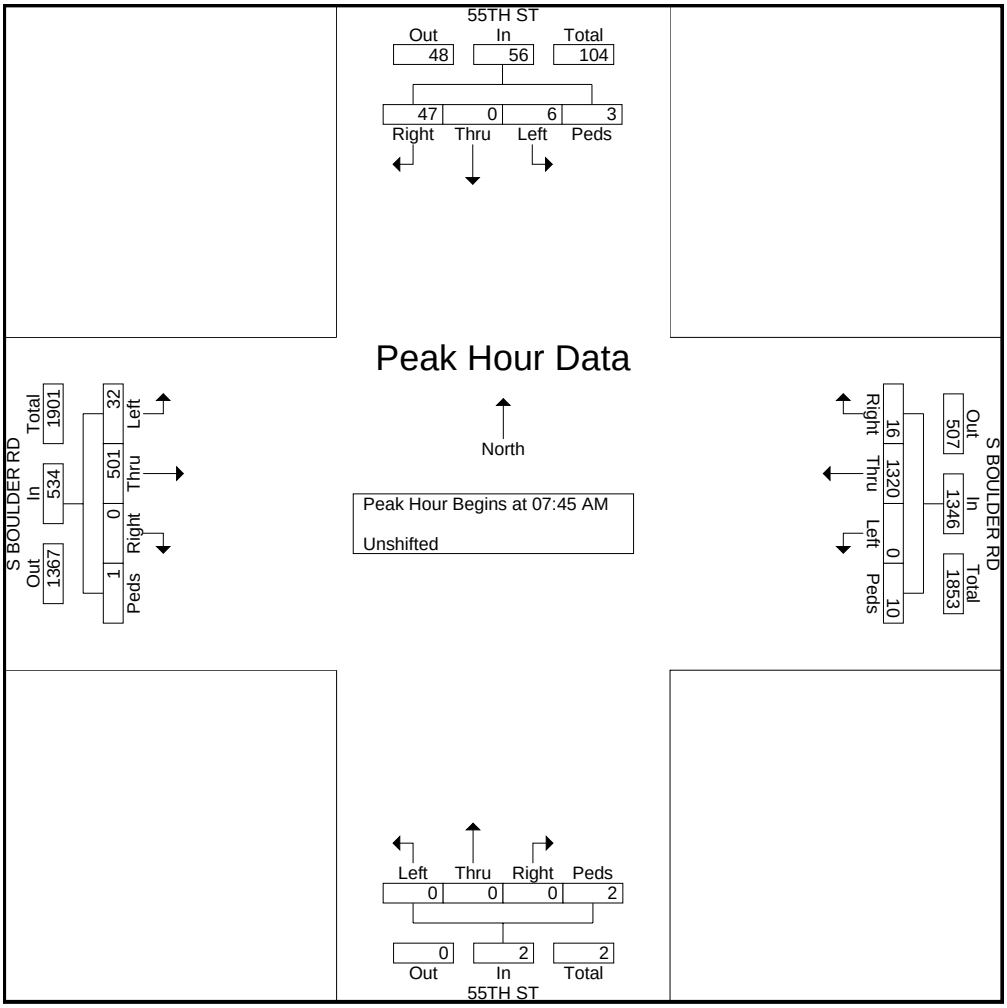
Groups Printed- Unshifted

	55TH ST Southbound				S BOULDER RD Westbound				55TH ST Northbound				S BOULDER RD Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	1	0	12	0	0	219	1	1	0	0	0	1	0	106	0	0	341
07:15 AM	0	0	12	1	0	264	1	0	0	0	0	0	2	103	0	1	384
07:30 AM	3	0	12	1	0	310	0	0	0	0	0	0	9	112	0	0	447
07:45 AM	4	0	14	1	0	344	2	6	0	0	0	0	10	139	0	0	520
Total	8	0	50	3	0	1137	4	7	0	0	0	1	21	460	0	1	1692
08:00 AM	1	0	14	0	0	314	7	3	0	0	0	0	3	111	0	0	453
08:15 AM	1	0	14	2	0	328	4	0	0	0	0	0	13	132	0	0	494
08:30 AM	0	0	5	0	0	334	3	1	0	0	0	2	6	119	0	1	471
08:45 AM	2	0	1	1	0	221	5	2	0	0	0	4	10	124	0	0	370
Total	4	0	34	3	0	1197	19	6	0	0	0	6	32	486	0	1	1788
Grand Total	12	0	84	6	0	2334	23	13	0	0	0	7	53	946	0	2	3480
Apprch %	11.8	0	82.4	5.9	0	98.5	1	0.5	0	0	0	100	5.3	94.5	0	0.2	
Total %	0.3	0	2.4	0.2	0	67.1	0.7	0.4	0	0	0	0.2	1.5	27.2	0	0.1	



File Name : #4 55TH&BOULDERAM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 2

	55TH ST Southbound					S BOULDER RD Westbound					55TH ST Northbound					S BOULDER RD Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	4	0	14	1	19	0	344	2	6	352	0	0	0	0	0	10	139	0	0	149	520
08:00 AM	1	0	14	0	15	0	314	7	3	324	0	0	0	0	0	3	111	0	0	114	453
08:15 AM	1	0	14	2	17	0	328	4	0	332	0	0	0	0	0	13	132	0	0	145	494
08:30 AM	0	0	5	0	5	0	334	3	1	338	0	0	0	2	2	6	119	0	1	126	471
Total Volume	6	0	47	3	56	0	1320	16	10	1346	0	0	0	2	2	32	501	0	1	534	1938
% App. Total	10.7	0	83.9	5.4		0	98.1	1.2	0.7		0	0	0	100		6	93.8	0	0.2		
PHF	.375	.000	.839	.375	.737	.000	.959	.571	.417	.956	.000	.000	.000	.250	.250	.615	.901	.000	.250	.896	.932



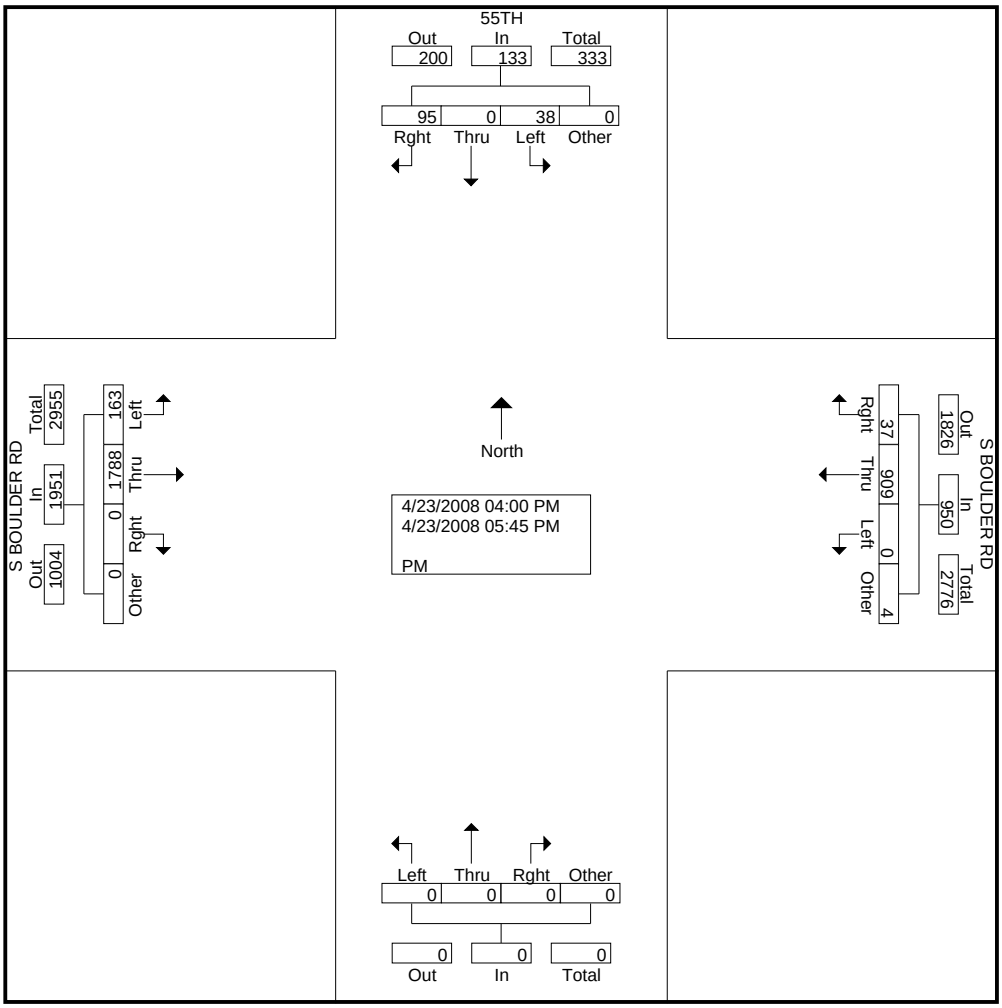
Cutting Edge Traffic Data LLC

12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

File Name : 55TH&SBOULDER_PM
Site Code : 2
Start Date : 4/23/2008
Page No : 1

Groups Printed- PM

	55TH Southbound					S BOULDER RD Westbound					Northbound					S BOULDER RD Eastbound					
Start Time	Rght	Thru	Left	Other	App. Total	Rght	Thru	Left	Other	App. Total	Rght	Thru	Left	Other	App. Total	Rght	Thru	Left	Other	App. Total	Int. Total
04:00 PM	8	0	4	0	12	4	112	0	1	117	0	0	0	0	0	0	150	20	0	170	299
04:15 PM	8	0	4	0	12	8	116	0	0	124	0	0	0	0	0	0	172	15	0	187	323
04:30 PM	10	0	0	0	10	3	104	0	1	108	0	0	0	0	0	0	190	8	0	198	316
04:45 PM	11	0	5	0	16	5	112	0	0	117	0	0	0	0	0	0	212	18	0	230	363
Total	37	0	13	0	50	20	444	0	2	466	0	0	0	0	0	0	724	61	0	785	1301
05:00 PM	16	0	3	0	19	3	140	0	1	144	0	0	0	0	0	0	230	21	0	251	414
05:15 PM	12	0	6	0	18	7	125	0	0	132	0	0	0	0	0	0	281	33	0	314	464
05:30 PM	21	0	9	0	30	4	95	0	1	100	0	0	0	0	0	0	311	28	0	339	469
05:45 PM	9	0	7	0	16	3	105	0	0	108	0	0	0	0	0	0	242	20	0	262	386
Total	58	0	25	0	83	17	465	0	2	484	0	0	0	0	0	0	1064	102	0	1166	1733
Grand Total	95	0	38	0	133	37	909	0	4	950	0	0	0	0	0	0	1788	163	0	1951	3034
Apprch %	71.4	0	28.6	0		3.9	95.7	0	0.4		0	0	0	0		0	91.6	8.4	0		
Total %	3.1	0	1.3	0	4.4	1.2	30	0	0.1	31.3	0	0	0	0	0	0	58.9	5.4	0	64.3	

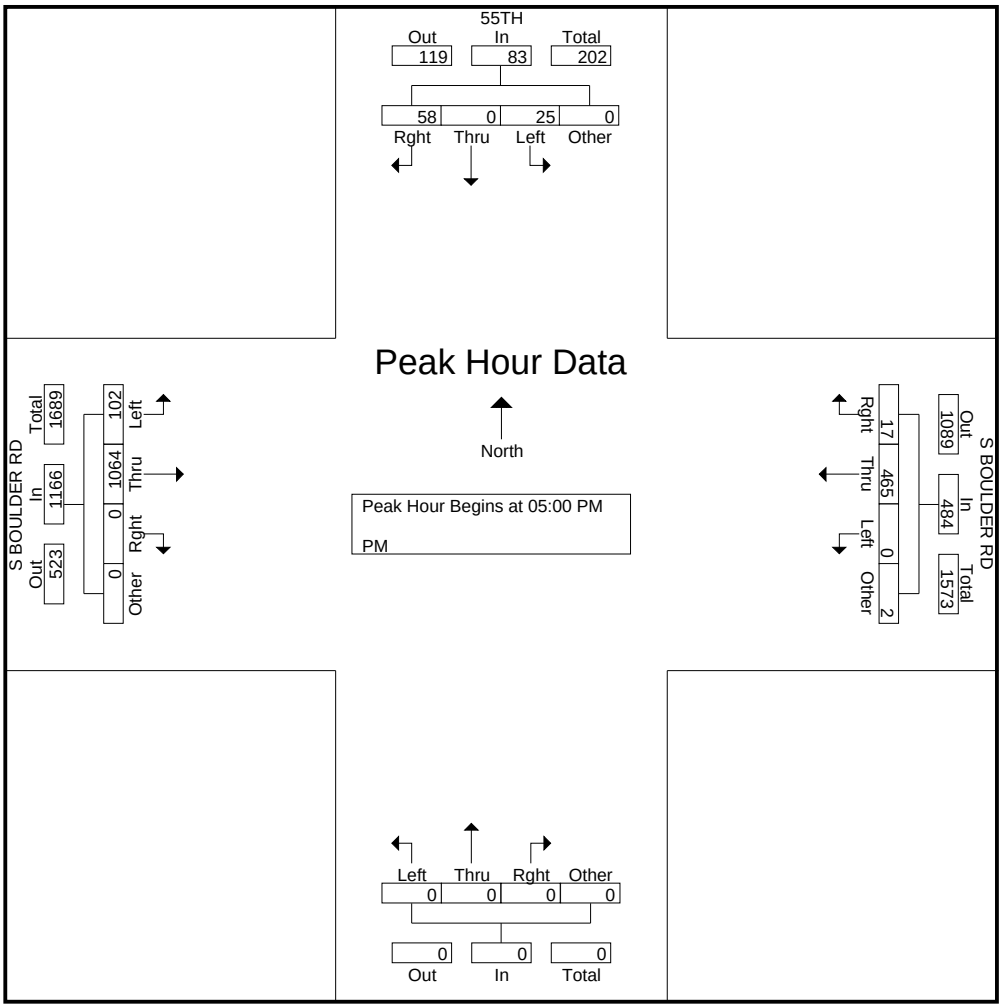


Cutting Edge Traffic Data LLC

12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

File Name : 55TH&SBOULDER_PM
Site Code : 2
Start Date : 4/23/2008
Page No : 2

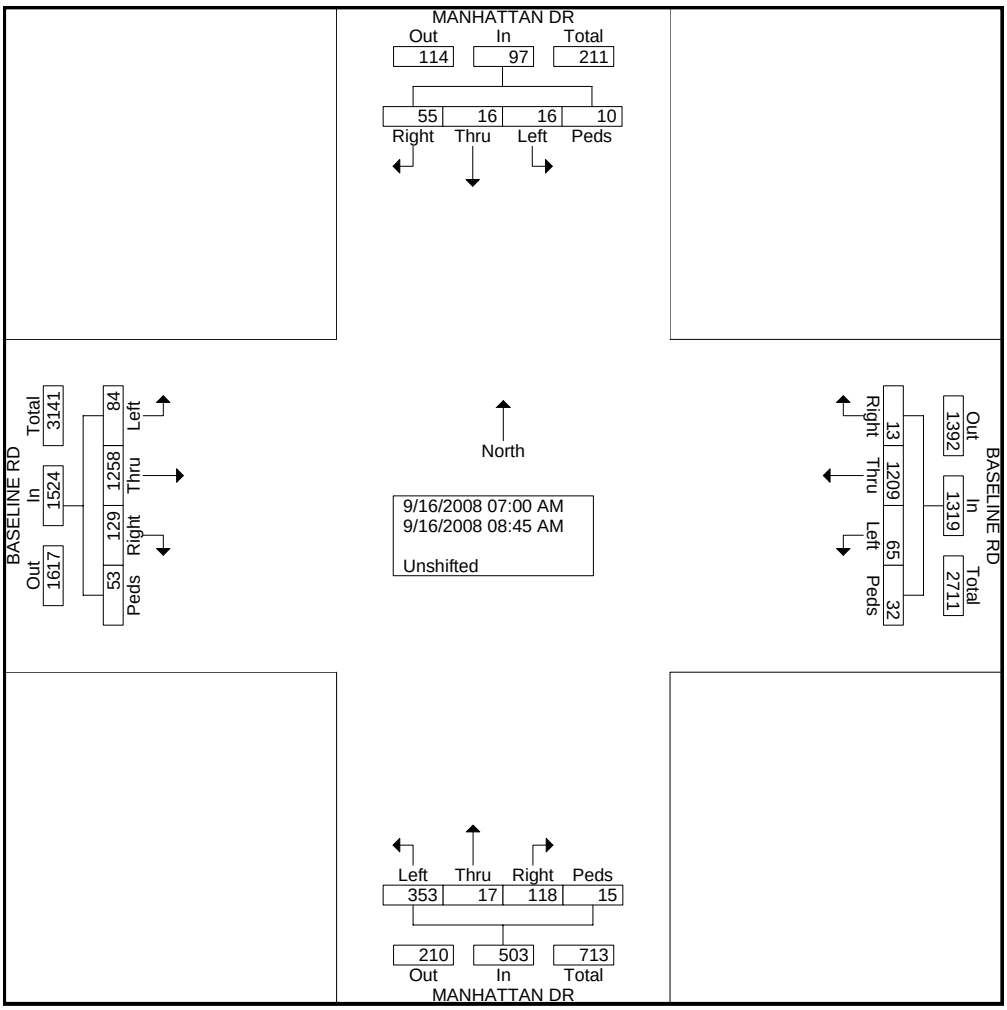
	55TH Southbound					S BOULDER RD Westbound					Northbound					S BOULDER RD Eastbound					
Start Time	Rght	Thru	Left	Other	App. Total	Rght	Thru	Left	Other	App. Total	Rght	Thru	Left	Other	App. Total	Rght	Thru	Left	Other	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	16	0	3	0	19	3	**140**	0	**1**	**144**	0	0	0	0	0	0	230	21	0	251	414
05:15 PM	12	0	6	0	18	**7**	125	0	0	132	0	0	0	0	0	0	281	**33**	0	314	464
05:30 PM	**21**	0	**9**	0	**30**	4	95	0	1	100	0	0	0	0	0	0	**311**	28	0	**339**	**469**
05:45 PM	9	0	7	0	16	3	105	0	0	108	0	0	0	0	0	0	242	20	0	262	386
Total Volume	58	0	25	0	83	17	465	0	2	484	0	0	0	0	0	0	1064	102	0	1166	1733
% App. Total	69.9	0	30.1	0		3.5	96.1	0	0.4		0	0	0	0		0	91.3	8.7	0		
PHF	.690	.000	.694	.000	.692	.607	.830	.000	.500	.840	.000	.000	.000	.000	.000	.000	.855	.773	.000	.860	.924



File Name : #1 MANHATTAN&BASELINEAM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 1

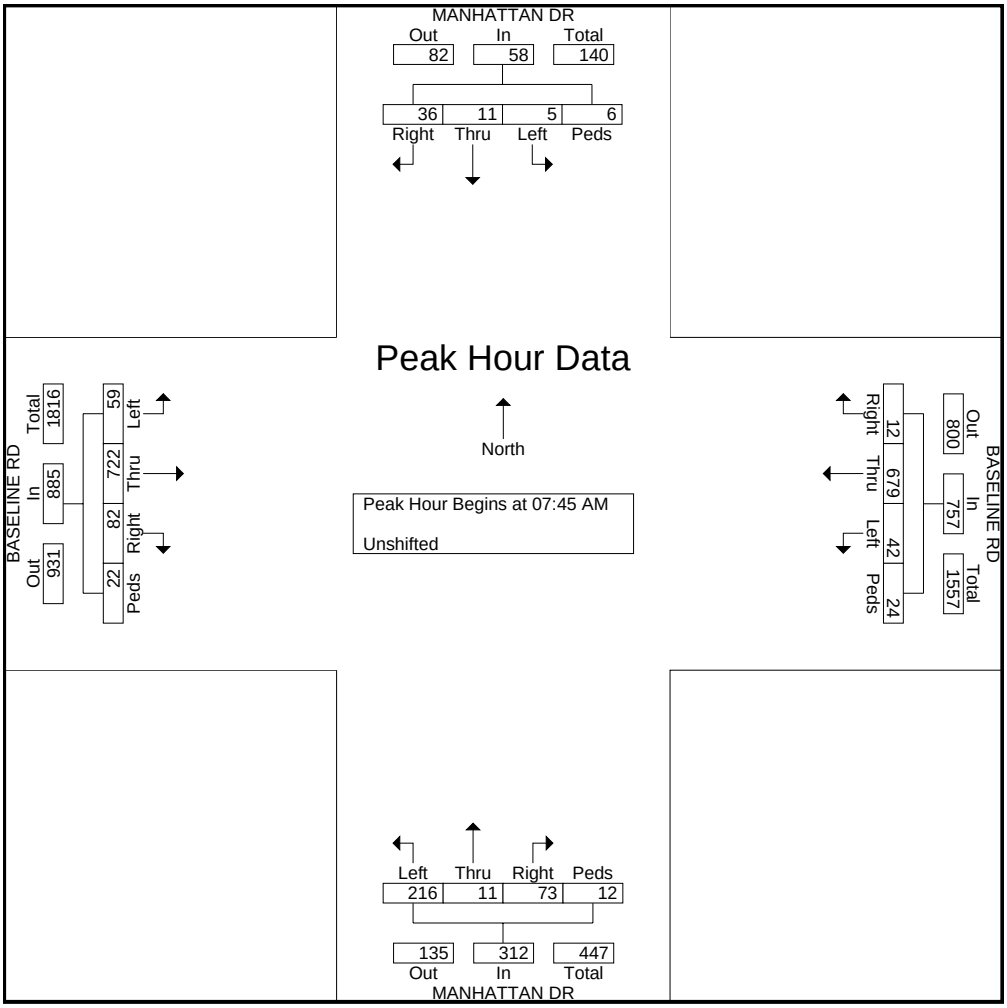
Groups Printed- Unshifted

	MANHATTAN DR Southbound				BASELINE RD Westbound				MANHATTAN DR Northbound				BASELINE RD Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	4	2	4	0	8	96	0	0	19	1	6	1	2	74	6	3	226
07:15 AM	2	1	5	0	6	125	0	1	29	1	10	0	10	111	17	1	319
07:30 AM	1	1	4	3	7	122	1	1	50	3	19	2	3	160	17	10	404
07:45 AM	2	5	9	1	7	186	6	7	49	6	14	3	12	160	10	5	482
Total	9	9	22	4	28	529	7	9	147	11	49	6	27	505	50	19	1431
08:00 AM	0	1	6	2	13	163	1	7	41	1	16	7	14	164	22	4	462
08:15 AM	1	3	14	2	12	171	2	3	54	2	9	0	11	208	23	7	522
08:30 AM	2	2	7	1	10	159	3	7	72	2	34	2	22	190	27	6	546
08:45 AM	4	1	6	1	2	187	0	6	39	1	10	0	10	191	7	17	482
Total	7	7	33	6	37	680	6	23	206	6	69	9	57	753	79	34	2012
Grand Total	16	16	55	10	65	1209	13	32	353	17	118	15	84	1258	129	53	3443
Apprch %	16.5	16.5	56.7	10.3	4.9	91.7	1	2.4	70.2	3.4	23.5	3	5.5	82.5	8.5	3.5	
Total %	0.5	0.5	1.6	0.3	1.9	35.1	0.4	0.9	10.3	0.5	3.4	0.4	2.4	36.5	3.7	1.5	



File Name : #1 MANHATTAN&BASELINEAM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 2

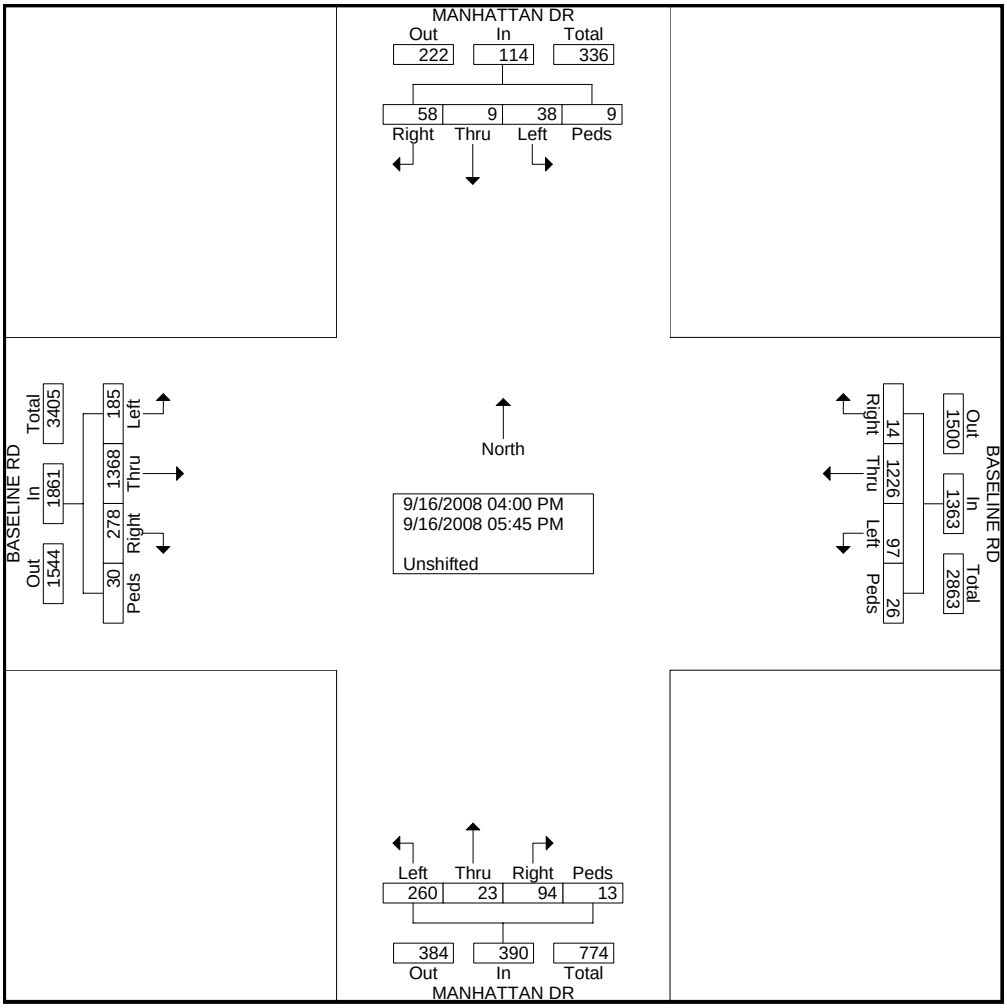
	MANHATTAN DR Southbound					BASELINE RD Westbound					MANHATTAN DR Northbound					BASELINE RD Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	2	5	9	1	17	7	186	6	7	206	49	6	14	3	72	12	160	10	5	187	482
08:00 AM	0	1	6	2	9	13	163	1	7	184	41	1	16	7	65	14	164	22	4	204	462
08:15 AM	1	3	14	2	20	12	171	2	3	188	54	2	9	0	65	11	208	23	7	249	522
08:30 AM	2	2	7	1	12	10	159	3	7	179	72	2	34	2	110	22	190	27	6	245	546
Total Volume	5	11	36	6	58	42	679	12	24	757	216	11	73	12	312	59	722	82	22	885	2012
% App. Total	8.6	19	62.1	10.3		5.5	89.7	1.6	3.2		69.2	3.5	23.4	3.8		6.7	81.6	9.3	2.5		
PHF	.625	.550	.643	.750	.725	.808	.913	.500	.857	.919	.750	.458	.537	.429	.709	.670	.868	.759	.786	.889	.921



File Name : #1 MANHATTAN&BASELINEPM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 1

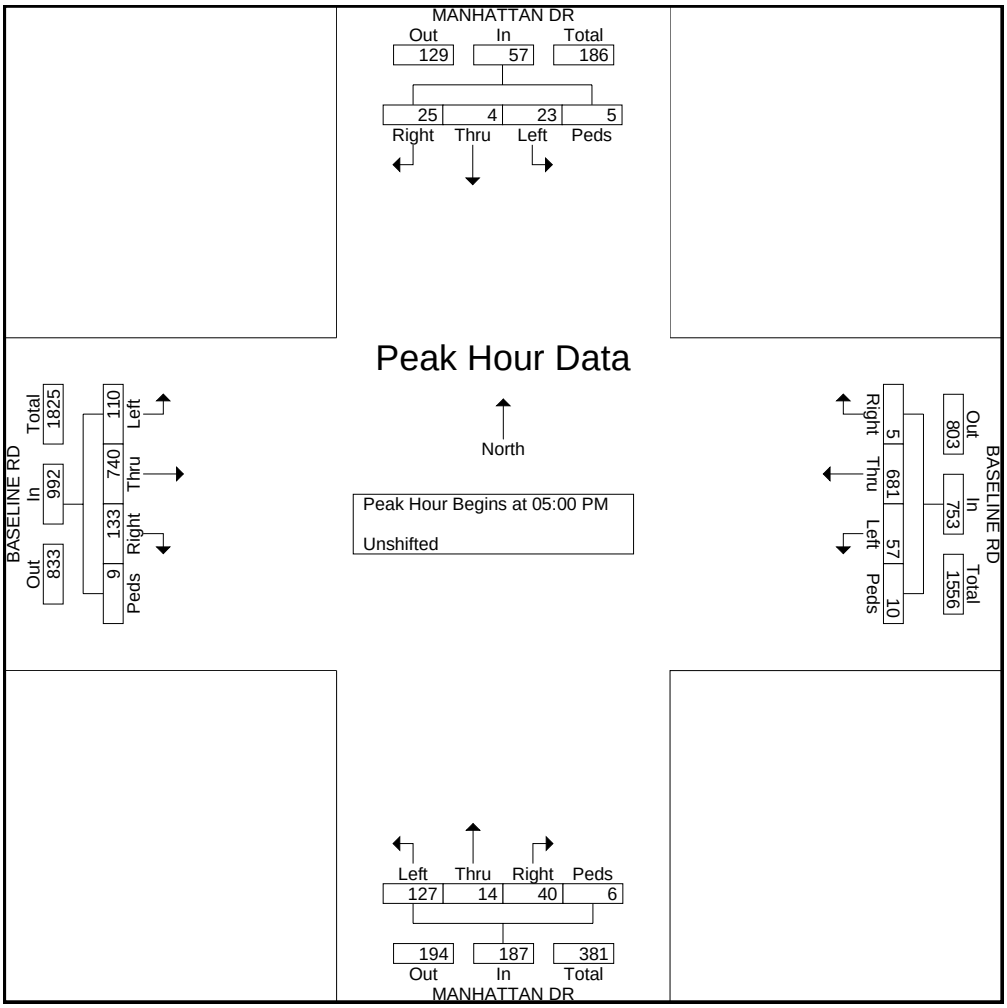
Groups Printed- Unshifted

	MANHATTAN DR Southbound				BASELINE RD Westbound				MANHATTAN DR Northbound				BASELINE RD Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
04:00 PM	0	1	3	1	8	131	1	4	52	4	18	3	18	141	41	9	435
04:15 PM	4	1	14	2	11	122	5	3	24	1	12	2	20	158	33	3	415
04:30 PM	9	2	8	1	15	127	3	5	27	2	12	0	23	161	43	5	443
04:45 PM	2	1	8	0	6	165	0	4	30	2	12	2	14	168	28	4	446
Total	15	5	33	4	40	545	9	16	133	9	54	7	75	628	145	21	1739
05:00 PM	5	2	4	2	22	160	1	3	40	1	14	2	28	176	37	3	500
05:15 PM	12	0	3	2	16	167	0	2	29	0	9	2	28	193	28	4	495
05:30 PM	3	2	12	0	8	205	2	2	25	3	10	1	23	219	30	1	546
05:45 PM	3	0	6	1	11	149	2	3	33	10	7	1	31	152	38	1	448
Total	23	4	25	5	57	681	5	10	127	14	40	6	110	740	133	9	1989
Grand Total	38	9	58	9	97	1226	14	26	260	23	94	13	185	1368	278	30	3728
Apprch %	33.3	7.9	50.9	7.9	7.1	89.9	1	1.9	66.7	5.9	24.1	3.3	9.9	73.5	14.9	1.6	
Total %	1	0.2	1.6	0.2	2.6	32.9	0.4	0.7	7	0.6	2.5	0.3	5	36.7	7.5	0.8	



File Name : #1 MANHATTAN&BASELINEPM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 2

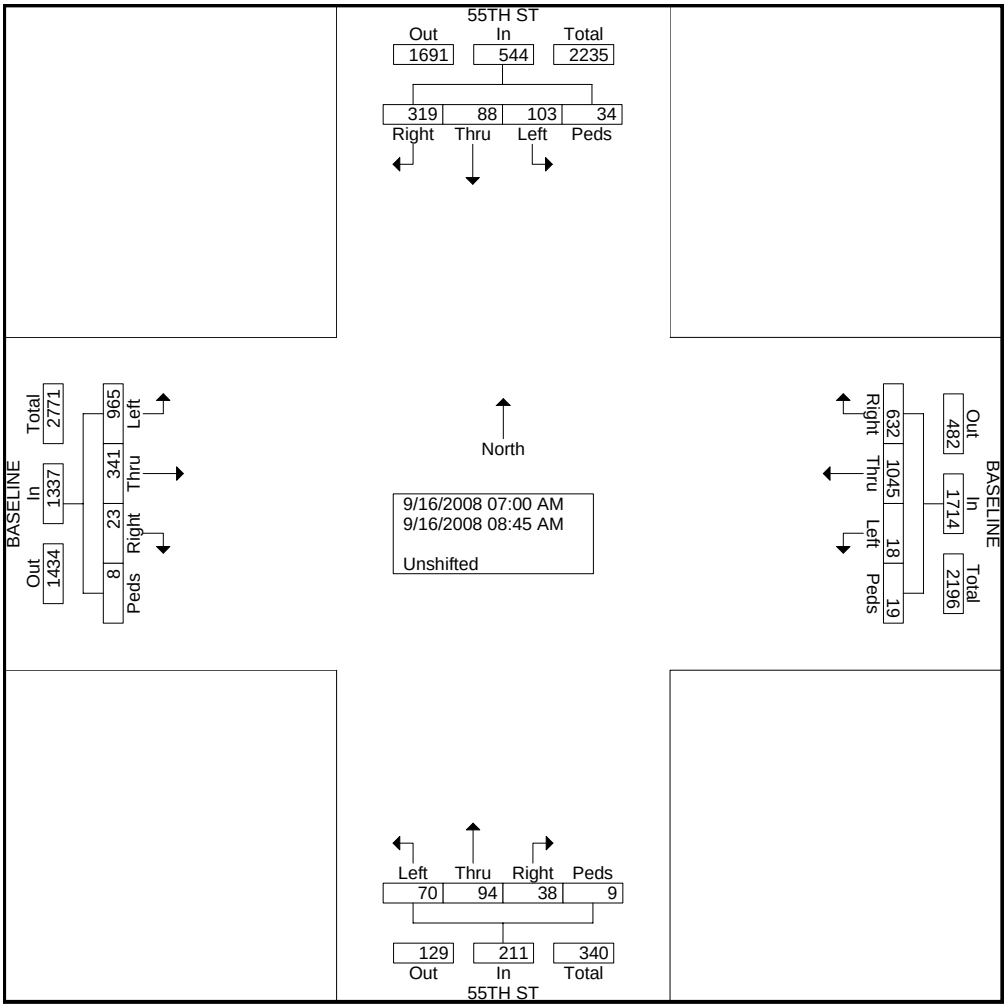
	MANHATTAN DR Southbound					BASELINE RD Westbound					MANHATTAN DR Northbound					BASELINE RD Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	5	2	4	2	13	22	160	1	3	186	40	1	14	2	57	28	176	37	3	244	500
05:15 PM	12	0	3	2	17	16	167	0	2	185	29	0	9	2	40	28	193	28	4	253	495
05:30 PM	3	2	12	0	17	8	205	2	2	217	25	3	10	1	39	23	219	30	1	273	546
05:45 PM	3	0	6	1	10	11	149	2	3	165	33	10	7	1	51	31	152	38	1	222	448
Total Volume	23	4	25	5	57	57	681	5	10	753	127	14	40	6	187	110	740	133	9	992	1989
% App. Total	40.4	7	43.9	8.8		7.6	90.4	0.7	1.3		67.9	7.5	21.4	3.2		11.1	74.6	13.4	0.9		
PHF	.479	.500	.521	.625	.838	.648	.830	.625	.833	.868	.794	.350	.714	.750	.820	.887	.845	.875	.563	.908	.911



File Name : #3 55TH&BASELINEAM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 1

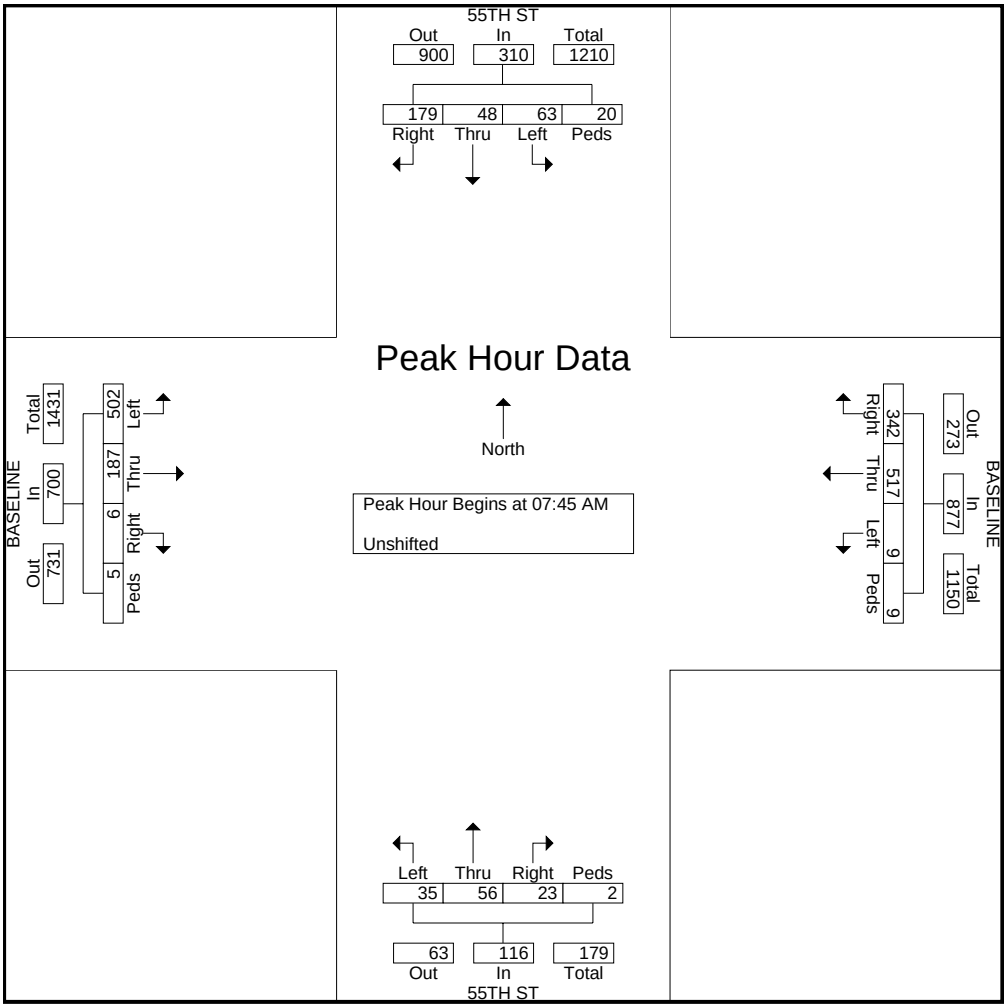
Groups Printed- Unshifted

	55TH ST Southbound				BASELINE Westbound				55TH ST Northbound				BASELINE Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	9	8	21	3	2	132	75	3	7	12	3	1	105	35	2	1	419
07:15 AM	8	10	32	2	1	145	80	2	8	11	2	1	112	42	2	1	459
07:30 AM	12	12	30	4	1	134	81	2	11	8	5	0	119	41	1	0	461
07:45 AM	9	12	40	5	2	142	89	2	11	15	9	1	124	39	2	1	503
Total	38	42	123	14	6	553	325	9	37	46	19	3	460	157	7	3	1842
08:00 AM	11	6	42	2	2	124	85	3	12	11	2	0	116	37	2	0	455
08:15 AM	26	12	49	8	0	135	91	2	5	15	3	0	126	57	1	2	532
08:30 AM	17	18	48	5	5	116	77	2	7	15	9	1	136	54	1	2	513
08:45 AM	11	10	57	5	5	117	54	3	9	7	5	5	127	36	12	1	464
Total	65	46	196	20	12	492	307	10	33	48	19	6	505	184	16	5	1964
Grand Total	103	88	319	34	18	1045	632	19	70	94	38	9	965	341	23	8	3806
Apprch %	18.9	16.2	58.6	6.2	1.1	61	36.9	1.1	33.2	44.5	18	4.3	72.2	25.5	1.7	0.6	
Total %	2.7	2.3	8.4	0.9	0.5	27.5	16.6	0.5	1.8	2.5	1	0.2	25.4	9	0.6	0.2	



File Name : #3 55TH&BASELINEAM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 2

	55TH ST Southbound					BASELINE Westbound					55TH ST Northbound					BASELINE Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	9	12	40	5	66	2	142	89	2	235	11	15	9	1	36	124	39	2	1	166	503
08:00 AM	11	6	42	2	61	2	124	85	3	214	12	11	2	0	25	116	37	2	0	155	455
08:15 AM	26	12	49	8	95	0	135	91	2	228	5	15	3	0	23	126	57	1	2	186	532
08:30 AM	17	18	48	5	88	5	116	77	2	200	7	15	9	1	32	136	54	1	2	193	513
Total Volume	63	48	179	20	310	9	517	342	9	877	35	56	23	2	116	502	187	6	5	700	2003
% App. Total	20.3	15.5	57.7	6.5		1	59	39	1		30.2	48.3	19.8	1.7		71.7	26.7	0.9	0.7		
PHF	.606	.667	.913	.625	.816	.450	.910	.940	.750	.933	.729	.933	.639	.500	.806	.923	.820	.750	.625	.907	.941



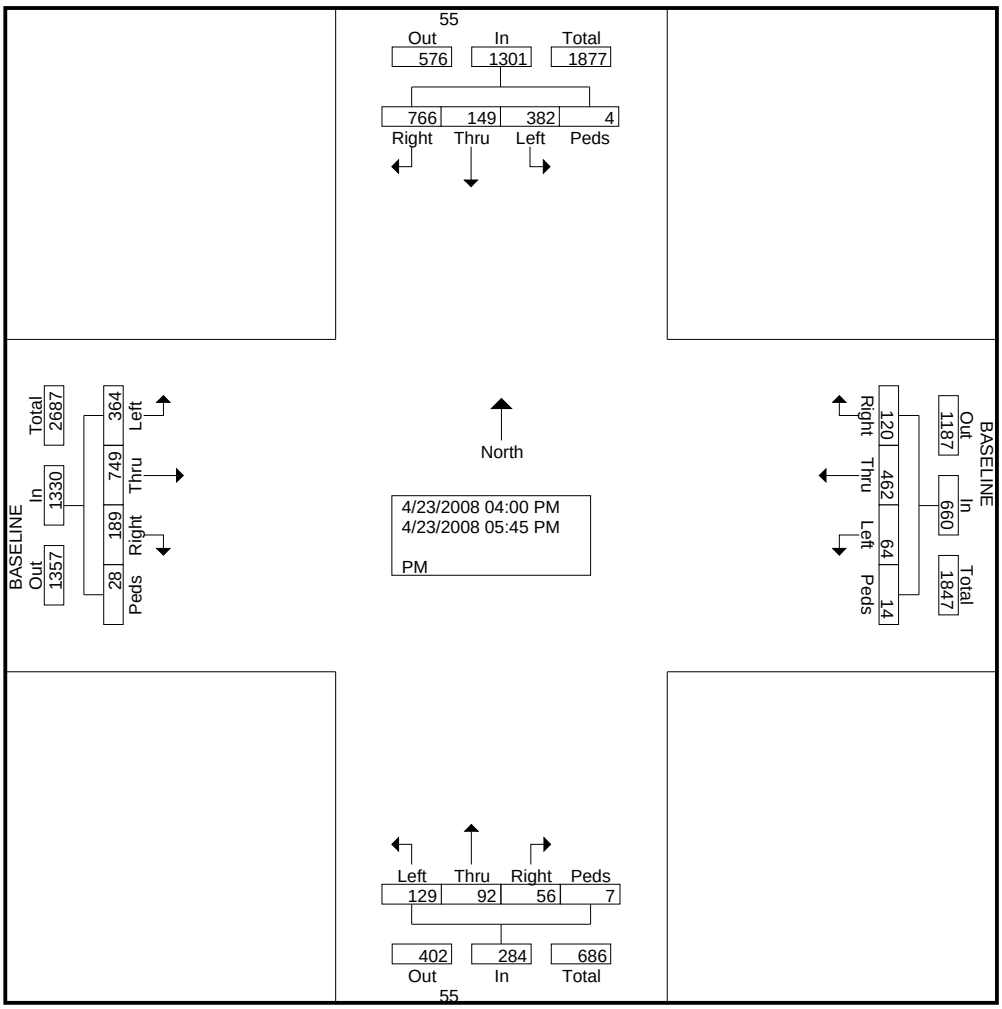
Cutting Edge Traffic Data LLC

12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

File Name : 55TH&BASELINE_PM
Site Code : 1
Start Date : 4/23/2008
Page No : 1

Groups Printed- PM

	55 Southbound					BASELINE Westbound					55 Northbound					BASELINE Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	97	15	33	0	145	9	58	7	4	78	5	11	16	0	32	19	89	40	5	153	408
04:15 PM	90	9	28	0	127	13	49	7	0	69	2	9	10	4	25	18	102	48	2	170	391
04:30 PM	90	17	44	1	152	17	55	0	1	73	2	6	11	0	19	7	66	38	2	113	357
04:45 PM	80	7	29	1	117	10	36	8	0	54	2	4	10	0	16	13	86	46	2	147	334
Total	357	48	134	2	541	49	198	22	5	274	11	30	47	4	92	57	343	172	11	583	1490
05:00 PM	112	26	69	0	207	17	63	7	1	88	5	4	10	0	19	27	85	49	6	167	481
05:15 PM	107	46	56	1	210	16	74	18	2	110	12	19	27	0	58	45	114	49	6	214	592
05:30 PM	98	21	79	1	199	14	57	13	1	85	19	29	30	0	78	41	118	56	3	218	580
05:45 PM	92	8	44	0	144	24	70	4	5	103	9	10	15	3	37	19	89	38	2	148	432
Total	409	101	248	2	760	71	264	42	9	386	45	62	82	3	192	132	406	192	17	747	2085
Grand Total	766	149	382	4	1301	120	462	64	14	660	56	92	129	7	284	189	749	364	28	1330	3575
Apprch %	58.9	11.5	29.4	0.3		18.2	70	9.7	2.1		19.7	32.4	45.4	2.5		14.2	56.3	27.4	2.1		
Total %	21.4	4.2	10.7	0.1	36.4	3.4	12.9	1.8	0.4	18.5	1.6	2.6	3.6	0.2	7.9	5.3	21	10.2	0.8	37.2	

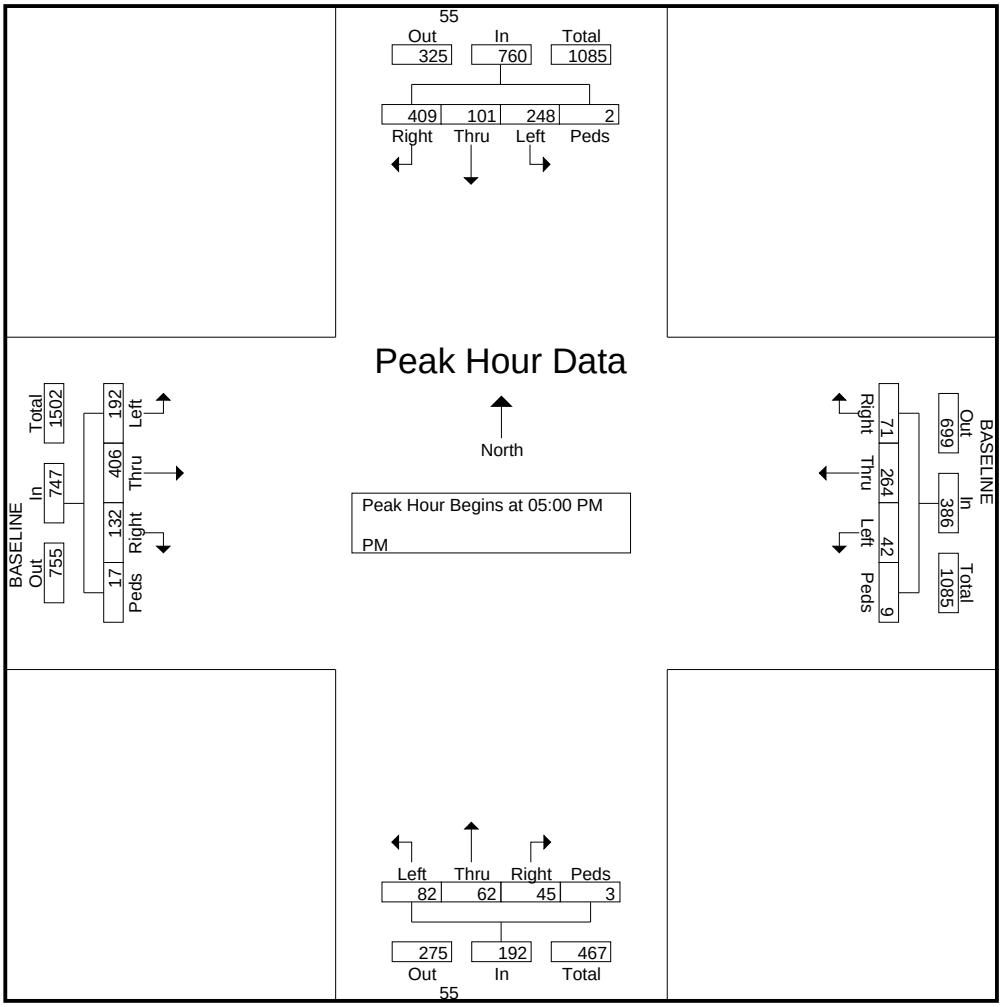


Cutting Edge Traffic Data LLC

12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

File Name : 55TH&BASELINE_PM
Site Code : 1
Start Date : 4/23/2008
Page No : 2

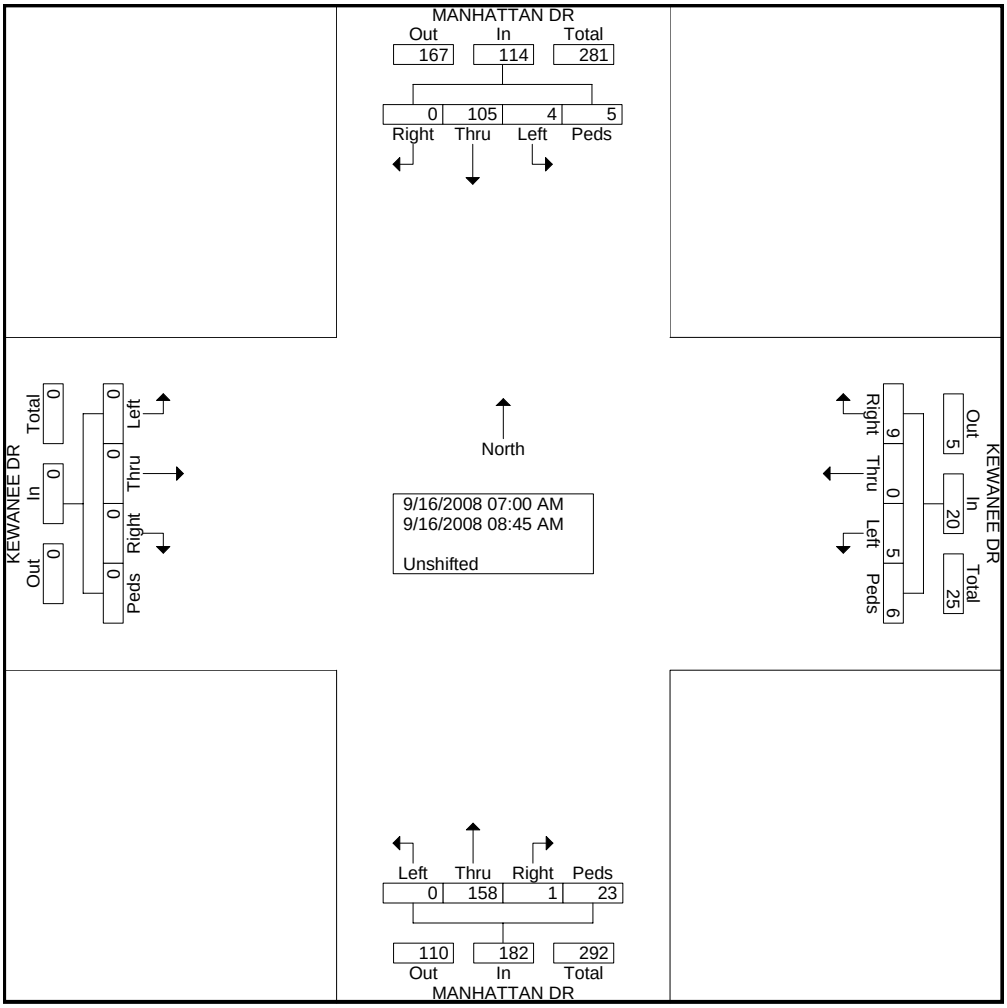
	55 Southbound					BASELINE Westbound					55 Northbound					BASELINE Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	**112**	26	69	0	207	17	63	7	1	88	5	4	10	0	19	27	85	49	**6**	167	481
05:15 PM	107	**46**	56	**1**	**210**	16	**74**	**18**	2	**110**	12	19	27	0	58	**45**	114	49	6	214	**592**
05:30 PM	98	21	**79**	1	199	14	57	13	1	85	**19**	**29**	**30**	0	**78**	41	**118**	**56**	3	**218**	580
05:45 PM	92	8	44	0	144	**24**	70	4	**5**	103	9	10	15	**3**	37	19	89	38	2	148	432
Total Volume	409	101	248	2	760	71	264	42	9	386	45	62	82	3	192	132	406	192	17	747	2085
% App. Total	53.8	13.3	32.6	0.3		18.4	68.4	10.9	2.3		23.4	32.3	42.7	1.6		17.7	54.4	25.7	2.3		
PHF	.913	.549	.785	.500	.905	.740	.892	.583	.450	.877	.592	.534	.683	.250	.615	.733	.860	.857	.708	.857	.880



File Name : #2 MANHATTAN&KEWANNEEAM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 1

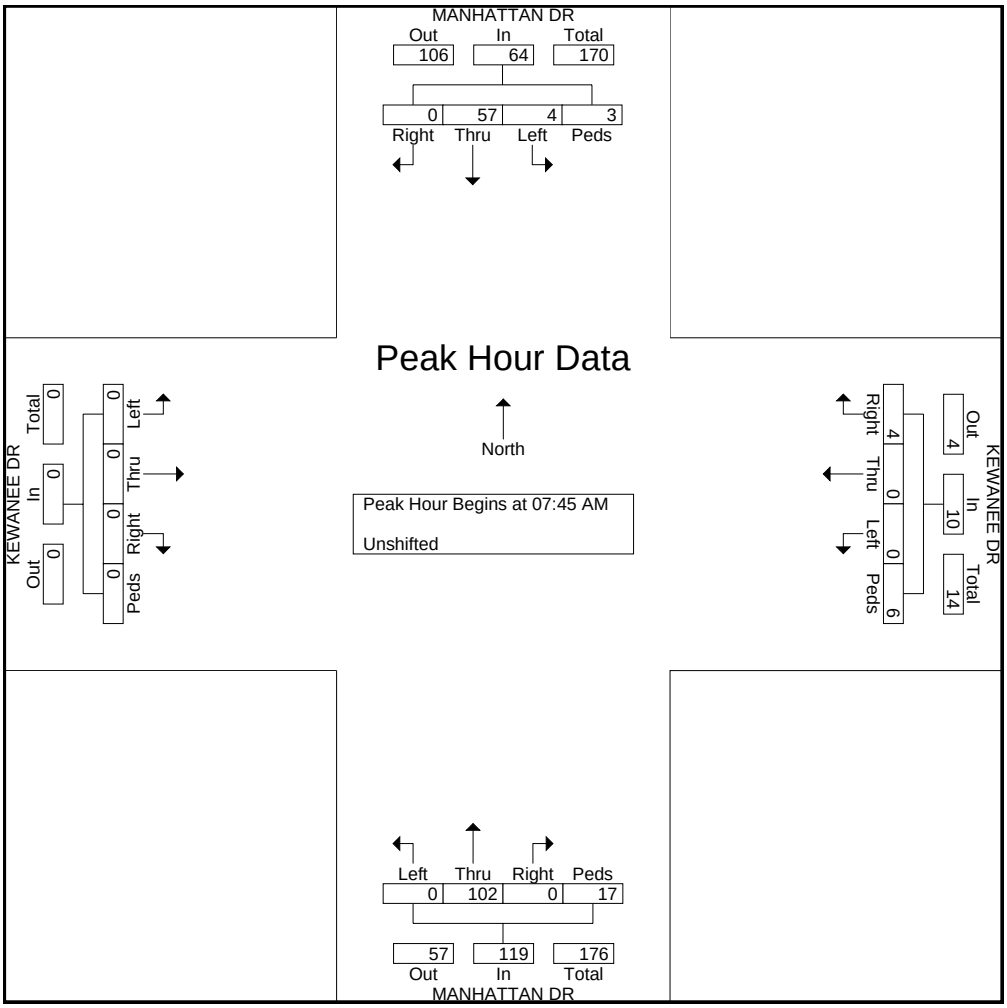
Groups Printed- Unshifted

	MANHATTAN DR Southbound				KEWANEE DR Westbound				MANHATTAN DR Northbound				KEWANEE DR Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	11	0	0	0	0	2	0	0	10	1	2	0	0	0	0	26
07:15 AM	0	7	0	1	1	0	0	0	0	12	0	1	0	0	0	0	22
07:30 AM	0	18	0	0	2	0	3	0	0	18	0	2	0	0	0	0	43
07:45 AM	2	11	0	1	0	0	2	1	0	21	0	4	0	0	0	0	42
Total	2	47	0	2	3	0	7	1	0	61	1	9	0	0	0	0	133
08:00 AM	0	10	0	1	0	0	1	3	0	18	0	1	0	0	0	0	34
08:15 AM	0	18	0	1	0	0	0	2	0	27	0	9	0	0	0	0	57
08:30 AM	2	18	0	0	0	0	1	0	0	36	0	3	0	0	0	0	60
08:45 AM	0	12	0	1	2	0	0	0	0	16	0	1	0	0	0	0	32
Total	2	58	0	3	2	0	2	5	0	97	0	14	0	0	0	0	183
Grand Total	4	105	0	5	5	0	9	6	0	158	1	23	0	0	0	0	316
Apprch %	3.5	92.1	0	4.4	25	0	45	30	0	86.8	0.5	12.6	0	0	0	0	
Total %	1.3	33.2	0	1.6	1.6	0	2.8	1.9	0	50	0.3	7.3	0	0	0	0	



File Name : #2 MANHATTAN&KEWANNEEAM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 2

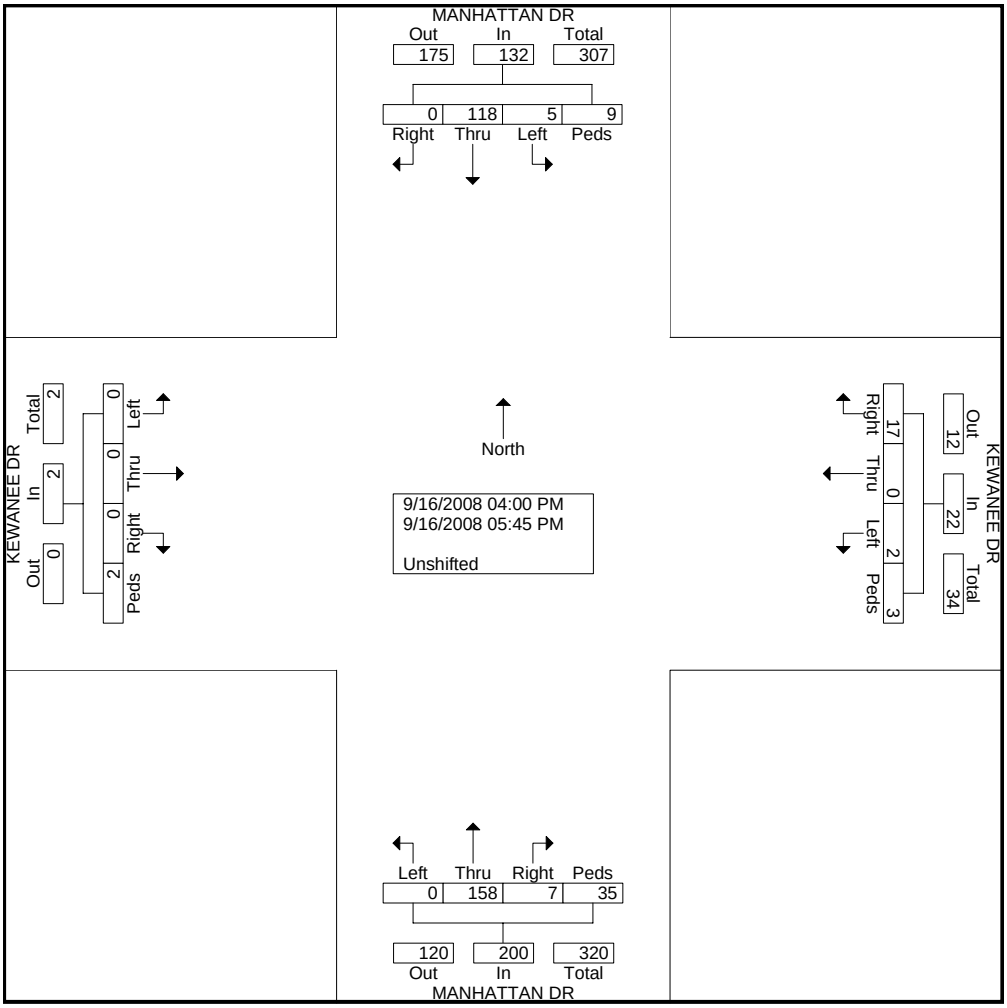
	MANHATTAN DR Southbound					KEWANEE DR Westbound					MANHATTAN DR Northbound					KEWANEE DR Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	2	11	0	1	14	0	0	2	1	3	0	21	0	4	25	0	0	0	0	0	42
08:00 AM	0	10	0	1	11	0	0	1	3	4	0	18	0	1	19	0	0	0	0	0	34
08:15 AM	0	18	0	1	19	0	0	0	2	2	0	27	0	9	36	0	0	0	0	0	57
08:30 AM	2	18	0	0	20	0	0	1	0	1	0	36	0	3	39	0	0	0	0	0	60
Total Volume	4	57	0	3	64	0	0	4	6	10	0	102	0	17	119	0	0	0	0	0	193
% App. Total	6.2	89.1	0	4.7		0	0	40	60		0	85.7	0	14.3		0	0	0	0		
PHF	.500	.792	.000	.750	.800	.000	.000	.500	.500	.625	.000	.708	.000	.472	.763	.000	.000	.000	.000	.000	.804



File Name : #2 MANHATTAN&KEWANNEEPM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 1

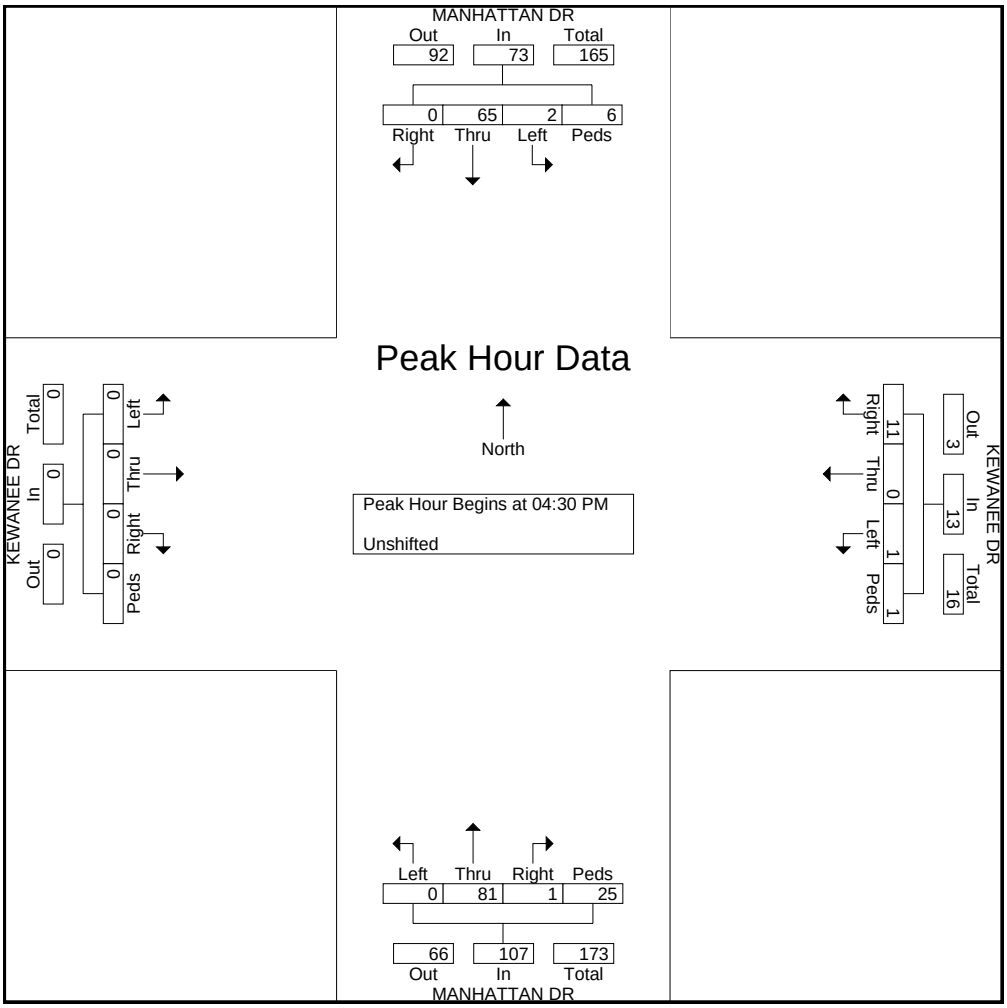
Groups Printed- Unshifted

	MANHATTAN DR Southbound				KEWANEE DR Westbound				MANHATTAN DR Northbound				KEWANEE DR Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
04:00 PM	0	15	0	0	0	0	3	0	0	36	2	4	0	0	0	0	60
04:15 PM	0	15	0	0	0	0	0	0	0	11	1	1	0	0	0	1	29
04:30 PM	1	19	0	0	0	0	5	0	0	19	0	9	0	0	0	0	53
04:45 PM	1	12	0	3	0	0	2	0	0	17	0	5	0	0	0	0	40
Total	2	61	0	3	0	0	10	0	0	83	3	19	0	0	0	1	182
05:00 PM	0	17	0	3	1	0	3	1	0	22	0	5	0	0	0	0	52
05:15 PM	0	17	0	0	0	0	1	0	0	23	1	6	0	0	0	0	48
05:30 PM	1	14	0	1	0	0	2	0	0	17	1	5	0	0	0	0	41
05:45 PM	2	9	0	2	1	0	1	2	0	13	2	0	0	0	0	1	33
Total	3	57	0	6	2	0	7	3	0	75	4	16	0	0	0	1	174
Grand Total	5	118	0	9	2	0	17	3	0	158	7	35	0	0	0	2	356
Apprch %	3.8	89.4	0	6.8	9.1	0	77.3	13.6	0	79	3.5	17.5	0	0	0	100	
Total %	1.4	33.1	0	2.5	0.6	0	4.8	0.8	0	44.4	2	9.8	0	0	0	0.6	



File Name : #2 MANHATTAN&KEWANNEEPM
Site Code : 00000000
Start Date : 9/16/2008
Page No : 2

	MANHATTAN DR Southbound					KEWANEE DR Westbound					MANHATTAN DR Northbound					KEWANEE DR Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	1	19	0	0	20	0	0	5	0	5	0	19	0	9	28	0	0	0	0	0	53
04:45 PM	1	12	0	3	16	0	0	2	0	2	0	17	0	5	22	0	0	0	0	0	40
05:00 PM	0	17	0	3	20	1	0	3	1	5	0	22	0	5	27	0	0	0	0	0	52
05:15 PM	0	17	0	0	17	0	0	1	0	1	0	23	1	6	30	0	0	0	0	0	48
Total Volume	2	65	0	6	73	1	0	11	1	13	0	81	1	25	107	0	0	0	0	0	193
% App. Total	2.7	89	0	8.2		7.7	0	84.6	7.7		0	75.7	0.9	23.4		0	0	0	0		
PHF	.500	.855	.000	.500	.913	.250	.000	.550	.250	.650	.000	.880	.250	.694	.892	.000	.000	.000	.000	.000	.910



All Traffic Data Services,Inc.

9660 W. 44th Ave
Wheat Ridge, CO 80033
www.alltrafficdata.net

MANHATTAN DR N-O S BOULDER RD

Site Code: 7
Station ID: 7

NB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
09/16/08	2	2	3	0	0	0	0	0	0	0	0	0	0	0	7
01:00	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
02:00	1	1	1	0	0	0	0	0	0	0	0	0	0	0	3
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
05:00	5	4	5	1	0	0	0	0	0	0	0	0	0	0	15
06:00	11	20	13	2	0	0	0	0	0	0	0	0	0	0	46
07:00	22	34	27	11	0	0	0	0	0	0	0	0	0	0	94
08:00	43	35	65	8	1	0	0	0	0	0	0	0	0	0	152
09:00	13	16	26	7	2	0	0	0	0	0	0	0	0	0	64
10:00	18	10	21	8	0	0	0	0	0	0	0	0	0	0	57
11:00	12	11	48	8	0	0	0	0	0	0	0	0	0	0	79
12 PM	29	24	28	8	1	0	0	0	0	0	0	0	0	0	90
13:00	13	13	34	18	1	0	0	0	0	0	0	0	0	0	79
14:00	12	12	35	16	2	0	0	0	0	0	0	0	0	0	77
15:00	29	16	74	19	3	0	0	0	0	0	0	0	0	0	141
16:00	42	23	69	27	3	1	0	0	0	0	0	0	0	0	165
17:00	39	25	68	13	0	0	0	0	0	0	0	0	0	0	145
18:00	25	25	52	10	0	0	0	0	0	0	0	0	0	0	112
19:00	11	22	35	4	0	0	0	0	0	0	0	0	0	0	72
20:00	6	7	19	6	1	0	0	0	0	0	0	0	0	0	39
21:00	7	9	19	4	0	0	0	0	0	0	0	0	0	0	39
22:00	4	3	13	4	0	0	0	0	0	0	0	0	0	0	24
23:00	1	3	4	4	0	0	0	0	0	0	0	0	0	0	12
Total	345	315	661	178	14	1	0	0	0	0	0	0	0	0	1514
Grand Total	345	315	661	178	14	1	0	0	0	0	0	0	0	0	1514

15th Percentile :	10 MPH
50th Percentile :	21 MPH
85th Percentile :	25 MPH
95th Percentile :	29 MPH

Statistics

Mean Speed(Average) :	19 MPH
10 MPH Pace Speed :	16-25 MPH
Number in Pace :	976
Percent in Pace :	64.5%
Number of Vehicles > 55 MPH :	0
Percent of Vehicles > 55 MPH :	0.0%

All Traffic Data Services,Inc.

9660 W. 44th Ave
Wheat Ridge, CO 80033
www.alltrafficdata.net

MANHATTAN DR N-O S BOULDER RD

Site Code: 7
Station ID: 7

SB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
09/16/08	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
03:00	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
04:00	1	0	1	1	0	0	0	0	0	0	0	0	0	0	3
05:00	8	5	9	1	0	0	0	0	0	0	0	0	0	0	23
06:00	16	14	14	8	0	0	0	0	0	0	0	0	0	0	52
07:00	51	35	43	10	0	0	0	0	0	0	0	0	0	0	139
08:00	42	41	35	9	0	0	0	0	0	0	1	0	0	0	128
09:00	34	31	32	9	0	0	0	0	0	0	0	0	0	0	106
10:00	18	22	18	8	0	0	0	0	0	0	0	0	0	0	66
11:00	26	34	25	1	0	0	0	0	0	0	0	0	0	0	86
12 PM	32	36	29	2	1	0	0	0	0	0	0	0	0	0	100
13:00	18	25	25	8	2	0	0	0	0	0	0	0	0	0	78
14:00	19	19	33	6	1	0	0	0	0	0	0	0	0	0	78
15:00	30	54	41	8	0	0	0	0	0	0	0	0	0	0	133
16:00	58	36	35	14	0	0	0	0	0	0	0	0	0	0	143
17:00	35	51	46	9	0	0	0	0	0	0	0	0	0	0	141
18:00	51	51	40	3	1	0	0	0	0	0	0	0	0	0	146
19:00	14	15	15	4	0	0	0	0	0	0	0	0	0	0	48
20:00	8	17	11	4	0	0	0	0	0	0	0	0	0	0	40
21:00	9	6	10	1	0	0	0	0	0	0	0	0	0	0	26
22:00	3	3	14	2	1	0	0	0	0	0	0	0	0	0	23
23:00	1	2	3	1	0	0	0	0	0	0	0	0	0	0	7
Total	474	497	483	111	6	0	0	0	0	0	1	0	0	0	1572
Grand Total	474	497	483	111	6	0	0	0	0	0	1	0	0	0	1572

15th Percentile :	8 MPH
50th Percentile :	19 MPH
85th Percentile :	24 MPH
95th Percentile :	27 MPH

Statistics

Mean Speed(Average) :	17 MPH
10 MPH Pace Speed :	16-25 MPH
Number in Pace :	980
Percent in Pace :	62.3%
Number of Vehicles > 55 MPH :	1
Percent of Vehicles > 55 MPH :	0.1%

All Traffic Data Services,Inc.

9660 W. 44th Ave
Wheat Ridge, CO 80033
www.alltrafficdata.net

55TH ST N-O S BOULDER RD

Site Code: 6
Station ID: 6

NB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
09/16/08	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
01:00	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	1	2	0	0	0	0	0	0	0	0	0	0	0	3
05:00	0	2	6	0	0	0	0	0	0	0	0	0	0	0	8
06:00	1	0	6	3	0	0	0	0	0	0	0	0	0	0	10
07:00	3	4	13	4	0	0	0	0	0	0	0	0	0	0	24
08:00	2	13	24	12	1	0	0	0	0	0	0	0	0	0	52
09:00	2	6	32	11	0	0	0	0	0	0	0	0	0	0	51
10:00	4	2	14	2	0	0	0	0	0	0	0	0	0	0	22
11:00	1	6	16	3	0	0	0	0	0	0	0	0	0	0	26
12 PM	2	5	16	6	0	0	0	0	0	0	0	0	0	0	29
13:00	2	4	22	6	0	0	0	0	0	0	0	0	0	0	34
14:00	1	6	18	6	0	0	0	0	0	0	0	0	0	0	31
15:00	3	10	50	15	0	0	0	0	0	0	0	0	0	0	78
16:00	11	17	70	16	0	0	0	0	0	0	0	0	0	0	114
17:00	22	16	60	24	1	0	0	0	0	0	0	0	0	0	123
18:00	11	9	50	20	0	0	0	0	0	0	0	0	0	0	90
19:00	9	5	27	6	1	0	0	0	0	0	0	0	0	0	48
20:00	1	0	13	2	0	0	0	0	0	0	0	0	0	0	16
21:00	2	2	12	7	0	0	0	0	0	0	0	0	0	0	23
22:00	0	0	4	1	0	0	0	0	0	0	0	0	0	0	5
23:00	0	0	2	1	0	0	0	0	0	0	0	0	0	0	3
Total	77	108	459	145	3	0	0	0	0	0	0	0	0	0	792
Grand Total	77	108	459	145	3	0	0	0	0	0	0	0	0	0	792

15th Percentile :	17 MPH
50th Percentile :	23 MPH
85th Percentile :	26 MPH
95th Percentile :	29 MPH

Statistics

Mean Speed(Average) :	22 MPH
10 MPH Pace Speed :	21-30 MPH
Number in Pace :	604
Percent in Pace :	76.3%
Number of Vehicles > 55 MPH :	0
Percent of Vehicles > 55 MPH :	0.0%

All Traffic Data Services,Inc.

9660 W. 44th Ave
Wheat Ridge, CO 80033
www.alltrafficdata.net

55TH ST N-O S BOULDER RD

Site Code: 6
Station ID: 6

SB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
09/16/08	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
01:00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	2	0	1	0	0	0	0	0	0	0	0	0	0	3
06:00	2	13	3	4	3	0	0	0	0	0	0	0	0	0	25
07:00	2	28	14	8	2	1	0	0	0	0	0	0	0	0	55
08:00	1	20	10	5	1	0	0	0	0	0	0	0	0	0	37
09:00	6	24	16	8	8	0	0	0	0	0	0	0	0	0	62
10:00	4	35	12	11	5	0	0	0	0	0	0	0	0	0	67
11:00	3	38	7	5	4	0	0	0	0	0	0	0	0	0	57
12 PM	1	28	1	6	2	0	0	0	0	0	0	0	0	0	38
13:00	5	22	0	2	7	1	0	0	0	0	0	0	0	0	37
14:00	2	16	0	5	3	0	0	0	0	0	0	0	0	0	26
15:00	4	22	3	6	5	0	0	0	0	0	0	0	0	0	40
16:00	6	85	5	16	8	0	0	0	0	0	0	0	0	0	120
17:00	11	80	8	19	15	0	0	0	0	0	0	0	0	0	133
18:00	6	91	10	22	9	0	0	0	0	0	0	0	0	0	138
19:00	1	48	10	19	1	0	0	0	0	0	0	0	0	0	79
20:00	5	12	3	4	7	0	0	0	0	0	0	0	0	0	31
21:00	1	6	0	3	1	0	0	0	0	0	0	0	0	0	11
22:00	1	1	0	2	1	0	0	0	0	0	0	0	0	0	5
23:00	0	1	0	2	0	0	0	0	0	0	0	0	0	0	3
Total	61	573	102	149	82	2	0	0	0	0	0	0	0	0	969
Grand Total	61	573	102	149	82	2	0	0	0	0	0	0	0	0	969

15th Percentile :	16 MPH
50th Percentile :	19 MPH
85th Percentile :	28 MPH
95th Percentile :	33 MPH

Statistics

Mean Speed(Average) :	21 MPH
10 MPH Pace Speed :	16-25 MPH
Number in Pace :	675
Percent in Pace :	69.7%
Number of Vehicles > 55 MPH :	0
Percent of Vehicles > 55 MPH :	0.0%

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 1
Station ID: 1
55TH N/O ONTARIO

Latitude: 0' 0.000 Undefined

Start Time	15-Apr-08 Tue	NB	SB	Total
12:00 AM		*	*	*
01:00		*	*	*
02:00		*	*	*
03:00		*	*	*
04:00		*	*	*
05:00		*	*	*
06:00		*	*	*
07:00		*	*	*
08:00		*	*	*
09:00		*	*	*
10:00		*	*	*
11:00		**28**	**33**	**61**
12:00 PM		33	30	63
01:00		22	34	56
02:00		29	26	55
03:00		25	36	61
04:00		69	47	116
05:00		**77**	**84**	**161**
06:00		49	56	105
07:00		34	61	95
08:00		11	23	34
09:00		5	12	17
10:00		5	5	10
11:00		1	1	2
Total		388	448	836
Percent		46.4%	53.6%	
AM Peak		11:00	11:00	11:00
Vol.		28	33	61
PM Peak		17:00	17:00	17:00
Vol.		77	84	161

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 1
Station ID: 1
55TH N/O ONTARIO

Latitude: 0' 0.000 Undefined

Start Time	16-Apr-08 Wed	NB	SB	Total
12:00 AM		0	1	1
01:00		1	1	2
02:00		0	0	0
03:00		0	1	1
04:00		0	0	0
05:00		22	2	24
06:00		16	8	24
07:00		24	**30**	54
08:00		**43**	22	**65**
09:00		38	22	60
10:00		27	29	56
11:00		32	20	52
12:00 PM		36	38	74
01:00		27	41	68
02:00		29	26	55
03:00		28	25	53
04:00		**49**	48	97
05:00		47	**53**	**100**
06:00		30	50	80
07:00		25	32	57
08:00		14	11	25
09:00		7	21	28
10:00		1	3	4
11:00		3	1	4
Total		499	485	984
Percent		50.7%	49.3%	
AM Peak		08:00	07:00	08:00
Vol.		43	30	65
PM Peak		16:00	17:00	17:00
Vol.		49	53	100

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 1
Station ID: 1
55TH N/O ONTARIO

Latitude: 0' 0.000 Undefined

Start Time	17-Apr-08 Thu	NB	SB	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		8	1	9
06:00		19	6	25
07:00		11	21	32
08:00		**30**	17	47
09:00		26	17	43
10:00		26	28	**54**
11:00		20	**32**	52
12:00 PM		29	21	50
01:00		37	25	62
02:00		15	23	38
03:00		35	42	77
04:00		67	37	104
05:00		**69**	75	**144**
06:00		48	**77**	125
07:00		41	52	93
08:00		17	30	47
09:00		4	27	31
10:00		2	12	14
11:00		1	0	1
Total		505	543	1048
Percent		48.2%	51.8%	
AM Peak		08:00	11:00	10:00
Vol.		30	32	54
PM Peak		17:00	18:00	17:00
Vol.		69	77	144

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 1
Station ID: 1
55TH N/O ONTARIO

Latitude: 0' 0.000 Undefined

Start Time	18-Apr-08 Fri	NB	SB	Total
12:00 AM		0	0	0
01:00		0	2	2
02:00		1	0	1
03:00		0	0	0
04:00		0	1	1
05:00		21	4	25
06:00		14	5	19
07:00		25	25	50
08:00		36	22	58
09:00		33	15	48
10:00		**41**	30	71
11:00		41	**33**	**74**
12:00 PM		36	38	74
01:00		22	31	53
02:00		25	28	53
03:00		39	35	74
04:00		**70**	53	123
05:00		57	**68**	**125**
06:00		42	39	81
07:00		30	39	69
08:00		9	16	25
09:00		5	13	18
10:00		5	3	8
11:00		4	3	7
Total		556	503	1059
Percent		52.5%	47.5%	
AM Peak		10:00	11:00	11:00
Vol.		41	33	74
PM Peak		16:00	17:00	17:00
Vol.		70	68	125

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 1
Station ID: 1
55TH N/O ONTARIO

Latitude: 0' 0.000 Undefined

Start Time	19-Apr-08 Sat	NB	SB	Total
12:00 AM		3	1	4
01:00		0	1	1
02:00		2	0	2
03:00		1	1	2
04:00		1	1	2
05:00		1	0	1
06:00		2	3	5
07:00		20	2	22
08:00		40	13	53
09:00		**55**	45	100
10:00		52	**50**	**102**
11:00		41	42	83
12:00 PM		38	29	67
01:00		23	40	63
02:00		33	32	65
03:00		**42**	30	72
04:00		32	**53**	**85**
05:00		21	29	50
06:00		18	20	38
07:00		8	13	21
08:00		14	18	32
09:00		1	4	5
10:00		1	5	6
11:00		2	6	8
Total		451	438	889
Percent		50.7%	49.3%	
AM Peak		09:00	10:00	10:00
Vol.		55	50	102
PM Peak		15:00	16:00	16:00
Vol.		42	53	85

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 1
Station ID: 1
55TH N/O ONTARIO

Latitude: 0' 0.000 Undefined

Start Time	20-Apr-08 Sun	NB	SB	Total
12:00 AM		0	2	2
01:00		1	1	2
02:00		2	0	2
03:00		0	0	0
04:00		0	0	0
05:00		4	1	5
06:00		0	1	1
07:00		4	2	6
08:00		14	10	24
09:00		28	11	39
10:00		35	11	46
11:00		**40**	**35**	**75**
12:00 PM		35	41	76
01:00		30	40	70
02:00		**50**	28	78
03:00		46	31	77
04:00		37	**54**	**91**
05:00		26	30	56
06:00		13	31	44
07:00		11	22	33
08:00		7	12	19
09:00		1	3	4
10:00		1	3	4
11:00		3	0	3
Total		388	369	757
Percent		51.3%	48.7%	
AM Peak		11:00	11:00	11:00
Vol.		40	35	75
PM Peak		14:00	16:00	16:00
Vol.		50	54	91

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 1
Station ID: 1
55TH N/O ONTARIO

Latitude: 0' 0.000 Undefined

Start Time	21-Apr-08 Mon	NB	SB	Total
12:00 AM		0	1	1
01:00		0	0	0
02:00		0	0	0
03:00		1	2	3
04:00		0	1	1
05:00		18	2	20
06:00		17	7	24
07:00		32	25	57
08:00		**41**	21	**62**
09:00		32	23	55
10:00		26	27	53
11:00		32	**28**	60
12:00 PM		48	31	79
01:00		34	38	72
02:00		23	35	58
03:00		33	33	66
04:00		72	53	125
05:00		**105**	**94**	**199**
06:00		56	49	105
07:00		16	64	80
08:00		11	22	33
09:00		4	27	31
10:00		1	2	3
11:00		0	3	3
Total		602	588	1190
Percent		50.6%	49.4%	
AM Peak		08:00	11:00	08:00
Vol.		41	28	62
PM Peak		17:00	17:00	17:00
Vol.		105	94	199

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 1
Station ID: 1
55TH N/O ONTARIO

Latitude: 0' 0.000 Undefined

Start Time	22-Apr-08 Tue	NB	SB	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		7	4	11
06:00		**18**	4	22
07:00		18	**11**	**29**
08:00		*	*	*
09:00		*	*	*
10:00		*	*	*
11:00		*	*	*
12:00 PM		*	*	*
01:00		*	*	*
02:00		*	*	*
03:00		*	*	*
04:00		*	*	*
05:00		*	*	*
06:00		*	*	*
07:00		*	*	*
08:00		*	*	*
09:00		*	*	*
10:00		*	*	*
11:00		*	*	*
Total		43	19	62
Percent		69.4%	30.6%	
AM Peak		06:00	07:00	07:00
Vol.		18	11	29
PM Peak				
Vol.				
Grand Total		3432	3393	6825
Percent		50.3%	49.7%	
ADT	Not Calculated			

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 2
Station ID: 2
55TH N/O PUEBLO

Latitude: 0' 0.000 Undefined

Start Time	15-Apr-08 Tue	NB	SB	Total
12:00 AM		*	*	*
01:00		*	*	*
02:00		*	*	*
03:00		*	*	*
04:00		*	*	*
05:00		*	*	*
06:00		*	*	*
07:00		*	*	*
08:00		*	*	*
09:00		*	*	*
10:00		*	*	*
11:00		**86**	**65**	**151**
12:00 PM		62	79	141
01:00		88	50	138
02:00		57	48	105
03:00		48	99	147
04:00		91	121	212
05:00		**129**	**181**	**310**
06:00		128	105	233
07:00		105	68	173
08:00		45	16	61
09:00		21	9	30
10:00		8	5	13
11:00		1	2	3
Total		869	848	1717
Percent		50.6%	49.4%	
AM Peak		11:00	11:00	11:00
Vol.		86	65	151
PM Peak		17:00	17:00	17:00
Vol.		129	181	310

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 2
Station ID: 2
55TH N/O PUEBLO

Latitude: 0' 0.000 Undefined

Start Time	16-Apr-08 Wed	NB	SB	Total
12:00 AM		0	1	1
01:00		0	1	1
02:00		0	1	1
03:00		0	0	0
04:00		0	1	1
05:00		8	28	36
06:00		11	24	35
07:00		48	40	88
08:00		**69**	**74**	**143**
09:00		61	62	123
10:00		67	54	121
11:00		67	63	130
12:00 PM		55	62	117
01:00		75	69	144
02:00		49	42	91
03:00		55	76	131
04:00		78	73	151
05:00		71	**105**	**176**
06:00		**82**	60	142
07:00		44	45	89
08:00		32	25	57
09:00		45	9	54
10:00		4	4	8
11:00		4	1	5
Total		925	920	1845
Percent		50.1%	49.9%	
AM Peak		08:00	08:00	08:00
Vol.		69	74	143
PM Peak		18:00	17:00	17:00
Vol.		82	105	176

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 2
Station ID: 2
55TH N/O PUEBLO

Latitude: 0' 0.000 Undefined

Start Time	17-Apr-08 Thu	NB	SB	Total
12:00 AM		0	0	0
01:00		1	0	1
02:00		0	0	0
03:00		0	1	1
04:00		0	0	0
05:00		5	8	13
06:00		15	23	38
07:00		31	40	71
08:00		50	47	97
09:00		43	**53**	96
10:00		44	38	82
11:00		**53**	45	**98**
12:00 PM		46	76	122
01:00		58	73	131
02:00		66	35	101
03:00		51	77	128
04:00		77	117	194
05:00		111	**192**	**303**
06:00		**136**	106	242
07:00		111	103	214
08:00		67	39	106
09:00		55	21	76
10:00		23	5	28
11:00		7	2	9
Total		1050	1101	2151
Percent		48.8%	51.2%	
AM Peak		11:00	09:00	11:00
Vol.		53	53	98
PM Peak		18:00	17:00	17:00
Vol.		136	192	303

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 2
Station ID: 2
55TH N/O PUEBLO

Latitude: 0' 0.000 Undefined

Start Time	18-Apr-08 Fri	NB	SB	Total
12:00 AM		2	3	5
01:00		1	2	3
02:00		0	2	2
03:00		0	0	0
04:00		0	0	0
05:00		6	24	30
06:00		14	23	37
07:00		46	30	76
08:00		52	53	105
09:00		42	52	94
10:00		57	**83**	140
11:00		**78**	83	**161**
12:00 PM		95	70	165
01:00		78	63	141
02:00		64	60	124
03:00		62	68	130
04:00		105	**123**	**228**
05:00		**106**	116	222
06:00		77	74	151
07:00		65	62	127
08:00		56	16	72
09:00		37	10	47
10:00		22	9	31
11:00		2	4	6
Total		1067	1030	2097
Percent		50.9%	49.1%	
AM Peak		11:00	10:00	11:00
Vol.		78	83	161
PM Peak		17:00	16:00	16:00
Vol.		106	123	228

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 2
Station ID: 2
55TH N/O PUEBLO

Latitude: 0' 0.000 Undefined

Start Time	19-Apr-08 Sat	NB	SB	Total
12:00 AM		6	2	8
01:00		0	1	1
02:00		0	6	6
03:00		6	0	6
04:00		0	0	0
05:00		3	1	4
06:00		1	6	7
07:00		13	40	53
08:00		30	80	110
09:00		92	96	188
10:00		**126**	**129**	**255**
11:00		98	72	170
12:00 PM		88	70	158
01:00		78	86	164
02:00		56	86	142
03:00		88	**106**	**194**
04:00		**94**	89	183
05:00		74	56	130
06:00		79	25	104
07:00		32	32	64
08:00		34	13	47
09:00		7	13	20
10:00		2	7	9
11:00		4	4	8
Total		1011	1020	2031
Percent		49.8%	50.2%	
AM Peak		10:00	10:00	10:00
Vol.		126	129	255
PM Peak		16:00	15:00	15:00
Vol.		94	106	194

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 2
Station ID: 2
55TH N/O PUEBLO

Latitude: 0' 0.000 Undefined

Start Time	20-Apr-08 Sun	NB	SB	Total
12:00 AM		0	3	3
01:00		2	2	4
02:00		2	1	3
03:00		0	0	0
04:00		0	0	0
05:00		2	0	2
06:00		2	2	4
07:00		7	7	14
08:00		15	32	47
09:00		17	47	64
10:00		40	80	120
11:00		**86**	**111**	**197**
12:00 PM		87	86	173
01:00		83	**98**	181
02:00		95	91	186
03:00		**115**	78	**193**
04:00		101	62	163
05:00		44	52	96
06:00		51	44	95
07:00		51	23	74
08:00		36	11	47
09:00		3	5	8
10:00		4	4	8
11:00		2	0	2
Total		845	839	1684
Percent		50.2%	49.8%	
AM Peak		11:00	11:00	11:00
Vol.		86	111	197
PM Peak		15:00	13:00	15:00
Vol.		115	98	193

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 2
Station ID: 2
55TH N/O PUEBLO

Latitude: 0' 0.000 Undefined

Start Time	21-Apr-08 Mon	NB	SB	Total
12:00 AM		1	2	3
01:00		1	2	3
02:00		0	1	1
03:00		1	1	2
04:00		0	2	2
05:00		6	25	31
06:00		15	21	36
07:00		51	32	83
08:00		46	**72**	118
09:00		58	51	109
10:00		54	58	112
11:00		**83**	53	**136**
12:00 PM		58	102	160
01:00		79	81	160
02:00		63	47	110
03:00		67	77	144
04:00		115	158	273
05:00		**203**	**252**	**455**
06:00		99	130	229
07:00		169	72	241
08:00		55	24	79
09:00		39	10	49
10:00		8	5	13
11:00		3	5	8
Total		1274	1283	2557
Percent		49.8%	50.2%	
AM Peak		11:00	08:00	11:00
Vol.		83	72	136
PM Peak		17:00	17:00	17:00
Vol.		203	252	455

Cutting Edge Traffic Data LLC
12970 W 63rd Circle Unit B
Arvada, CO 80004
303-502-7343

Site Code: 2
Station ID: 2
55TH N/O PUEBLO

Latitude: 0' 0.000 Undefined

Start Time	22-Apr-08 Tue	NB	SB	Total
12:00 AM		1	2	3
01:00		0	0	0
02:00		0	0	0
03:00		0	0	0
04:00		1	1	2
05:00		6	10	16
06:00		14	**23**	37
07:00		**38**	23	**61**
08:00		*	*	*
09:00		*	*	*
10:00		*	*	*
11:00		*	*	*
12:00 PM		*	*	*
01:00		*	*	*
02:00		*	*	*
03:00		*	*	*
04:00		*	*	*
05:00		*	*	*
06:00		*	*	*
07:00		*	*	*
08:00		*	*	*
09:00		*	*	*
10:00		*	*	*
11:00		*	*	*
Total		60	59	119
Percent		50.4%	49.6%	
AM Peak		07:00	06:00	07:00
Vol.		38	23	61
PM Peak				
Vol.				
Grand Total		7101	7100	14201
Percent		50.0%	50.0%	
ADT	Not Calculated			

Appendix:
Background Information

City of Boulder TMP Traffic Model Volumes

City of Boulder Project Scoping Document

City of Boulder Signal Timing plans

1. Manhattan Drive and S Boulder Road
2. 55th Street and S Boulder Road
3. S Boulder Road Signal Coordination Data

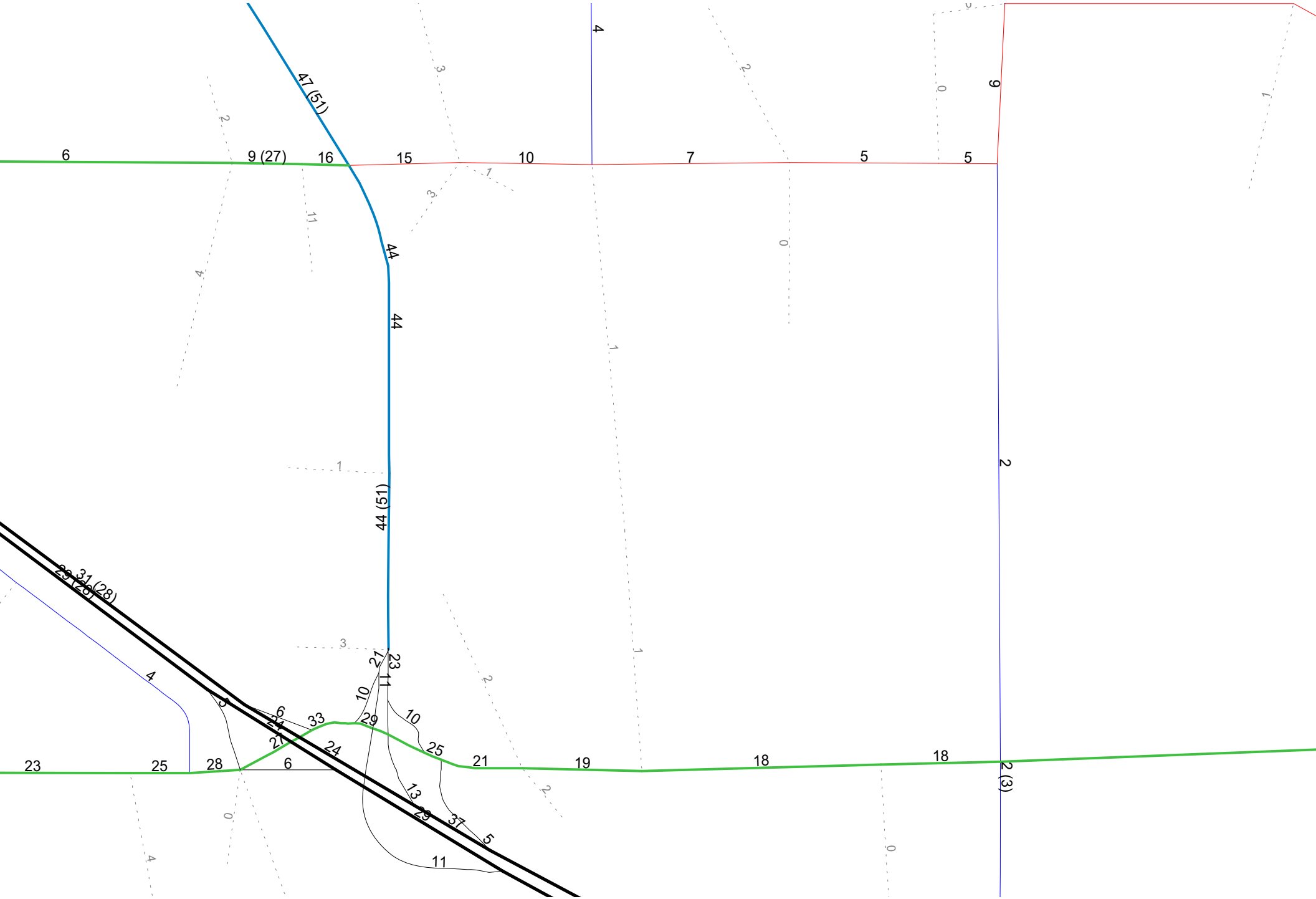
Existing Traffic Signal Warrant Analyses

4. Manhattan Drive and S Boulder Road
5. 55th Street and S Boulder Road

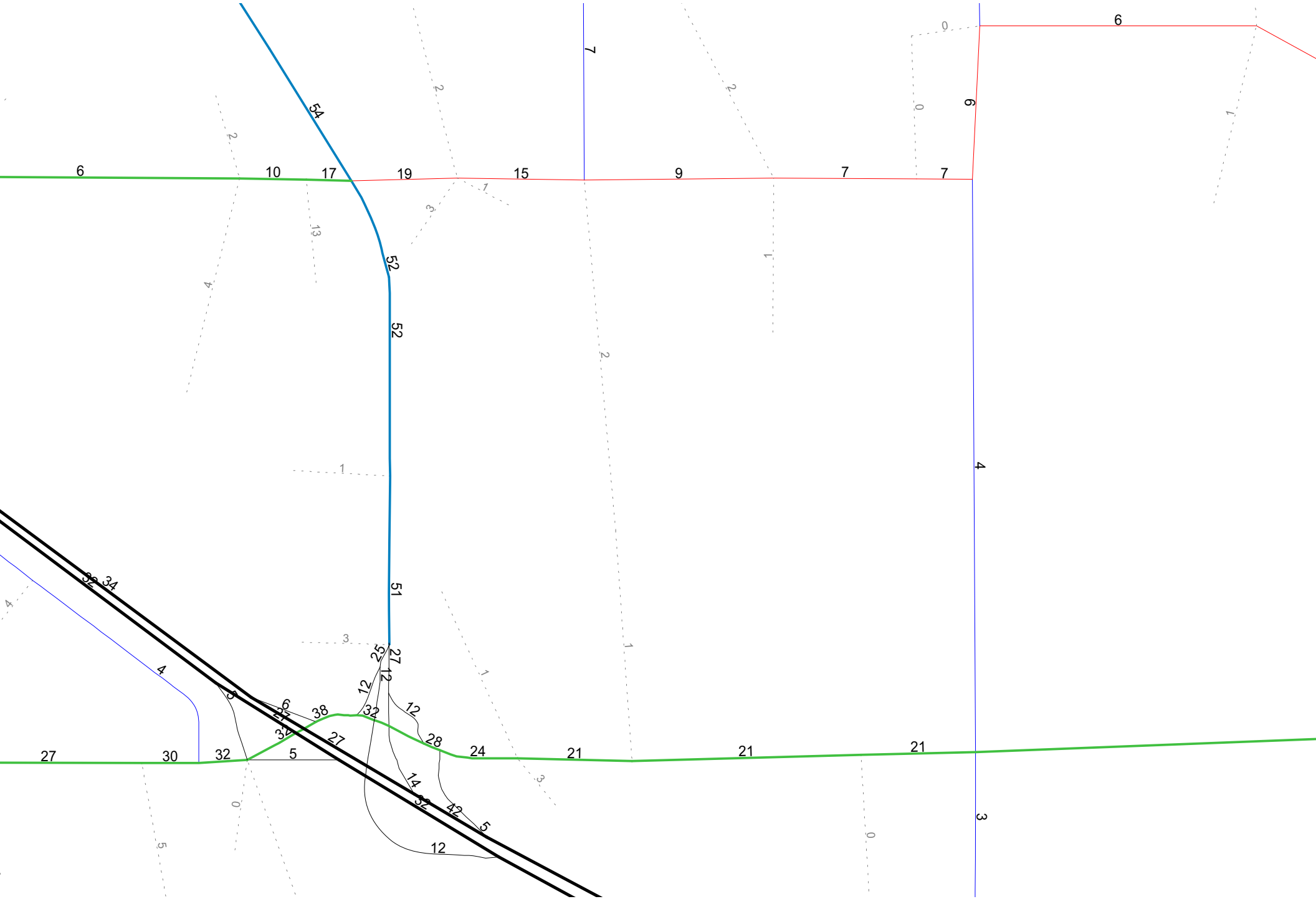
East Boulder Community Park Traffic Study

Fox-Higgins Transportation Group
October, 2008

Year 2001 Base Volumes



Year 2025 Fiscally Constrained Volumes



5399 Kewanee - Traffic Study Parameters

A traffic impact study is a requirement of Site Review since trip generation was shown to exceed the residential development threshold of 20 vehicle trips or greater during any single hour. In addition to meeting the following parameters, the traffic study format must be in compliance with section 2.03 of the City of Boulder Design and Construction Standards (DCS). Accident analyses and noise attenuation measures are not required by the city for this project.

Relevant Transportation Area and Sub-area Plans:

The traffic study must consider and comply with the following plans regarding future build-out volumes, connections, etc.:

1. The traffic study and site plan must be in compliance with the City of Boulder Transportation Master Plan (TMP).
    - The applicant is notified that the TMP shows a multi-use path extending from 55th Street on the eastern portion of this site, north across the Recreation Center property to connect with the existing multi-use path adjacent to the westernmost parking lot at the Recreation Center.
    - The TMP can be found on the City of Boulder website (www.bouldercolorado.gov) Follow the links to: Departments -> Public Works -> Transportation -> Transportation Master Plan
2. The traffic study and site plan should consider and coordinate with the Draft East Boulder Community Park Plan.

Proposed Street Sections/Improvements

A daily traffic volume analysis must be provided for each of the proposed public streets within the development in order to support the proposed street sections in accordance with Table 2-13 of the DCS. The transportation consultant or engineer preparing the study is encouraged to contact Michelle Mahan (303-441-4417) prior to Site Review submittal to confirm the street sections required by the analysis.

If public improvements are proposed in order to bring any approach of any intersection back up to level of service (LOS) D where the addition of project generated traffic has caused the LOS to fall below this standard for the city, the improvements must be demonstrated on the submitted site plans.

Study Area Boundaries

At a minimum, the following intersections must be analyzed:

- Baseline/Manhattan
- Baseline/55th
- South Boulder Road/Manhattan
- South Boulder Road/55th
- Kewanee/Manhattan
- Proposed street connection to Kewanee
- Proposed street connection to 55th

Level of Service Analysis

The level of service analysis must be performed for the above outlined intersections for:

- existing traffic conditions, project completion year background traffic, project completion year total traffic, 2025 background traffic, and 2025 total traffic
- am and pm peak hour conditions

For existing timing and phasing of signalized intersections, contact Joe Paulson, City of Boulder Signal Operations Engineer, at 303-441-3289.

A level of service comparison table must be provided which compares all level of service scenarios and includes the number of seconds of delay for <u>each movement</u>. All level of service

scenarios must be included on the same page for easy comparison.

Methods for Projecting Future Year Background Traffic Volumes
Future year background traffic volumes should consider the 2025 TMP travel model (see attached maps), historic traffic volume data if available, and the anticipated East Boulder Community Park improvements. The following should be noted when using the 2025 TMP travel model:

- The travel model includes assumptions that Boulder will increase its alternate mode share and in some corridors traffic volumes may actually decrease in the future, which is built into the model. The user of these model projections should be aware that these mode use assumptions are built into the TMP traffic model when developing future traffic estimates.
- Determine the percentage that the model is low or high by comparing the Base Year (2001) Volumes model assignment (numbers with no parenthesis) and the Base Year (2001) Volumes actual count (numbers with parenthesis). Use this percentage to appropriately adjust the Fiscally Constrained 2025 Volumes.

Historic Growth Rates and Intersection Count Data
Traffic counts and growth rate information can be found on the "Map It" function on the City of Boulder website (www.bouldercolorado.gov).
Follow the links to: A-Z -> TMP -> Map It -> Streets -> Traffic Counts

Since the latest available city counts are more than 2 years old, new counts should be taken.

Trip Generation Reductions
Any trip reduction methods used should be clearly demonstrated in the study. This includes but is not limited to reductions due to multi-modal/shared trips, internal trips, pass-by trips, and diverted trips.

Travel Demand Management Strategies
At the time of Site Review submittal, a Travel Demand Management (TDM) plan in accordance with section 2.03(I) of the DCS and section 9-2-14(h)(2)(D) of the Boulder Revised Code is required to be submitted which outlines strategies to mitigate traffic impacts created by the proposed development and implementable measures for promoting alternate modes of travel. The applicant should contact Andrea Robbins (303-441-4139) with GO Boulder, to discuss TDM options. In addition to incorporating the TDM plan into the traffic impact study, the TDM plan must also be submitted as a separate document with Site Review submittal.

FORM T1 — REVISED 3/80

CITY OF BOULDER

Actuated Controller Settings

REMARKS:

CABINET CHANGE-OUT:
ADJUST PHASING, CLEARANCES.

7/19/95 ADJUST CLEARANCES. CA 7-25-95
9/5/95 ADJUST Ø4/8 EXT. SZ 9-5-95
8/5/96 ADJUST MAXs. SZ 8/5/96

COORDINATING UNIT — CYCLE LEN =

KEY POSITION/FUNCTION	KEY POSITION/FUNCTION

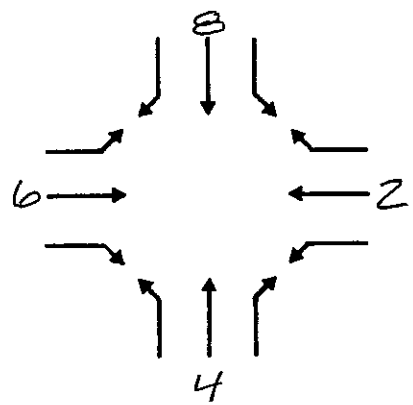
CIRCLE IF % INTERVAL OR % OFFSET

N

INTERSECTION LAYOUT
- INDICATE NORTH TOWARDS TOP
- DRAW/LABEL STICK DIAGRAM

PHASE Ø DIAGRAM

LABEL VEHICLE PHASES.



CROSS OUT PROHIBITED MOVEMENTS.

LOCATION

BASELINE & MANHATTAN/CRESCENT

CONTROLLER MANUFACTURER/MODEL

SAFETRAN 170 3368

SYSTEM: ____ COMPUTRAN
____ MIDWEST
____ OTHER

INITIATED BY JDP DATE 5/9/94

FIELD VERIFIED BY SZ DATE 5-10-94

ACTUATED CONTROLLER SETTINGS

PHASING			GREEN				MAXIMUMS			CLEAR-ANCE		PED			VOLUME-DENSITY				OTHER	
Ø	ACTU-ATED?	MOVE-MENT	MIN	INITIAL	VARIABLE INIT SEC/ACT	VEH EXT / UNIT EXT PASS	MAX 1 EXT LIM 1	MAX 2 EXT LIM 2	MAX INIT	YELLOW / VEHICLE	ALL RED	WALK	CLEAR	DELAY	MIN GAP	SLOPE	TIME BEFORE REDUCT-ION	TIME TO REDUCE		
2	N	WB	10			3.0 / ~~2.5~~	40	~~10~~		3.6	2.0	7 / ~~5~~	10 / ~~12~~							
						3.0														
4	Y	NB	6			~~2.0~~ / ~~2.5~~	40 / ~~20~~	~~99~~		3.0	2.0 / ~~3.0~~	8 / ~~5~~	19 / ~~21~~							
6	N	EB	10			3.0 / ~~2.5~~	40	~~10~~		3.6	2.0	7 / ~~5~~	10 / ~~12~~							
						3.0														
8	Y	SB	6			~~2.0~~ / ~~2.5~~	40 / ~~20~~	~~99~~		3.0	2.0 / ~~3.0~~	8 / ~~5~~	19 / ~~21~~							

LOCATION ____ #79

FORM T1 — REVISED 3/80

CITY OF BOULDER

Actuated Controller Settings

REMARKS:

NEW SIGNAL INSTALLATION.

5/9/94 CABINET CHANGE-OUT.

8/1/95 ADJUST CLEARANCES. CA 8/4/95

9/15/97 ADJUST Ø1 MAX1, CLEAR MAX 2's. KB 9/17/97

3/8/05 ADJUST Ø4/8 MAX. JDP 3/8/05

*COORDINATING UNIT — CYCLE LEN =

KEY POSITION/FUNCTION	KEY POSITION/FUNCTION

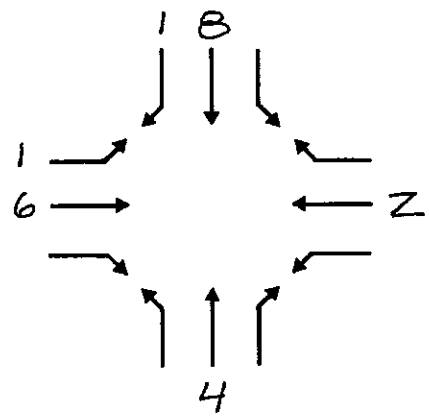
CIRCLE IF % INTERVAL OR % OFFSET

N

INTERSECTION LAYOUT
- INDICATE NORTH TOWARDS TOP
- DRAW/LABEL STICK DIAGRAM

PHASE Ø DIAGRAM

LABEL VEHICLE PHASES.



CROSS OUT PROHIBITED MOVEMENTS.

LOCATION

BASELINE & 55TH

CONTROLLER MANUFACTURER/MODEL

SAFETRAN 170 336S

SYSTEM: _____ COMPUTRAN
_____ MIDWEST
_____ OTHER

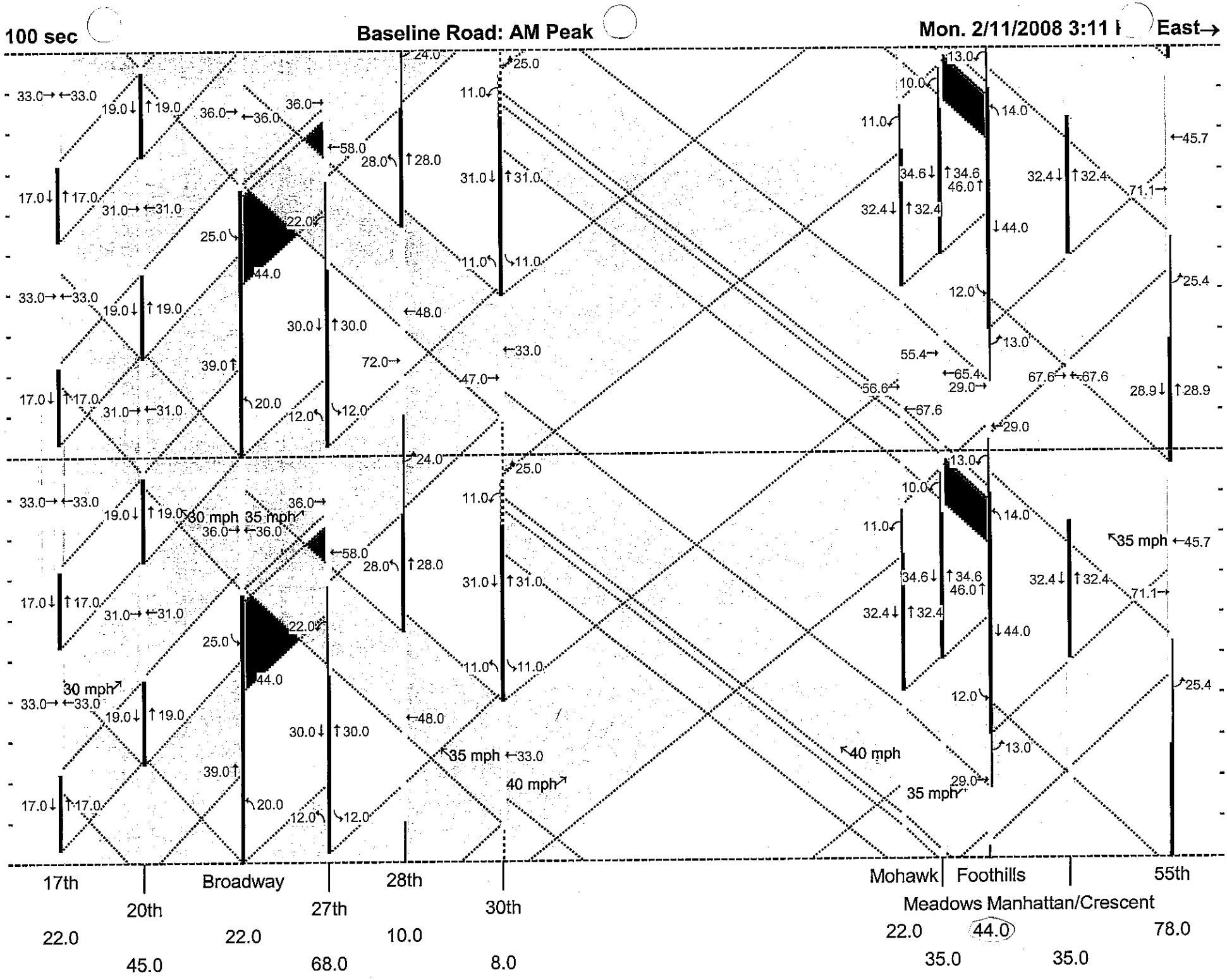
INITIATED BY JDP DATE 5/18/92

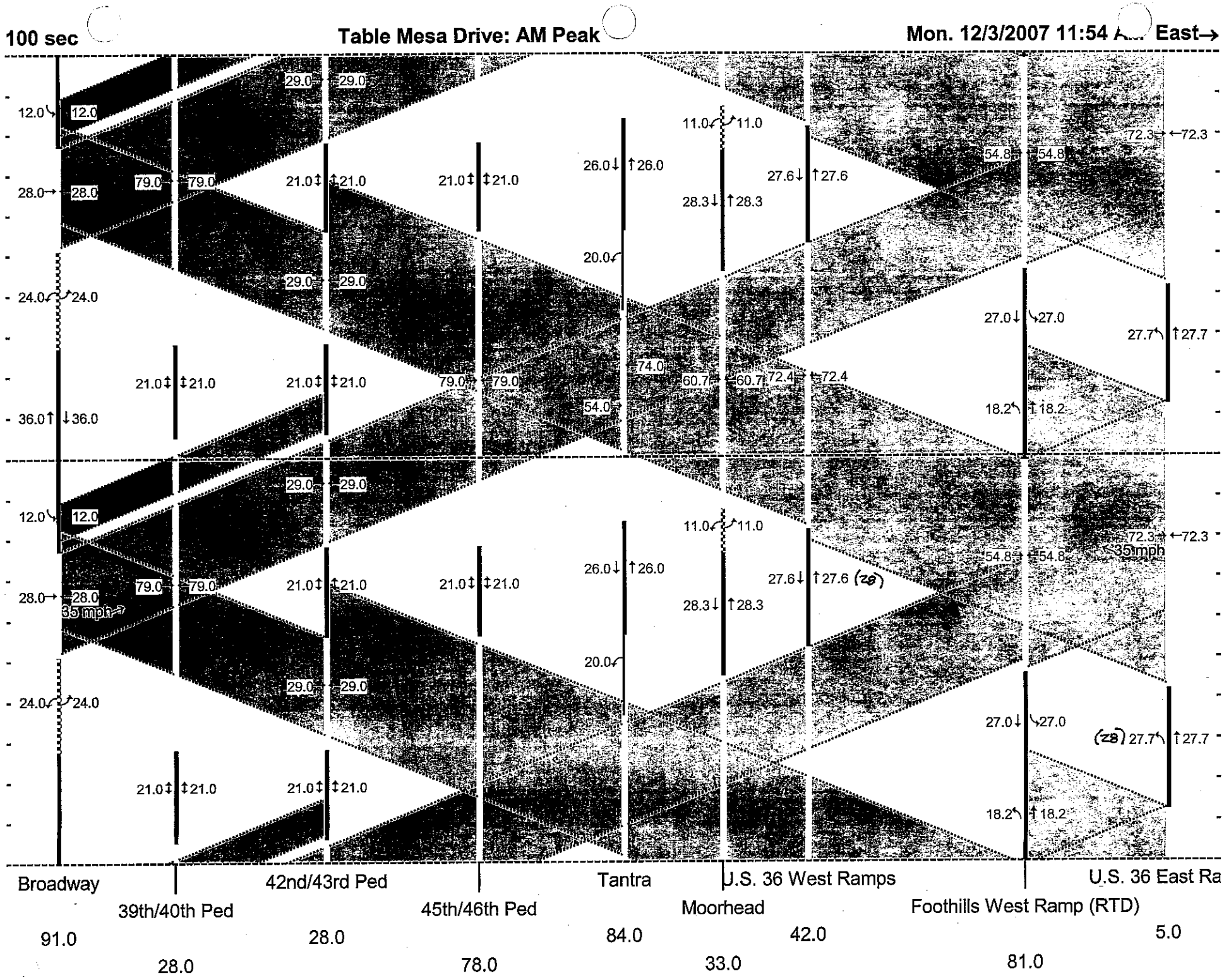
FIELD VERIFIED BY Stan Z. DATE 5-21-92

ACTUATED CONTROLLER SETTINGS

PHASING			GREEN				MAXIMUMS			CLEAR-ANCE		PED			VOLUME-DENSITY				OTHER	
Ø	ACTU-ATED?	MOVE-MENT	MIN	INITIAL	VARIABLE INIT SEC/ACT	VEH EXT UNIT EXT PASS	MAX 1 EXT LIM 1	MAX 2 EXT LIM 2	MAX INIT	YELLOW VEHICLE	ALL RED	WALK	CLEAR	DELAY	MIN GAP	SLOPE	TIME BEFORE REDUCT-ION	TIME TO REDUCE		
1	Y	EB LT	4			1.0	40 ~~25~~	99		3.0	2.0 ~~2.6~~									
2	N	WB	10 ~~6~~			3.0 ~~2.5~~	40	10		3.9	1.8	5	15							
4	Y	NB	6			2.0	30 ~~25~~	99		3.6	2.0 ~~2.2~~	5	17							
6	N	EB	10 ~~6~~			3.0 ~~2.5~~	40	10		3.9	1.8	5	15							
8	Y	SB	6			2.5	30 ~~25~~	~~99~~		3.6	2.0 ~~2.2~~	5	17							

LOCATION #109

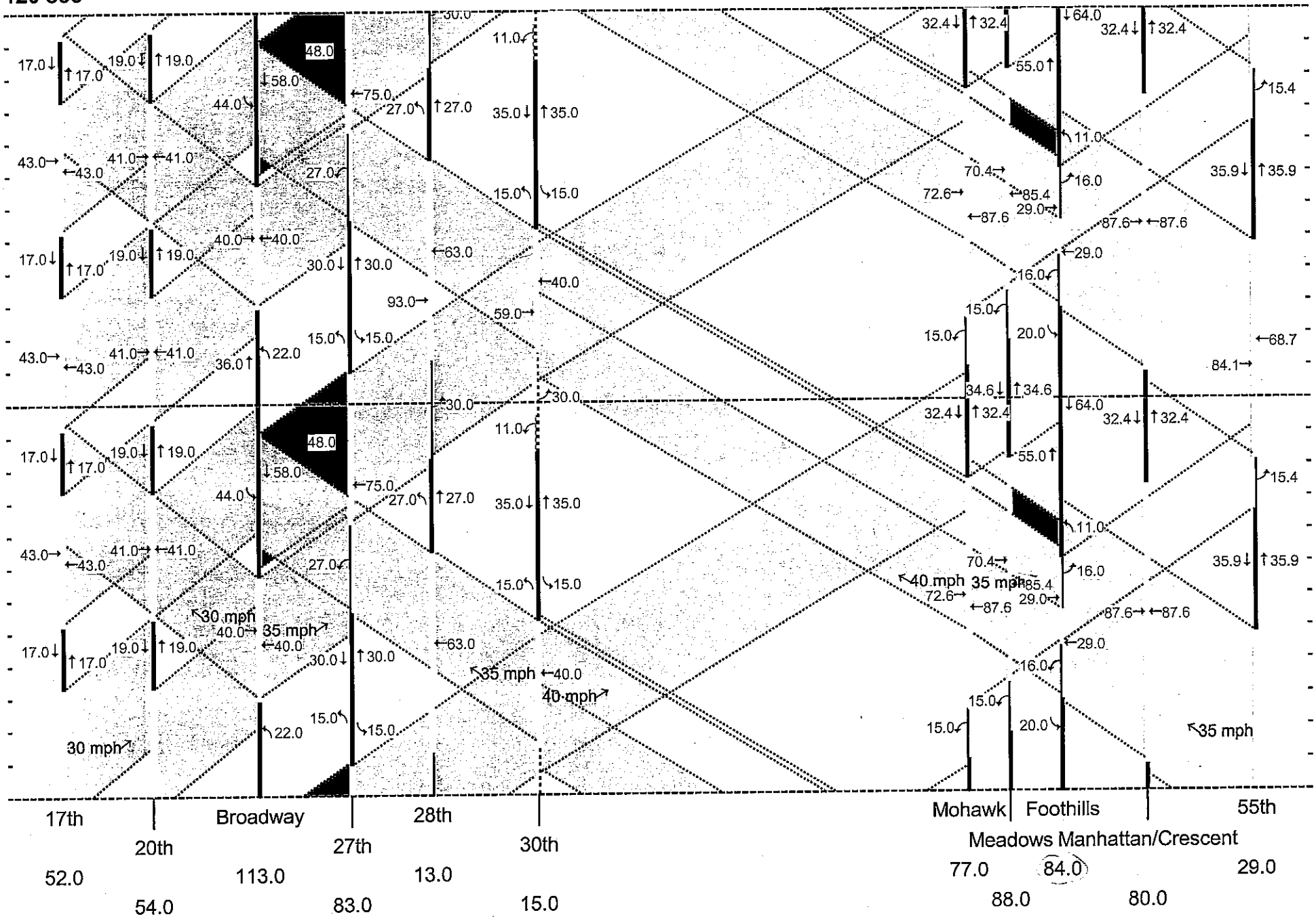

100 sec
Baseline Road: AM Peak
Mon. 2/11/2008 3:11 P
East→
Monday, February 11, 2008, 3:11:45 PM
30.00 seconds/inch
30 mph 35 mph
30 mph
35 mph
40 mph
35 mph
17th
20th
Broadway
27th
28th
30th
Mohawk
Foothills
55th
Meadows Manhattan/Crescent
22.0
45.0
22.0
68.0
10.0
8.0
22.0
44.0
35.0
35.0
78.0


100 sec
Table Mesa Drive: AM Peak
Mon. 12/3/2007 11:54 A... East→
30.00 seconds/inch
Broadway
39th/40th Ped
42nd/43rd Ped
45th/46th Ped
Tantra
Moorhead
U.S. 36 West Ramps
Foothills West Ramp (RTD)
U.S. 36 East Ra
91.0
28.0
28.0
78.0
84.0
33.0
42.0
81.0
5.0
35 mph
35mph

120 sec

Baseline Road: PM Peak

Mon. 2/11/2008 3:30 PM East→

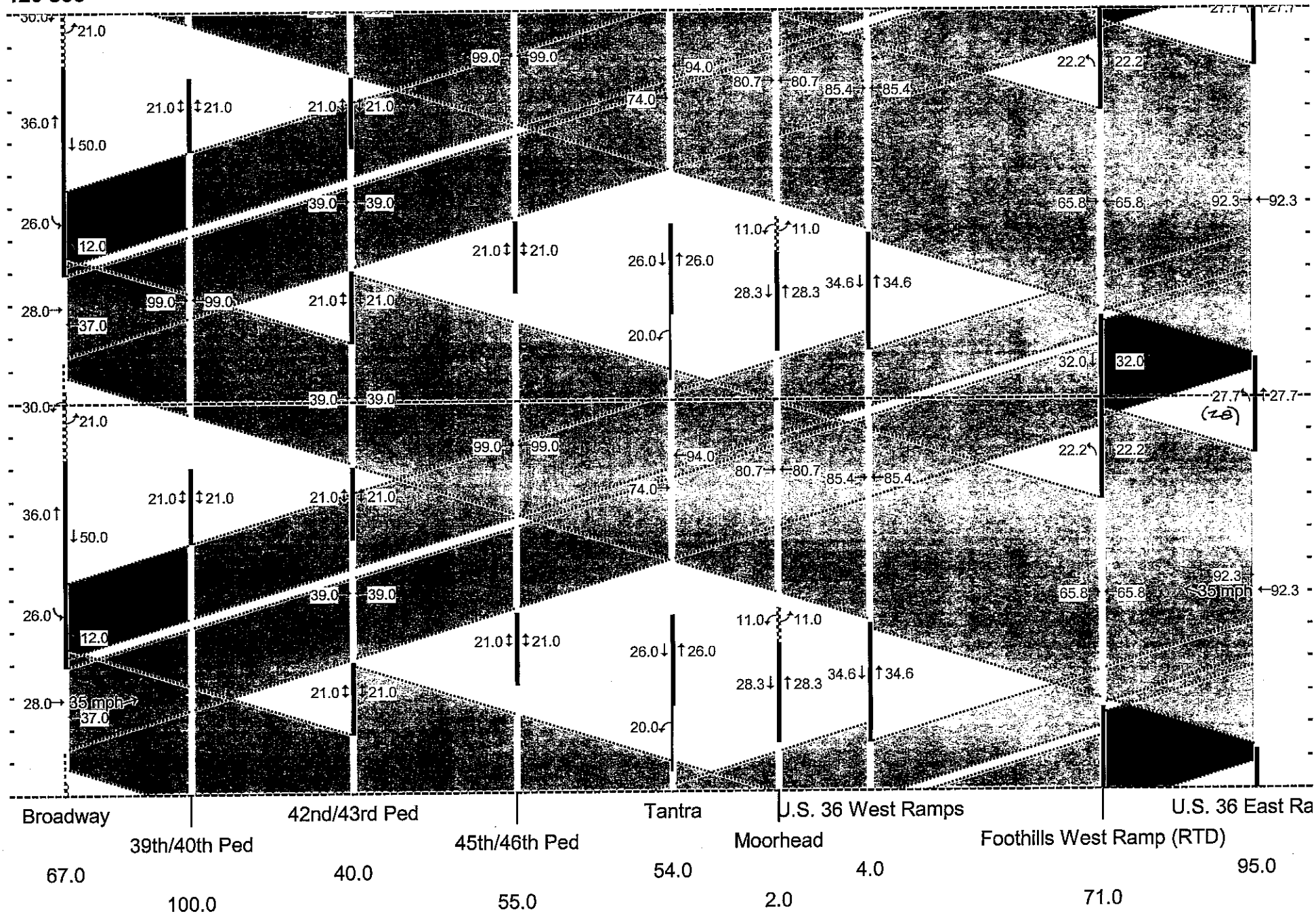


40.00 seconds/inch

120 sec

Table Mesa Drive: PM Peak

Mon. 12/3/2007 2:38 PM East→

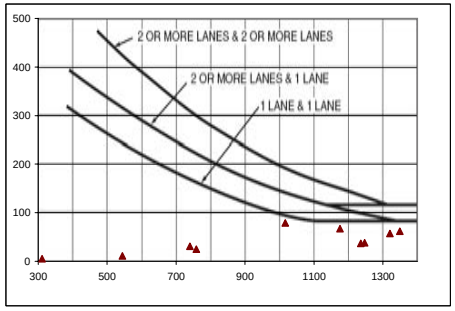


40.00 seconds/inch

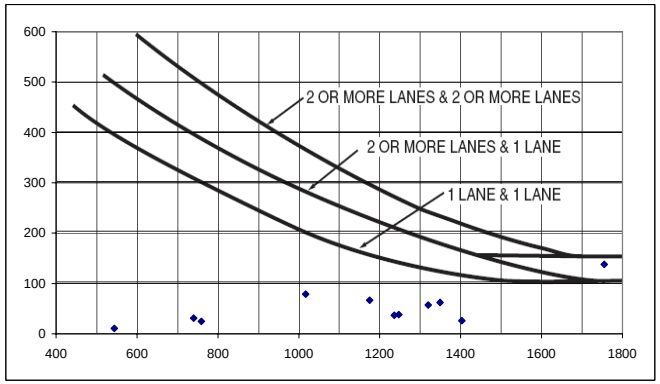
Existing Traffic Signal Warrants

55th	SB	Rank	S Boulder Traffic	Eight Hour Cond A	Eight Hour Cond B	four hour for major volume greater than 1400 vph	Peak Hour for major volume conditions greater than 1700 vph
0:00	1	20	96	Not Met	Not Met	Not Met	Not Met
1:00	1	20	42	Not Met	Not Met	Not Met	Not Met
2:00	0	22	34	Not Met	Not Met	Not Met	Not Met
3:00	0	22	32	Not Met	Not Met	Not Met	Not Met
4:00	0	22	54	Not Met	Not Met	Not Met	Not Met
5:00	3	18	204	Not Met	Not Met	Not Met	Not Met
6:00	25	15	759	Not Met	Not Met	Not Met	Not Met
7:00	55	8	2237	Not Met	Not Met	Not Met	Not Met
8:00	37	11	2491	Not Met	Not Met	Not Met	Not Met
9:00	62	6	1349	Not Met	Not Met	Not Met	Not Met
10:00	67	5	1175	Not Met	Not Met	Not Met	Not Met
11:00	57	7	1320	Not Met	Not Met	Not Met	Not Met
12:00	38	10	1247	Not Met	Not Met	Not Met	Not Met
13:00	37	11	1236	Not Met	Not Met	Not Met	Not Met
14:00	26	14	1403	Not Met	Not Met	Not Met	Not Met
15:00	40	9	1864	Not Met	Not Met	Not Met	Not Met
16:00	120	3	2143	Not Met	Met	Met	Met
17:00	133	2	2637	Not Met	Met	Met	Met
18:00	138	1	1755	Not Met	Met	Met	Not Met
19:00	79	4	1017	Not Met	Met	Not Met	Not Met
20:00	31	13	740	Not Met	Not Met	Not Met	Not Met
21:00	11	16	544	Not Met	Not Met	Not Met	Not Met
22:00	5	17	311	Not Met	Not Met	Not Met	Not Met
23:00	3	18	167	Not Met	Not Met	Not Met	Not Met

Four Hour for major volume less than 1400 vph

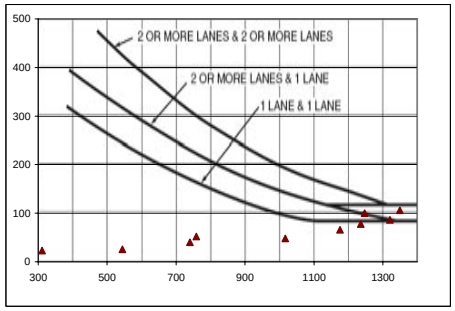


For Major Volume Conditions less than 1800 vph

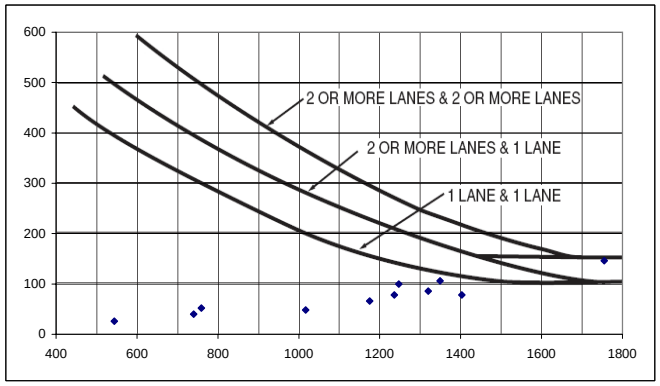


Manhattan	SB	Rank	S Boulder Traffic	Eight Hour Cond A	Eight Hour Cond B	four hour for major volume greater than 1400 vph, single lane minor approach	Peak Hour for major volume conditions greater than 1800 vph, single lane minor approach
0:00	4	20	96	Not Met	Not Met	Not Met	Not Met
1:00	0	24	42	Not Met	Not Met	Not Met	Not Met
2:00	1	22	34	Not Met	Not Met	Not Met	Not Met
3:00	1	22	32	Not Met	Not Met	Not Met	Not Met
4:00	3	21	54	Not Met	Not Met	Not Met	Not Met
5:00	23	17	204	Not Met	Not Met	Not Met	Not Met
6:00	52	13	759	Not Met	Not Met	Not Met	Not Met
7:00	139	4	2237	Not Met	Met	Met	Met
8:00	128	6	2491	Not Met	Met	Met	Met
9:00	106	7	1349	Not Met	Met	Not Met	Not Met
10:00	66	12	1175	Not Met	Not Met	Not Met	Not Met
11:00	86	9	1320	Not Met	Met	Not Met	Not Met
12:00	100	8	1247	Not Met	Met	Not Met	Not Met
13:00	78	10	1236	Not Met	Met	Not Met	Not Met
14:00	78	10	1403	Not Met	Met	Not Met	Not Met
15:00	133	5	1864	Not Met	Met	Met	Met
16:00	143	2	2143	Not Met	Met	Met	Met
17:00	141	3	2637	Not Met	Met	Met	Met
18:00	146	1	1755	Not Met	Met	Met	Met
19:00	48	14	1017	Not Met	Not Met	Not Met	Not Met
20:00	40	15	740	Not Met	Not Met	Not Met	Not Met
21:00	26	16	544	Not Met	Not Met	Not Met	Not Met
22:00	23	17	311	Not Met	Not Met	Not Met	Not Met
23:00	7	19	167	Not Met	Not Met	Not Met	Not Met

Four Hour for major volume less than 1400 vph



For Major Volume Conditions less than 1800 vph



East Boulder Community Park Traffic Study

Boulder, Colorado

Submitted To:
Boulder Parks and Recreation Department

Submitted By:
Fox Higgins Transportation Group, LLC
P.O. Box 19768
Boulder, CO 80308

October 6, 2008

1.0 Introduction

The City of Boulder Parks and Recreation Department is developing plans to provide enhancements to the East Boulder Community Park located adjacent to the East Boulder Recreation and Senior Centers. The park location and vicinity are illustrated on Figure 1.

Currently the park has a variety of outdoor court facilities, a playground, a dog park, and a large open turf area approximately the size of one and one half soccer fields. The turf area is used for programmed sports activities with the most active being youth soccer. The park is served by a 104 space parking lot (separate from the recreation center parking lot) located between the soccer field and the court area. A paved multi-use path traverses through the park in an east-west direction. The park currently includes a large unimproved and unused dirt area located between the soccer field and the dog park, south of the parking lot.

This traffic study estimates the additional traffic that will be generated by proposed new uses at the park and analyzes the traffic impact on area roadways. It also evaluates the impact of completing the missing section of Sioux Drive adjacent to the recreation center parking lot.

2.0 Proposed Park Expansion

The proposed park improvement plan includes a number of enhancements to the existing court area, including restrooms, lighting, shelters, and new p'etanque courts. There will also be improvements made to the dog park area. A second 104 space parking lot will be added south of the dog park with access to 55th Street. This new parking area will provide efficient access to the south end of the new turf field and the dog park. The proposed park enhancement plan is illustrated on Figure 2.

The most significant expansion to the park that will impact traffic access is the addition of a new soccer/turf field south of the existing parking lot. In addition, both soccer/turf fields (new and existing) will be surfaced with artificial turf. The new turf/soccer field will allow for an expansion of the existing programmed recreational sports use on any given day, and the artificial turf will likely extend the use of the fields over a long season.

3.0 Existing Roadway and Traffic Conditions

All traffic accessing the park and recreation center from outside the immediate neighborhoods must use 55th Street from either Baseline Road on the north or South Boulder Road on the south. 55th Street is classified as a collector and has a 25 mph speed limit. Portions of 55th Street in this segment are narrow, curving, and have landscaped medians. The 55th Street alignment is not continuous across the park, and the southern portion winds to the east around the recreation center. Sioux Drive travels along the north edge of the park and connects the north and south portions of 55th Street but even it is not continuous adjacent to the recreation center. A short segment of Sioux Drive was not completed historically, but a connection through the recreation center parking lot is

physically possible. The net result is a very disjointed and indirect roadway connection between Baseline Road and South Boulder Road in the 55th Street corridor.

Existing traffic conditions in the vicinity of the park were documented this spring during the youth soccer season (historically the peak use period of the park), including:

- Weekday PM peak hour traffic in the Baseline/55th Street intersection and the South Boulder Road/55th Street intersection
- 24-hour traffic volume on 55th Street both north and south of the park on weekdays and weekends
- Parking lot utilization during weekday PM and Saturday morning peak hours when youth soccer was in session
- Parking occupancy on adjacent residential roadways and school parking lot during periods of youth soccer activity
- East-west cut-through traffic in the recreation center parking lot adjacent to the missing section of Sioux Drive.

Existing traffic conditions are summarized in Figures 3 and 4. Significant observations include the following:

- There are approximately 2,500 vehicles per weekday using 55th Street just north of the park and 1,200 vehicles per day just south of the park.
- Weekend traffic on 55th Street is typically 20 to 25% lower than on weekdays.
- Existing traffic on 55th Street is well below the daily roadway capacity which is typically considered to be at least 10,000 vehicles per day on 2-lane collectors.
- The 104 space parking lot is full during the weekday PM peak hour when inbound and outbound soccer teams overlap when the fields are transitioning between the early and late afternoon programmed use periods. The parking lot utilization peaked at 82% on Saturday mornings during the soccer turnover period.
- No significant park related parking was observed on any of the surrounding neighborhood streets. There was some park related parking in the south lot at the Manhattan School to the west of the existing turf area.

Existing weekday PM peak hour traffic level of service (LOS) was calculated for the Baseline/55th and South Boulder Road/55th intersections using calculation procedures detailed in the Federal Highway Association's Highway Capacity Manual. The LOS scale uses letter grades between A and F, with A representing little or no congestion, and F representing periods with significant congestion and vehicular delay. A detailed description of traffic conditions associated with each letter grade is attached in the Appendix. The LOS is calculated for each intersection approach movement (left, through, or right as appropriate), and summarized for the entire intersection. Intersection peak hour LOS in the A-D range is typically considered acceptable, while LOS E or F may indicate the need for mitigation measures (although it should be noted that it is common for stop sign controlled side street approaches to arterial roadways to operate in the LOS E or F range at accepted levels of delay) .

Table 1 summarizes the LOS in each intersection and detailed calculation sheets are included in the Appendix. It can be seen that the signalized Baseline/55th Street intersection currently operates acceptably at LOS D, with individual southbound movements experiencing congestion (using the same signal timing inputs as programmed by City of Boulder staff in the field). The South Boulder Road/55th Street intersection currently operates well, with the southbound stop controlled movement at LOS C.

4.0 Connecting Sioux Drive to Avoid Parking Lot Cut-Through

As noted above, the discontinuous segment of Sioux Drive results in through traffic cutting through the recreation center parking lot. This cut-through movement was documented during the weekday PM peak hour and the Saturday morning peak hour when there were programmed soccer activities at the park. Figure 4 illustrates the cut-through route in the parking lot. Approximately 100 vehicles were observed during the weekday PM peak with half traveling in each direction. Approximately 60 vehicles were observed on Saturday morning cutting through the lot.

It is not known how much of this traffic cutting through the parking lot might have been destined to/from the west parking lot and the soccer field. Similarly, it is also not known how much traffic is from adjacent neighborhoods, or how much is traveling all the way between Baseline Road and South Boulder Road. But what is known is that this through traffic in a parking lot is not desirable and potentially an unsafe mix with autos and pedestrians accessing parking stalls at the recreation center. While we are not aware of a documented accident problem, it is our understanding from recreation center staff that there are numerous close calls and associated complaints.

The proposed park improvement plan includes the connection of the missing piece of Sioux Drive. It is our opinion that this will be a significant safety improvement in the vicinity of the recreation center. It is understood that adjacent neighborhood residents may be concerned that this connection will "attract" traffic traveling through between Baseline Road and South Boulder Road. To address this concern, the Parks Department has proposed that a median and speed humps be constructed in Sioux Drive to add "travel impedance or friction" and discourage cut-through travel. It is our understanding that the Boulder Fire Department does not object to these traffic calming measures because this section of the 55th Street corridor is not a Critical Emergency Response Route and the speed humps will be placed so as to not impede their response route to the west access of the recreation center parking lot.

Finally, a serious of timed trips between Baseline Road and South Boulder Road (both directions) were conducted on Foothills Highway, 55th Street, and Cherryvale Road. Results indicate that it takes more than twice as long to travel along 55th Street, with over a two minute penalty relative to either of the other two routes. On this basis we do not believe this connection on Sioux Drive will attract any new cut-through traffic from outside the area, and we strongly support its implementation.

5.0 Trip Generation

Studies at many other parks in Boulder and other communities have indicated that each park and the traffic that they generate tends to be unique to each location and there is no established "trip generation rate" that would accurately predict what the proposed park expansions at this location will generate. Since the proposed expansion of this park is predominantly adding more of the existing park uses, we have estimated the automobile trips that will be generated based on a detailed observation of the traffic accessing the existing park. In addition to the traffic data listed above, this study has included observations of the pedestrian interaction between the existing 104 space parking lot and the adjacent recreational facilities to help with estimation of future park traffic.

As noted above, the predominant new or expanded use at the park will be the addition of a new soccer/turf field. The new field will increase the available space for programmed soccer by approximately 70%.

It is estimated, base on our observations of park access, that the current soccer activity generates 100 inbound and 100 outbound automobile trips during the weekday PM peak hour when youth soccer is in operation. For purposes of this study it is estimated that the new park enhancements and expansions will add an additional 100 inbound and 100 outbound automobile trips during the weekday PM peak hour. Most of this traffic will be related to the new turf field but some will also be generated by the enhancements to the rest of the park. Weekend traffic increases will likely be 70 to 80% of the weekday increases, at a time when the adjacent roadways are carrying less traffic.

6.0 Trip Distribution

Based on the location of the new soccer/turf field within the park, the addition of a new 104 space parking lot on the south side of the park, existing traffic patterns, and the general location of the park relative to the rest of the community, it is estimated that:

- 50% of the new park traffic will be oriented to/from Baseline Road, and 50% will be oriented to/from South Boulder Road.
- There will be no significant increase (and possibly a slight decrease) in traffic accessing the park from the Manhattan Drive corridor.

The anticipated directional distribution of new park access traffic is illustrated in Figure 5.

7.0 Traffic Assignment

The anticipated new PM peak hour traffic accessing the park has been assigned to the adjacent roadways using the directional distribution assumptions discussed above. The result is illustrated in Figures 6A and 6B. It is anticipated that the location of the new parking lot will minimize the amount of park traffic that circulates around the recreation center, but will not eliminate it.

8.0 Existing Plus Site Generated Traffic Conditions

The new park traffic was added to the existing peak traffic during the weekday PM peak hour. The result is illustrated on Figure 7. The 55th Street intersections at Baseline Road and South Boulder Road were then evaluated, using the same procedures described above, to determine the impact of the additional park traffic (calculation sheets in the Appendix). It can be seen in Table 1 that the additional park traffic will add marginally (less than a second per vehicle) to the overall delay at the Baseline intersection, and none of the individual intersection approaches will drop a letter grade. The slight increase in overall delay results in the intersection LOS dropping into the E range, but just slightly. No improvements are needed to accommodate the additional park traffic at this intersection.

The delay for the southbound approach at the South Boulder Road/55th Street intersection will increase by approximately 4 seconds per vehicle, which drops this approach's LOS into the D range. This intersection will continue to operate acceptably with the existing stop sign control.

9.0 Year 2030 Background Traffic Conditions

Traffic projections have been made for a long range planning horizon (Year 2030) to allow an evaluation of the additional park traffic in the future when area traffic has increased. Background traffic projections (without the addition of new park traffic) have been made by using projections on area roadways in the City's regional travel model, and by incorporating the potential traffic increase related to the residential development of the vacant parcel immediately southwest of the park. This residential development is currently in the planning process and traffic projections for that site have been incorporated into this study. That project is currently evaluating two access scenarios, with and without a local roadway connection to Kiwanne Drive and the Manhattan corridor. To be conservative relative to 55th Street traffic, this study has used the projections that do not include a local connection to Kiwanne Drive. The resultant Year 2030 background traffic projections are illustrated in Figure 8 at the Baseline/55th and South Boulder Road/55th Street intersections.

The LOS at the major intersections serving the park site was evaluated for this future year background condition using the same procedures described above. The results are included in Table 1. It can be seen that the signalized Baseline/55th intersection will

continue to operate in the LOS E range with only a marginal increase in average vehicle delay.

At the South Boulder Road/55th intersection the southbound approach drops into the LOS E range. This is due to the addition of the new residential traffic and the increases in background traffic on South Boulder Road which make it harder to turn out onto South Boulder Road from 55th during the peak hour. The relative need for a traffic signal or other intersection improvement at this location is discussed in a following section of this report.

10.0 Year 2030 Plus Site Traffic Conditions

New park traffic has been added to the Year 2030 background traffic discussed above to yield the projected Year 2030 total traffic illustrated on Figure 9. A LOS evaluation at the Baseline/55th intersection indicates that the intersection will continue to operate in the LOS E range with most individual traffic movements remaining at the same LOS. The northbound left turn is projected to drop into the LOS E range with the addition of both the new park and new residential traffic.

The South Boulder Road intersection will experience an increase in delay on the southbound approach with the addition of the new park traffic (on top of the new residential traffic). This approach is calculated to operate in the LOS F range (although we typically observe that the LOS software and calculation procedures tend to overestimate the delay for side streets at stop signs). The next section of this report discusses potential mitigation measures for this condition.

11.0 Traffic Control at the South Boulder Road / 55th Street Intersection

The LOS analysis at the South Boulder Road/55th Street intersection has concluded that the southbound stop sign controlled approach to this intersection currently operates acceptably at LOS D. This approach will drop to LOS E in the PM peak hour in the Year 2030 with the addition of the adjacent residential project (or the park expansion without the residential project), and it will drop to LOS F with both the park expansion and the residential project's traffic added.

While this level of side street delay exists today at many other intersections in town, it does suggest that potential mitigation measures be identified. Two choices are described below:

- 55th Street is approximately 40 feet wide north of South Boulder Road with single northbound and southbound travel lanes. The existing pavement could be restriped to maintain a single northbound lane but add a separate short (say 40 feet plus transition) southbound left turn lane. This restriping would require prohibiting on-street parking along 55th for some distance north of South Boulder Road in an area where the adjacent land area is vacant. This southbound left turn lane would allow the higher right turning southbound traffic

the ability to access westbound South Boulder Road more efficiently. In the Year 2030 Total traffic scenario, this improvement would allow the southbound right turns to operate at LOS B and the overall southbound approach would operate at LOS E (calculation sheet in the Appendix). This would be a significant improvement for southbound traffic, although given the width of the roadway, this side-by-side southbound approach may already be occurring to some extent.

- Another way to minimize congestion for southbound traffic (at the expense of east-west traffic on South Boulder Road) would be to install a traffic signal. The Manual on Uniform Traffic Control Devices (MUTCD) includes a set of traffic signal "warrants" to determine if a traffic signal may be needed, and typically a number of these warrants must be met before the City would consider installing a traffic signal. The Peak Hour Warrant is one that can be evaluated at the traffic study stage and is often used as an indicator for future traffic mitigation needs and measures. Figure 10 includes the peak hour warrant graph with plotted points for each of the traffic scenarios evaluated in this study. A review of this peak hour warrant graph indicates that:

  - Existing traffic does not warrant a traffic signal in the PM peak hour.
  - The "Existing Plus Site" and "Year 2030 Background" scenarios both may warrant a signal in the PM with the single southbound lane, and both would not warrant a signal if a second southbound lane were added.
  - The "Year 2030 Total" traffic scenario may warrant a signal even with the addition of a second southbound approach lane, but the City would need to confirm at the time (looking at all the warrants based on actual traffic volumes, accident history, etc.). It should be noted that not all intersections meeting a peak hour signal warrant are actual candidates for traffic signal installation.

12.0 Conclusions and Recommendations

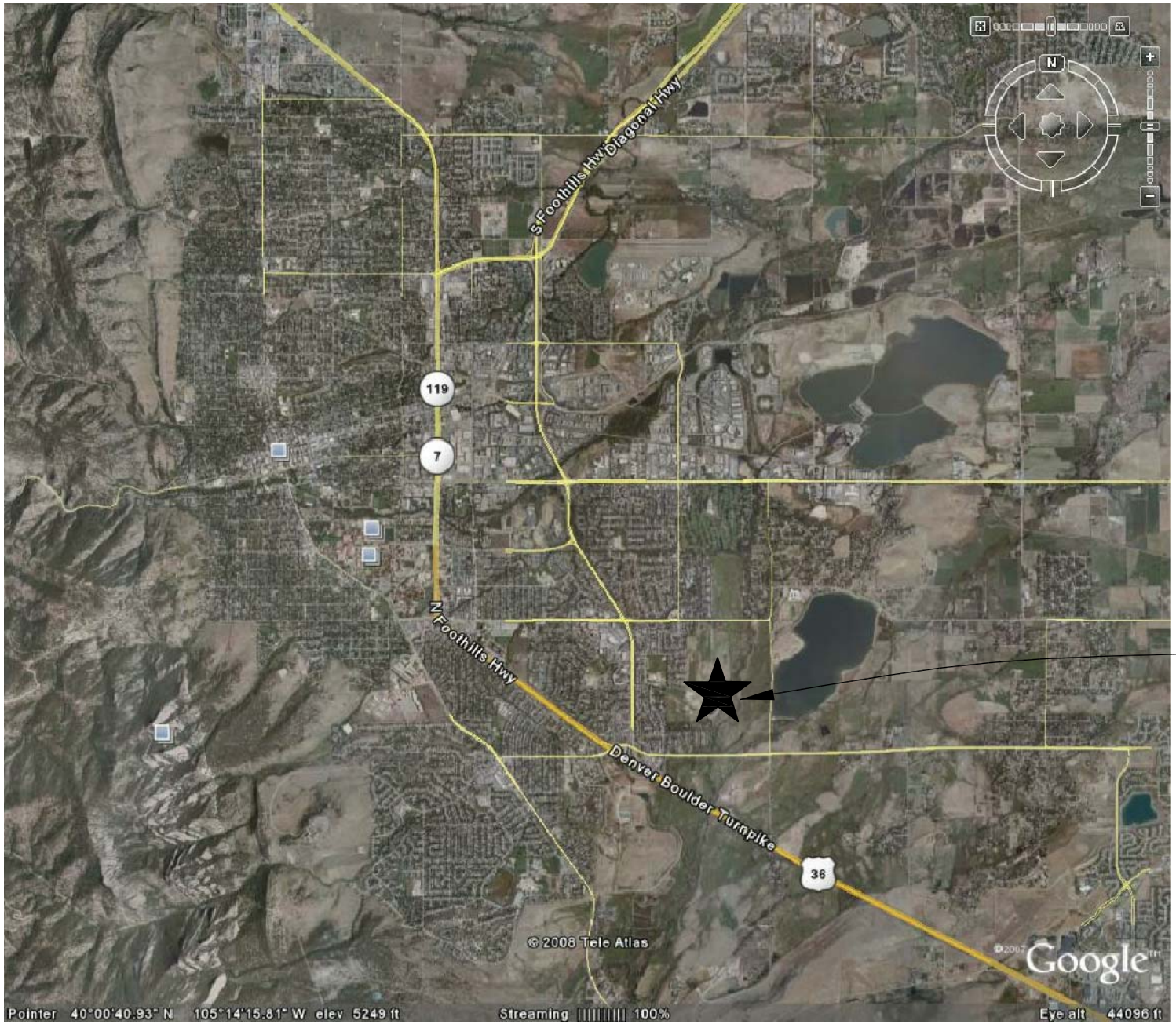
This traffic study has evaluated the anticipated traffic impacts associated with the expansion of the East Boulder Community Park. The most significant new traffic generator during peak traffic access times will be the addition of another soccer/turf field. Traffic projections have been made for near term and long term planning horizons, and the addition of traffic from the potential new residential development south of the park has been included. Significant observations and recommendations include:

- New park uses may add approximately 100 inbound and 100 outbound vehicle trips during the weekday PM peak hour when the turf fields are programmed for youth soccer.
- Peak weekend traffic is less than peak weekday traffic, and the background traffic on adjacent roadways is also less on weekends.
- The 55th Street corridor will be able to easily accommodate the additional traffic generated by the park from a volume-to-capacity perspective.
- New traffic will likely be distributed equally from the Baseline and South Boulder Road corridors, and no significant increase on Manhattan Drive is anticipated.
- The new 104 space parking lot should be able to accommodate the increased parking demand generated by proposed enhancements.
- The missing piece of Sioux Drive should be completed to eliminate the parking lot cut-through that currently exists at the recreation center. We do not anticipate that this connection will attract any new cut-through traffic between Baseline Road and South Boulder Road, but we do support the proposed traffic calming treatments on Sioux Drive to manage traffic speed in this area.
- The signalized intersection of Baseline Road and 55th Street will be able to accommodate the increased traffic projected from all sources in the Year 2030 with marginal increase in overall vehicle delay.
- The southbound approach to the stop sign on 55th Street at South Boulder Road will experience increased delay over time as traffic grows on South Boulder Road and the park expansion and the adjacent residential project are implemented. It is questionable whether the City's traffic signal warranting procedure (based on the MUTCD) would actually be met at this intersection, but it is certain that delay can be minimized with the addition of a short southbound left turn lane. This new lane could be striped in the existing roadway width with minimal disruption of on-street parking and would greatly improve the unsignalized LOS at this location. It is recommended that this improvement be pursued.
- Residents in the area have expressed concerns about pedestrian safety in the crosswalks near Ontario Place, and at the multi-use path crossing of 55th Street just south of Sioux Drive. It is recommended that the City's transportation division staff tours these crossings to make sure that the signing and marking is appropriate or if any improvements are needed.

Table 1 - Peak Hour Intersection Level of Service Summary

Intersection and Critical Movements	Existing PM Peak Hour Delay (a)	Existing PM Peak Hour LOS	Existing + Site PM Peak Hour Delay (a)	Existing + Site PM Peak Hour LOS	2030 Background PM Peak Hour Delay (a)	2030 Background PM Peak Hour LOS	2030 + Site PM Peak Hour Delay (a)	2030 + Site PM Peak Hour LOS
STOP SIGN CONTROL								
South Boulder Road / 55th Street	**1.5**	**A**	**2.6**	**A**	**3.2**	**A**	**6.7**	**A**
Eastbound Left	*0.8*	*A*	*1.1*	*A*	*1.1*	*A*	*1.4*	*A*
Southbound Left-Right	*21.2*	*C*	*25.3*	*D*	*39.1*	*E*	*68.2*	*F*
SIGNAL CONTROL								
Baseline / 55th Street	**54.5**	**D**	**55.3**	**E**	**57.8**	**E**	**61.8**	**E**
Eastbound Left	*9.2*	*A*	*9.1*	*A*	*10.9*	*B*	*10.8*	*B*
Eastbound Through	*11.6*	*B*	*11.5*	*B*	*13.2*	*B*	*13.1*	*B*
Eastbound Right	*10.6*	*B*	*10.8*	*B*	*9.6*	*A*	*9.8*	*A*
Westbound Left	*13.1*	*B*	*13.3*	*B*	*14.2*	*B*	*14.4*	*B*
Westbound Through-Right	*13.8*	*B*	*13.8*	*B*	*15.0*	*B*	*15.0*	*B*
Northbound Left	*37.2*	*D*	*43.5*	*D*	*43.2*	*D*	*70.1*	*E*
Northbound Through	*33.7*	*C*	*34.0*	*C*	*34.1*	*C*	*34.4*	*C*
Northbound Right	*32.7*	*C*	*32.8*	*C*	*32.7*	*C*	*32.8*	*C*
Southbound Left	*>90*	*F*	*>90*	*F*	*>90*	*F*	*>90*	*F*
Southbound Through	*40.9*	*D*	*41.5*	*D*	*41.1*	*D*	*41.6*	*D*
Southbound Right	*>90*	*F*	*>90*	*F*	*>90*	*F*	*>90*	*F*

(a) Delay represented in average seconds per vehicle.



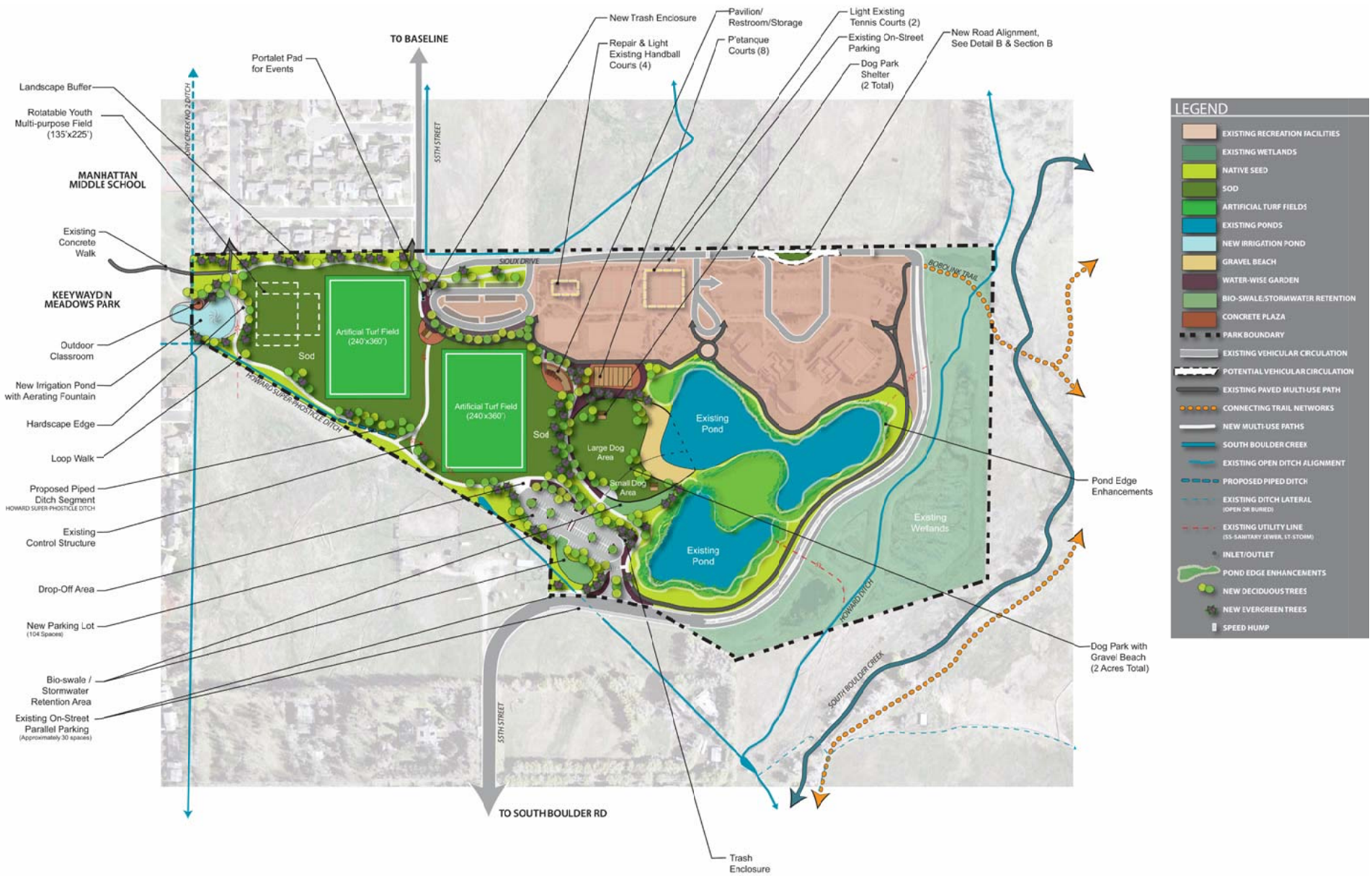
EAST BOULDER COMMUNITY PARK

FOX HIGGINS
TRANSPORTATION GROUP

EAST BOULDER COMMUNITY PARK TRAFFIC STUDY

VICINITY MAP

FH Project #	08016	Original Scale	NONE	Date	09-26-2008	Drawn by	WCF	Figure #	1

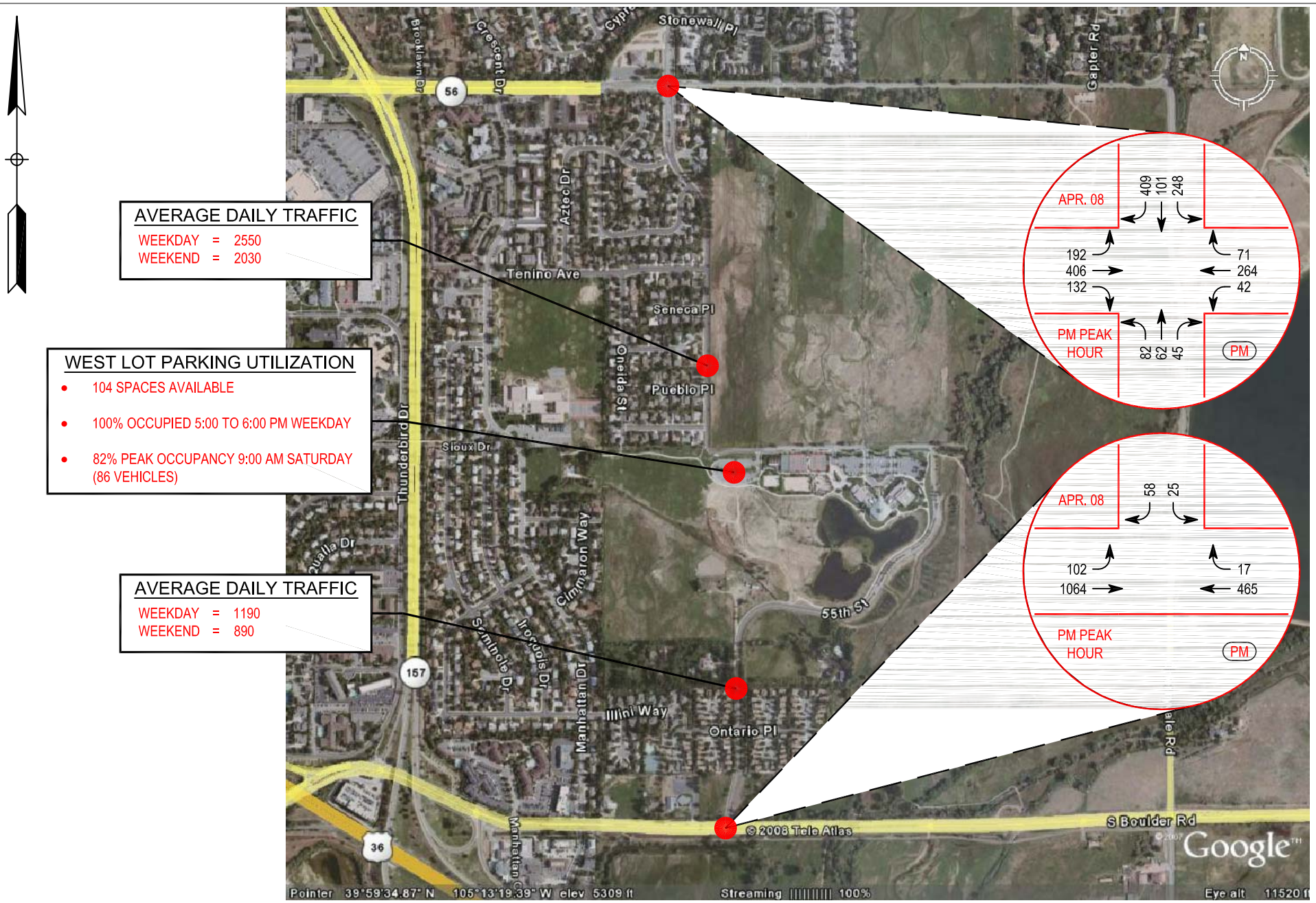


FOX HIGGINS
TRANSPORTATION GROUP

EAST BOULDER COMMUNITY PARK TRAFFIC STUDY

SITE PLAN

FH Project #	08016	Original Scale	NONE	Date	09-26-2008	Drawn by	WCF	Figure #	2



FOX HIGGINS
TRANSPORTATION GROUP

EAST BOULDER COMMUNITY PARK TRAFFIC STUDY

EXISTING TRAFFIC CONDITIONS

FH Project #	08016	Original Scale	NONE	Date	9-26--2008	Drawn by	WCF	Figure #	3

PARKING LOT CUT-THROUGH		
	WEEKDAY * 5:00 - 6:00 PM	SATURDAY * 9:30 - 10:30 AM
EB:	48	39
WB:	50	23
TOTAL:	98	62

* includes vehicles accessing west lot which may not be "cut-throughs"

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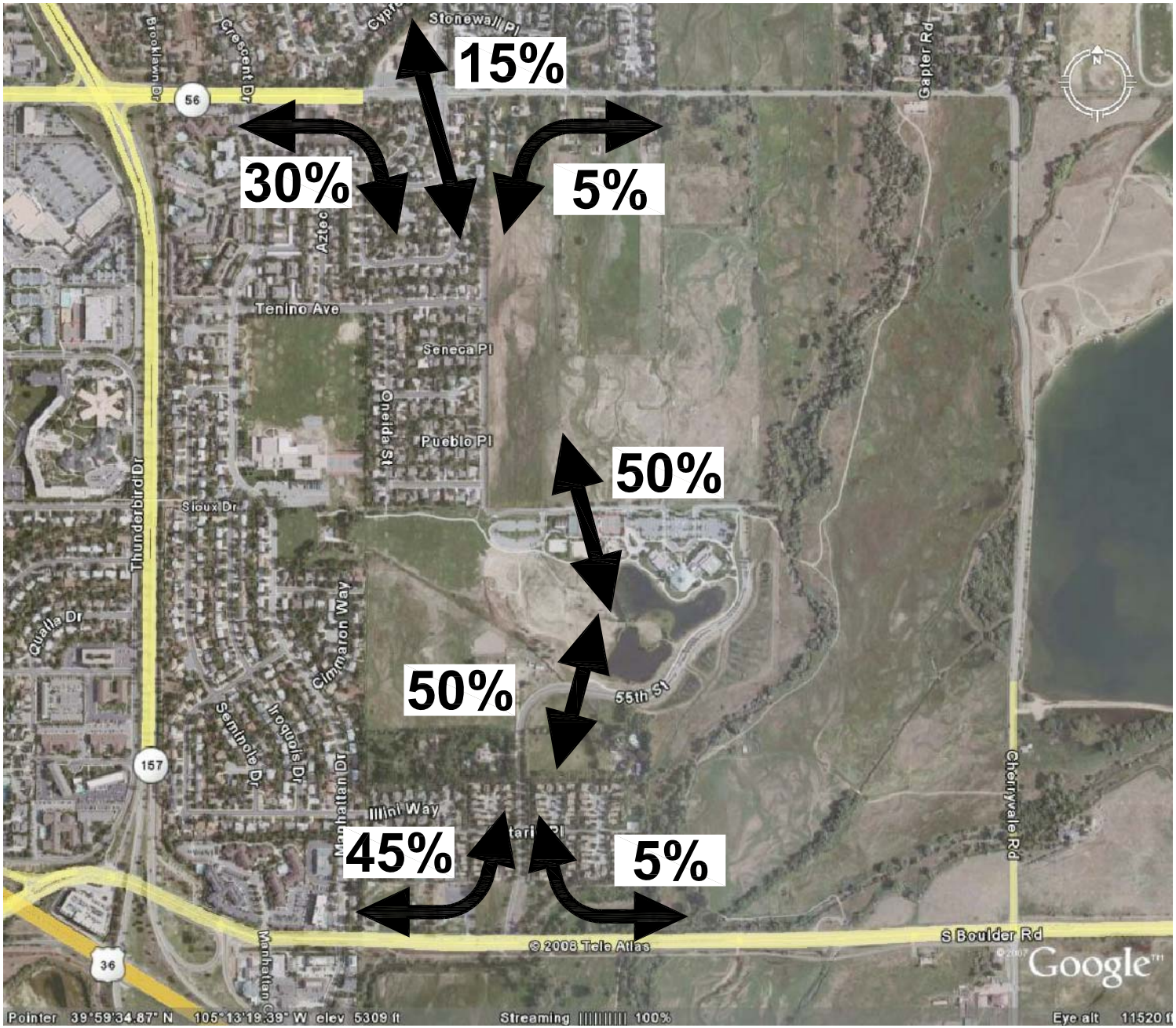
EAST BOULDER COMMUNITY PARK TRAFFIC STUDY

PARKING LOT CUT-THROUGH

FH Project #	08016	Original Scale	NONE	Date	9-26--2008	Drawn by	WCF	Figure #	4



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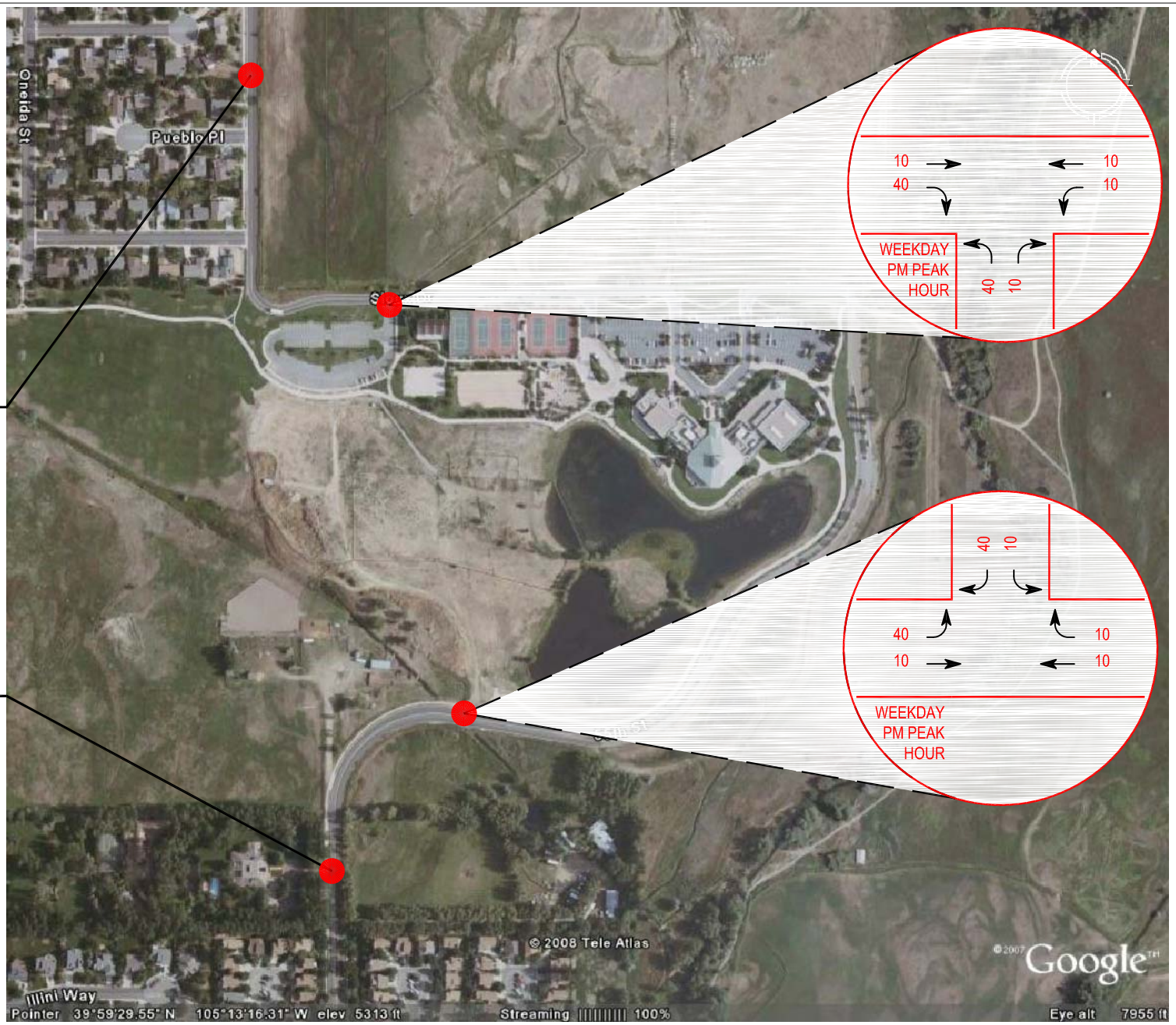
EAST BOULDER COMMUNITY PARK TRAFFIC STUDY

DIRECTIONAL DISTRIBUTION OF NEW PARK TRAFFIC

FH Project #	08016	Original Scale	NONE	Date	9-26--2008	Drawn by	WCF	Figure #	5



DAILY TRAFFIC

WEEKDAY = 200
SATURDAY = 150

DAILY TRAFFIC

WEEKDAY = 200
SATURDAY = 150

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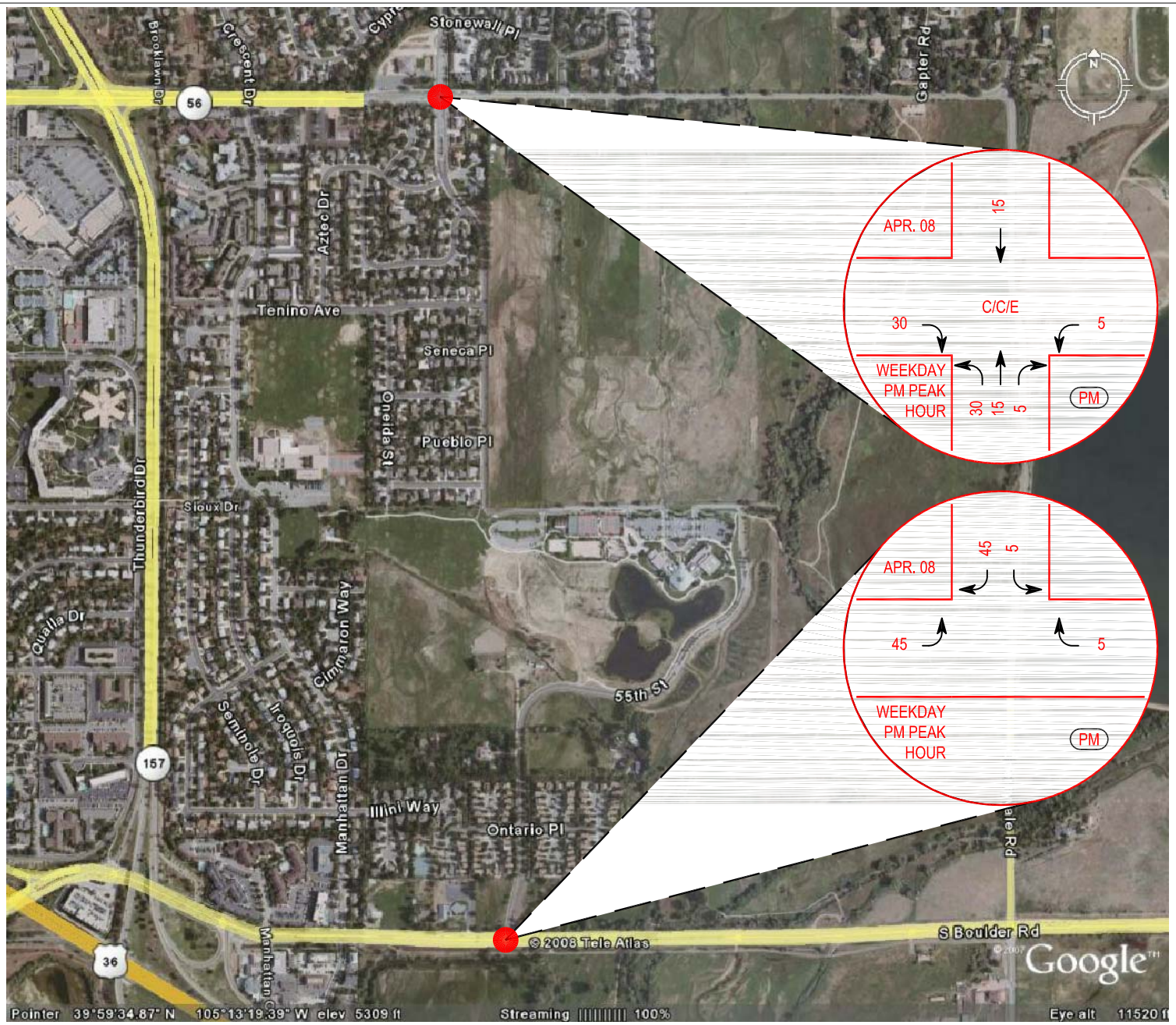
EAST BOULDER COMMUNITY PARK TRAFFIC STUDY

NEW PARK USER TRAFFIC AT SITE ACCESSES

FH Project #	08016	Original Scale	NONE	Date	9-26--2008	Drawn by	WCF	Figure #	6A



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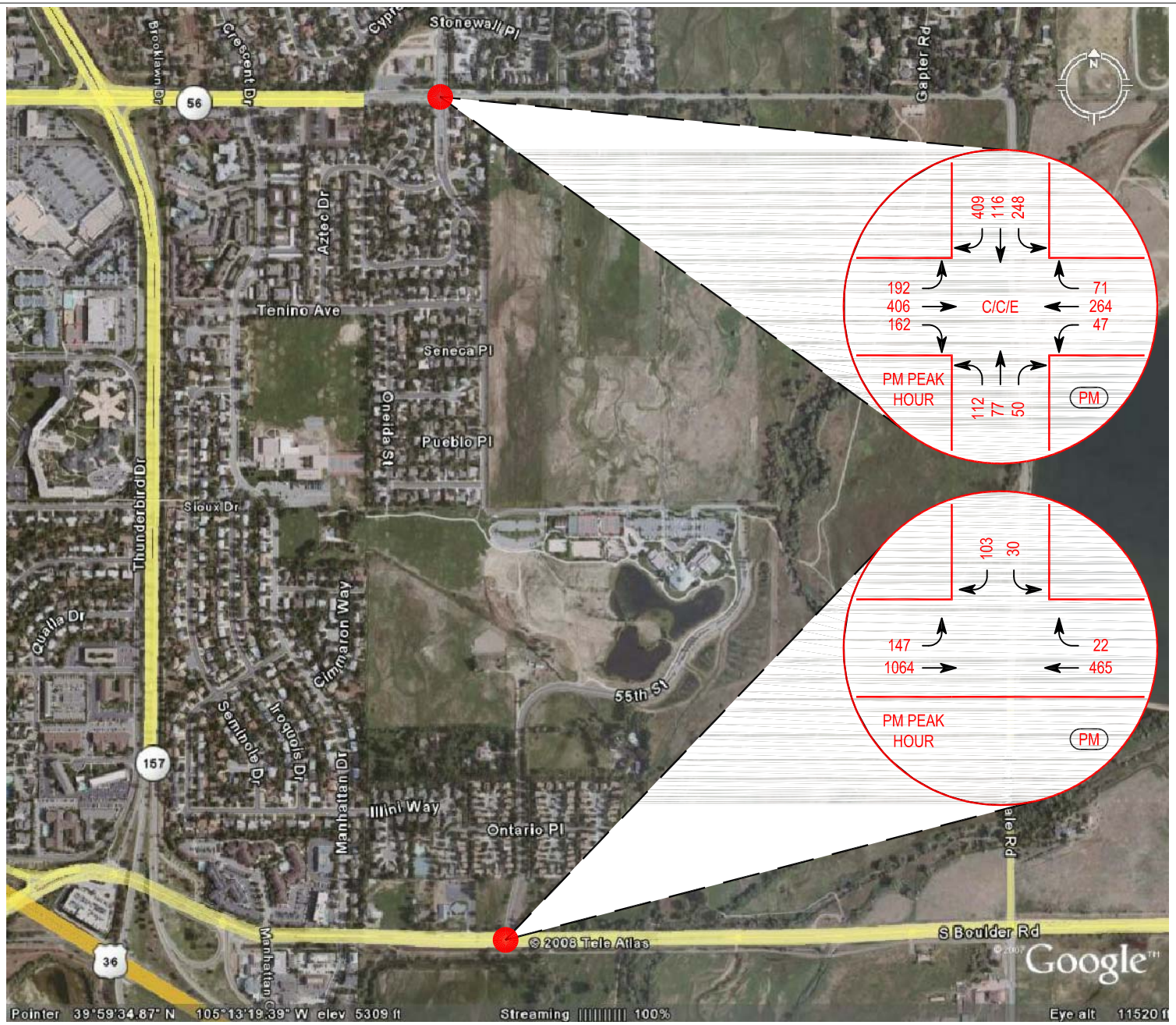
EAST BOULDER COMMUNITY PARK TRAFFIC STUDY

NEW PARK USER TRAFFIC

FH Project #	08016	Original Scale	NONE	Date	9-26--2008	Drawn by	WCF	Figure #	6B



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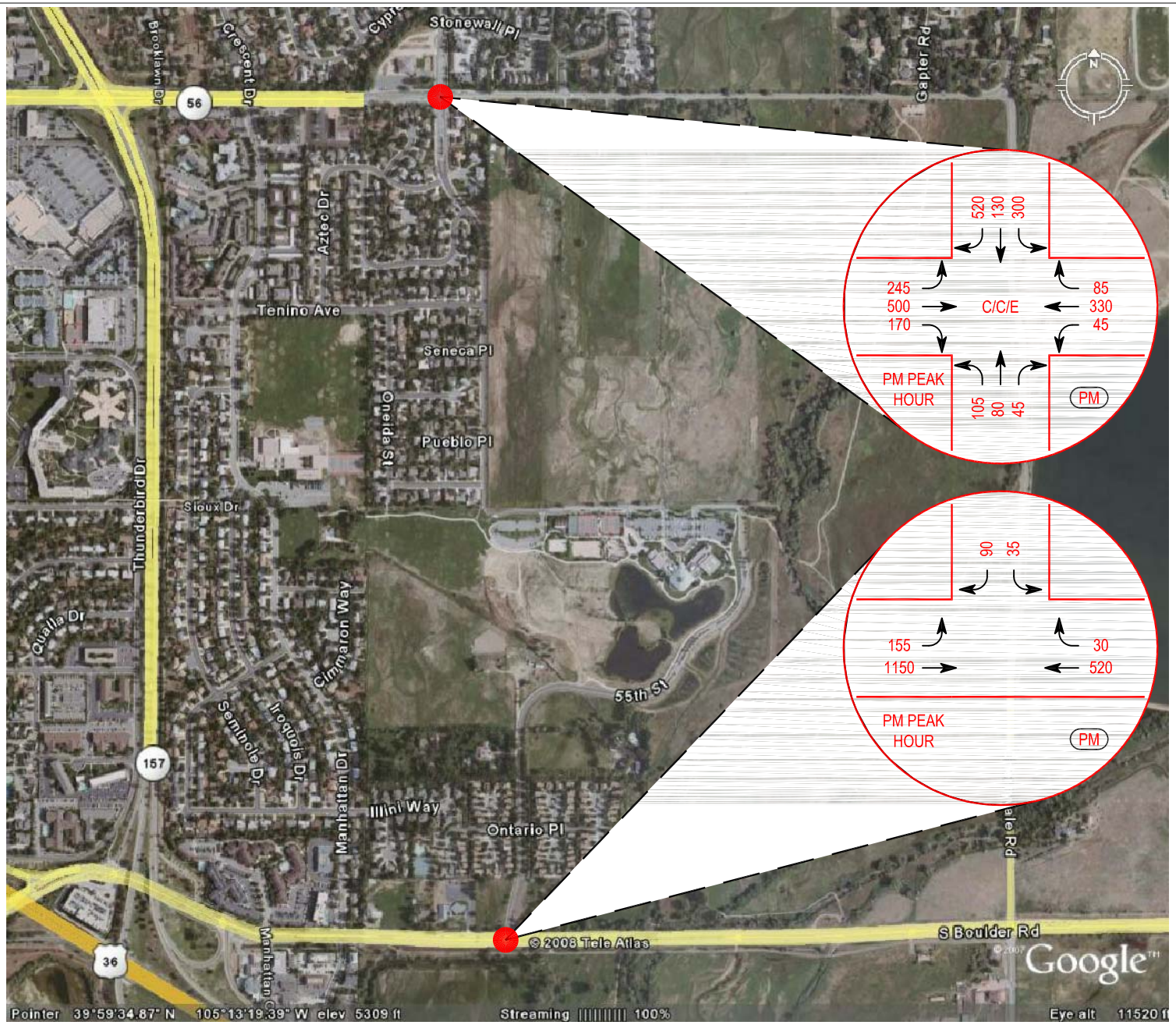
EAST BOULDER COMMUNITY PARK TRAFFIC STUDY

EXISTING PLUS SITE TRAFFIC CONDITIONS

FH Project #	08016	Original Scale	NONE	Date	9-26--2008	Drawn by	WCF	Figure #	7



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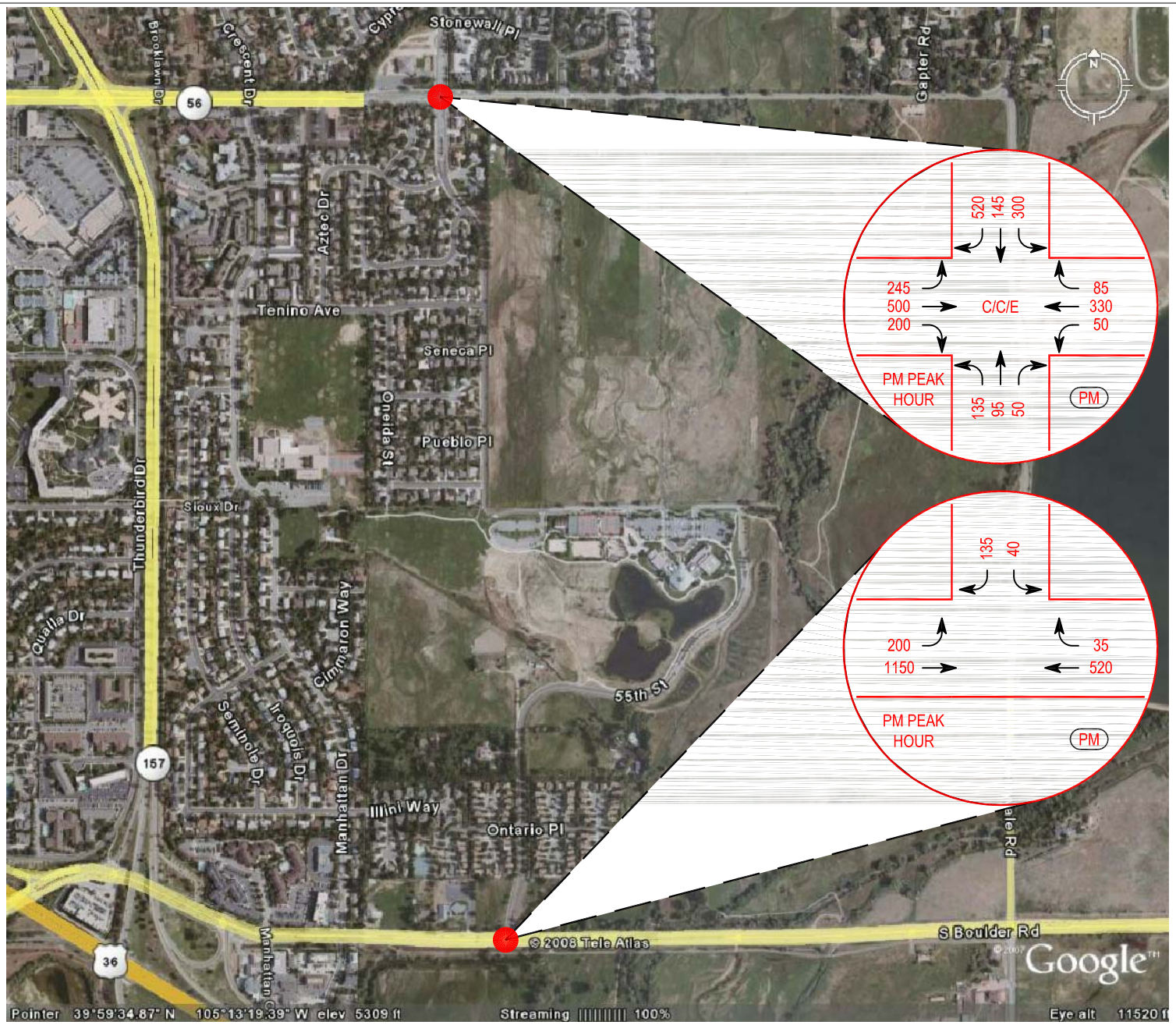
EAST BOULDER COMMUNITY PARK TRAFFIC STUDY

FUTURE YEAR 2030 BACKGROUND TRAFFIC CONDITIONS

FH Project #	08016	Original Scale	NONE	Date	9-26--2008	Drawn by	WCF	Figure #	8



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EAST BOULDER COMMUNITY PARK TRAFFIC STUDY

FUTURE YEAR 2030 TOTAL TRAFFIC

FH Project #	08016	Original Scale	NONE	Date	9-26--2008	Drawn by	WCF	Figure #	9

Appendix:
Synchro 7 Calculations

1. **Manhattan Drive and S Boulder Road**
2. **55th Street and South Boulder Road**
3. **Manhattan Dive and Baseline Road**
4. **55th Street and Baseline Road**
5. **Manhattan Drive and Kewanee Drive**
6. **55th Street and 55th Street Access**

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	120	1190	15	15	840	20	45	5	40	20	0	110
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	130	1293	16	16	913	22	49	5	43	22	0	120
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	935			1310			2171	2530	655	1910	2527	467
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	935			1310			2171	2530	655	1910	2527	467
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	82			97			0	75	89	14	100	78
cM capacity (veh/h)	728			524			17	22	409	25	22	542

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	130	862	447	16	609	326	98	141
Volume Left	130	0	0	16	0	0	49	22
Volume Right	0	0	16	0	0	22	43	120
cSH	728	1700	1700	524	1700	1700	30	131
Volume to Capacity	0.18	0.51	0.26	0.03	0.36	0.19	3.21	1.08
Queue Length 95th (ft)	16	0	0	2	0	0	Err	199
Control Delay (s)	11.0	0.0	0.0	12.1	0.0	0.0	Err	167.8
Lane LOS	B			B			F	F
Approach Delay (s)	1.0			0.2			Err	167.8
Approach LOS							F	F

Intersection Summary			
Average Delay	381.5		
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	120	1190	15	15	840	20	45	5	40	20	0	110
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	130	1293	16	16	913	22	49	5	43	22	0	120
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	935			1310			2171	2530	655	1910	2527	467
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	935			1310			2171	2530	655	1910	2527	467
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	82			97			0	75	89	14	100	78
cM capacity (veh/h)	728			524			17	22	409	25	22	542

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	130	862	447	16	609	326	49	49	22	120
Volume Left	130	0	0	16	0	0	49	0	22	0
Volume Right	0	0	16	0	0	22	0	43	0	120
cSH	728	1700	1700	524	1700	1700	17	137	25	542
Volume to Capacity	0.18	0.51	0.26	0.03	0.36	0.19	2.85	0.36	0.86	0.22
Queue Length 95th (ft)	16	0	0	2	0	0	168	37	66	21
Control Delay (s)	11.0	0.0	0.0	12.1	0.0	0.0	1296.4	45.4	352.9	13.5
Lane LOS	B			B			F	E	F	B
Approach Delay (s)	1.0			0.2			670.9		65.7	
Approach LOS							F		F	

Intersection Summary			
Average Delay	29.1		
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	560	40	25	1425	50	15	5	5	15	5	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.97			0.89	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.99	
Satd. Flow (prot)	1770	3504		1770	3521			1760			1642	
Flt Permitted	0.12	1.00		0.40	1.00			0.78			0.96	
Satd. Flow (perm)	227	3504		753	3521			1416			1585	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	609	43	27	1549	54	16	5	5	16	5	109
RTOR Reduction (vph)	0	4	0	0	2	0	0	4	0	0	41	0
Lane Group Flow (vph)	98	648	0	27	1601	0	0	22	0	0	89	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	74.2	74.2		74.2	74.2			13.4			13.4	
Effective Green, g (s)	74.2	74.2		74.2	74.2			13.4			13.4	
Actuated g/C Ratio	0.74	0.74		0.74	0.74			0.13			0.13	
Clearance Time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	168	2600		559	2613			190			212	
v/s Ratio Prot		0.18			c0.45							
v/s Ratio Perm	0.43			0.04				0.02			c0.06	
v/c Ratio	0.58	0.25		0.05	0.61			0.11			0.42	
Uniform Delay, d1	5.9	4.1		3.5	6.1			38.1			39.7	
Progression Factor	1.00	1.00		0.22	0.41			1.00			0.90	
Incremental Delay, d2	14.0	0.2		0.1	0.9			0.3			1.3	
Delay (s)	19.8	4.3		0.9	3.5			38.3			36.9	
Level of Service	B	A		A	A			D			D	
Approach Delay (s)		6.3			3.4			38.3			36.9	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	6.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	98	652	27	1603	26	130
v/c Ratio	0.58	0.25	0.05	0.61	0.13	0.51
Control Delay	26.7	5.0	1.3	4.0	30.6	28.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	5.0	1.3	4.0	30.6	28.5
Queue Length 50th (ft)	21	48	0	10	12	52
Queue Length 95th (ft)	#134	105	m1	18	33	103
Internal Link Dist (ft)		159		947	41	867
Turn Bay Length (ft)	125		100			
Base Capacity (vph)	169	2602	558	2614	305	375
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.25	0.05	0.61	0.09	0.35

Intersection Summary

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

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

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	90	560	40	25	1425	50	15	5	5	15	5	100
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	609	43	27	1549	54	16	5	5	16	5	109
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1603			652			1766	2484	326	2139	2478	802
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1603			652			1766	2484	326	2139	2478	802
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	76			97			29	75	99	8	75	67
cM capacity (veh/h)	404			930			23	21	670	18	22	327

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	98	406	246	27	1033	571	27	130
Volume Left	98	0	0	27	0	0	16	16
Volume Right	0	0	43	0	0	54	5	109
cSH	404	1700	1700	930	1700	1700	28	87
Volume to Capacity	0.24	0.24	0.14	0.03	0.61	0.34	0.97	1.50
Queue Length 95th (ft)	23	0	0	2	0	0	79	256
Control Delay (s)	16.7	0.0	0.0	9.0	0.0	0.0	364.6	361.7
Lane LOS	C			A			F	F
Approach Delay (s)	2.2			0.1			364.6	361.7
Approach LOS							F	F

Intersection Summary			
Average Delay	23.2		
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	90	560	40	25	1425	50	15	5	5	15	5	100
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	609	43	27	1549	54	16	5	5	16	5	109
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1603			652			1766	2484	326	2139	2478	802
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1603			652			1766	2484	326	2139	2478	802
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	76			97			29	75	99	8	75	67
cM capacity (veh/h)	404			930			23	21	670	18	22	327

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	98	406	246	27	1033	571	16	11	16	114
Volume Left	98	0	0	27	0	0	16	0	16	0
Volume Right	0	0	43	0	0	54	0	5	0	109
cSH	404	1700	1700	930	1700	1700	23	41	18	195
Volume to Capacity	0.24	0.24	0.14	0.03	0.61	0.34	0.71	0.26	0.92	0.58
Queue Length 95th (ft)	23	0	0	2	0	0	52	22	60	80
Control Delay (s)	16.7	0.0	0.0	9.0	0.0	0.0	329.2	120.3	479.6	46.5
Lane LOS	C			A			F	F	F	E
Approach Delay (s)	2.2			0.1			245.6		100.6	
Approach LOS							F		F	

Intersection Summary			
Average Delay	8.5		
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	1120	15	15	790	20	45	5	40	20	0	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.94			0.89	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1770	3532		1770	3526			1708			1638	
Flt Permitted	0.32	1.00		0.21	1.00			0.56			0.92	
Satd. Flow (perm)	588	3532		390	3526			979			1526	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	1217	16	16	859	22	49	5	43	22	0	120
RTOR Reduction (vph)	0	1	0	0	1	0	0	26	0	0	107	0
Lane Group Flow (vph)	130	1232	0	16	880	0	0	71	0	0	35	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	95.0	95.0		95.0	95.0			12.6			12.6	
Effective Green, g (s)	95.0	95.0		95.0	95.0			12.6			12.6	
Actuated g/C Ratio	0.79	0.79		0.79	0.79			0.10			0.10	
Clearance Time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	466	2796		309	2791			103			160	
v/s Ratio Prot		c0.35			0.25							
v/s Ratio Perm	0.22			0.04				c0.07			0.02	
v/c Ratio	0.28	0.44		0.05	0.32			0.69			0.22	
Uniform Delay, d1	3.3	4.0		2.7	3.5			51.8			49.2	
Progression Factor	1.00	1.00		0.93	0.92			1.00			1.59	
Incremental Delay, d2	1.5	0.5		0.3	0.3			17.5			0.7	
Delay (s)	4.8	4.5		2.9	3.5			69.3			79.0	
Level of Service	A	A		A	A			E			E	
Approach Delay (s)		4.5			3.5			69.3			79.0	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM Average Control Delay	10.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	130	1233	16	881	97	142
v/c Ratio	0.28	0.44	0.05	0.32	0.75	0.53
Control Delay	6.0	5.1	4.1	4.0	68.0	26.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.0	5.1	4.1	4.0	68.0	26.2
Queue Length 50th (ft)	21	127	2	76	52	27
Queue Length 95th (ft)	63	233	m9	115	106	90
Internal Link Dist (ft)		159		947	41	867
Turn Bay Length (ft)	125		100			
Base Capacity (vph)	464	2796	308	2791	198	370
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.44	0.05	0.32	0.49	0.38

Intersection Summary

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

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	120	1120	15	15	790	20	45	5	40	20	0	110
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	130	1217	16	16	859	22	49	5	43	22	0	120
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	880			1234			2068	2399	617	1818	2397	440
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	880			1234			2068	2399	617	1818	2397	440
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	83			97			0	80	90	31	100	79
cM capacity (veh/h)	763			560			21	27	433	31	27	565

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	130	812	422	16	572	308	98	141
Volume Left	130	0	0	16	0	0	49	22
Volume Right	0	0	16	0	0	22	43	120
cSH	763	1700	1700	560	1700	1700	37	157
Volume to Capacity	0.17	0.48	0.25	0.03	0.34	0.18	2.63	0.90
Queue Length 95th (ft)	15	0	0	2	0	0	273	160
Control Delay (s)	10.7	0.0	0.0	11.6	0.0	0.0	969.6	105.1
Lane LOS	B			B			F	F
Approach Delay (s)	1.0			0.2			969.6	105.1
Approach LOS							F	F

Intersection Summary			
Average Delay	44.5		
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	120	1120	15	15	790	20	45	5	40	20	0	110
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	130	1217	16	16	859	22	49	5	43	22	0	120
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	880			1234			2068	2399	617	1818	2397	440
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	880			1234			2068	2399	617	1818	2397	440
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	83			97			0	80	90	31	100	79
cM capacity (veh/h)	763			560			21	27	433	31	27	565

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	130	812	422	16	572	308	49	49	22	120
Volume Left	130	0	0	16	0	0	49	0	22	0
Volume Right	0	0	16	0	0	22	0	43	0	120
cSH	763	1700	1700	560	1700	1700	21	160	31	565
Volume to Capacity	0.17	0.48	0.25	0.03	0.34	0.18	2.33	0.31	0.69	0.21
Queue Length 95th (ft)	15	0	0	2	0	0	159	30	58	20
Control Delay (s)	10.7	0.0	0.0	11.6	0.0	0.0	994.0	37.1	250.8	13.1
Lane LOS	B			B			F	E	F	B
Approach Delay (s)	1.0			0.2			515.5		49.7	
Approach LOS							F		E	

Intersection Summary			
Average Delay	23.6		
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	525	40	25	1335	50	15	5	5	15	5	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.97			0.89	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.99	
Satd. Flow (prot)	1770	3502		1770	3520			1760			1642	
Flt Permitted	0.14	1.00		0.42	1.00			0.77			0.96	
Satd. Flow (perm)	263	3502		781	3520			1403			1584	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	571	43	27	1451	54	16	5	5	16	5	109
RTOR Reduction (vph)	0	4	0	0	2	0	0	4	0	0	50	0
Lane Group Flow (vph)	98	610	0	27	1503	0	0	22	0	0	80	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	74.4	74.4		74.4	74.4			13.2			13.2	
Effective Green, g (s)	74.4	74.4		74.4	74.4			13.2			13.2	
Actuated g/C Ratio	0.74	0.74		0.74	0.74			0.13			0.13	
Clearance Time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	196	2605		581	2619			185			209	
v/s Ratio Prot		0.17			c0.43							
v/s Ratio Perm	0.37			0.03				0.02			c0.05	
v/c Ratio	0.50	0.23		0.05	0.57			0.12			0.38	
Uniform Delay, d1	5.2	4.0		3.4	5.7			38.3			39.7	
Progression Factor	1.00	1.00		0.23	0.40			1.00			0.88	
Incremental Delay, d2	8.8	0.2		0.1	0.8			0.3			1.2	
Delay (s)	14.1	4.2		0.9	3.1			38.5			36.0	
Level of Service	B	A		A	A			D			D	
Approach Delay (s)		5.5			3.1			38.5			36.0	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	6.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	98	614	27	1505	26	130
v/c Ratio	0.50	0.24	0.05	0.57	0.14	0.50
Control Delay	19.0	4.9	1.3	3.6	30.8	25.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.0	4.9	1.3	3.6	30.8	25.3
Queue Length 50th (ft)	18	43	0	7	12	45
Queue Length 95th (ft)	#106	97	m1	17	33	96
Internal Link Dist (ft)		159		947	41	867
Turn Bay Length (ft)	125		100			
Base Capacity (vph)	196	2610	580	2624	303	383
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.24	0.05	0.57	0.09	0.34

Intersection Summary

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

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

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	90	525	40	25	1335	20	15	5	5	15	5	100
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	571	43	27	1451	22	16	5	5	16	5	109
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1473			614			1679	2315	307	2005	2326	736
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1473			614			1679	2315	307	2005	2326	736
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			97			46	81	99	33	81	70
cM capacity (veh/h)	454			961			30	28	689	24	28	361

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	98	380	234	27	967	505	27	130
Volume Left	98	0	0	27	0	0	16	16
Volume Right	0	0	43	0	0	22	5	109
cSH	454	1700	1700	961	1700	1700	37	112
Volume to Capacity	0.22	0.22	0.14	0.03	0.57	0.30	0.74	1.16
Queue Length 95th (ft)	20	0	0	2	0	0	66	206
Control Delay (s)	15.1	0.0	0.0	8.9	0.0	0.0	233.6	209.2
Lane LOS	C			A			F	F
Approach Delay (s)	2.1			0.2			233.6	209.2
Approach LOS							F	F

Intersection Summary			
Average Delay	14.9		
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	90	525	40	25	1335	20	15	5	5	15	5	100
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	571	43	27	1451	22	16	5	5	16	5	109
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1473			614			1679	2315	307	2005	2326	736
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1473			614			1679	2315	307	2005	2326	736
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			97			46	81	99	33	81	70
cM capacity (veh/h)	454			961			30	28	689	24	28	361

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	98	380	234	27	967	505	16	11	16	114
Volume Left	98	0	0	27	0	0	16	0	16	0
Volume Right	0	0	43	0	0	22	0	5	0	109
cSH	454	1700	1700	961	1700	1700	30	55	24	231
Volume to Capacity	0.22	0.22	0.14	0.03	0.57	0.30	0.54	0.20	0.67	0.50
Queue Length 95th (ft)	20	0	0	2	0	0	44	17	51	63
Control Delay (s)	15.1	0.0	0.0	8.9	0.0	0.0	219.6	86.6	302.3	35.0
Lane LOS	C			A			F	F	F	E
Approach Delay (s)	2.1			0.2			166.4		68.4	
Approach LOS							F		F	

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	120	1052	11	13	727	19	44	2	36	17	0	109
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	130	1143	12	14	790	21	48	2	39	18	0	118
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	811			1155			1952	2249	578	1702	2245	405
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	811			1155			1952	2249	578	1702	2245	405
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	84			98			0	94	91	59	100	80
cM capacity (veh/h)	811			600			26	34	459	45	34	595

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	130	762	393	14	527	284	89	137
Volume Left	130	0	0	14	0	0	48	18
Volume Right	0	0	12	0	0	21	39	118
cSH	811	1700	1700	600	1700	1700	46	223
Volume to Capacity	0.16	0.45	0.23	0.02	0.31	0.17	1.95	0.61
Queue Length 95th (ft)	14	0	0	2	0	0	228	89
Control Delay (s)	10.3	0.0	0.0	11.1	0.0	0.0	638.8	43.8
Lane LOS	B			B			F	E
Approach Delay (s)	1.0			0.2			638.8	43.8
Approach LOS							F	E

Intersection Summary			
Average Delay	27.6		
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	87	513	38	24	1307	48	11	1	5	15	2	96
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	95	558	41	26	1421	52	12	1	5	16	2	104
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1473			599			1635	2292	299	1973	2287	736
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1473			599			1635	2292	299	1973	2287	736
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	79			97			68	96	99	45	93	71
cM capacity (veh/h)	454			974			37	30	697	29	30	361

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	95	372	227	26	947	526	18	123
Volume Left	95	0	0	26	0	0	12	16
Volume Right	0	0	41	0	0	52	5	104
cSH	454	1700	1700	974	1700	1700	50	134
Volume to Capacity	0.21	0.22	0.13	0.03	0.56	0.31	0.37	0.92
Queue Length 95th (ft)	19	0	0	2	0	0	33	153
Control Delay (s)	15.0	0.0	0.0	8.8	0.0	0.0	113.6	119.5
Lane LOS	C			A			F	F
Approach Delay (s)	2.0			0.2			113.6	119.5
Approach LOS							F	F

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	1190	15	15	840	20	45	5	40	20	0	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.94			0.89	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1770	3533		1770	3527			1708			1638	
Flt Permitted	0.30	1.00		0.19	1.00			0.56			0.92	
Satd. Flow (perm)	553	3533		355	3527			979			1526	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	1293	16	16	913	22	49	5	43	22	0	120
RTOR Reduction (vph)	0	1	0	0	1	0	0	26	0	0	107	0
Lane Group Flow (vph)	130	1308	0	16	934	0	0	71	0	0	35	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	95.0	95.0		95.0	95.0			12.6			12.6	
Effective Green, g (s)	95.0	95.0		95.0	95.0			12.6			12.6	
Actuated g/C Ratio	0.79	0.79		0.79	0.79			0.10			0.10	
Clearance Time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	438	2797		281	2792			103			160	
v/s Ratio Prot		c0.37			0.26							
v/s Ratio Perm	0.24			0.05				c0.07			0.02	
v/c Ratio	0.30	0.47		0.06	0.33			0.69			0.22	
Uniform Delay, d1	3.4	4.1		2.7	3.5			51.8			49.2	
Progression Factor	1.00	1.00		0.95	0.92			1.00			1.59	
Incremental Delay, d2	1.7	0.6		0.4	0.3			17.5			0.7	
Delay (s)	5.1	4.7		3.0	3.6			69.3			79.0	
Level of Service	A	A		A	A			E			E	
Approach Delay (s)		4.7			3.6			69.3			79.0	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	130	1309	16	935	97	142
v/c Ratio	0.30	0.47	0.06	0.34	0.75	0.53
Control Delay	6.4	5.3	4.3	4.1	68.0	26.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.4	5.3	4.3	4.1	68.0	26.2
Queue Length 50th (ft)	22	140	2	82	52	27
Queue Length 95th (ft)	65	255	m9	124	106	90
Internal Link Dist (ft)		159		947	41	867
Turn Bay Length (ft)	125		100			
Base Capacity (vph)	438	2796	282	2791	198	370
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.47	0.06	0.34	0.49	0.38

Intersection Summary

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

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	90	530	40	25	1347	50	15	5	5	15	5	100
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	576	43	27	1464	54	16	5	5	16	5	109
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1518			620			1691	2366	310	2038	2361	759
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1518			620			1691	2366	310	2038	2361	759
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			97			43	79	99	27	79	69
cM capacity (veh/h)	436			957			29	26	686	22	26	349

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	98	384	236	27	976	542	27	130
Volume Left	98	0	0	27	0	0	16	16
Volume Right	0	0	43	0	0	54	5	109
cSH	436	1700	1700	957	1700	1700	35	105
Volume to Capacity	0.22	0.23	0.14	0.03	0.57	0.32	0.79	1.24
Queue Length 95th (ft)	21	0	0	2	0	0	69	219
Control Delay (s)	15.6	0.0	0.0	8.9	0.0	0.0	259.1	243.1
Lane LOS	C			A			F	F
Approach Delay (s)	2.1			0.2			259.1	243.1
Approach LOS							F	F

Intersection Summary			
Average Delay	16.7		
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	120	1133	15	15	798	20	45	5	40	20	0	110
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	130	1232	16	16	867	22	49	5	43	22	0	120
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	889			1248			2086	2422	624	1834	2420	445
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	889			1248			2086	2422	624	1834	2420	445
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	83			97			0	79	90	28	100	79
cM capacity (veh/h)	758			554			20	26	428	30	26	561

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	130	821	427	16	578	311	98	141
Volume Left	130	0	0	16	0	0	49	22
Volume Right	0	0	16	0	0	22	43	120
cSH	758	1700	1700	554	1700	1700	36	152
Volume to Capacity	0.17	0.48	0.25	0.03	0.34	0.18	2.73	0.93
Queue Length 95th (ft)	15	0	0	2	0	0	277	166
Control Delay (s)	10.7	0.0	0.0	11.7	0.0	0.0	1017.6	113.7
Lane LOS	B			B			F	F
Approach Delay (s)	1.0			0.2			1017.6	113.7
Approach LOS							F	F

Intersection Summary			
Average Delay	46.5		
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	92	527	40	25	1341	50	15	5	5	16	5	106
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	100	573	43	27	1458	54	16	5	5	17	5	115
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1512			616			1696	2361	308	2034	2355	756
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1512			616			1696	2361	308	2034	2355	756
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	77			97			41	79	99	23	79	67
cM capacity (veh/h)	438			960			28	26	688	23	26	351

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	100	382	234	27	972	540	16	11	17	121
Volume Left	100	0	0	27	0	0	16	0	17	0
Volume Right	0	0	43	0	0	54	0	5	0	115
cSH	438	1700	1700	960	1700	1700	28	50	23	226
Volume to Capacity	0.23	0.22	0.14	0.03	0.57	0.32	0.59	0.22	0.77	0.53
Queue Length 95th (ft)	22	0	0	2	0	0	47	18	56	71
Control Delay (s)	15.6	0.0	0.0	8.9	0.0	0.0	251.0	95.1	353.6	37.9
Lane LOS	C			A			F	F	F	E
Approach Delay (s)	2.2			0.2			188.6		77.7	
Approach LOS							F		F	

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	127	1127	15	15	794	21	45	5	40	21	0	114
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	138	1225	16	16	863	23	49	5	43	23	0	124
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	886			1241			2097	2428	621	1842	2424	443
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	886			1241			2097	2428	621	1842	2424	443
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	82			97			0	78	90	23	100	78
cM capacity (veh/h)	760			557			20	25	430	30	25	562

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	138	817	425	16	575	311	98	147
Volume Left	138	0	0	16	0	0	49	23
Volume Right	0	0	16	0	0	23	43	124
cSH	760	1700	1700	557	1700	1700	35	148
Volume to Capacity	0.18	0.48	0.25	0.03	0.34	0.18	2.82	0.99
Queue Length 95th (ft)	17	0	0	2	0	0	279	184
Control Delay (s)	10.8	0.0	0.0	11.7	0.0	0.0	1066.0	131.9
Lane LOS	B			B			F	F
Approach Delay (s)	1.1			0.2			1066.0	131.9
Approach LOS							F	F

Intersection Summary			
Average Delay	49.6		
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	90	565	40	25	1437	50	15	5	5	15	5	100
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	614	43	27	1562	54	16	5	5	16	5	109
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1616			658			1778	2502	329	2154	2497	808
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1616			658			1778	2502	329	2154	2497	808
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	76			97			26	74	99	5	74	66
cM capacity (veh/h)	399			926			22	21	667	17	21	324

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	98	409	248	27	1041	575	27	130
Volume Left	98	0	0	27	0	0	16	16
Volume Right	0	0	43	0	0	54	5	109
cSH	399	1700	1700	926	1700	1700	27	84
Volume to Capacity	0.24	0.24	0.15	0.03	0.61	0.34	1.01	1.55
Queue Length 95th (ft)	24	0	0	2	0	0	80	262
Control Delay (s)	16.9	0.0	0.0	9.0	0.0	0.0	385.0	384.0
Lane LOS	C			A			F	F
Approach Delay (s)	2.2			0.1			385.0	384.0
Approach LOS							F	F

Intersection Summary			
Average Delay	24.4		
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	120	1203	15	15	848	20	45	5	40	20	0	110
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	130	1308	16	16	922	22	49	5	43	22	0	120
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	943			1324			2190	2553	662	1926	2550	472
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	943			1324			2190	2553	662	1926	2550	472
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	82			97			0	74	89	11	100	78
cM capacity (veh/h)	723			518			17	21	404	24	21	539

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	130	872	452	16	614	329	98	141
Volume Left	130	0	0	16	0	0	49	22
Volume Right	0	0	16	0	0	22	43	120
cSH	723	1700	1700	518	1700	1700	29	127
Volume to Capacity	0.18	0.51	0.27	0.03	0.36	0.19	3.32	1.12
Queue Length 95th (ft)	16	0	0	2	0	0	Err	206
Control Delay (s)	11.1	0.0	0.0	12.2	0.0	0.0	Err	182.0
Lane LOS	B			B			F	F
Approach Delay (s)	1.0			0.2			Err	182.0
Approach LOS							F	F

Intersection Summary			
Average Delay	379.0		
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	92	562	40	25	1431	50	15	5	5	16	5	106
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	100	611	43	27	1555	54	16	5	5	17	5	115
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1610			654			1783	2497	327	2151	2491	805
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1610			654			1783	2497	327	2151	2491	805
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	75			97			24	74	99	0	74	65
cM capacity (veh/h)	402			929			21	21	669	17	21	326

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	100	407	247	27	1037	573	27	138
Volume Left	100	0	0	27	0	0	16	17
Volume Right	0	0	43	0	0	54	5	115
cSH	402	1700	1700	929	1700	1700	26	85
Volume to Capacity	0.25	0.24	0.15	0.03	0.61	0.34	1.03	1.63
Queue Length 95th (ft)	24	0	0	2	0	0	81	281
Control Delay (s)	16.9	0.0	0.0	9.0	0.0	0.0	402.0	414.4
Lane LOS	C			A			F	F
Approach Delay (s)	2.2			0.1			402.0	414.4
Approach LOS							F	F

Intersection Summary			
Average Delay	27.4		
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total PM w kewanee.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	127	1197	15	15	844	21	45	5	40	21	0	114
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	138	1301	16	16	917	23	49	5	43	23	0	124
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	940			1317			2201	2558	659	1934	2555	470
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	940			1317			2201	2558	659	1934	2555	470
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	81			97			0	73	89	3	100	77
cM capacity (veh/h)	725			521			16	20	406	24	21	540

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	138	867	450	16	612	329	98	147
Volume Left	138	0	0	16	0	0	49	23
Volume Right	0	0	16	0	0	23	43	124
cSH	725	1700	1700	521	1700	1700	28	123
Volume to Capacity	0.19	0.51	0.26	0.03	0.36	0.19	3.44	1.19
Queue Length 95th (ft)	17	0	0	2	0	0	Err	227
Control Delay (s)	11.1	0.0	0.0	12.1	0.0	0.0	Err	211.0
Lane LOS	B			B			F	F
Approach Delay (s)	1.1			0.2			Err	211.0
Approach LOS							F	F

Intersection Summary			
Average Delay	380.5		
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	90	537	40	25	1366	50	15	5	5	15	5	100
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	584	43	27	1485	54	16	5	5	16	5	109
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1539			627			1709	2395	314	2062	2389	770
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1539			627			1709	2395	314	2062	2389	770
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	77			97			40	78	99	23	78	68
cM capacity (veh/h)	428			951			27	25	682	21	25	343

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	98	389	238	27	990	549	16	11	16	114
Volume Left	98	0	0	27	0	0	16	0	16	0
Volume Right	0	0	43	0	0	54	0	5	0	109
cSH	428	1700	1700	951	1700	1700	27	48	21	214
Volume to Capacity	0.23	0.23	0.14	0.03	0.58	0.32	0.60	0.23	0.77	0.53
Queue Length 95th (ft)	22	0	0	2	0	0	47	19	55	70
Control Delay (s)	15.9	0.0	0.0	8.9	0.0	0.0	256.9	100.8	369.3	39.5
Lane LOS	C			A			F	F	F	E
Approach Delay (s)	2.1			0.2			194.5		80.8	
Approach LOS							F		F	

Intersection Summary			
Average Delay	7.2		
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2012 Total PM - turn lanes.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	120	1133	15	15	798	20	45	5	40	20	0	110
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	130	1232	16	16	867	22	49	5	43	22	0	120
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	889			1248			2086	2422	624	1834	2420	445
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	889			1248			2086	2422	624	1834	2420	445
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	83			97			0	79	90	28	100	79
cM capacity (veh/h)	758			554			20	26	428	30	26	561

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	130	821	427	16	578	311	49	49	22	120
Volume Left	130	0	0	16	0	0	49	0	22	0
Volume Right	0	0	16	0	0	22	0	43	0	120
cSH	758	1700	1700	554	1700	1700	20	156	30	561
Volume to Capacity	0.17	0.48	0.25	0.03	0.34	0.18	2.41	0.31	0.72	0.21
Queue Length 95th (ft)	15	0	0	2	0	0	161	31	59	20
Control Delay (s)	10.7	0.0	0.0	11.7	0.0	0.0	1042.9	38.3	265.7	13.1
Lane LOS	B			B			F	E	F	B
Approach Delay (s)	1.0			0.2			540.6		52.0	
Approach LOS							F		F	

Intersection Summary			
Average Delay	24.5		
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2012 Total AM w kewanee - turn lanes.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	92	527	40	25	1341	50	15	5	5	16	5	106
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	100	573	43	27	1458	54	16	5	5	17	5	115
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1512			616			1696	2361	308	2034	2355	756
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1512			616			1696	2361	308	2034	2355	756
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	77			97			41	79	99	23	79	67
cM capacity (veh/h)	438			960			28	26	688	23	26	351

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	100	382	234	27	972	540	16	11	17	121
Volume Left	100	0	0	27	0	0	16	0	17	0
Volume Right	0	0	43	0	0	54	0	5	0	115
cSH	438	1700	1700	960	1700	1700	28	50	23	226
Volume to Capacity	0.23	0.22	0.14	0.03	0.57	0.32	0.59	0.22	0.77	0.53
Queue Length 95th (ft)	22	0	0	2	0	0	47	18	56	71
Control Delay (s)	15.6	0.0	0.0	8.9	0.0	0.0	251.0	95.1	353.6	37.9
Lane LOS	C			A			F	F	F	E
Approach Delay (s)	2.2			0.2			188.6		77.7	
Approach LOS							F		F	

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2012 Total PM w kewanee - turn lanes.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	127	1127	15	15	794	21	45	5	40	21	0	114
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	138	1225	16	16	863	23	49	5	43	23	0	124
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	886			1241			2097	2428	621	1842	2424	443
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	886			1241			2097	2428	621	1842	2424	443
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	82			97			0	78	90	23	100	78
cM capacity (veh/h)	760			557			20	25	430	30	25	562

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	138	817	425	16	575	311	49	49	23	124
Volume Left	138	0	0	16	0	0	49	0	23	0
Volume Right	0	0	16	0	0	23	0	43	0	124
cSH	760	1700	1700	557	1700	1700	20	154	30	562
Volume to Capacity	0.18	0.48	0.25	0.03	0.34	0.18	2.50	0.32	0.77	0.22
Queue Length 95th (ft)	17	0	0	2	0	0	162	32	63	21
Control Delay (s)	10.8	0.0	0.0	11.7	0.0	0.0	1095.1	38.9	287.3	13.2
Lane LOS	B			B			F	E	F	B
Approach Delay (s)	1.1			0.2			567.0		55.8	
Approach LOS							F		F	

Intersection Summary			
Average Delay	25.9		
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total AM-turn lanes.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	90	565	40	25	1437	50	15	5	5	15	5	100
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	614	43	27	1562	54	16	5	5	16	5	109
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1616			658			1778	2502	329	2154	2497	808
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1616			658			1778	2502	329	2154	2497	808
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	76			97			26	74	99	5	74	66
cM capacity (veh/h)	399			926			22	21	667	17	21	324

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	98	409	248	27	1041	575	16	11	16	114
Volume Left	98	0	0	27	0	0	16	0	16	0
Volume Right	0	0	43	0	0	54	0	5	0	109
cSH	399	1700	1700	926	1700	1700	22	40	17	192
Volume to Capacity	0.24	0.24	0.15	0.03	0.61	0.34	0.74	0.27	0.95	0.60
Queue Length 95th (ft)	24	0	0	2	0	0	53	22	61	82
Control Delay (s)	16.9	0.0	0.0	9.0	0.0	0.0	347.1	124.9	506.4	48.2
Lane LOS	C			A			F	F	F	E
Approach Delay (s)	2.2			0.1			258.2		105.5	
Approach LOS							F		F	

Intersection Summary			
Average Delay	8.9		
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total PM-turn lanes.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	120	1203	15	15	848	20	45	5	40	20	0	110
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	130	1308	16	16	922	22	49	5	43	22	0	120
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	943			1324			2190	2553	662	1926	2550	472
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	943			1324			2190	2553	662	1926	2550	472
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	82			97			0	74	89	11	100	78
cM capacity (veh/h)	723			518			17	21	404	24	21	539

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	130	872	452	16	614	329	49	49	22	120
Volume Left	130	0	0	16	0	0	49	0	22	0
Volume Right	0	0	16	0	0	22	0	43	0	120
cSH	723	1700	1700	518	1700	1700	17	133	24	539
Volume to Capacity	0.18	0.51	0.27	0.03	0.36	0.19	2.96	0.37	0.89	0.22
Queue Length 95th (ft)	16	0	0	2	0	0	169	38	67	21
Control Delay (s)	11.1	0.0	0.0	12.2	0.0	0.0	1357.2	47.2	374.7	13.6
Lane LOS	B			B			F	E	F	B
Approach Delay (s)	1.0			0.2			702.2		69.1	
Approach LOS							F		F	

Intersection Summary			
Average Delay	30.2		
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total AM w kewanee-turn lanes.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	92	562	40	25	1431	50	15	5	5	16	5	106
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	100	611	43	27	1555	54	16	5	5	17	5	115
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1610			654			1783	2497	327	2151	2491	805
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1610			654			1783	2497	327	2151	2491	805
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	75			97			24	74	99	0	74	65
cM capacity (veh/h)	402			929			21	21	669	17	21	326

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	100	407	247	27	1037	573	16	11	17	121
Volume Left	100	0	0	27	0	0	16	0	17	0
Volume Right	0	0	43	0	0	54	0	5	0	115
cSH	402	1700	1700	929	1700	1700	21	40	17	197
Volume to Capacity	0.25	0.24	0.15	0.03	0.61	0.34	0.76	0.27	1.01	0.61
Queue Length 95th (ft)	24	0	0	2	0	0	54	22	64	87
Control Delay (s)	16.9	0.0	0.0	9.0	0.0	0.0	367.3	124.4	527.5	48.6
Lane LOS	C			A			F	F	F	E
Approach Delay (s)	2.2			0.1			270.2		109.0	
Approach LOS							F		F	

Intersection Summary			
Average Delay	9.5		
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total PM w kewanee-turn lanes.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	127	1197	15	15	844	21	45	5	40	21	0	114
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	138	1301	16	16	917	23	49	5	43	23	0	124
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	940			1317			2201	2558	659	1934	2555	470
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	940			1317			2201	2558	659	1934	2555	470
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	81			97			0	73	89	3	100	77
cM capacity (veh/h)	725			521			16	20	406	24	21	540

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	138	867	450	16	612	329	49	49	23	124
Volume Left	138	0	0	16	0	0	49	0	23	0
Volume Right	0	0	16	0	0	23	0	43	0	124
cSH	725	1700	1700	521	1700	1700	16	131	24	540
Volume to Capacity	0.19	0.51	0.26	0.03	0.36	0.19	3.07	0.37	0.97	0.23
Queue Length 95th (ft)	17	0	0	2	0	0	Err	39	72	22
Control Delay (s)	11.1	0.0	0.0	12.1	0.0	0.0	Err	48.0	406.6	13.6
Lane LOS	B			B			F	E	F	B
Approach Delay (s)	1.1			0.2			5023.5		74.8	
Approach LOS							F		F	

Intersection Summary			
Average Delay	189.8		
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2012 Total AM-Added Signals.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	530	40	25	1347	50	15	5	5	15	5	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.97			0.89	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.99	
Satd. Flow (prot)	1770	3502		1770	3520			1760			1642	
Flt Permitted	0.14	1.00		0.42	1.00			0.78			0.96	
Satd. Flow (perm)	258	3502		777	3520			1409			1585	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	576	43	27	1464	54	16	5	5	16	5	109
RTOR Reduction (vph)	0	4	0	0	2	0	0	4	0	0	49	0
Lane Group Flow (vph)	98	615	0	27	1516	0	0	22	0	0	81	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	74.3	74.3		74.3	74.3			13.3			13.3	
Effective Green, g (s)	74.3	74.3		74.3	74.3			13.3			13.3	
Actuated g/C Ratio	0.74	0.74		0.74	0.74			0.13			0.13	
Clearance Time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	192	2602		577	2615			187			211	
v/s Ratio Prot		0.18			c0.43							
v/s Ratio Perm	0.38			0.03				0.02			c0.05	
v/c Ratio	0.51	0.24		0.05	0.58			0.12			0.38	
Uniform Delay, d1	5.3	4.0		3.4	5.8			38.2			39.6	
Progression Factor	1.00	1.00		0.23	0.42			1.00			0.88	
Incremental Delay, d2	9.4	0.2		0.1	0.8			0.3			1.1	
Delay (s)	14.7	4.2		0.9	3.3			38.4			35.8	
Level of Service	B	A		A	A			D			D	
Approach Delay (s)		5.7			3.2			38.4			35.8	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	6.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2012 Total PM-Added Signals.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	1133	15	15	798	20	45	5	40	20	0	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.94			0.89	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1770	3532		1770	3526			1708			1638	
Flt Permitted	0.31	1.00		0.21	1.00			0.56			0.92	
Satd. Flow (perm)	582	3532		383	3526			979			1526	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	1232	16	16	867	22	49	5	43	22	0	120
RTOR Reduction (vph)	0	1	0	0	1	0	0	26	0	0	107	0
Lane Group Flow (vph)	130	1247	0	16	888	0	0	71	0	0	35	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	95.0	95.0		95.0	95.0			12.6			12.6	
Effective Green, g (s)	95.0	95.0		95.0	95.0			12.6			12.6	
Actuated g/C Ratio	0.79	0.79		0.79	0.79			0.10			0.10	
Clearance Time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	461	2796		303	2791			103			160	
v/s Ratio Prot		c0.35			0.25							
v/s Ratio Perm	0.22			0.04				c0.07			0.02	
v/c Ratio	0.28	0.45		0.05	0.32			0.69			0.22	
Uniform Delay, d1	3.4	4.0		2.7	3.5			51.8			49.2	
Progression Factor	1.00	1.00		0.93	0.92			1.00			1.59	
Incremental Delay, d2	1.5	0.5		0.3	0.3			17.5			0.7	
Delay (s)	4.9	4.5		2.9	3.5			69.3			79.0	
Level of Service	A	A		A	A			E			E	
Approach Delay (s)		4.6			3.5			69.3			79.0	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM Average Control Delay	10.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2012 Total PM with kewanee-Added Signals.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	127	1127	15	15	794	21	45	5	40	21	0	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.94			0.89	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1770	3532		1770	3525			1708			1638	
Flt Permitted	0.31	1.00		0.21	1.00			0.54			0.92	
Satd. Flow (perm)	584	3532		386	3525			954			1524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	138	1225	16	16	863	23	49	5	43	23	0	124
RTOR Reduction (vph)	0	1	0	0	1	0	0	26	0	0	111	0
Lane Group Flow (vph)	138	1240	0	16	885	0	0	71	0	0	36	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	94.9	94.9		94.9	94.9			12.7			12.7	
Effective Green, g (s)	94.9	94.9		94.9	94.9			12.7			12.7	
Actuated g/C Ratio	0.79	0.79		0.79	0.79			0.11			0.11	
Clearance Time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	462	2793		305	2788			101			161	
v/s Ratio Prot		c0.35			0.25							
v/s Ratio Perm	0.24			0.04				c0.07			0.02	
v/c Ratio	0.30	0.44		0.05	0.32			0.70			0.22	
Uniform Delay, d1	3.4	4.0		2.7	3.5			51.8			49.1	
Progression Factor	1.00	1.00		0.93	0.92			1.00			1.57	
Incremental Delay, d2	1.7	0.5		0.3	0.3			19.9			0.7	
Delay (s)	5.1	4.6		2.9	3.5			71.7			77.9	
Level of Service	A	A		A	A			E			E	
Approach Delay (s)		4.6			3.5			71.7			77.9	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM Average Control Delay	11.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total AM-Added Signals.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	565	40	25	1437	50	15	5	5	15	5	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.97			0.89	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.99	
Satd. Flow (prot)	1770	3504		1770	3521			1760			1642	
Flt Permitted	0.12	1.00		0.40	1.00			0.78			0.96	
Satd. Flow (perm)	223	3504		749	3521			1422			1585	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	614	43	27	1562	54	16	5	5	16	5	109
RTOR Reduction (vph)	0	4	0	0	2	0	0	4	0	0	40	0
Lane Group Flow (vph)	98	653	0	27	1614	0	0	22	0	0	90	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	74.1	74.1		74.1	74.1			13.5			13.5	
Effective Green, g (s)	74.1	74.1		74.1	74.1			13.5			13.5	
Actuated g/C Ratio	0.74	0.74		0.74	0.74			0.14			0.14	
Clearance Time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	165	2596		555	2609			192			214	
v/s Ratio Prot		0.19			c0.46							
v/s Ratio Perm	0.44			0.04				0.02			c0.06	
v/c Ratio	0.59	0.25		0.05	0.62			0.11			0.42	
Uniform Delay, d1	6.0	4.1		3.5	6.2			38.0			39.7	
Progression Factor	1.00	1.00		0.22	0.42			1.00			0.88	
Incremental Delay, d2	14.8	0.2		0.1	1.0			0.3			1.3	
Delay (s)	20.8	4.4		0.9	3.5			38.3			36.3	
Level of Service	C	A		A	A			D			D	
Approach Delay (s)		6.5			3.5			38.3			36.3	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	6.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total PM-Added Signals.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	1203	15	15	848	20	45	5	40	20	0	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.94			0.89	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1770	3533		1770	3527			1708			1638	
Flt Permitted	0.29	1.00		0.19	1.00			0.56			0.92	
Satd. Flow (perm)	547	3533		349	3527			979			1526	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	1308	16	16	922	22	49	5	43	22	0	120
RTOR Reduction (vph)	0	1	0	0	1	0	0	26	0	0	107	0
Lane Group Flow (vph)	130	1323	0	16	943	0	0	71	0	0	35	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	95.0	95.0		95.0	95.0			12.6			12.6	
Effective Green, g (s)	95.0	95.0		95.0	95.0			12.6			12.6	
Actuated g/C Ratio	0.79	0.79		0.79	0.79			0.10			0.10	
Clearance Time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	433	2797		276	2792			103			160	
v/s Ratio Prot		c0.37			0.27							
v/s Ratio Perm	0.24			0.05				c0.07			0.02	
v/c Ratio	0.30	0.47		0.06	0.34			0.69			0.22	
Uniform Delay, d1	3.4	4.2		2.7	3.6			51.8			49.2	
Progression Factor	1.00	1.00		0.93	0.92			1.00			1.59	
Incremental Delay, d2	1.8	0.6		0.4	0.3			17.5			0.7	
Delay (s)	5.2	4.7		2.9	3.6			69.3			78.9	
Level of Service	A	A		A	A			E			E	
Approach Delay (s)		4.8			3.6			69.3			78.9	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total AM with kewanee-Added Signals.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	562	40	25	1431	50	15	5	5	16	5	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.97			0.89	
Flt Protected	0.95	1.00		0.95	1.00			0.97			0.99	
Satd. Flow (prot)	1770	3504		1770	3521			1760			1641	
Flt Permitted	0.12	1.00		0.40	1.00			0.77			0.96	
Satd. Flow (perm)	225	3504		751	3521			1395			1584	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	100	611	43	27	1555	54	16	5	5	17	5	115
RTOR Reduction (vph)	0	4	0	0	2	0	0	4	0	0	41	0
Lane Group Flow (vph)	100	650	0	27	1607	0	0	22	0	0	96	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	74.0	74.0		74.0	74.0			13.6			13.6	
Effective Green, g (s)	74.0	74.0		74.0	74.0			13.6			13.6	
Actuated g/C Ratio	0.74	0.74		0.74	0.74			0.14			0.14	
Clearance Time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	167	2593		556	2606			190			215	
v/s Ratio Prot		0.19			c0.46							
v/s Ratio Perm	0.45			0.04				0.02			c0.06	
v/c Ratio	0.60	0.25		0.05	0.62			0.11			0.45	
Uniform Delay, d1	6.1	4.1		3.5	6.2			37.9			39.7	
Progression Factor	1.00	1.00		0.22	0.41			1.00			0.89	
Incremental Delay, d2	14.9	0.2		0.1	0.9			0.3			1.5	
Delay (s)	20.9	4.4		0.9	3.5			38.2			36.7	
Level of Service	C	A		A	A			D			D	
Approach Delay (s)		6.6			3.5			38.2			36.7	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	6.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: S Boulder Road & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total PM w kewanee-Added Signals.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	127	1197	15	15	844	21	45	5	40	21	0	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.94			0.89	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1770	3533		1770	3526			1708			1638	
Flt Permitted	0.29	1.00		0.19	1.00			0.54			0.92	
Satd. Flow (perm)	549	3533		351	3526			954			1524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	138	1301	16	16	917	23	49	5	43	23	0	124
RTOR Reduction (vph)	0	1	0	0	1	0	0	26	0	0	111	0
Lane Group Flow (vph)	138	1316	0	16	939	0	0	71	0	0	36	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	94.9	94.9		94.9	94.9			12.7			12.7	
Effective Green, g (s)	94.9	94.9		94.9	94.9			12.7			12.7	
Actuated g/C Ratio	0.79	0.79		0.79	0.79			0.11			0.11	
Clearance Time (s)	6.6	6.6		6.6	6.6			5.8			5.8	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	434	2794		278	2788			101			161	
v/s Ratio Prot		c0.37			0.27							
v/s Ratio Perm	0.25			0.05				c0.07			0.02	
v/c Ratio	0.32	0.47		0.06	0.34			0.70			0.22	
Uniform Delay, d1	3.5	4.2		2.8	3.6			51.8			49.1	
Progression Factor	1.00	1.00		0.95	0.92			1.00			1.56	
Incremental Delay, d2	1.9	0.6		0.4	0.3			19.9			0.7	
Delay (s)	5.4	4.8		3.0	3.6			71.7			77.6	
Level of Service	A	A		A	A			E			E	
Approach Delay (s)		4.8			3.6			71.7			77.6	
Approach LOS		A			A			E			E	

Intersection Summary			
HCM Average Control Delay	10.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	98	619	27	1518	26	130
v/c Ratio	0.51	0.24	0.05	0.58	0.14	0.50
Control Delay	20.1	4.9	1.4	3.8	30.8	25.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.1	4.9	1.4	3.8	30.8	25.4
Queue Length 50th (ft)	18	44	0	12	12	46
Queue Length 95th (ft)	#121	98	m1	22	33	97
Internal Link Dist (ft)		159		947	41	867
Turn Bay Length (ft)	125		100			
Base Capacity (vph)	191	2608	577	2620	304	382
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.24	0.05	0.58	0.09	0.34

Intersection Summary

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

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

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	130	1248	16	889	97	142
v/c Ratio	0.28	0.45	0.05	0.32	0.75	0.53
Control Delay	6.1	5.2	4.1	4.0	68.0	26.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.1	5.2	4.1	4.0	68.0	26.2
Queue Length 50th (ft)	22	130	2	77	52	26
Queue Length 95th (ft)	63	236	m9	116	106	90
Internal Link Dist (ft)		159		947	41	867
Turn Bay Length (ft)	125		100			
Base Capacity (vph)	461	2796	302	2791	198	370
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.45	0.05	0.32	0.49	0.38

Intersection Summary

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

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	138	1241	16	886	97	147
v/c Ratio	0.30	0.44	0.05	0.32	0.76	0.54
Control Delay	6.3	5.2	4.1	4.0	70.3	26.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.3	5.2	4.1	4.0	70.3	26.0
Queue Length 50th (ft)	23	129	2	76	52	27
Queue Length 95th (ft)	68	235	m9	116	106	89
Internal Link Dist (ft)		159		947	41	867
Turn Bay Length (ft)	125		100			
Base Capacity (vph)	463	2795	305	2790	193	372
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.44	0.05	0.32	0.50	0.40

Intersection Summary

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

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	130	1324	16	944	97	142
v/c Ratio	0.30	0.47	0.06	0.34	0.75	0.53
Control Delay	6.5	5.4	4.3	4.1	68.0	26.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.5	5.4	4.3	4.1	68.0	26.1
Queue Length 50th (ft)	22	142	2	83	52	27
Queue Length 95th (ft)	66	259	m9	125	106	90
Internal Link Dist (ft)		159		947	41	867
Turn Bay Length (ft)	125		100			
Base Capacity (vph)	434	2796	275	2794	198	370
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.47	0.06	0.34	0.49	0.38

Intersection Summary

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

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	138	1317	16	940	97	147
v/c Ratio	0.32	0.47	0.06	0.34	0.76	0.54
Control Delay	6.7	5.4	4.3	4.1	70.3	25.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.7	5.4	4.3	4.1	70.3	25.9
Queue Length 50th (ft)	24	142	2	83	52	27
Queue Length 95th (ft)	71	257	m9	124	106	89
Internal Link Dist (ft)		159		947	41	867
Turn Bay Length (ft)	125		100			
Base Capacity (vph)	435	2795	278	2789	193	372
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.47	0.06	0.34	0.50	0.40

Intersection Summary

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

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	98	657	27	1616	26	130
v/c Ratio	0.59	0.25	0.05	0.62	0.13	0.51
Control Delay	27.6	5.1	1.3	4.1	30.5	28.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.6	5.1	1.3	4.1	30.5	28.3
Queue Length 50th (ft)	21	50	1	14	12	52
Queue Length 95th (ft)	#136	105	m1	23	33	104
Internal Link Dist (ft)		159		947	41	867
Turn Bay Length (ft)	125		100			
Base Capacity (vph)	166	2599	555	2611	307	374
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.25	0.05	0.62	0.08	0.35

Intersection Summary

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

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

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	98	657	27	1616	26	130
v/c Ratio	0.59	0.25	0.05	0.62	0.13	0.51
Control Delay	27.6	5.1	1.3	4.1	30.5	28.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.6	5.1	1.3	4.1	30.5	28.4
Queue Length 50th (ft)	21	50	1	14	12	53
Queue Length 95th (ft)	#136	105	m1	23	33	103
Internal Link Dist (ft)		159		947	41	867
Turn Bay Length (ft)	125		100			
Base Capacity (vph)	166	2599	555	2611	307	374
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.25	0.05	0.62	0.08	0.35

Intersection Summary

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

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

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	100	654	27	1609	26	137
v/c Ratio	0.60	0.25	0.05	0.62	0.13	0.54
Control Delay	28.5	5.1	1.3	4.0	30.6	29.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.5	5.1	1.3	4.0	30.6	29.2
Queue Length 50th (ft)	22	50	0	12	12	56
Queue Length 95th (ft)	#139	105	m1	21	33	109
Internal Link Dist (ft)		159		947	41	867
Turn Bay Length (ft)	125		100			
Base Capacity (vph)	166	2597	556	2608	301	375
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.25	0.05	0.62	0.09	0.37

Intersection Summary

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

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

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	150	1160	510	25	30	105
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	163	1261	554	27	33	114
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	582				1524	291
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	582				1524	291
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	84				64	84
cM capacity (veh/h)	989				91	706

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	163	630	630	370	212	147
Volume Left	163	0	0	0	0	33
Volume Right	0	0	0	0	27	114
cSH	989	1700	1700	1700	1700	282
Volume to Capacity	0.16	0.37	0.37	0.22	0.12	0.52
Queue Length 95th (ft)	15	0	0	0	0	70
Control Delay (s)	9.4	0.0	0.0	0.0	0.0	30.9
Lane LOS	A					D
Approach Delay (s)	1.1			0.0		30.9
Approach LOS						D

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	150	1160	510	25	30	105
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	163	1261	554	27	33	114
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	582				1524	291
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	582				1524	291
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	84				64	84
cM capacity (veh/h)	989				91	706

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	163	630	630	370	212	33	114
Volume Left	163	0	0	0	0	33	0
Volume Right	0	0	0	0	27	0	114
cSH	989	1700	1700	1700	1700	91	706
Volume to Capacity	0.16	0.37	0.37	0.22	0.12	0.36	0.16
Queue Length 95th (ft)	15	0	0	0	0	35	14
Control Delay (s)	9.4	0.0	0.0	0.0	0.0	65.4	11.1
Lane LOS	A					F	B
Approach Delay (s)	1.1			0.0		23.2	
Approach LOS						C	

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	35	545	1440	20	10	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6	6.6		5.8	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frt	1.00	1.00	1.00		0.89	
Flt Protected	0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1770	3539	3532		1640	
Flt Permitted	0.14	1.00	1.00		0.99	
Satd. Flow (perm)	254	3539	3532		1640	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	592	1565	22	11	54
RTOR Reduction (vph)	0	0	1	0	42	0
Lane Group Flow (vph)	38	592	1586	0	23	0
Turn Type	Perm					
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	79.5	79.5	79.5		8.1	
Effective Green, g (s)	79.5	79.5	79.5		8.1	
Actuated g/C Ratio	0.80	0.80	0.80		0.08	
Clearance Time (s)	6.6	6.6	6.6		5.8	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	202	2814	2808		133	
v/s Ratio Prot		0.17	c0.45		c0.01	
v/s Ratio Perm	0.15					
v/c Ratio	0.19	0.21	0.56		0.17	
Uniform Delay, d1	2.5	2.5	3.8		42.8	
Progression Factor	1.04	0.98	1.00		1.00	
Incremental Delay, d2	2.0	0.2	0.8		0.6	
Delay (s)	4.6	2.6	4.6		43.4	
Level of Service	A	A	A		D	
Approach Delay (s)		2.8	4.6		43.4	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	5.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	38	592	1587	65
v/c Ratio	0.18	0.20	0.55	0.34
Control Delay	7.0	3.3	5.6	21.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.0	3.3	5.6	21.3
Queue Length 50th (ft)	4	32	131	12
Queue Length 95th (ft)	26	94	363	45
Internal Link Dist (ft)		947	536	325
Turn Bay Length (ft)	125			
Base Capacity (vph)	207	2901	2895	386
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.18	0.20	0.55	0.17

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	35	545	1440	20	10	50
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	592	1565	22	11	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1587				1948	793
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1587				1948	793
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	91				79	84
cM capacity (veh/h)	410				51	331

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	38	296	296	1043	543	65
Volume Left	38	0	0	0	0	11
Volume Right	0	0	0	0	22	54
cSH	410	1700	1700	1700	1700	173
Volume to Capacity	0.09	0.17	0.17	0.61	0.32	0.38
Queue Length 95th (ft)	8	0	0	0	0	40
Control Delay (s)	14.7	0.0	0.0	0.0	0.0	37.8
Lane LOS	B					E
Approach Delay (s)	0.9			0.0		37.8
Approach LOS						E

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	35	545	1440	20	10	50
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	592	1565	22	11	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1587				1948	793
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1587				1948	793
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	91				79	84
cM capacity (veh/h)	410				51	331

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	38	296	296	1043	543	11	54
Volume Left	38	0	0	0	0	11	0
Volume Right	0	0	0	0	22	0	54
cSH	410	1700	1700	1700	1700	51	331
Volume to Capacity	0.09	0.17	0.17	0.61	0.32	0.21	0.16
Queue Length 95th (ft)	8	0	0	0	0	18	14
Control Delay (s)	14.7	0.0	0.0	0.0	0.0	93.3	18.0
Lane LOS	B					F	C
Approach Delay (s)	0.9			0.0		30.5	
Approach LOS						D	

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	150	1085	475	25	30	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6	6.6		5.8	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frt	1.00	1.00	0.99		0.90	
Flt Protected	0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1770	3539	3513		1649	
Flt Permitted	0.45	1.00	1.00		0.99	
Satd. Flow (perm)	837	3539	3513		1649	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	1179	516	27	33	114
RTOR Reduction (vph)	0	0	2	0	106	0
Lane Group Flow (vph)	163	1179	541	0	41	0
Turn Type	Perm					
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	98.8	98.8	98.8		8.8	
Effective Green, g (s)	98.8	98.8	98.8		8.8	
Actuated g/C Ratio	0.82	0.82	0.82		0.07	
Clearance Time (s)	6.6	6.6	6.6		5.8	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	689	2914	2892		121	
v/s Ratio Prot		c0.33	0.15		c0.03	
v/s Ratio Perm	0.19					
v/c Ratio	0.24	0.40	0.19		0.34	
Uniform Delay, d1	2.3	2.8	2.2		52.8	
Progression Factor	0.68	0.63	1.00		1.00	
Incremental Delay, d2	0.7	0.4	0.1		1.7	
Delay (s)	2.3	2.2	2.4		54.5	
Level of Service	A	A	A		D	
Approach Delay (s)		2.2	2.4		54.5	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	6.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	163	1179	543	147
v/c Ratio	0.24	0.40	0.19	0.65
Control Delay	2.7	2.4	2.6	28.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	2.7	2.4	2.6	28.7
Queue Length 50th (ft)	15	55	33	25
Queue Length 95th (ft)	26	75	63	88
Internal Link Dist (ft)		947	536	325
Turn Bay Length (ft)	125			
Base Capacity (vph)	688	2913	2894	386
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.24	0.40	0.19	0.38

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	150	1085	475	25	30	105
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	163	1179	516	27	33	114
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	543				1446	272
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	543				1446	272
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	84				68	84
cM capacity (veh/h)	1022				103	726

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	163	590	590	344	199	147
Volume Left	163	0	0	0	0	33
Volume Right	0	0	0	0	27	114
cSH	1022	1700	1700	1700	1700	310
Volume to Capacity	0.16	0.35	0.35	0.20	0.12	0.47
Queue Length 95th (ft)	14	0	0	0	0	60
Control Delay (s)	9.2	0.0	0.0	0.0	0.0	26.7
Lane LOS	A					D
Approach Delay (s)	1.1			0.0		26.7
Approach LOS						D

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	44.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	150	1085	475	25	30	105
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	163	1179	516	27	33	114
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	543				1446	272
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	543				1446	272
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	84				68	84
cM capacity (veh/h)	1022				103	726

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	163	590	590	344	199	33	114
Volume Left	163	0	0	0	0	33	0
Volume Right	0	0	0	0	27	0	114
cSH	1022	1700	1700	1700	1700	103	726
Volume to Capacity	0.16	0.35	0.35	0.20	0.12	0.32	0.16
Queue Length 95th (ft)	14	0	0	0	0	31	14
Control Delay (s)	9.2	0.0	0.0	0.0	0.0	55.4	10.9
Lane LOS	A					F	B
Approach Delay (s)	1.1			0.0		20.8	
Approach LOS						C	

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	35	515	1350	20	10	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6	6.6		5.8	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frt	1.00	1.00	1.00		0.89	
Flt Protected	0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1770	3539	3531		1640	
Flt Permitted	0.16	1.00	1.00		0.99	
Satd. Flow (perm)	289	3539	3531		1640	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	560	1467	22	11	54
RTOR Reduction (vph)	0	0	1	0	50	0
Lane Group Flow (vph)	38	560	1488	0	15	0
Turn Type	Perm					
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	79.5	79.5	79.5		8.1	
Effective Green, g (s)	79.5	79.5	79.5		8.1	
Actuated g/C Ratio	0.80	0.80	0.80		0.08	
Clearance Time (s)	6.6	6.6	6.6		5.8	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	230	2814	2807		133	
v/s Ratio Prot		0.16	c0.42		c0.01	
v/s Ratio Perm	0.13					
v/c Ratio	0.17	0.20	0.53		0.12	
Uniform Delay, d1	2.4	2.5	3.6		42.6	
Progression Factor	1.02	0.98	1.00		1.00	
Incremental Delay, d2	1.5	0.2	0.7		0.4	
Delay (s)	4.0	2.6	4.4		43.0	
Level of Service	A	A	A		D	
Approach Delay (s)		2.7	4.4		43.0	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	5.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	38	560	1489	65
v/c Ratio	0.16	0.19	0.51	0.33
Control Delay	6.2	3.3	5.3	17.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.2	3.3	5.3	17.9
Queue Length 50th (ft)	4	30	117	7
Queue Length 95th (ft)	24	88	325	41
Internal Link Dist (ft)		947	536	325
Turn Bay Length (ft)	125			
Base Capacity (vph)	237	2901	2895	392
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.16	0.19	0.51	0.17

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	35	515	1350	20	10	50
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	560	1467	22	11	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1489				1834	745
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1489				1834	745
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	91				82	85
cM capacity (veh/h)	447				62	357

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	38	280	280	978	511	65
Volume Left	38	0	0	0	0	11
Volume Right	0	0	0	0	22	54
cSH	447	1700	1700	1700	1700	199
Volume to Capacity	0.09	0.16	0.16	0.58	0.30	0.33
Queue Length 95th (ft)	7	0	0	0	0	34
Control Delay (s)	13.8	0.0	0.0	0.0	0.0	31.8
Lane LOS	B					D
Approach Delay (s)	0.9			0.0		31.8
Approach LOS						D

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	35	515	1350	20	10	50
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	560	1467	22	11	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1489				1834	745
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1489				1834	745
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	91				82	85
cM capacity (veh/h)	447				62	357

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	38	280	280	978	511	11	54
Volume Left	38	0	0	0	0	11	0
Volume Right	0	0	0	0	22	0	54
cSH	447	1700	1700	1700	1700	62	357
Volume to Capacity	0.09	0.16	0.16	0.58	0.30	0.18	0.15
Queue Length 95th (ft)	7	0	0	0	0	15	13
Control Delay (s)	13.8	0.0	0.0	0.0	0.0	75.4	16.9
Lane LOS	B					F	C
Approach Delay (s)	0.9			0.0		26.6	
Approach LOS						D	

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	102	1064	465	17	25	58
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	111	1157	505	18	27	63
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	524				1315	262
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	524				1315	262
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	89				80	91
cM capacity (veh/h)	1039				134	737

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	111	578	578	337	187	90
Volume Left	111	0	0	0	0	27
Volume Right	0	0	0	0	18	63
cSH	1039	1700	1700	1700	1700	312
Volume to Capacity	0.11	0.34	0.34	0.20	0.11	0.29
Queue Length 95th (ft)	9	0	0	0	0	29
Control Delay (s)	8.9	0.0	0.0	0.0	0.0	21.2
Lane LOS	A					C
Approach Delay (s)	0.8			0.0		21.2
Approach LOS						C

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	32	501	1320	16	6	47
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	545	1435	17	7	51
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1452				1785	726
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1452				1785	726
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				90	86
cM capacity (veh/h)	462				67	367

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	35	272	272	957	496	58
Volume Left	35	0	0	0	0	7
Volume Right	0	0	0	0	17	51
cSH	462	1700	1700	1700	1700	244
Volume to Capacity	0.08	0.16	0.16	0.56	0.29	0.24
Queue Length 95th (ft)	6	0	0	0	0	22
Control Delay (s)	13.4	0.0	0.0	0.0	0.0	24.3
Lane LOS	B					C
Approach Delay (s)	0.8			0.0		24.3
Approach LOS						C

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	150	1160	510	25	30	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6	6.6		5.8	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frt	1.00	1.00	0.99		0.90	
Flt Protected	0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1770	3539	3515		1649	
Flt Permitted	0.43	1.00	1.00		0.99	
Satd. Flow (perm)	807	3539	3515		1649	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	1261	554	27	33	114
RTOR Reduction (vph)	0	0	2	0	106	0
Lane Group Flow (vph)	163	1261	579	0	41	0
Turn Type	Perm					
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	98.8	98.8	98.8		8.8	
Effective Green, g (s)	98.8	98.8	98.8		8.8	
Actuated g/C Ratio	0.82	0.82	0.82		0.07	
Clearance Time (s)	6.6	6.6	6.6		5.8	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	664	2914	2894		121	
v/s Ratio Prot		c0.36	0.16		c0.03	
v/s Ratio Perm	0.20					
v/c Ratio	0.25	0.43	0.20		0.34	
Uniform Delay, d1	2.3	2.9	2.2		52.8	
Progression Factor	0.67	0.61	1.00		1.00	
Incremental Delay, d2	0.8	0.4	0.2		1.7	
Delay (s)	2.4	2.2	2.4		54.5	
Level of Service	A	A	A		D	
Approach Delay (s)		2.2	2.4		54.5	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	5.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	163	1261	581	147
v/c Ratio	0.25	0.43	0.20	0.65
Control Delay	2.7	2.4	2.6	28.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	2.7	2.4	2.6	28.7
Queue Length 50th (ft)	15	60	35	25
Queue Length 95th (ft)	26	80	67	88
Internal Link Dist (ft)		947	536	325
Turn Bay Length (ft)	125			
Base Capacity (vph)	664	2913	2894	386
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.25	0.43	0.20	0.38

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	40	515	1350	21	12	62
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	560	1467	23	13	67
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1490				1846	745
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1490				1846	745
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				78	81
cM capacity (veh/h)	447				60	356

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	43	280	280	978	512	80
Volume Left	43	0	0	0	0	13
Volume Right	0	0	0	0	23	67
cSH	447	1700	1700	1700	1700	198
Volume to Capacity	0.10	0.16	0.16	0.58	0.30	0.41
Queue Length 95th (ft)	8	0	0	0	0	46
Control Delay (s)	13.9	0.0	0.0	0.0	0.0	35.2
Lane LOS	B					E
Approach Delay (s)	1.0			0.0		35.2
Approach LOS						E

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: S Boulder Road & 55th St

H:\Boulder Creek Commons\Synchro\2012 Total PM.syn

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	163	1085	475	27	31	113
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	177	1179	516	29	34	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	546				1475	273
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	546				1475	273
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				65	83
cM capacity (veh/h)	1020				97	725

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	177	590	590	344	201	157
Volume Left	177	0	0	0	0	34
Volume Right	0	0	0	0	29	123
cSH	1020	1700	1700	1700	1700	302
Volume to Capacity	0.17	0.35	0.35	0.20	0.12	0.52
Queue Length 95th (ft)	16	0	0	0	0	70
Control Delay (s)	9.3	0.0	0.0	0.0	0.0	29.0
Lane LOS	A					D
Approach Delay (s)	1.2			0.0		29.0
Approach LOS						D

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	45.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: S Boulder Road & 55th St

H:\Boulder Creek Commons\Synchro\2012 Total AM w kewanee.syn

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	37	516	1350	20	11	56
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	561	1467	22	12	61
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1489				1839	745
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1489				1839	745
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	91				80	83
cM capacity (veh/h)	447				61	357

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	40	280	280	978	511	12	61
Volume Left	40	0	0	0	0	12	0
Volume Right	0	0	0	0	22	0	61
cSH	447	1700	1700	1700	1700	61	357
Volume to Capacity	0.09	0.16	0.16	0.58	0.30	0.20	0.17
Queue Length 95th (ft)	7	0	0	0	0	17	15
Control Delay (s)	13.8	0.0	0.0	0.0	0.0	78.0	17.2
Lane LOS	B					F	C
Approach Delay (s)	0.9			0.0		27.1	
Approach LOS						D	

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: S Boulder Road & 55th St

H:\Boulder Creek Commons\Synchro\2012 Total PM w kewanee.syn

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	175	1085	475	32	35	120
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	190	1179	516	35	38	130
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	551				1504	276
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	551				1504	276
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	81				58	82
cM capacity (veh/h)	1015				91	722

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	190	590	590	344	207	168
Volume Left	190	0	0	0	0	38
Volume Right	0	0	0	0	35	130
cSH	1015	1700	1700	1700	1700	282
Volume to Capacity	0.19	0.35	0.35	0.20	0.12	0.60
Queue Length 95th (ft)	17	0	0	0	0	89
Control Delay (s)	9.4	0.0	0.0	0.0	0.0	35.1
Lane LOS	A					E
Approach Delay (s)	1.3			0.0		35.1
Approach LOS						E

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	46.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	40	545	1440	21	12	62
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	592	1565	23	13	67
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1588				1960	794
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1588				1960	794
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	89				74	80
cM capacity (veh/h)	409				50	331

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	43	296	296	1043	545	80
Volume Left	43	0	0	0	0	13
Volume Right	0	0	0	0	23	67
cSH	409	1700	1700	1700	1700	172
Volume to Capacity	0.11	0.17	0.17	0.61	0.32	0.47
Queue Length 95th (ft)	9	0	0	0	0	55
Control Delay (s)	14.8	0.0	0.0	0.0	0.0	42.9
Lane LOS	B					E
Approach Delay (s)	1.0			0.0		42.9
Approach LOS						E

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: S Boulder Road & 55th St

H:\Boulder Creek Commons\Synchro\2025 Total PM.syn

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	163	1160	510	27	31	113
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	177	1261	554	29	34	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	584				1554	292
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	584				1554	292
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	82				60	83
cM capacity (veh/h)	987				85	705

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	177	630	630	370	214	157
Volume Left	177	0	0	0	0	34
Volume Right	0	0	0	0	29	123
cSH	987	1700	1700	1700	1700	275
Volume to Capacity	0.18	0.37	0.37	0.22	0.13	0.57
Queue Length 95th (ft)	16	0	0	0	0	81
Control Delay (s)	9.4	0.0	0.0	0.0	0.0	34.1
Lane LOS	A					D
Approach Delay (s)	1.2			0.0		34.1
Approach LOS						D

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	37	546	1440	20	11	56
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	593	1565	22	12	61
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1587				1953	793
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1587				1953	793
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				76	82
cM capacity (veh/h)	410				51	331

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	40	297	297	1043	543	73
Volume Left	40	0	0	0	0	12
Volume Right	0	0	0	0	22	61
cSH	410	1700	1700	1700	1700	173
Volume to Capacity	0.10	0.17	0.17	0.61	0.32	0.42
Queue Length 95th (ft)	8	0	0	0	0	47
Control Delay (s)	14.7	0.0	0.0	0.0	0.0	40.1
Lane LOS	B					E
Approach Delay (s)	0.9			0.0		40.1
Approach LOS						E

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: S Boulder Road & 55th St

H:\Boulder Creek Commons\Synchro\2025 Total PM w kewanee.syn

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	157	1161	511	26	31	109
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	171	1262	555	28	34	118
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	584				1542	292
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	584				1542	292
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				61	83
cM capacity (veh/h)	987				88	705

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	171	631	631	370	213	152
Volume Left	171	0	0	0	0	34
Volume Right	0	0	0	0	28	118
cSH	987	1700	1700	1700	1700	275
Volume to Capacity	0.17	0.37	0.37	0.22	0.13	0.55
Queue Length 95th (ft)	16	0	0	0	0	77
Control Delay (s)	9.4	0.0	0.0	0.0	0.0	33.2
Lane LOS	A					D
Approach Delay (s)	1.1			0.0		33.2
Approach LOS						D

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: S Boulder Road & 55th St

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	47	515	1350	22	16	81
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	51	560	1467	24	17	88
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1491				1861	746
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1491				1861	746
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	89				70	75
cM capacity (veh/h)	446				57	356

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	51	280	280	978	513	17	88
Volume Left	51	0	0	0	0	17	0
Volume Right	0	0	0	0	24	0	88
cSH	446	1700	1700	1700	1700	57	356
Volume to Capacity	0.11	0.16	0.16	0.58	0.30	0.30	0.25
Queue Length 95th (ft)	10	0	0	0	0	27	24
Control Delay (s)	14.1	0.0	0.0	0.0	0.0	93.2	18.4
Lane LOS	B					F	C
Approach Delay (s)	1.2			0.0		30.7	
Approach LOS						D	

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: S Boulder Road & 55th St

H:\Boulder Creek Commons\Synchro\2012 Total PM - turn lanes.syn

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	163	1085	475	27	31	113
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	177	1179	516	29	34	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	546				1475	273
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	546				1475	273
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				65	83
cM capacity (veh/h)	1020				97	725

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	177	590	590	344	201	34	123
Volume Left	177	0	0	0	0	34	0
Volume Right	0	0	0	0	29	0	123
cSH	1020	1700	1700	1700	1700	97	725
Volume to Capacity	0.17	0.35	0.35	0.20	0.12	0.35	0.17
Queue Length 95th (ft)	16	0	0	0	0	34	15
Control Delay (s)	9.3	0.0	0.0	0.0	0.0	60.9	11.0
Lane LOS	A					F	B
Approach Delay (s)	1.2			0.0		21.7	
Approach LOS						C	

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: S Boulder Road & 55th St

H:\Boulder Creek Commons\Synchro\2012 Total AM w kewanee - turn lanes.syn

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	37	516	1350	20	11	56
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	561	1467	22	12	61
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1489				1839	745
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1489				1839	745
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	91				80	83
cM capacity (veh/h)	447				61	357

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	40	280	280	978	511	12	61
Volume Left	40	0	0	0	0	12	0
Volume Right	0	0	0	0	22	0	61
cSH	447	1700	1700	1700	1700	61	357
Volume to Capacity	0.09	0.16	0.16	0.58	0.30	0.20	0.17
Queue Length 95th (ft)	7	0	0	0	0	17	15
Control Delay (s)	13.8	0.0	0.0	0.0	0.0	78.0	17.2
Lane LOS	B					F	C
Approach Delay (s)	0.9			0.0		27.1	
Approach LOS						D	

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: S Boulder Road & 55th St

H:\Boulder Creek Commons\Synchro\2012 Total PM w kewanee - turn lanes.syn

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	175	1085	475	32	35	120
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	190	1179	516	35	38	130
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	551				1504	276
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	551				1504	276
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	81				58	82
cM capacity (veh/h)	1015				91	722

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	190	590	590	344	207	38	130
Volume Left	190	0	0	0	0	38	0
Volume Right	0	0	0	0	35	0	130
cSH	1015	1700	1700	1700	1700	91	722
Volume to Capacity	0.19	0.35	0.35	0.20	0.12	0.42	0.18
Queue Length 95th (ft)	17	0	0	0	0	43	16
Control Delay (s)	9.4	0.0	0.0	0.0	0.0	70.3	11.1
Lane LOS	A					F	B
Approach Delay (s)	1.3			0.0		24.5	
Approach LOS						C	

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: S Boulder Road & 55th St

H:\Boulder Creek Commons\Synchro\2025 Total AM-turn lanes.syn

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	40	545	1440	21	12	62
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	592	1565	23	13	67
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1588				1960	794
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1588				1960	794
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	89				74	80
cM capacity (veh/h)	409				50	331

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	43	296	296	1043	545	13	67
Volume Left	43	0	0	0	0	13	0
Volume Right	0	0	0	0	23	0	67
cSH	409	1700	1700	1700	1700	50	331
Volume to Capacity	0.11	0.17	0.17	0.61	0.32	0.26	0.20
Queue Length 95th (ft)	9	0	0	0	0	22	19
Control Delay (s)	14.8	0.0	0.0	0.0	0.0	101.7	18.6
Lane LOS	B					F	C
Approach Delay (s)	1.0			0.0		32.1	
Approach LOS						D	

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: S Boulder Road & 55th St

H:\Boulder Creek Commons\Synchro\2025 Total PM-turn lanes.syn

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	163	1160	510	27	31	113
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	177	1261	554	29	34	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	584				1554	292
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	584				1554	292
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	82				60	83
cM capacity (veh/h)	987				85	705

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	177	630	630	370	214	34	123
Volume Left	177	0	0	0	0	34	0
Volume Right	0	0	0	0	29	0	123
cSH	987	1700	1700	1700	1700	85	705
Volume to Capacity	0.18	0.37	0.37	0.22	0.13	0.40	0.17
Queue Length 95th (ft)	16	0	0	0	0	39	16
Control Delay (s)	9.4	0.0	0.0	0.0	0.0	72.5	11.2
Lane LOS	A					F	B
Approach Delay (s)	1.2			0.0		24.4	
Approach LOS						C	

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: S Boulder Road & 55th St

H:\Boulder Creek Commons\Synchro\2025 Total AM w kewanee-turn lanes.syn

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	37	546	1440	20	11	56
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	593	1565	22	12	61
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1587				1953	793
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1587				1953	793
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				76	82
cM capacity (veh/h)	410				51	331

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	40	297	297	1043	543	12	61
Volume Left	40	0	0	0	0	12	0
Volume Right	0	0	0	0	22	0	61
cSH	410	1700	1700	1700	1700	51	331
Volume to Capacity	0.10	0.17	0.17	0.61	0.32	0.24	0.18
Queue Length 95th (ft)	8	0	0	0	0	20	17
Control Delay (s)	14.7	0.0	0.0	0.0	0.0	97.0	18.3
Lane LOS	B					F	C
Approach Delay (s)	0.9			0.0		31.2	
Approach LOS						D	

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	157	1161	511	26	31	109
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	171	1262	555	28	34	118
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	584				1542	292
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	584				1542	292
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				61	83
cM capacity (veh/h)	987				88	705

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	171	631	631	370	213	34	118
Volume Left	171	0	0	0	0	34	0
Volume Right	0	0	0	0	28	0	118
cSH	987	1700	1700	1700	1700	88	705
Volume to Capacity	0.17	0.37	0.37	0.22	0.13	0.39	0.17
Queue Length 95th (ft)	16	0	0	0	0	38	15
Control Delay (s)	9.4	0.0	0.0	0.0	0.0	69.9	11.1
Lane LOS	A					F	B
Approach Delay (s)	1.1			0.0		24.1	
Approach LOS						C	

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	40	545	1440	21	12	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6	6.6		5.8	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frt	1.00	1.00	1.00		0.89	
Flt Protected	0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1770	3539	3532		1639	
Flt Permitted	0.13	1.00	1.00		0.99	
Satd. Flow (perm)	251	3539	3532		1639	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	592	1565	23	13	67
RTOR Reduction (vph)	0	0	1	0	42	0
Lane Group Flow (vph)	43	592	1587	0	38	0
Turn Type	Perm					
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	78.8	78.8	78.8		8.8	
Effective Green, g (s)	78.8	78.8	78.8		8.8	
Actuated g/C Ratio	0.79	0.79	0.79		0.09	
Clearance Time (s)	6.6	6.6	6.6		5.8	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	198	2789	2783		144	
v/s Ratio Prot		0.17	c0.45		c0.02	
v/s Ratio Perm	0.17					
v/c Ratio	0.22	0.21	0.57		0.26	
Uniform Delay, d1	2.7	2.7	4.1		42.6	
Progression Factor	1.07	0.98	1.00		1.00	
Incremental Delay, d2	2.5	0.2	0.9		1.0	
Delay (s)	5.3	2.8	4.9		43.6	
Level of Service	A	A	A		D	
Approach Delay (s)		3.0	4.9		43.6	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	5.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	163	1160	510	27	31	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6	6.6		5.8	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frt	1.00	1.00	0.99		0.89	
Flt Protected	0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1770	3539	3513		1648	
Flt Permitted	0.43	1.00	1.00		0.99	
Satd. Flow (perm)	805	3539	3513		1648	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	1261	554	29	34	123
RTOR Reduction (vph)	0	0	2	0	114	0
Lane Group Flow (vph)	177	1261	581	0	43	0
Turn Type	Perm					
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	99.3	99.3	99.3		8.3	
Effective Green, g (s)	99.3	99.3	99.3		8.3	
Actuated g/C Ratio	0.83	0.83	0.83		0.07	
Clearance Time (s)	6.6	6.6	6.6		5.8	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	666	2929	2907		114	
v/s Ratio Prot		c0.36	0.17		c0.03	
v/s Ratio Perm	0.22					
v/c Ratio	0.27	0.43	0.20		0.37	
Uniform Delay, d1	2.3	2.8	2.1		53.4	
Progression Factor	0.67	0.62	1.00		1.00	
Incremental Delay, d2	0.9	0.4	0.2		2.1	
Delay (s)	2.4	2.1	2.3		55.4	
Level of Service	A	A	A		E	
Approach Delay (s)		2.2	2.3		55.4	
Approach LOS		A	A		E	

Intersection Summary			
HCM Average Control Delay	6.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: S Boulder Road & 55th St

H:\Boulder Creek Commons\Synchro\2025 Total AM with kewanee-Added Signals.syn

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	37	546	1440	20	11	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6	6.6		5.8	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frt	1.00	1.00	1.00		0.89	
Flt Protected	0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1770	3539	3532		1639	
Flt Permitted	0.14	1.00	1.00		0.99	
Satd. Flow (perm)	253	3539	3532		1639	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	593	1565	22	12	61
RTOR Reduction (vph)	0	0	1	0	42	0
Lane Group Flow (vph)	40	593	1586	0	31	0
Turn Type	Perm					
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	79.1	79.1	79.1		8.5	
Effective Green, g (s)	79.1	79.1	79.1		8.5	
Actuated g/C Ratio	0.79	0.79	0.79		0.08	
Clearance Time (s)	6.6	6.6	6.6		5.8	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	200	2799	2794		139	
v/s Ratio Prot		0.17	c0.45		c0.02	
v/s Ratio Perm	0.16					
v/c Ratio	0.20	0.21	0.57		0.22	
Uniform Delay, d1	2.6	2.6	4.0		42.7	
Progression Factor	1.05	0.98	1.00		1.00	
Incremental Delay, d2	2.2	0.2	0.8		0.8	
Delay (s)	4.9	2.7	4.8		43.5	
Level of Service	A	A	A		D	
Approach Delay (s)		2.9	4.8		43.5	
Approach LOS		A	A		D	

Intersection Summary			
HCM Average Control Delay	5.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: S Boulder Road & 55th St

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Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	157	1161	511	26	31	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6	6.6		5.8	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frt	1.00	1.00	0.99		0.90	
Flt Protected	0.95	1.00	1.00		0.99	
Satd. Flow (prot)	1770	3539	3514		1649	
Flt Permitted	0.43	1.00	1.00		0.99	
Satd. Flow (perm)	805	3539	3514		1649	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	171	1262	555	28	34	118
RTOR Reduction (vph)	0	0	2	0	110	0
Lane Group Flow (vph)	171	1262	581	0	42	0
Turn Type	Perm					
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	99.2	99.2	99.2		8.4	
Effective Green, g (s)	99.2	99.2	99.2		8.4	
Actuated g/C Ratio	0.83	0.83	0.83		0.07	
Clearance Time (s)	6.6	6.6	6.6		5.8	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	665	2926	2905		115	
v/s Ratio Prot		c0.36	0.17		c0.03	
v/s Ratio Perm	0.21					
v/c Ratio	0.26	0.43	0.20		0.37	
Uniform Delay, d1	2.3	2.8	2.2		53.3	
Progression Factor	0.67	0.62	1.00		1.00	
Incremental Delay, d2	0.8	0.4	0.2		2.0	
Delay (s)	2.4	2.2	2.3		55.3	
Level of Service	A	A	A		E	
Approach Delay (s)		2.2	2.3		55.3	
Approach LOS		A	A		E	

Intersection Summary			
HCM Average Control Delay	5.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	43	560	1490	80
v/c Ratio	0.18	0.19	0.52	0.38
Control Delay	6.8	3.4	5.4	21.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.8	3.4	5.4	21.2
Queue Length 50th (ft)	5	32	124	15
Queue Length 95th (ft)	28	88	325	51
Internal Link Dist (ft)		947	536	325
Turn Bay Length (ft)	125			
Base Capacity (vph)	234	2888	2883	393
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.18	0.19	0.52	0.20

Intersection Summary

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	177	1179	545	157
v/c Ratio	0.26	0.40	0.19	0.69
Control Delay	2.7	2.3	2.4	30.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	2.7	2.3	2.4	30.7
Queue Length 50th (ft)	16	55	30	26
Queue Length 95th (ft)	27	73	61	92
Internal Link Dist (ft)		947	536	325
Turn Bay Length (ft)	125			
Base Capacity (vph)	692	2929	2908	394
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.26	0.40	0.19	0.40

Intersection Summary

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	171	1180	545	152
v/c Ratio	0.25	0.40	0.19	0.68
Control Delay	2.7	2.3	2.4	30.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	2.7	2.3	2.4	30.5
Queue Length 50th (ft)	15	55	31	26
Queue Length 95th (ft)	27	74	61	91
Internal Link Dist (ft)		947	536	325
Turn Bay Length (ft)	125			
Base Capacity (vph)	691	2926	2905	390
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.25	0.40	0.19	0.39

Intersection Summary

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	40	593	1587	73
v/c Ratio	0.19	0.21	0.55	0.36
Control Delay	7.5	3.4	5.8	23.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.5	3.4	5.8	23.1
Queue Length 50th (ft)	4	34	141	17
Queue Length 95th (ft)	27	94	363	51
Internal Link Dist (ft)		947	536	325
Turn Bay Length (ft)	125			
Base Capacity (vph)	206	2886	2881	385
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.19	0.21	0.55	0.19

Intersection Summary

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	43	592	1588	80
v/c Ratio	0.21	0.21	0.55	0.39
Control Delay	8.0	3.5	5.9	25.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	8.0	3.5	5.9	25.2
Queue Length 50th (ft)	5	35	146	21
Queue Length 95th (ft)	29	94	363	57
Internal Link Dist (ft)		947	536	325
Turn Bay Length (ft)	125			
Base Capacity (vph)	204	2878	2873	385
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.21	0.21	0.55	0.21

Intersection Summary

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	171	1262	583	152
v/c Ratio	0.26	0.43	0.20	0.68
Control Delay	2.7	2.3	2.5	30.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	2.7	2.3	2.5	30.5
Queue Length 50th (ft)	15	60	33	26
Queue Length 95th (ft)	26	78	65	91
Internal Link Dist (ft)		947	536	325
Turn Bay Length (ft)	125			
Base Capacity (vph)	666	2926	2907	390
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.26	0.43	0.20	0.39

Intersection Summary

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	177	1261	583	157
v/c Ratio	0.27	0.43	0.20	0.69
Control Delay	2.8	2.3	2.5	30.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	2.8	2.3	2.5	30.7
Queue Length 50th (ft)	16	59	33	26
Queue Length 95th (ft)	27	78	65	92
Internal Link Dist (ft)		947	536	325
Turn Bay Length (ft)	125			
Base Capacity (vph)	666	2929	2910	394
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.27	0.43	0.20	0.40

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	915	85	45	860	15	220	15	75	5	15	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.87		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3494		1770	3530		1770	1629		1770	1659	
Flt Permitted	0.27	1.00		0.23	1.00		0.72	1.00		0.69	1.00	
Satd. Flow (perm)	502	3494		419	3530		1338	1629		1292	1659	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	995	92	49	935	16	239	16	82	5	16	43
RTOR Reduction (vph)	0	6	0	0	1	0	0	64	0	0	33	0
Lane Group Flow (vph)	65	1081	0	49	950	0	239	34	0	5	26	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	67.3	67.3		67.3	67.3		22.1	22.1		22.1	22.1	
Effective Green, g (s)	67.3	67.3		67.3	67.3		22.1	22.1		22.1	22.1	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.22	0.22		0.22	0.22	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	338	2351		282	2376		296	360		286	367	
v/s Ratio Prot		c0.31			0.27			0.02			0.02	
v/s Ratio Perm	0.13			0.12			c0.18			0.00		
v/c Ratio	0.19	0.46		0.17	0.40		0.81	0.09		0.02	0.07	
Uniform Delay, d1	6.1	7.7		6.1	7.3		36.9	31.0		30.5	30.8	
Progression Factor	1.00	1.00		1.85	2.04		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.7		1.2	0.5		14.8	0.1		0.0	0.1	
Delay (s)	7.4	8.4		12.4	15.4		51.7	31.1		30.5	30.9	
Level of Service	A	A		B	B		D	C		C	C	
Approach Delay (s)		8.3			15.2			45.7			30.9	
Approach LOS		A			B			D			C	

Intersection Summary			
HCM Average Control Delay	16.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	65	1087	49	951	239	98	5	59
v/c Ratio	0.19	0.46	0.17	0.40	0.81	0.23	0.02	0.15
Control Delay	9.2	9.0	16.1	16.8	57.0	10.2	27.4	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.2	9.0	16.1	16.8	57.0	10.2	27.4	13.2
Queue Length 50th (ft)	14	156	20	235	144	8	3	8
Queue Length 95th (ft)	39	230	m40	332	222	46	11	38
Internal Link Dist (ft)		675		1083		61		27
Turn Bay Length (ft)	110		110		50		75	
Base Capacity (vph)	339	2357	282	2376	367	506	354	486
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.46	0.17	0.40	0.65	0.19	0.01	0.12

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	815	135	60	750	5	130	15	40	25	5	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.89		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3464		1770	3536		1770	1659		1770	1627	
Flt Permitted	0.33	1.00		0.26	1.00		0.74	1.00		0.72	1.00	
Satd. Flow (perm)	614	3464		478	3536		1372	1659		1338	1627	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	886	147	65	815	5	141	16	43	27	5	27
RTOR Reduction (vph)	0	8	0	0	0	0	0	37	0	0	23	0
Lane Group Flow (vph)	120	1025	0	65	820	0	141	22	0	27	9	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	91.4	91.4		91.4	91.4		18.0	18.0		18.0	18.0	
Effective Green, g (s)	91.4	91.4		91.4	91.4		18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.15	0.15		0.15	0.15	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	468	2638		364	2693		206	249		201	244	
v/s Ratio Prot		c0.30			0.23			0.01			0.01	
v/s Ratio Perm	0.20			0.14			c0.10			0.02		
v/c Ratio	0.26	0.39		0.18	0.30		0.68	0.09		0.13	0.04	
Uniform Delay, d1	4.2	4.8		3.9	4.4		48.3	43.9		44.2	43.6	
Progression Factor	1.00	1.00		1.25	1.25		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.4		1.0	0.3		9.1	0.2		0.3	0.1	
Delay (s)	5.6	5.3		5.9	5.8		57.4	44.1		44.5	43.7	
Level of Service	A	A		A	A		E	D		D	D	
Approach Delay (s)		5.3			5.8			53.5			44.1	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	120	1033	65	820	141	59	27	32
v/c Ratio	0.26	0.39	0.18	0.30	0.68	0.21	0.13	0.12
Control Delay	6.9	5.7	7.9	6.6	64.0	18.4	42.6	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.9	5.7	7.9	6.6	64.0	18.4	42.6	17.4
Queue Length 50th (ft)	23	114	14	98	105	11	18	3
Queue Length 95th (ft)	64	202	m43	181	161	45	43	30
Internal Link Dist (ft)		675		1083		61		27
Turn Bay Length (ft)	110		110		50		75	
Base Capacity (vph)	468	2646	365	2692	313	412	306	392
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.39	0.18	0.30	0.45	0.14	0.09	0.08

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	765	85	45	720	15	220	15	75	5	15	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.87		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3486		1770	3529		1770	1629		1770	1659	
Flt Permitted	0.33	1.00		0.28	1.00		0.72	1.00		0.69	1.00	
Satd. Flow (perm)	609	3486		520	3529		1338	1629		1292	1659	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	832	92	49	783	16	239	16	82	5	16	43
RTOR Reduction (vph)	0	7	0	0	1	0	0	64	0	0	33	0
Lane Group Flow (vph)	65	917	0	49	798	0	239	34	0	5	26	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	67.3	67.3		67.3	67.3		22.1	22.1		22.1	22.1	
Effective Green, g (s)	67.3	67.3		67.3	67.3		22.1	22.1		22.1	22.1	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.22	0.22		0.22	0.22	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	410	2346		350	2375		296	360		286	367	
v/s Ratio Prot		c0.26			0.23			0.02			0.02	
v/s Ratio Perm	0.11			0.09			c0.18			0.00		
v/c Ratio	0.16	0.39		0.14	0.34		0.81	0.09		0.02	0.07	
Uniform Delay, d1	6.0	7.3		5.9	6.9		36.9	31.0		30.5	30.8	
Progression Factor	1.00	1.00		1.97	2.20		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.5		0.7	0.3		14.8	0.1		0.0	0.1	
Delay (s)	6.8	7.7		12.3	15.5		51.7	31.1		30.5	30.9	
Level of Service	A	A		B	B		D	C		C	C	
Approach Delay (s)		7.7			15.3			45.7			30.9	
Approach LOS		A			B			D			C	

Intersection Summary			
HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	65	924	49	799	239	98	5	59
v/c Ratio	0.16	0.39	0.14	0.34	0.81	0.23	0.02	0.15
Control Delay	8.5	8.3	15.8	16.9	57.2	10.2	27.4	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.5	8.3	15.8	16.9	57.2	10.2	27.4	13.2
Queue Length 50th (ft)	14	122	21	206	144	8	3	8
Queue Length 95th (ft)	37	184	m40	286	222	46	11	38
Internal Link Dist (ft)		675		1083		61		27
Turn Bay Length (ft)	110		110		50		75	
Base Capacity (vph)	410	2355	350	2378	367	506	354	486
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.39	0.14	0.34	0.65	0.19	0.01	0.12

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	740	133	57	681	5	127	14	40	23	4	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.89		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3458		1770	3536		1770	1656		1770	1619	
Flt Permitted	0.36	1.00		0.28	1.00		0.74	1.00		0.72	1.00	
Satd. Flow (perm)	669	3458		529	3536		1373	1656		1340	1619	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	804	145	62	740	5	138	15	43	25	4	27
RTOR Reduction (vph)	0	9	0	0	0	0	0	37	0	0	23	0
Lane Group Flow (vph)	120	940	0	62	745	0	138	21	0	25	8	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	91.5	91.5		91.5	91.5		17.9	17.9		17.9	17.9	
Effective Green, g (s)	91.5	91.5		91.5	91.5		17.9	17.9		17.9	17.9	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.15	0.15		0.15	0.15	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	510	2637		403	2696		205	247		200	242	
v/s Ratio Prot		c0.27			0.21			0.01			0.00	
v/s Ratio Perm	0.18			0.12			c0.10			0.02		
v/c Ratio	0.24	0.36		0.15	0.28		0.67	0.09		0.12	0.03	
Uniform Delay, d1	4.1	4.6		3.8	4.3		48.3	44.0		44.3	43.7	
Progression Factor	1.00	1.00		1.21	1.20		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.4		0.8	0.2		8.4	0.2		0.3	0.1	
Delay (s)	5.2	5.0		5.4	5.4		56.7	44.2		44.5	43.7	
Level of Service	A	A		A	A		E	D		D	D	
Approach Delay (s)		5.0			5.4			53.0			44.1	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	120	949	62	745	138	58	25	31
v/c Ratio	0.24	0.36	0.15	0.28	0.68	0.20	0.13	0.12
Control Delay	6.5	5.4	7.1	6.1	63.5	18.2	42.5	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.5	5.4	7.1	6.1	63.5	18.2	42.5	16.9
Queue Length 50th (ft)	22	99	12	80	103	10	17	3
Queue Length 95th (ft)	61	179	m39	155	158	45	40	29
Internal Link Dist (ft)		675		1083		61		27
Turn Bay Length (ft)	110		110		50		75	
Base Capacity (vph)	510	2647	404	2698	314	411	306	391
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.36	0.15	0.28	0.44	0.14	0.08	0.08

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	59	722	82	42	679	12	216	11	73	5	11	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.87		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3485		1770	3530		1770	1620		1770	1649	
Flt Permitted	0.35	1.00		0.30	1.00		0.72	1.00		0.70	1.00	
Satd. Flow (perm)	647	3485		555	3530		1348	1620		1300	1649	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	64	785	89	46	738	13	235	12	79	5	12	39
RTOR Reduction (vph)	0	7	0	0	1	0	0	62	0	0	30	0
Lane Group Flow (vph)	64	867	0	46	750	0	235	29	0	5	21	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	67.6	67.6		67.6	67.6		21.8	21.8		21.8	21.8	
Effective Green, g (s)	67.6	67.6		67.6	67.6		21.8	21.8		21.8	21.8	
Actuated g/C Ratio	0.68	0.68		0.68	0.68		0.22	0.22		0.22	0.22	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	437	2356		375	2386		294	353		283	359	
v/s Ratio Prot		c0.25			0.21			0.02			0.01	
v/s Ratio Perm	0.10			0.08			c0.17			0.00		
v/c Ratio	0.15	0.37		0.12	0.31		0.80	0.08		0.02	0.06	
Uniform Delay, d1	5.8	7.0		5.7	6.7		37.0	31.1		30.7	31.0	
Progression Factor	1.00	1.00		2.06	2.16		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.4		0.6	0.3		14.1	0.1		0.0	0.1	
Delay (s)	6.5	7.4		12.4	14.7		51.1	31.2		30.7	31.0	
Level of Service	A	A		B	B		D	C		C	C	
Approach Delay (s)		7.4			14.6			45.5			31.0	
Approach LOS		A			B			D			C	

Intersection Summary			
HCM Average Control Delay	16.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	64	874	46	751	235	91	5	51
v/c Ratio	0.15	0.37	0.12	0.31	0.80	0.22	0.02	0.13
Control Delay	8.2	7.9	15.9	16.2	56.3	9.8	27.6	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.2	7.9	15.9	16.2	56.3	9.8	27.6	12.9
Queue Length 50th (ft)	14	112	20	194	141	6	3	6
Queue Length 95th (ft)	36	171	m41	262	216	43	11	34
Internal Link Dist (ft)		675		1083		61		27
Turn Bay Length (ft)	110		110		50		75	
Base Capacity (vph)	438	2364	375	2387	370	502	356	480
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.37	0.12	0.31	0.64	0.18	0.01	0.11

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	970	135	60	895	5	130	15	40	25	5	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.89		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3474		1770	3537		1770	1659		1770	1627	
Flt Permitted	0.27	1.00		0.21	1.00		0.74	1.00		0.72	1.00	
Satd. Flow (perm)	511	3474		390	3537		1372	1659		1338	1627	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	1054	147	65	973	5	141	16	43	27	5	27
RTOR Reduction (vph)	0	7	0	0	0	0	0	37	0	0	23	0
Lane Group Flow (vph)	120	1194	0	65	978	0	141	22	0	27	9	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	91.4	91.4		91.4	91.4		18.0	18.0		18.0	18.0	
Effective Green, g (s)	91.4	91.4		91.4	91.4		18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.15	0.15		0.15	0.15	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	389	2646		297	2694		206	249		201	244	
v/s Ratio Prot		c0.34			0.28			0.01			0.01	
v/s Ratio Perm	0.23			0.17			c0.10			0.02		
v/c Ratio	0.31	0.45		0.22	0.36		0.68	0.09		0.13	0.04	
Uniform Delay, d1	4.5	5.2		4.1	4.7		48.3	43.9		44.2	43.6	
Progression Factor	1.00	1.00		1.21	1.21		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.1	0.6		1.6	0.4		9.1	0.2		0.3	0.1	
Delay (s)	6.5	5.8		6.6	6.0		57.4	44.1		44.5	43.7	
Level of Service	A	A		A	A		E	D		D	D	
Approach Delay (s)		5.8			6.1			53.5			44.1	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	120	1201	65	978	141	59	27	32
v/c Ratio	0.31	0.45	0.22	0.36	0.68	0.21	0.13	0.12
Control Delay	8.1	6.3	8.7	6.8	64.0	18.4	42.6	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.1	6.3	8.7	6.8	64.0	18.4	42.6	17.4
Queue Length 50th (ft)	24	144	14	121	105	11	18	3
Queue Length 95th (ft)	71	252	m45	215	161	45	43	30
Internal Link Dist (ft)		675		1083		61		27
Turn Bay Length (ft)	110		110		50		75	
Base Capacity (vph)	388	2653	296	2692	313	412	306	392
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.45	0.22	0.36	0.45	0.14	0.09	0.08

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	771	85	45	734	15	220	15	79	5	15	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.87		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3487		1770	3529		1770	1627		1770	1659	
Flt Permitted	0.32	1.00		0.28	1.00		0.72	1.00		0.69	1.00	
Satd. Flow (perm)	598	3487		516	3529		1338	1627		1287	1659	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	838	92	49	798	16	239	16	86	5	16	43
RTOR Reduction (vph)	0	7	0	0	1	0	0	67	0	0	33	0
Lane Group Flow (vph)	65	923	0	49	813	0	239	35	0	5	26	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	67.3	67.3		67.3	67.3		22.1	22.1		22.1	22.1	
Effective Green, g (s)	67.3	67.3		67.3	67.3		22.1	22.1		22.1	22.1	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.22	0.22		0.22	0.22	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	402	2347		347	2375		296	360		284	367	
v/s Ratio Prot		c0.26			0.23			0.02			0.02	
v/s Ratio Perm	0.11			0.09			c0.18			0.00		
v/c Ratio	0.16	0.39		0.14	0.34		0.81	0.10		0.02	0.07	
Uniform Delay, d1	6.0	7.3		5.9	6.9		36.9	31.0		30.5	30.8	
Progression Factor	1.00	1.00		1.93	2.16		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.5		0.7	0.3		14.8	0.1		0.0	0.1	
Delay (s)	6.9	7.8		12.1	15.3		51.7	31.1		30.5	30.9	
Level of Service	A	A		B	B		D	C		C	C	
Approach Delay (s)		7.7			15.1			45.6			30.9	
Approach LOS		A			B			D			C	

Intersection Summary			
HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Baseline Rd & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2012 Total PM.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	830	135	60	760	5	130	15	40	25	5	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.89		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3465		1770	3536		1770	1659		1770	1627	
Flt Permitted	0.33	1.00		0.25	1.00		0.74	1.00		0.72	1.00	
Satd. Flow (perm)	606	3465		469	3536		1372	1659		1338	1627	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	902	147	65	826	5	141	16	43	27	5	27
RTOR Reduction (vph)	0	8	0	0	0	0	0	37	0	0	23	0
Lane Group Flow (vph)	120	1041	0	65	831	0	141	22	0	27	9	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	91.4	91.4		91.4	91.4		18.0	18.0		18.0	18.0	
Effective Green, g (s)	91.4	91.4		91.4	91.4		18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.15	0.15		0.15	0.15	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	462	2639		357	2693		206	249		201	244	
v/s Ratio Prot		c0.30			0.23			0.01			0.01	
v/s Ratio Perm	0.20			0.14			c0.10			0.02		
v/c Ratio	0.26	0.39		0.18	0.31		0.68	0.09		0.13	0.04	
Uniform Delay, d1	4.2	4.9		4.0	4.5		48.3	43.9		44.2	43.6	
Progression Factor	1.00	1.00		1.26	1.26		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.4		1.0	0.3		9.1	0.2		0.3	0.1	
Delay (s)	5.6	5.3		6.0	5.9		57.4	44.1		44.5	43.7	
Level of Service	A	A		A	A		E	D		D	D	
Approach Delay (s)		5.3			5.9			53.5			44.1	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Baseline Rd & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2012 Total AM w kewanee.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	767	89	47	724	15	230	15	79	5	15	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.87		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3484		1770	3529		1770	1627		1770	1659	
Flt Permitted	0.32	1.00		0.28	1.00		0.72	1.00		0.69	1.00	
Satd. Flow (perm)	604	3484		513	3529		1338	1627		1287	1659	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	834	97	51	787	16	250	16	86	5	16	43
RTOR Reduction (vph)	0	8	0	0	1	0	0	66	0	0	33	0
Lane Group Flow (vph)	65	923	0	51	802	0	250	36	0	5	26	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	66.6	66.6		66.6	66.6		22.8	22.8		22.8	22.8	
Effective Green, g (s)	66.6	66.6		66.6	66.6		22.8	22.8		22.8	22.8	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.23	0.23		0.23	0.23	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	402	2320		342	2350		305	371		293	378	
v/s Ratio Prot		c0.27			0.23			0.02			0.02	
v/s Ratio Perm	0.11			0.10			c0.19			0.00		
v/c Ratio	0.16	0.40		0.15	0.34		0.82	0.10		0.02	0.07	
Uniform Delay, d1	6.3	7.6		6.2	7.2		36.6	30.5		29.9	30.3	
Progression Factor	1.00	1.00		1.96	2.18		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.5		0.8	0.3		15.7	0.1		0.0	0.1	
Delay (s)	7.1	8.1		12.9	16.1		52.3	30.6		29.9	30.3	
Level of Service	A	A		B	B		D	C		C	C	
Approach Delay (s)		8.0			15.9			46.0			30.3	
Approach LOS		A			B			D			C	

Intersection Summary			
HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Baseline Rd & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2012 Total AM w kewanee.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	767	89	47	724	15	230	15	79	5	15	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.87		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3484		1770	3529		1770	1627		1770	1659	
Flt Permitted	0.32	1.00		0.28	1.00		0.72	1.00		0.69	1.00	
Satd. Flow (perm)	604	3484		513	3529		1338	1627		1287	1659	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	834	97	51	787	16	250	16	86	5	16	43
RTOR Reduction (vph)	0	8	0	0	1	0	0	66	0	0	33	0
Lane Group Flow (vph)	65	923	0	51	802	0	250	36	0	5	26	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	66.6	66.6		66.6	66.6		22.8	22.8		22.8	22.8	
Effective Green, g (s)	66.6	66.6		66.6	66.6		22.8	22.8		22.8	22.8	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.23	0.23		0.23	0.23	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	402	2320		342	2350		305	371		293	378	
v/s Ratio Prot		c0.27			0.23			0.02			0.02	
v/s Ratio Perm	0.11			0.10			c0.19			0.00		
v/c Ratio	0.16	0.40		0.15	0.34		0.82	0.10		0.02	0.07	
Uniform Delay, d1	6.3	7.6		6.2	7.2		36.6	30.5		29.9	30.3	
Progression Factor	1.00	1.00		1.96	2.18		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.5		0.8	0.3		15.7	0.1		0.0	0.1	
Delay (s)	7.1	8.1		12.9	16.1		52.3	30.6		29.9	30.3	
Level of Service	A	A		B	B		D	C		C	C	
Approach Delay (s)		8.0			15.9			46.0			30.3	
Approach LOS		A			B			D			C	

Intersection Summary			
HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Baseline Rd & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2012 Total PM w kewanee.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	819	146	64	753	5	137	15	43	25	5	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.89		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3459		1770	3536		1770	1654		1770	1627	
Flt Permitted	0.33	1.00		0.25	1.00		0.74	1.00		0.72	1.00	
Satd. Flow (perm)	611	3459		467	3536		1372	1654		1334	1627	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	890	159	70	818	5	149	16	47	27	5	27
RTOR Reduction (vph)	0	9	0	0	0	0	0	40	0	0	23	0
Lane Group Flow (vph)	120	1040	0	70	823	0	149	23	0	27	9	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	90.8	90.8		90.8	90.8		18.6	18.6		18.6	18.6	
Effective Green, g (s)	90.8	90.8		90.8	90.8		18.6	18.6		18.6	18.6	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.16	0.16		0.16	0.16	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	462	2617		353	2676		213	256		207	252	
v/s Ratio Prot		c0.30			0.23			0.01			0.01	
v/s Ratio Perm	0.20			0.15			c0.11			0.02		
v/c Ratio	0.26	0.40		0.20	0.31		0.70	0.09		0.13	0.04	
Uniform Delay, d1	4.4	5.1		4.2	4.6		48.1	43.5		43.7	43.1	
Progression Factor	1.00	1.00		1.13	1.14		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.5		1.2	0.3		9.6	0.2		0.3	0.1	
Delay (s)	5.8	5.5		5.9	5.5		57.7	43.6		44.0	43.1	
Level of Service	A	A		A	A		E	D		D	D	
Approach Delay (s)		5.6			5.6			53.5			43.5	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	10.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	921	85	45	874	15	220	15	75	5	15	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.87		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3495		1770	3530		1770	1629		1770	1659	
Flt Permitted	0.26	1.00		0.22	1.00		0.72	1.00		0.69	1.00	
Satd. Flow (perm)	493	3495		416	3530		1338	1629		1292	1659	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	1001	92	49	950	16	239	16	82	5	16	43
RTOR Reduction (vph)	0	6	0	0	1	0	0	64	0	0	33	0
Lane Group Flow (vph)	65	1087	0	49	965	0	239	34	0	5	26	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	67.3	67.3		67.3	67.3		22.1	22.1		22.1	22.1	
Effective Green, g (s)	67.3	67.3		67.3	67.3		22.1	22.1		22.1	22.1	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.22	0.22		0.22	0.22	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	332	2352		280	2376		296	360		286	367	
v/s Ratio Prot		c0.31			0.27			0.02			0.02	
v/s Ratio Perm	0.13			0.12			c0.18			0.00		
v/c Ratio	0.20	0.46		0.17	0.41		0.81	0.09		0.02	0.07	
Uniform Delay, d1	6.2	7.8		6.1	7.4		36.9	31.0		30.5	30.8	
Progression Factor	1.00	1.00		1.75	2.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.7		1.0	0.4		14.8	0.1		0.0	0.1	
Delay (s)	7.5	8.4		11.6	15.1		51.7	31.1		30.5	30.9	
Level of Service	A	A		B	B		D	C		C	C	
Approach Delay (s)		8.4			15.0			45.7			30.9	
Approach LOS		A			B			D			C	

Intersection Summary			
HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Baseline Rd & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total PM.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	985	135	60	905	5	130	15	40	25	5	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.89		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3475		1770	3537		1770	1659		1770	1627	
Flt Permitted	0.27	1.00		0.20	1.00		0.74	1.00		0.72	1.00	
Satd. Flow (perm)	504	3475		381	3537		1372	1659		1338	1627	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	1071	147	65	984	5	141	16	43	27	5	27
RTOR Reduction (vph)	0	7	0	0	0	0	0	37	0	0	23	0
Lane Group Flow (vph)	120	1211	0	65	989	0	141	22	0	27	9	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	91.4	91.4		91.4	91.4		18.0	18.0		18.0	18.0	
Effective Green, g (s)	91.4	91.4		91.4	91.4		18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.15	0.15		0.15	0.15	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	384	2647		290	2694		206	249		201	244	
v/s Ratio Prot		c0.35			0.28			0.01			0.01	
v/s Ratio Perm	0.24			0.17			c0.10			0.02		
v/c Ratio	0.31	0.46		0.22	0.37		0.68	0.09		0.13	0.04	
Uniform Delay, d1	4.5	5.2		4.1	4.7		48.3	43.9		44.2	43.6	
Progression Factor	1.00	1.00		1.34	1.34		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.1	0.6		1.6	0.3		9.1	0.2		0.3	0.1	
Delay (s)	6.6	5.8		7.1	6.7		57.4	44.1		44.5	43.7	
Level of Service	A	A		A	A		E	D		D	D	
Approach Delay (s)		5.9			6.7			53.5			44.1	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Baseline Rd & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total AM w kewanee.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	917	89	47	864	15	230	15	79	5	15	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.87		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3492		1770	3530		1770	1627		1770	1659	
Flt Permitted	0.27	1.00		0.22	1.00		0.72	1.00		0.69	1.00	
Satd. Flow (perm)	497	3492		412	3530		1338	1627		1287	1659	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	997	97	51	939	16	250	16	86	5	16	43
RTOR Reduction (vph)	0	6	0	0	1	0	0	66	0	0	33	0
Lane Group Flow (vph)	65	1088	0	51	954	0	250	36	0	5	26	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	66.6	66.6		66.6	66.6		22.8	22.8		22.8	22.8	
Effective Green, g (s)	66.6	66.6		66.6	66.6		22.8	22.8		22.8	22.8	
Actuated g/C Ratio	0.67	0.67		0.67	0.67		0.23	0.23		0.23	0.23	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	331	2326		274	2351		305	371		293	378	
v/s Ratio Prot		c0.31			0.27			0.02			0.02	
v/s Ratio Perm	0.13			0.12			c0.19			0.00		
v/c Ratio	0.20	0.47		0.19	0.41		0.82	0.10		0.02	0.07	
Uniform Delay, d1	6.4	8.1		6.4	7.6		36.6	30.5		29.9	30.3	
Progression Factor	1.00	1.00		1.78	2.02		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.7		1.1	0.4		15.7	0.1		0.0	0.1	
Delay (s)	7.7	8.8		12.4	15.8		52.3	30.6		29.9	30.3	
Level of Service	A	A		B	B		D	C		C	C	
Approach Delay (s)		8.7			15.6			46.0			30.3	
Approach LOS		A			B			D			C	

Intersection Summary			
HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Baseline Rd & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total PM w kewanee.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	974	146	64	898	5	137	15	43	25	5	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.89		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3470		1770	3537		1770	1654		1770	1627	
Flt Permitted	0.27	1.00		0.20	1.00		0.74	1.00		0.72	1.00	
Satd. Flow (perm)	507	3470		379	3537		1372	1654		1334	1627	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	1059	159	70	976	5	149	16	47	27	5	27
RTOR Reduction (vph)	0	8	0	0	0	0	0	40	0	0	23	0
Lane Group Flow (vph)	120	1210	0	70	981	0	149	23	0	27	9	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	90.8	90.8		90.8	90.8		18.6	18.6		18.6	18.6	
Effective Green, g (s)	90.8	90.8		90.8	90.8		18.6	18.6		18.6	18.6	
Actuated g/C Ratio	0.76	0.76		0.76	0.76		0.16	0.16		0.16	0.16	
Clearance Time (s)	5.6	5.6		5.6	5.6		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	384	2626		287	2676		213	256		207	252	
v/s Ratio Prot		c0.35			0.28			0.01			0.01	
v/s Ratio Perm	0.24			0.18			c0.11			0.02		
v/c Ratio	0.31	0.46		0.24	0.37		0.70	0.09		0.13	0.04	
Uniform Delay, d1	4.7	5.5		4.4	4.9		48.1	43.5		43.7	43.1	
Progression Factor	1.00	1.00		1.33	1.32		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.1	0.6		1.8	0.3		9.6	0.2		0.3	0.1	
Delay (s)	6.8	6.0		7.6	6.9		57.7	43.6		44.0	43.1	
Level of Service	A	A		A	A		E	D		D	D	
Approach Delay (s)		6.1			6.9			53.5			43.5	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	11.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	65	930	49	814	239	98	5	59
v/c Ratio	0.16	0.40	0.14	0.34	0.81	0.23	0.02	0.15
Control Delay	8.6	8.3	15.6	16.7	55.0	8.6	27.4	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.6	8.3	15.6	16.7	55.0	8.6	27.4	13.2
Queue Length 50th (ft)	14	124	21	207	144	8	3	8
Queue Length 95th (ft)	37	185	m38	288	216	m38	11	38
Internal Link Dist (ft)		675		1083		61		27
Turn Bay Length (ft)	110		110		50		75	
Base Capacity (vph)	403	2353	347	2377	367	506	354	486
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.40	0.14	0.34	0.65	0.19	0.01	0.12

Intersection Summary

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	120	1049	65	831	141	59	27	32
v/c Ratio	0.26	0.40	0.18	0.31	0.68	0.21	0.13	0.12
Control Delay	7.0	5.8	8.0	6.7	62.1	16.7	42.6	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.0	5.8	8.0	6.7	62.1	16.7	42.6	17.4
Queue Length 50th (ft)	23	117	14	104	106	11	18	3
Queue Length 95th (ft)	64	206	m44	187	161	46	43	30
Internal Link Dist (ft)		675		1083		61		27
Turn Bay Length (ft)	110		110		50		75	
Base Capacity (vph)	462	2646	357	2692	313	412	306	392
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.40	0.18	0.31	0.45	0.14	0.09	0.08

Intersection Summary

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

Queues

3: Baseline Rd & Manhattan Drive H:\Boulder Creek Commons\Synchro\2012 Total PM with kewanee-Added Signals.syn

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	120	1049	70	823	149	63	27	32
v/c Ratio	0.26	0.40	0.20	0.31	0.70	0.21	0.13	0.12
Control Delay	7.1	5.9	8.2	6.7	62.9	16.0	42.2	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.1	5.9	8.2	6.7	62.9	16.0	42.2	17.2
Queue Length 50th (ft)	24	120	15	102	111	11	18	3
Queue Length 95th (ft)	64	206	46	182	170	48	43	30
Internal Link Dist (ft)		675		1083		61		27
Turn Bay Length (ft)	110		110		50		75	
Base Capacity (vph)	463	2627	354	2677	313	414	305	392
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.40	0.20	0.31	0.48	0.15	0.09	0.08

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	65	1093	49	966	239	98	5	59
v/c Ratio	0.20	0.46	0.18	0.41	0.81	0.23	0.02	0.15
Control Delay	9.4	9.1	15.1	16.6	55.0	8.8	27.4	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	9.1	15.1	16.6	55.0	8.8	27.4	13.2
Queue Length 50th (ft)	14	157	21	243	144	8	3	8
Queue Length 95th (ft)	40	231	m35	357	215	m36	11	38
Internal Link Dist (ft)		675		1083		61		27
Turn Bay Length (ft)	110		110		50		75	
Base Capacity (vph)	331	2357	279	2378	367	506	354	486
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.46	0.18	0.41	0.65	0.19	0.01	0.12

Intersection Summary

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	120	1218	65	989	141	59	27	32
v/c Ratio	0.31	0.46	0.22	0.37	0.68	0.21	0.13	0.12
Control Delay	8.2	6.4	9.5	7.6	62.0	16.6	42.6	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.2	6.4	9.5	7.6	62.0	16.6	42.6	17.4
Queue Length 50th (ft)	24	147	17	151	106	11	18	3
Queue Length 95th (ft)	71	257	m44	240	161	46	43	30
Internal Link Dist (ft)		675		1083		61		27
Turn Bay Length (ft)	110		110		50		75	
Base Capacity (vph)	385	2653	291	2692	313	412	306	392
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.46	0.22	0.37	0.45	0.14	0.09	0.08

Intersection Summary

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

Queues

3: Baseline Rd & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total AM with kewanee-Added Signals.syn

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	65	1094	51	955	250	102	5	59
v/c Ratio	0.20	0.47	0.19	0.41	0.82	0.23	0.02	0.14
Control Delay	9.6	9.4	15.9	17.2	55.5	8.6	27.2	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.6	9.4	15.9	17.2	55.5	8.6	27.2	13.0
Queue Length 50th (ft)	15	162	22	243	150	7	3	8
Queue Length 95th (ft)	40	231	m36	351	226	m38	11	38
Internal Link Dist (ft)		675		1083		61		27
Turn Bay Length (ft)	110		110		50		75	
Base Capacity (vph)	331	2333	275	2352	367	509	353	486
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.47	0.19	0.41	0.68	0.20	0.01	0.12

Intersection Summary

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

Queues

3: Baseline Rd & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total PM w kewanee-Added Signals.syn

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	120	1218	70	981	149	63	27	32
v/c Ratio	0.31	0.46	0.24	0.37	0.70	0.21	0.13	0.12
Control Delay	8.4	6.6	9.9	7.6	62.8	15.9	42.2	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.4	6.6	9.9	7.6	62.8	15.9	42.2	17.2
Queue Length 50th (ft)	25	152	19	149	112	11	18	3
Queue Length 95th (ft)	71	257	m47	235	170	48	43	30
Internal Link Dist (ft)		675		1083		61		27
Turn Bay Length (ft)	110		110		50		75	
Base Capacity (vph)	384	2633	288	2677	313	414	305	392
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.46	0.24	0.37	0.48	0.15	0.09	0.08

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	640	240	10	10	655	435	35	60	25	80	50	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3327		1770	1863	1583	1770	1863	1583
Flt Permitted	0.09	1.00	1.00	0.60	1.00		0.72	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	170	1863	1583	1114	3327		1345	1863	1583	1331	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	696	261	11	11	712	473	38	65	27	87	54	250
RTOR Reduction (vph)	0	0	2	0	115	0	0	0	24	0	0	57
Lane Group Flow (vph)	696	261	9	11	1070	0	38	65	3	87	54	193
Turn Type	pm+pt		Perm	Perm			Perm		Perm	Perm		pm+ov
Protected Phases	1	6			2			4			8	1
Permitted Phases	6		6	2			4		4	8		8
Actuated Green, G (s)	78.2	78.2	78.2	38.9	38.9		10.5	10.5	10.5	10.5	10.5	44.8
Effective Green, g (s)	78.2	78.2	78.2	38.9	38.9		10.5	10.5	10.5	10.5	10.5	44.8
Actuated g/C Ratio	0.78	0.78	0.78	0.39	0.39		0.10	0.10	0.10	0.10	0.10	0.45
Clearance Time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Vehicle Extension (s)	1.0	2.5	2.5	2.0	2.0		3.0	3.0	3.0	3.0	3.0	1.0
Lane Grp Cap (vph)	682	1457	1238	433	1294		141	196	166	140	196	709
v/s Ratio Prot	c0.35	0.14			0.32			0.03			0.03	0.09
v/s Ratio Perm	c0.45		0.01	0.01			0.03		0.00	c0.07		0.03
v/c Ratio	1.02	0.18	0.01	0.03	0.83		0.27	0.33	0.02	0.62	0.28	0.27
Uniform Delay, d1	27.9	2.8	2.4	18.9	27.5		41.2	41.5	40.1	42.8	41.2	17.4
Progression Factor	0.84	0.25	0.05	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	38.2	0.2	0.0	0.1	6.2		1.0	1.0	0.0	8.3	0.8	0.1
Delay (s)	61.6	0.9	0.1	19.0	33.7		42.3	42.5	40.2	51.1	42.0	17.4
Level of Service	E	A	A	B	C		D	D	D	D	D	B
Approach Delay (s)		44.6			33.5			41.9			28.3	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM Average Control Delay	37.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	696	261	11	11	1185	38	65	27	87	54	250
v/c Ratio	1.02	0.17	0.01	0.02	0.82	0.24	0.30	0.13	0.55	0.25	0.30
Control Delay	63.2	1.1	0.1	18.5	28.0	41.9	42.2	14.8	53.8	41.0	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.2	1.1	0.1	18.5	28.0	41.9	42.2	14.8	53.8	41.0	9.6
Queue Length 50th (ft)	~448	7	0	4	299	22	38	0	53	32	50
Queue Length 95th (ft)	#702	17	m0	16	391	51	75	24	98	65	100
Internal Link Dist (ft)		1083			170		276			196	
Turn Bay Length (ft)			100	105		65		135	175		175
Base Capacity (vph)	685	1499	1276	446	1444	313	434	390	310	434	833
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.02	0.17	0.01	0.02	0.82	0.12	0.15	0.07	0.28	0.12	0.30

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	205	430	165	50	280	75	115	80	50	265	120	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3426		1770	1863	1583	1770	1863	1583
Flt Permitted	0.48	1.00	1.00	0.50	1.00		0.64	1.00	1.00	0.70	1.00	1.00
Satd. Flow (perm)	891	1863	1583	922	3426		1189	1863	1583	1305	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	467	179	54	304	82	125	87	54	288	130	473
RTOR Reduction (vph)	0	0	55	0	19	0	0	0	41	0	0	326
Lane Group Flow (vph)	223	467	124	54	367	0	125	87	13	288	130	147
Turn Type	pm+pt		Perm	Perm			Perm		Perm	Perm		pm+ov
Protected Phases	1	6			2			4			8	1
Permitted Phases	6		6	2			4		4	8		8
Actuated Green, G (s)	80.1	80.1	80.1	66.3	66.3		28.6	28.6	28.6	28.6	28.6	37.4
Effective Green, g (s)	80.1	80.1	80.1	66.3	66.3		28.6	28.6	28.6	28.6	28.6	37.4
Actuated g/C Ratio	0.67	0.67	0.67	0.55	0.55		0.24	0.24	0.24	0.24	0.24	0.31
Clearance Time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Vehicle Extension (s)	1.0	3.0	3.0	3.0	3.0		2.0	2.0	2.0	2.5	2.5	1.0
Lane Grp Cap (vph)	659	1244	1057	509	1893		283	444	377	311	444	493
v/s Ratio Prot	0.02	c0.25			0.11			0.05			0.07	0.02
v/s Ratio Perm	0.20		0.08	0.06			0.11		0.01	c0.22		0.07
v/c Ratio	0.34	0.38	0.12	0.11	0.19		0.44	0.20	0.03	0.93	0.29	0.30
Uniform Delay, d1	7.8	8.9	7.2	12.8	13.5		38.9	36.5	35.1	44.7	37.4	31.3
Progression Factor	0.94	0.90	0.79	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.8	0.2	0.4	0.2		0.4	0.1	0.0	32.1	0.3	0.1
Delay (s)	7.4	8.8	5.9	13.2	13.7		39.3	36.6	35.1	76.8	37.7	31.5
Level of Service	A	A	A	B	B		D	D	D	E	D	C
Approach Delay (s)		7.9			13.6			37.6			47.0	
Approach LOS		A			B			D			D	

Intersection Summary			
HCM Average Control Delay	26.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	223	467	179	54	386	125	87	54	288	130	473
v/c Ratio	0.34	0.38	0.16	0.11	0.20	0.44	0.20	0.13	0.93	0.29	0.54
Control Delay	8.6	9.3	1.4	14.8	12.8	43.9	37.0	10.0	80.0	38.8	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.6	9.3	1.4	14.8	12.8	43.9	37.0	10.0	80.0	38.8	4.8
Queue Length 50th (ft)	59	131	2	20	69	81	53	0	215	81	0
Queue Length 95th (ft)	86	173	23	43	100	142	98	33	#374	138	66
Internal Link Dist (ft)		1083			170		276			196	
Turn Bay Length (ft)			100	105		65		135	175		175
Base Capacity (vph)	676	1244	1112	510	1914	300	470	440	330	470	885
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.38	0.16	0.11	0.20	0.42	0.19	0.12	0.87	0.28	0.53

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	535	200	10	10	550	365	35	60	25	70	50	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3327		1770	1863	1583	1770	1863	1583
Flt Permitted	0.13	1.00	1.00	0.62	1.00		0.72	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	239	1863	1583	1160	3327		1345	1863	1583	1331	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	582	217	11	11	598	397	38	65	27	76	54	207
RTOR Reduction (vph)	0	0	2	0	115	0	0	0	24	0	0	84
Lane Group Flow (vph)	582	217	9	11	880	0	38	65	3	76	54	123
Turn Type	pm+pt		Perm	Perm			Perm		Perm	Perm		pm+ov
Protected Phases	1	6			2			4			8	1
Permitted Phases	6		6	2			4		4	8		8
Actuated Green, G (s)	78.9	78.9	78.9	38.9	38.9		9.8	9.8	9.8	9.8	9.8	44.8
Effective Green, g (s)	78.9	78.9	78.9	38.9	38.9		9.8	9.8	9.8	9.8	9.8	44.8
Actuated g/C Ratio	0.79	0.79	0.79	0.39	0.39		0.10	0.10	0.10	0.10	0.10	0.45
Clearance Time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Vehicle Extension (s)	1.0	2.5	2.5	2.0	2.0		3.0	3.0	3.0	3.0	3.0	1.0
Lane Grp Cap (vph)	724	1470	1249	451	1294		132	183	155	130	183	709
v/s Ratio Prot	c0.28	0.12			0.26			0.03			0.03	0.06
v/s Ratio Perm	c0.35		0.01	0.01			0.03		0.00	c0.06		0.02
v/c Ratio	0.80	0.15	0.01	0.02	0.68		0.29	0.36	0.02	0.58	0.30	0.17
Uniform Delay, d1	21.0	2.5	2.2	18.8	25.4		41.9	42.1	40.7	43.2	41.9	16.5
Progression Factor	0.76	0.29	0.09	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.8	0.2	0.0	0.1	2.9		1.2	1.2	0.0	6.6	0.9	0.0
Delay (s)	21.8	0.9	0.2	18.9	28.3		43.1	43.3	40.8	49.7	42.8	16.6
Level of Service	C	A	A	B	C		D	D	D	D	D	B
Approach Delay (s)		15.9			28.2			42.7			28.2	
Approach LOS		B			C			D			C	

Intersection Summary			
HCM Average Control Delay	24.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	582	217	11	11	995	38	65	27	76	54	207
v/c Ratio	0.80	0.14	0.01	0.02	0.69	0.26	0.32	0.14	0.52	0.26	0.24
Control Delay	26.0	1.1	0.2	18.5	22.7	43.3	43.6	15.4	53.4	42.3	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.0	1.1	0.2	18.5	22.7	43.3	43.6	15.4	53.4	42.3	5.1
Queue Length 50th (ft)	127	7	0	4	221	23	39	0	46	32	17
Queue Length 95th (ft)	#475	16	m1	16	295	52	76	24	89	66	56
Internal Link Dist (ft)		1083			170		276			196	
Turn Bay Length (ft)			100	105		65		135	175		175
Base Capacity (vph)	729	1512	1287	464	1444	313	434	390	310	434	858
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.14	0.01	0.02	0.69	0.12	0.15	0.07	0.25	0.12	0.24

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	192	406	132	42	264	71	82	62	45	248	101	409
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3427		1770	1863	1583	1770	1863	1583
Flt Permitted	0.49	1.00	1.00	0.51	1.00		0.68	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	921	1863	1583	944	3427		1258	1863	1583	1329	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	209	441	143	46	287	77	89	67	49	270	110	445
RTOR Reduction (vph)	0	0	45	0	18	0	0	0	38	0	0	313
Lane Group Flow (vph)	209	441	98	46	346	0	89	67	11	270	110	132
Turn Type	pm+pt		Perm	Perm			Perm		Perm	Perm		pm+ov
Protected Phases	1	6			2			4			8	1
Permitted Phases	6		6	2			4		4	8		8
Actuated Green, G (s)	81.4	81.4	81.4	68.0	68.0		27.3	27.3	27.3	27.3	27.3	35.7
Effective Green, g (s)	81.4	81.4	81.4	68.0	68.0		27.3	27.3	27.3	27.3	27.3	35.7
Actuated g/C Ratio	0.68	0.68	0.68	0.57	0.57		0.23	0.23	0.23	0.23	0.23	0.30
Clearance Time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Vehicle Extension (s)	1.0	3.0	3.0	3.0	3.0		2.0	2.0	2.0	2.5	2.5	1.0
Lane Grp Cap (vph)	684	1264	1074	535	1942		286	424	360	302	424	471
v/s Ratio Prot	0.02	c0.24			0.10			0.04			0.06	0.02
v/s Ratio Perm	0.19		0.06	0.05			0.07		0.01	c0.20		0.06
v/c Ratio	0.31	0.35	0.09	0.09	0.18		0.31	0.16	0.03	0.89	0.26	0.28
Uniform Delay, d1	7.2	8.1	6.6	11.8	12.5		38.5	37.1	36.1	44.9	38.1	32.3
Progression Factor	0.93	0.91	0.79	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.7	0.2	0.3	0.2		0.2	0.1	0.0	26.6	0.2	0.1
Delay (s)	6.8	8.1	5.4	12.2	12.7		38.8	37.2	36.1	71.5	38.3	32.4
Level of Service	A	A	A	B	B		D	D	D	E	D	C
Approach Delay (s)		7.3			12.7			37.6			46.0	
Approach LOS		A			B			D			D	

Intersection Summary			
HCM Average Control Delay	25.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	209	441	143	46	364	89	67	49	270	110	445
v/c Ratio	0.30	0.35	0.13	0.09	0.19	0.31	0.16	0.12	0.89	0.26	0.53
Control Delay	8.0	8.7	1.3	14.3	12.2	40.6	36.7	10.3	75.4	38.7	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.0	8.7	1.3	14.3	12.2	40.6	36.7	10.3	75.4	38.7	4.8
Queue Length 50th (ft)	54	123	0	17	64	56	41	0	198	68	0
Queue Length 95th (ft)	82	159	19	38	94	104	79	31	#336	119	65
Internal Link Dist (ft)		1083			170		276			196	
Turn Bay Length (ft)			100	105		65		135	175		175
Base Capacity (vph)	703	1263	1119	535	1958	317	470	436	335	470	856
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.35	0.13	0.09	0.19	0.28	0.14	0.11	0.81	0.23	0.52

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	502	187	6	9	517	342	35	56	23	63	48	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3328		1770	1863	1583	1770	1863	1583
Flt Permitted	0.17	1.00	1.00	0.63	1.00		0.72	1.00	1.00	0.72	1.00	1.00
Satd. Flow (perm)	317	1863	1583	1174	3328		1347	1863	1583	1336	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	546	203	7	10	562	372	38	61	25	68	52	195
RTOR Reduction (vph)	0	0	1	0	107	0	0	0	23	0	0	101
Lane Group Flow (vph)	546	203	6	10	827	0	38	61	2	68	52	94
Turn Type	pm+pt		Perm	Perm			Perm		Perm	Perm		pm+ov
Protected Phases	1	6			2			4			8	1
Permitted Phases	6		6	2			4		4	8		8
Actuated Green, G (s)	79.4	79.4	79.4	42.3	42.3		9.3	9.3	9.3	9.3	9.3	41.4
Effective Green, g (s)	79.4	79.4	79.4	42.3	42.3		9.3	9.3	9.3	9.3	9.3	41.4
Actuated g/C Ratio	0.79	0.79	0.79	0.42	0.42		0.09	0.09	0.09	0.09	0.09	0.41
Clearance Time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Vehicle Extension (s)	1.0	2.5	2.5	2.0	2.0		3.0	3.0	3.0	3.0	3.0	1.0
Lane Grp Cap (vph)	718	1479	1257	497	1408		125	173	147	124	173	655
v/s Ratio Prot	c0.24	0.11			0.25			0.03			0.03	0.05
v/s Ratio Perm	c0.36		0.00	0.01			0.03		0.00	c0.05		0.01
v/c Ratio	0.76	0.14	0.00	0.02	0.59		0.30	0.35	0.02	0.55	0.30	0.14
Uniform Delay, d1	17.4	2.4	2.1	16.8	22.1		42.3	42.5	41.2	43.3	42.3	18.2
Progression Factor	0.76	0.30	0.12	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.1	0.2	0.0	0.1	1.8		1.4	1.2	0.0	4.9	1.0	0.0
Delay (s)	17.4	0.9	0.3	16.9	23.9		43.7	43.8	41.2	48.2	43.3	18.3
Level of Service	B	A	A	B	C		D	D	D	D	D	B
Approach Delay (s)		12.8			23.9			43.2			28.9	
Approach LOS		B			C			D			C	

Intersection Summary			
HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	546	203	7	10	934	38	61	25	68	52	195
v/c Ratio	0.75	0.13	0.01	0.02	0.60	0.27	0.31	0.13	0.49	0.27	0.24
Control Delay	19.6	1.1	0.2	18.3	19.7	44.5	44.3	16.1	52.9	43.1	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.6	1.1	0.2	18.3	19.7	44.5	44.3	16.1	52.9	43.1	3.8
Queue Length 50th (ft)	89	6	0	4	196	23	37	0	42	31	7
Queue Length 95th (ft)	#363	15	m0	14	268	52	73	24	82	65	43
Internal Link Dist (ft)		1083			170		276			196	
Turn Bay Length (ft)			100	105		65		135	175		175
Base Capacity (vph)	724	1522	1295	511	1552	314	434	388	311	434	819
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.13	0.01	0.02	0.60	0.12	0.14	0.06	0.22	0.12	0.24

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	245	515	165	50	335	90	115	80	50	315	120	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3427		1770	1863	1583	1770	1863	1583
Flt Permitted	0.43	1.00	1.00	0.45	1.00		0.64	1.00	1.00	0.70	1.00	1.00
Satd. Flow (perm)	800	1863	1583	846	3427		1198	1863	1583	1305	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	560	179	54	364	98	125	87	54	342	130	565
RTOR Reduction (vph)	0	0	48	0	20	0	0	0	40	0	0	299
Lane Group Flow (vph)	266	560	131	54	442	0	125	87	14	342	130	266
Turn Type	pm+pt		Perm	Perm			Perm		Perm	Perm		pm+ov
Protected Phases	1	6			2			4			8	1
Permitted Phases	6		6	2			4		4	8		8
Actuated Green, G (s)	78.4	78.4	78.4	63.9	63.9		30.3	30.3	30.3	30.3	30.3	39.8
Effective Green, g (s)	78.4	78.4	78.4	63.9	63.9		30.3	30.3	30.3	30.3	30.3	39.8
Actuated g/C Ratio	0.65	0.65	0.65	0.53	0.53		0.25	0.25	0.25	0.25	0.25	0.33
Clearance Time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Vehicle Extension (s)	1.0	3.0	3.0	3.0	3.0		2.0	2.0	2.0	2.5	2.5	1.0
Lane Grp Cap (vph)	599	1217	1034	450	1825		302	470	400	330	470	525
v/s Ratio Prot	0.04	c0.30			0.13			0.05			0.07	0.04
v/s Ratio Perm	0.25		0.08	0.06			0.10		0.01	c0.26		0.13
v/c Ratio	0.44	0.46	0.13	0.12	0.24		0.41	0.19	0.03	1.04	0.28	0.51
Uniform Delay, d1	8.9	10.3	7.9	14.0	15.1		37.4	35.2	33.8	44.9	36.0	32.2
Progression Factor	0.96	0.88	0.87	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	1.2	0.2	0.5	0.3		0.3	0.1	0.0	59.3	0.2	0.3
Delay (s)	8.7	10.3	7.0	14.6	15.4		37.8	35.2	33.8	104.1	36.3	32.5
Level of Service	A	B	A	B	B		D	D	C	F	D	C
Approach Delay (s)		9.3			15.3			36.1			56.6	
Approach LOS		A			B			D			E	

Intersection Summary			
HCM Average Control Delay	30.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	266	560	179	54	462	125	87	54	342	130	565
v/c Ratio	0.44	0.46	0.17	0.12	0.25	0.41	0.19	0.12	1.04	0.28	0.64
Control Delay	10.1	10.5	2.2	15.4	14.2	42.5	36.5	9.9	103.6	38.0	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	10.5	2.2	15.4	14.2	42.5	36.5	9.9	103.6	38.0	9.9
Queue Length 50th (ft)	73	169	9	20	89	81	53	0	~286	81	60
Queue Length 95th (ft)	101	217	32	44	122	142	98	33	#472	138	181
Internal Link Dist (ft)		1083			170		276			196	
Turn Bay Length (ft)			100	105		65		135	175		175
Base Capacity (vph)	611	1217	1082	450	1843	302	470	440	330	470	885
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.46	0.17	0.12	0.25	0.41	0.19	0.12	1.04	0.28	0.64

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	535	200	16	12	550	365	49	66	31	70	52	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3327		1770	1863	1583	1770	1863	1583
Flt Permitted	0.13	1.00	1.00	0.62	1.00		0.72	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	239	1863	1583	1160	3327		1341	1863	1583	1323	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	582	217	17	13	598	397	53	72	34	76	57	207
RTOR Reduction (vph)	0	0	4	0	115	0	0	0	31	0	0	84
Lane Group Flow (vph)	582	217	13	13	880	0	53	72	3	76	57	123
Turn Type	pm+pt		Perm	Perm			Perm		Perm	Perm		pm+ov
Protected Phases	1	6			2			4			8	1
Permitted Phases	6		6	2			4		4	8		8
Actuated Green, G (s)	78.8	78.8	78.8	38.9	38.9		9.9	9.9	9.9	9.9	9.9	44.8
Effective Green, g (s)	78.8	78.8	78.8	38.9	38.9		9.9	9.9	9.9	9.9	9.9	44.8
Actuated g/C Ratio	0.79	0.79	0.79	0.39	0.39		0.10	0.10	0.10	0.10	0.10	0.45
Clearance Time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Vehicle Extension (s)	1.0	2.5	2.5	2.0	2.0		3.0	3.0	3.0	3.0	3.0	1.0
Lane Grp Cap (vph)	723	1468	1247	451	1294		133	184	157	131	184	709
v/s Ratio Prot	c0.28	0.12			0.26			0.04			0.03	0.06
v/s Ratio Perm	c0.35		0.01	0.01			0.04		0.00	c0.06		0.02
v/c Ratio	0.80	0.15	0.01	0.03	0.68		0.40	0.39	0.02	0.58	0.31	0.17
Uniform Delay, d1	21.0	2.5	2.3	18.9	25.4		42.3	42.2	40.7	43.1	41.9	16.5
Progression Factor	0.79	0.30	0.07	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.8	0.2	0.0	0.1	2.9		2.0	1.4	0.1	6.4	1.0	0.0
Delay (s)	22.5	1.0	0.2	19.0	28.3		44.2	43.6	40.7	49.5	42.8	16.6
Level of Service	C	A	A	B	C		D	D	D	D	D	B
Approach Delay (s)		16.3			28.2			43.2			28.3	
Approach LOS		B			C			D			C	

Intersection Summary			
HCM Average Control Delay	25.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Baseline Rd & 55th St

H:\Boulder Creek Commons\Synchro\2012 Total PM.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	205	430	180	57	280	75	125	84	54	265	127	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3426		1770	1863	1583	1770	1863	1583
Flt Permitted	0.48	1.00	1.00	0.50	1.00		0.62	1.00	1.00	0.70	1.00	1.00
Satd. Flow (perm)	891	1863	1583	922	3426		1160	1863	1583	1300	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	467	196	62	304	82	136	91	59	288	138	473
RTOR Reduction (vph)	0	0	61	0	19	0	0	0	45	0	0	325
Lane Group Flow (vph)	223	467	135	62	367	0	136	91	14	288	138	148
Turn Type	pm+pt		Perm	Perm			Perm		Perm	Perm		pm+ov
Protected Phases	1	6			2			4			8	1
Permitted Phases	6		6	2			4		4	8		8
Actuated Green, G (s)	80.0	80.0	80.0	66.2	66.2		28.7	28.7	28.7	28.7	28.7	37.5
Effective Green, g (s)	80.0	80.0	80.0	66.2	66.2		28.7	28.7	28.7	28.7	28.7	37.5
Actuated g/C Ratio	0.67	0.67	0.67	0.55	0.55		0.24	0.24	0.24	0.24	0.24	0.31
Clearance Time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Vehicle Extension (s)	1.0	3.0	3.0	3.0	3.0		2.0	2.0	2.0	2.5	2.5	1.0
Lane Grp Cap (vph)	658	1242	1055	509	1890		277	446	379	311	446	495
v/s Ratio Prot	0.02	c0.25			0.11			0.05			0.07	0.02
v/s Ratio Perm	0.20		0.09	0.07			0.12		0.01	c0.22		0.07
v/c Ratio	0.34	0.38	0.13	0.12	0.19		0.49	0.20	0.04	0.93	0.31	0.30
Uniform Delay, d1	7.8	8.9	7.3	12.9	13.5		39.4	36.5	35.0	44.6	37.5	31.3
Progression Factor	0.94	0.90	0.79	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.8	0.2	0.5	0.2		0.5	0.1	0.0	32.1	0.3	0.1
Delay (s)	7.4	8.9	6.0	13.4	13.7		39.9	36.6	35.1	76.8	37.8	31.4
Level of Service	A	A	A	B	B		D	D	D	E	D	C
Approach Delay (s)		7.9			13.7			37.8			46.9	
Approach LOS		A			B			D			D	

Intersection Summary			
HCM Average Control Delay	26.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Baseline Rd & 55th St

H:\Boulder Creek Commons\Synchro\2012 Total AM w kewanee.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	535	204	12	11	552	365	39	66	27	70	52	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3328		1770	1863	1583	1770	1863	1583
Flt Permitted	0.13	1.00	1.00	0.62	1.00		0.72	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	237	1863	1583	1154	3328		1341	1863	1583	1323	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	582	222	13	12	600	397	42	72	29	76	57	207
RTOR Reduction (vph)	0	0	3	0	114	0	0	0	26	0	0	84
Lane Group Flow (vph)	582	222	10	12	883	0	42	72	3	76	57	123
Turn Type	pm+pt		Perm	Perm			Perm		Perm	Perm		pm+ov
Protected Phases	1	6			2			4			8	1
Permitted Phases	6		6	2			4		4	8		8
Actuated Green, G (s)	78.8	78.8	78.8	38.9	38.9		9.9	9.9	9.9	9.9	9.9	44.8
Effective Green, g (s)	78.8	78.8	78.8	38.9	38.9		9.9	9.9	9.9	9.9	9.9	44.8
Actuated g/C Ratio	0.79	0.79	0.79	0.39	0.39		0.10	0.10	0.10	0.10	0.10	0.45
Clearance Time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Vehicle Extension (s)	1.0	2.5	2.5	2.0	2.0		3.0	3.0	3.0	3.0	3.0	1.0
Lane Grp Cap (vph)	722	1468	1247	449	1295		133	184	157	131	184	709
v/s Ratio Prot	c0.28	0.12			0.27			0.04			0.03	0.06
v/s Ratio Perm	c0.35		0.01	0.01			0.03		0.00	c0.06		0.02
v/c Ratio	0.81	0.15	0.01	0.03	0.68		0.32	0.39	0.02	0.58	0.31	0.17
Uniform Delay, d1	21.1	2.6	2.3	18.9	25.4		41.9	42.2	40.7	43.1	41.9	16.5
Progression Factor	0.82	0.29	0.08	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.9	0.2	0.0	0.1	2.9		1.4	1.4	0.0	6.4	1.0	0.0
Delay (s)	23.1	1.0	0.2	19.0	28.3		43.3	43.6	40.7	49.5	42.8	16.6
Level of Service	C	A	A	B	C		D	D	D	D	D	B
Approach Delay (s)		16.7			28.2			42.9			28.3	
Approach LOS		B			C			D			C	

Intersection Summary			
HCM Average Control Delay	25.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Baseline Rd & 55th St

H:\Boulder Creek Commons\Synchro\2012 Total PM w kewanee.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	205	433	169	52	284	75	118	84	51	265	127	436
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3428		1770	1863	1583	1770	1863	1583
Flt Permitted	0.51	1.00	1.00	0.43	1.00		0.62	1.00	1.00	0.70	1.00	1.00
Satd. Flow (perm)	950	1863	1583	798	3428		1160	1863	1583	1300	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	471	184	57	309	82	128	91	55	288	138	474
RTOR Reduction (vph)	0	0	56	0	19	0	0	0	42	0	0	320
Lane Group Flow (vph)	223	471	128	57	372	0	128	91	13	288	138	154
Turn Type	pm+pt		Perm	Perm			Perm		Perm	Perm		pm+ov
Protected Phases	1	6			2			4			8	1
Permitted Phases	6		6	2			4		4	8		8
Actuated Green, G (s)	80.7	80.0	80.0	64.6	64.6		28.7	28.7	28.7	28.7	28.7	39.1
Effective Green, g (s)	80.7	80.0	80.0	64.6	64.6		28.7	28.7	28.7	28.7	28.7	39.1
Actuated g/C Ratio	0.67	0.67	0.67	0.54	0.54		0.24	0.24	0.24	0.24	0.24	0.33
Clearance Time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Vehicle Extension (s)	1.0	3.0	3.0	3.0	3.0		2.0	2.0	2.0	2.5	2.5	1.0
Lane Grp Cap (vph)	710	1242	1055	430	1845		277	446	379	311	446	582
v/s Ratio Prot	0.03	c0.25			0.11			0.05			0.07	0.02
v/s Ratio Perm	0.18		0.08	0.07			0.11		0.01	c0.22		0.07
v/c Ratio	0.31	0.38	0.12	0.13	0.20		0.46	0.20	0.03	0.93	0.31	0.27
Uniform Delay, d1	9.0	8.9	7.3	13.8	14.3		39.0	36.5	35.0	44.6	37.5	29.9
Progression Factor	0.90	0.90	0.80	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.8	0.2	0.6	0.2		0.4	0.1	0.0	32.1	0.3	0.1
Delay (s)	8.2	8.9	6.0	14.4	14.6		39.5	36.6	35.0	76.8	37.8	29.9
Level of Service	A	A	A	B	B		D	D	D	E	D	C
Approach Delay (s)		8.1			14.6			37.6			46.1	
Approach LOS		A			B			D			D	

Intersection Summary			
HCM Average Control Delay	26.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	640	240	16	12	655	435	49	66	31	80	52	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3327		1770	1863	1583	1770	1863	1583
Flt Permitted	0.09	1.00	1.00	0.60	1.00		0.72	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	170	1863	1583	1114	3327		1341	1863	1583	1323	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	696	261	17	13	712	473	53	72	34	87	57	250
RTOR Reduction (vph)	0	0	4	0	115	0	0	0	30	0	0	57
Lane Group Flow (vph)	696	261	13	13	1070	0	53	72	4	87	57	193
Turn Type	pm+pt		Perm	Perm			Perm		Perm	Perm		pm+ov
Protected Phases	1	6			2			4			8	1
Permitted Phases	6		6	2			4		4	8		8
Actuated Green, G (s)	78.1	78.1	78.1	38.8	38.8		10.6	10.6	10.6	10.6	10.6	44.9
Effective Green, g (s)	78.1	78.1	78.1	38.8	38.8		10.6	10.6	10.6	10.6	10.6	44.9
Actuated g/C Ratio	0.78	0.78	0.78	0.39	0.39		0.11	0.11	0.11	0.11	0.11	0.45
Clearance Time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Vehicle Extension (s)	1.0	2.5	2.5	2.0	2.0		3.0	3.0	3.0	3.0	3.0	1.0
Lane Grp Cap (vph)	682	1455	1236	432	1291		142	197	168	140	197	711
v/s Ratio Prot	c0.35	0.14			0.32			0.04			0.03	0.09
v/s Ratio Perm	c0.45		0.01	0.01			0.04		0.00	c0.07		0.03
v/c Ratio	1.02	0.18	0.01	0.03	0.83		0.37	0.37	0.02	0.62	0.29	0.27
Uniform Delay, d1	27.9	2.8	2.4	18.9	27.6		41.6	41.6	40.1	42.8	41.2	17.3
Progression Factor	0.84	0.25	0.04	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	38.2	0.2	0.0	0.1	6.2		1.7	1.2	0.1	8.3	0.8	0.1
Delay (s)	61.7	0.9	0.1	19.1	33.8		43.3	42.7	40.1	51.1	42.0	17.4
Level of Service	E	A	A	B	C		D	D	D	D	D	B
Approach Delay (s)		44.3			33.7			42.3			28.4	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM Average Control Delay	37.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	245	515	180	57	335	90	125	84	54	315	127	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3427		1770	1863	1583	1770	1863	1583
Flt Permitted	0.43	1.00	1.00	0.45	1.00		0.63	1.00	1.00	0.70	1.00	1.00
Satd. Flow (perm)	800	1863	1583	846	3427		1170	1863	1583	1300	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	560	196	62	364	98	136	91	59	342	138	565
RTOR Reduction (vph)	0	0	52	0	20	0	0	0	44	0	0	299
Lane Group Flow (vph)	266	560	144	62	442	0	136	91	15	342	138	266
Turn Type	pm+pt		Perm	Perm			Perm		Perm	Perm		pm+ov
Protected Phases	1	6			2			4			8	1
Permitted Phases	6		6	2			4		4	8		8
Actuated Green, G (s)	78.4	78.4	78.4	63.9	63.9		30.3	30.3	30.3	30.3	30.3	39.8
Effective Green, g (s)	78.4	78.4	78.4	63.9	63.9		30.3	30.3	30.3	30.3	30.3	39.8
Actuated g/C Ratio	0.65	0.65	0.65	0.53	0.53		0.25	0.25	0.25	0.25	0.25	0.33
Clearance Time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Vehicle Extension (s)	1.0	3.0	3.0	3.0	3.0		2.0	2.0	2.0	2.5	2.5	1.0
Lane Grp Cap (vph)	599	1217	1034	450	1825		295	470	400	328	470	525
v/s Ratio Prot	0.04	c0.30			0.13			0.05			0.07	0.04
v/s Ratio Perm	0.25		0.09	0.07			0.12		0.01	c0.26		0.13
v/c Ratio	0.44	0.46	0.14	0.14	0.24		0.46	0.19	0.04	1.04	0.29	0.51
Uniform Delay, d1	8.9	10.3	7.9	14.2	15.1		37.9	35.2	33.8	44.9	36.2	32.2
Progression Factor	0.95	0.88	0.87	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	1.1	0.3	0.6	0.3		0.4	0.1	0.0	61.2	0.3	0.3
Delay (s)	8.6	10.3	7.1	14.8	15.4		38.4	35.3	33.9	106.1	36.5	32.5
Level of Service	A	B	A	B	B		D	D	C	F	D	C
Approach Delay (s)		9.2			15.3			36.5			57.1	
Approach LOS		A			B			D			E	

Intersection Summary			
HCM Average Control Delay	30.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Baseline Rd & 55th St

H:\Boulder Creek Commons\Synchro\2025 Total AM w kewanee.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	640	244	12	11	657	435	39	66	27	80	52	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3328		1770	1863	1583	1770	1863	1583
Flt Permitted	0.09	1.00	1.00	0.60	1.00		0.72	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	170	1863	1583	1110	3328		1341	1863	1583	1323	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	696	265	13	12	714	473	42	72	29	87	57	250
RTOR Reduction (vph)	0	0	3	0	114	0	0	0	26	0	0	56
Lane Group Flow (vph)	696	265	10	12	1073	0	42	72	3	87	57	194
Turn Type	pm+pt		Perm	Perm			Perm		Perm	Perm		pm+ov
Protected Phases	1	6			2			4			8	1
Permitted Phases	6		6	2			4		4	8		8
Actuated Green, G (s)	78.1	78.1	78.1	38.8	38.8		10.6	10.6	10.6	10.6	10.6	44.9
Effective Green, g (s)	78.1	78.1	78.1	38.8	38.8		10.6	10.6	10.6	10.6	10.6	44.9
Actuated g/C Ratio	0.78	0.78	0.78	0.39	0.39		0.11	0.11	0.11	0.11	0.11	0.45
Clearance Time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Vehicle Extension (s)	1.0	2.5	2.5	2.0	2.0		3.0	3.0	3.0	3.0	3.0	1.0
Lane Grp Cap (vph)	682	1455	1236	431	1291		142	197	168	140	197	711
v/s Ratio Prot	c0.35	0.14			0.32			0.04			0.03	0.09
v/s Ratio Perm	c0.45		0.01	0.01			0.03		0.00	c0.07		0.03
v/c Ratio	1.02	0.18	0.01	0.03	0.83		0.30	0.37	0.02	0.62	0.29	0.27
Uniform Delay, d1	27.9	2.8	2.4	18.9	27.6		41.3	41.6	40.0	42.8	41.2	17.3
Progression Factor	0.85	0.25	0.05	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	38.2	0.3	0.0	0.1	6.3		1.2	1.2	0.0	8.3	0.8	0.1
Delay (s)	62.0	1.0	0.1	19.1	34.0		42.4	42.7	40.1	51.1	42.0	17.4
Level of Service	E	A	A	B	C		D	D	D	D	D	B
Approach Delay (s)		44.5			33.8			42.1			28.4	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM Average Control Delay	37.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Baseline Rd & 55th St

H:\Boulder Creek Commons\Synchro\2025 Total PM w kewanee.syn

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	245	518	169	52	339	90	118	84	51	315	127	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3428		1770	1863	1583	1770	1863	1583
Flt Permitted	0.43	1.00	1.00	0.45	1.00		0.63	1.00	1.00	0.70	1.00	1.00
Satd. Flow (perm)	796	1863	1583	844	3428		1170	1863	1583	1300	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	563	184	57	368	98	128	91	55	342	138	565
RTOR Reduction (vph)	0	0	49	0	20	0	0	0	41	0	0	295
Lane Group Flow (vph)	266	563	135	57	446	0	128	91	14	342	138	270
Turn Type	pm+pt		Perm	Perm			Perm		Perm	Perm		pm+ov
Protected Phases	1	6			2			4			8	1
Permitted Phases	6		6	2			4		4	8		8
Actuated Green, G (s)	78.4	78.4	78.4	63.9	63.9		30.3	30.3	30.3	30.3	30.3	39.8
Effective Green, g (s)	78.4	78.4	78.4	63.9	63.9		30.3	30.3	30.3	30.3	30.3	39.8
Actuated g/C Ratio	0.65	0.65	0.65	0.53	0.53		0.25	0.25	0.25	0.25	0.25	0.33
Clearance Time (s)	5.0	5.7	5.7	5.7	5.7		5.6	5.6	5.6	5.6	5.6	5.0
Vehicle Extension (s)	1.0	3.0	3.0	3.0	3.0		2.0	2.0	2.0	2.5	2.5	1.0
Lane Grp Cap (vph)	597	1217	1034	449	1825		295	470	400	328	470	525
v/s Ratio Prot	0.04	c0.30			0.13			0.05			0.07	0.04
v/s Ratio Perm	0.26		0.09	0.07			0.11		0.01	c0.26		0.13
v/c Ratio	0.45	0.46	0.13	0.13	0.24		0.43	0.19	0.03	1.04	0.29	0.51
Uniform Delay, d1	8.9	10.3	7.9	14.1	15.1		37.7	35.2	33.8	44.9	36.2	32.3
Progression Factor	0.95	0.88	0.87	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	1.2	0.2	0.6	0.3		0.4	0.1	0.0	61.2	0.3	0.4
Delay (s)	8.6	10.3	7.1	14.6	15.4		38.0	35.3	33.8	106.1	36.5	32.7
Level of Service	A	B	A	B	B		D	D	C	F	D	C
Approach Delay (s)		9.3			15.3			36.3			57.2	
Approach LOS		A			B			D			E	

Intersection Summary			
HCM Average Control Delay	30.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	582	217	17	13	995	53	72	34	76	57	207
v/c Ratio	0.80	0.14	0.01	0.03	0.69	0.36	0.35	0.17	0.52	0.28	0.24
Control Delay	26.6	1.1	0.1	18.6	22.7	46.3	44.4	14.5	53.3	42.5	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	1.1	0.1	18.6	22.7	46.3	44.4	14.5	53.3	42.5	5.1
Queue Length 50th (ft)	126	7	0	5	221	32	43	0	46	34	17
Queue Length 95th (ft)	#479	16	m1	17	295	67	82	27	89	69	56
Internal Link Dist (ft)		1083			170		276			196	
Turn Bay Length (ft)			100	105		65		135	175		175
Base Capacity (vph)	727	1511	1287	464	1444	312	434	395	308	434	858
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.14	0.01	0.03	0.69	0.17	0.17	0.09	0.25	0.13	0.24

Intersection Summary

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

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	223	467	196	62	386	136	91	59	288	138	473
v/c Ratio	0.34	0.38	0.18	0.12	0.20	0.49	0.20	0.14	0.93	0.31	0.54
Control Delay	8.6	9.3	1.4	15.0	12.8	45.6	37.2	9.6	80.6	39.1	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.6	9.3	1.4	15.0	12.8	45.6	37.2	9.6	80.6	39.1	4.8
Queue Length 50th (ft)	59	131	2	23	69	90	56	0	215	87	0
Queue Length 95th (ft)	87	174	24	49	100	155	101	34	#375	145	66
Internal Link Dist (ft)		1083			170		276			196	
Turn Bay Length (ft)			100	105		65		135	175		175
Base Capacity (vph)	675	1243	1116	509	1910	293	470	444	328	470	886
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.38	0.18	0.12	0.20	0.46	0.19	0.13	0.88	0.29	0.53

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	223	471	184	57	391	128	91	55	288	138	473
v/c Ratio	0.34	0.38	0.17	0.11	0.20	0.46	0.20	0.13	0.93	0.31	0.54
Control Delay	8.6	9.3	1.5	14.9	12.9	44.6	37.2	9.8	80.6	39.1	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.6	9.3	1.5	14.9	12.9	44.6	37.2	9.8	80.6	39.1	4.8
Queue Length 50th (ft)	59	132	2	21	71	84	56	0	215	87	0
Queue Length 95th (ft)	87	175	24	46	102	146	101	33	#375	145	66
Internal Link Dist (ft)		1083			170		276			196	
Turn Bay Length (ft)			100	105		65		135	175		175
Base Capacity (vph)	672	1243	1112	507	1911	293	470	441	328	470	886
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.38	0.17	0.11	0.20	0.44	0.19	0.12	0.88	0.29	0.53

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	582	217	11	11	995	38	65	27	76	54	207
v/c Ratio	0.80	0.14	0.01	0.02	0.69	0.26	0.32	0.14	0.52	0.26	0.24
Control Delay	27.1	1.0	0.1	18.5	22.7	43.3	43.6	15.4	53.4	42.3	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.1	1.0	0.1	18.5	22.7	43.3	43.6	15.4	53.4	42.3	5.1
Queue Length 50th (ft)	124	6	0	4	221	23	39	0	46	32	17
Queue Length 95th (ft)	#484	14	m0	16	295	52	76	24	89	66	56
Internal Link Dist (ft)		1083			170		276			196	
Turn Bay Length (ft)			100	105		65		135	175		175
Base Capacity (vph)	729	1512	1287	464	1444	313	434	390	310	434	858
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.14	0.01	0.02	0.69	0.12	0.15	0.07	0.25	0.12	0.24

Intersection Summary

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

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	266	560	196	62	462	136	91	59	342	138	565
v/c Ratio	0.44	0.46	0.18	0.14	0.25	0.46	0.19	0.13	1.04	0.29	0.64
Control Delay	10.1	10.5	2.3	15.6	14.2	44.0	36.6	9.5	105.3	38.3	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	10.5	2.3	15.6	14.2	44.0	36.6	9.5	105.3	38.3	9.9
Queue Length 50th (ft)	73	168	10	24	89	89	56	0	~287	87	60
Queue Length 95th (ft)	101	216	34	50	122	155	101	34	#474	145	181
Internal Link Dist (ft)		1083			170		276			196	
Turn Bay Length (ft)			100	105		65		135	175		175
Base Capacity (vph)	611	1217	1087	450	1843	295	470	444	328	470	885
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.46	0.18	0.14	0.25	0.46	0.19	0.13	1.04	0.29	0.64

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	696	265	13	12	1187	42	72	29	87	57	250
v/c Ratio	1.02	0.18	0.01	0.03	0.82	0.27	0.33	0.14	0.55	0.26	0.30
Control Delay	63.6	1.1	0.1	18.5	28.2	42.5	42.9	14.6	53.9	41.2	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.6	1.1	0.1	18.5	28.2	42.5	42.9	14.6	53.9	41.2	9.7
Queue Length 50th (ft)	~442	8	0	5	300	25	43	0	53	34	51
Queue Length 95th (ft)	#704	17	m0	16	392	55	81	25	98	68	101
Internal Link Dist (ft)		1083			170		276			196	
Turn Bay Length (ft)			100	105		65		135	175		175
Base Capacity (vph)	684	1498	1275	444	1443	312	434	391	308	434	832
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.02	0.18	0.01	0.03	0.82	0.13	0.17	0.07	0.28	0.13	0.30

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	266	563	184	57	455	128	91	55	342	138	565
v/c Ratio	0.44	0.46	0.17	0.13	0.25	0.43	0.19	0.12	1.04	0.29	0.65
Control Delay	10.0	10.5	2.3	15.5	14.4	43.2	36.6	9.7	105.3	38.3	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.0	10.5	2.3	15.5	14.4	43.2	36.6	9.7	105.3	38.3	10.2
Queue Length 50th (ft)	73	170	9	22	89	84	56	0	~287	87	63
Queue Length 95th (ft)	101	218	32	46	121	146	101	33	#474	145	186
Internal Link Dist (ft)		1083			170		276			196	
Turn Bay Length (ft)			100	105		65		135	175		175
Base Capacity (vph)	615	1217	1083	449	1846	295	470	441	328	470	882
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.46	0.17	0.13	0.25	0.43	0.19	0.12	1.04	0.29	0.64

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	5	105	0	5	60
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	5	114	0	5	65
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	190	114			114	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	190	114			114	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	796	938			1475	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	5	114	71
Volume Left	0	0	5
Volume Right	5	0	0
cSH	938	1700	1475
Volume to Capacity	0.01	0.07	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	8.9	0.0	0.6
Lane LOS	A		A
Approach Delay (s)	8.9	0.0	0.6
Approach LOS	A		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	15	85	5	5	65
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	16	92	5	5	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	177	95			98	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	177	95			98	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			100	
cM capacity (veh/h)	810	962			1495	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	22	98	76
Volume Left	5	0	5
Volume Right	16	5	0
cSH	919	1700	1495
Volume to Capacity	0.02	0.06	0.00
Queue Length 95th (ft)	2	0	0
Control Delay (s)	9.0	0.0	0.6
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	0.6
Approach LOS	A		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	17.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	5	105	0	5	60
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	5	114	0	5	65
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	190	114			114	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	190	114			114	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	796	938			1475	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	5	114	71
Volume Left	0	0	5
Volume Right	5	0	0
cSH	938	1700	1475
Volume to Capacity	0.01	0.07	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	8.9	0.0	0.6
Lane LOS	A		A
Approach Delay (s)	8.9	0.0	0.6
Approach LOS	A		

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	1	11	81	1	2	65
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	12	88	1	2	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	164	89			89	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	164	89			89	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	826	970			1506	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	13	89	73
Volume Left	1	0	2
Volume Right	12	1	0
cSH	956	1700	1506
Volume to Capacity	0.01	0.05	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	8.8	0.0	0.2
Lane LOS	A		A
Approach Delay (s)	8.8	0.0	0.2
Approach LOS	A		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	15.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	4	102	0	4	57
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	4	111	0	4	62
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	182	111			111	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	182	111			111	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	806	942			1479	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	4	111	66
Volume Left	0	0	4
Volume Right	4	0	0
cSH	942	1700	1479
Volume to Capacity	0.00	0.07	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	8.8	0.0	0.5
Lane LOS	A		A
Approach Delay (s)	8.8	0.0	0.5
Approach LOS	A		

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	16.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	15	85	5	5	65
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	16	92	5	5	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	177	95			98	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	177	95			98	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			100	
cM capacity (veh/h)	810	962			1495	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	22	98	76
Volume Left	5	0	5
Volume Right	16	5	0
cSH	919	1700	1495
Volume to Capacity	0.02	0.06	0.00
Queue Length 95th (ft)	2	0	0
Control Delay (s)	9.0	0.0	0.6
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	0.6
Approach LOS	A		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	17.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Kewanee Dr & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2012 Total AM w kewanee.syn

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	7	19	105	3	11	60
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	21	114	3	12	65
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	205	116			117	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	205	116			117	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			99	
cM capacity (veh/h)	777	937			1471	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	28	117	77
Volume Left	8	0	12
Volume Right	21	3	0
cSH	888	1700	1471
Volume to Capacity	0.03	0.07	0.01
Queue Length 95th (ft)	2	0	1
Control Delay (s)	9.2	0.0	1.2
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	1.2
Approach LOS	A		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	20.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Kewanee Dr & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2012 Total PM w kewanee.syn

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	10	25	85	13	20	65
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	27	92	14	22	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	214	99			107	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	214	99			107	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	97			99	
cM capacity (veh/h)	763	956			1484	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	38	107	92
Volume Left	11	0	22
Volume Right	27	14	0
cSH	892	1700	1484
Volume to Capacity	0.04	0.06	0.01
Queue Length 95th (ft)	3	0	1
Control Delay (s)	9.2	0.0	1.8
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	1.8
Approach LOS	A		

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	21.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Kewanee Dr & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total AM w kewanee.syn

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	7	19	105	3	11	60
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	21	114	3	12	65
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	205	116			117	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	205	116			117	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	98			99	
cM capacity (veh/h)	777	937			1471	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	28	117	77
Volume Left	8	0	12
Volume Right	21	3	0
cSH	888	1700	1471
Volume to Capacity	0.03	0.07	0.01
Queue Length 95th (ft)	2	0	1
Control Delay (s)	9.2	0.0	1.2
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	1.2
Approach LOS	A		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	20.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Kewanee Dr & Manhattan Drive

H:\Boulder Creek Commons\Synchro\2025 Total PM w kewanee.syn

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	10	25	85	13	20	65
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	27	92	14	22	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	214	99			107	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	214	99			107	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	97			99	
cM capacity (veh/h)	763	956			1484	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	38	107	92
Volume Left	11	0	22
Volume Right	27	14	0
cSH	892	1700	1484
Volume to Capacity	0.04	0.06	0.01
Queue Length 95th (ft)	3	0	1
Control Delay (s)	9.2	0.0	1.8
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	1.8
Approach LOS	A		

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	21.2%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix:
Accident Data Summaries

CRASH HISTORY FOR BOULDER AT INTERSECTION OF SOUTH BOULDER ROAD AND 55TH STREET
YEAR 2006

DATE	TIME	CRASH LOCATION	NUM. INJURED	NUM. KIL	JUNCTION RELATION	MANNER OF COLLISION	DIRECTION	LIGHT COND	ROAD COND	DRIVER ACTION
2006										
09/20/06	0759	S BOULDER RD 55TH ST	1	0	INTERSECTION	COLLISION WITH MEDIAN	EAST			CARELESS DRIVING

CRASH HISTORY FOR BOULDER AT INTERSECTION OF SOUTH BOULDER ROAD AND 55TH STREET
YEAR 2006

CRASH HISTORY FOR BOULDER AT INTERSECTION OF BASELINE AND MANHATTAN
FOR THE YEARS 2005 THROUGH APPROXIMATELY NOVEMBER 2009

DATE	TIME	CRASH LOCATION	NUM. INJURED	NUM. KIL	JUNCTION RELATION	MANNER OF COLLISION	DIRECTION	LIGHT COND	ROAD COND	DRIVER ACTION
2005										
03/03/05	0805	MANHATTAN BASELINE	0	0	INTERSECTION	FRONT TO REAR	NORTH	DAYLIGHT		FOOT SLIPPED OFF BRAKE VEHICLE HIT CAR IN FRONT
03/16/05	(none)	MANHATTAN BASELINE	0	0	INTERSECTION	FRONT TO REAR	NORTH	DAYLIGHT	DRY	BRAKES FAILED
05/25/05	0852	MANHATTAN BASELINE	0	0	APPROACHING INTERSECTION	FRONT TO LEFT REAR	NORTH	DAYLIGHT	DRY	CARELESS DRIVING VEHICLE HIT PARKED CAR WHICH HIT PARKED CAR IN FRONT
06/08/05	1610	MANHATTAN BASELINE	0	0	APPROACHING INTERSECTION	FRONT LEFT TO REAR LEFT	SOUTH	DAYLIGHT	DRY	VEHICLE TURNING LEFT ONTO MANHATTAN BLINDED BY TRUCK TO NORTH FAILED TO YIELD TO VEHICLE HEADING SOUTH FROM BASELINE
07/26/05	0900	BASELINE MANHATTAN	1	0	INTERSECTION	VEHICLE HIT PEDESTRIAN	NORTH	DAYLIGHT	DRY	VEHICLE TURNING LEFT ONTO BASELINE WEST FAILED TO YIELD TO PEDESTRIAN CROSSING NORTH ON BASELINE
09/26/05	1019	BASELINE MANHATTAN	0	0	INTERSECTION	FRONT TO REAR	EAST	DAYLIGHT	DRY	FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
2006										
12/31/06	2200	BASELINE MANHATTAN	0	0	INTERSECTION	FRONT TO REAR	EAST			VEHICLE SLOWING TO TURNI RIGHT ON MANHATTAN HIT BY VEHICLE FROM BEHIND
2007										
03/20/07	1655	MANHATTAN BASELINE	0	0	APPROACHING INTERSECTION	RIGHT FRONT TO LEFT FRONT	NORTH			VEHICLE PULLED AROUND VEHICLE TURNING LFT ONTO BASELINE, HIT PARKED CAR ON E SIDE MANHATTAN
05/12/07	1223	MANHATTAN BASELINE	0	0	SOUTH OF INTERSECTION	LEFT FRONT TO RIGHT FRONT	SOUTH	DAYLIGHT		VEHICLE PULLED OUT FROM PARKING SPACE, HIT SOUTHBOUND VEHICLE
2008										
02/01/08	1310	MANHATTAN BASELINE	0	0	APPROACHING INTERSECTION	LEFT FRONT TO RIGHT FRONT	SOUTH	DAYLIGHT		VEHICLE PULLED OUT OF EAST DRIVEWAY ACCESS ONTO MANHATTAN NB HIT NB VEHICLE STOPPED AT LIGHT
2009										
03/31/09	0951	BASELINE MANHATTAN	1	0	INTERSECTION	FRONT	NORTH	DAYLIGHT		PED NB AGAINST LIGHT HIT EB VEHICLE
06/15/09	0825	BASELINE	0	0	INTERSECTION	RIGHT REAR	EAST	DAYLIGHT	DRY	EB VEHICLE TURNED RT HIT BICYCLIST
10/15/09	1155	BASELINE MANHATTAN	1	0	INTERSECTION	NONE	NORTH	DAYLIGHT		WB VEHICLE ILLEGAL UTURN HIT EB VEHICLE
11/09/09	0745	MANHATTAN BASELINE	0	0	APPROACHING INTERSECTION	FRONT TO REAR	NORTH	DAYLIGHT	DRY	FAILED TO STOP

CRASH HISTORY FOR BOULDER AT INTERSECTION OF 55TH STREET AND BASELINE
FOR THE YEARS 2005 THROUGH APPROXIMATELY OCTOBER 2009

DATE	TIME	CRASH LOCATION	NUM. INJURED	NUM. KIL	JUNCTION RELATION	MANNER OF COLLISION	DIRECTION	LIGHT COND	ROAD COND	DRIVER ACTION
2005										
04/29/05	1535	BASELINE 55TH	0	0	INTERSECTION	FRONT TO SIDE, OPPOSING DIRECTION	WEST	DAYLIGHT		FAILURE TO YIELD ROW
05/26/05	0919	BASELINE 55TH	0	0	INTERSECTION	FRONT TO REAR	EAST	DAYLIGHT		BIKE HIT CAR
09/09/05	1006	55TH BASELINE	0	0	INTERSECTION	FRONT TO REAR	SOUTH	DAYLIGHT		FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
09/17/05	1340	55TH BASELINE	0	0	INTERSECTION	FRONT TO REAR	SOUTH	DAYLIGHT		FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
12/02/05	1840	55TH BASELINE	0	0	INTERSECTION	FRONT TO REAR	SOUTH			FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
2006										
04/01/06	0730	55TH BASELINE	0	0	INTERSECTION	VEHICLE HIT MEDIAN	SOUTH			VEHICLE TURNING LEFT ONTO 55TH SB FROM BASELINE WB HIT MEDIAN
09/01/06	1330	BASELINE 55TH	0	0	INTERSECTION	FRONT TO FRONT RIGHT	EAST			FAILURE TO YIELD ROW
09/26/06	0845		0	0	INTERSECTION	FRONT TO REAR	EAST			FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
11/30/06	1930	BASELINE 55TH	0	0	INTERSECTION	OTHER	EAST		ICY	VEHICLE COLLISION WITH DEER
12/05/06	0844	55TH BASELINE	0	0	INTERSECTION	FRONT TO REAR	SOUTH			FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
12/31/06	2130	BASELINE 55TH	0	0	INTERSECTION	FRONT TO REAR	EAST			FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
2007										
03/07/07	0810	BASELINE 55TH	0	0	INTERSECTION	SIDE TO SIDE	EAST			VEHICLE ENTERED CONED LEFT TURN AREA SIDESWIPED VEHICLE IN STRAIGHT LANE
3/26/07	1730	55TH BASELINE	0	0	INTERSECTION	FRONT TO REAR	SOUTH			FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
4/14/07	2348	BASELINE 55TH	0	0	INTERSECTION	FRONT TO RIGHT FRONT	EAST			FAILURE TO YIELD ROW
04/20/07	0859	BASELINE 55TH	0	0	INTERSECTION	FRONT TO REAR	EAST			FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
05/16/07	1740	55TH BASELINE	0	0	INTERSECTION	FRONT TO REAR	NORTH			FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
06/29/07	0855	55TH BASELINE	0	0	INTERSECTION	FRONT TO REAR	NORTH			FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
10/05/07	1749	BASELINE 55TH	0	0	INTERSECTION	FRONT TO LEFT REAR	WEST			FAILURE TO YIELD ROW

CRASH HISTORY FOR BOULDER AT INTERSECTION OF 55TH STREET AND BASELINE
FOR THE YEARS 2005 THROUGH APPROXIMATELY OCTOBER 2009

DATE	TIME	CRASH LOCATION	NUM. INJURED	NUM. KIL	JUNCTION RELATION	MANNER OF COLLISION	DIRECTION	LIGHT COND	ROAD COND	DRIVER ACTION
10/05/07	0828	BASELINE 55TH	0	0	INTERSECTION	FRONT TO RIGHT FRONT	WEST	DAYLIGHT	DRY	FAILURE TO YIELD ROW
2008										
01/03/08	0925	55TH BASELINE	0	0	INTERSECTION	R IGH FRONT TO LEFT SIDE	SOUTH	DAYLIGHT		FAILURE TO YIELD TO VEHICLE BEFORE CHANGING LANES
06/18/08	0925	BASELINE 55TH	1	0		FRONT BUS HIT BIKE	NORTH	DAYLIGHT		FAILURE TO YIELD TO BIKE
07/10/08	0900	55TH BASELINE	0	0	INTERSECTION	FRONT TO REAR	NORTH	DAYLIGHT		FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
07/14/08	1714	55TH BASELINE	1	0	INTERSECTION	VEHICLE HIT BIKE	SOUTH	DAYLIGHT		VEHICLE TURNING RIGHT FAILED TO YIELD TO BIK
07/21/08	0725	BASELINE 55TH	1	0	INTERSECTION	VEHICLE HIT BIKE	EAST	DAYLIGHT		VEHICLE TURNING LEFT FAILED TO YIELD TO BIKE
8/18/08	0724	BASELINE 55TH	0	0	INTERSECTION	VEHICLE HIT BIKE	WEST	DAYLIGHT		VEHICLE TURNING LEFT FAILED TO YIELD TO BIKE
08/21/08	1833	55TH BASELINE	0	0	INTERSECTION	FRONT TO REAR	SOUTH	DAYLIGHT		FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
11/03/08	0750	55TH BASELINE	0	0	INTERSECTION	VEHICLE HIT BIKE	SOUTH	DAYLIGHT		VEHICLE TURNING RIGHT FAILED TO YIELD TO BIK
2009										
01/09/09	2322	BASELINE 55TH	0	0	APPROACHING INTERSECTION	OTHER	EAST	DARKNESS		COLLIDED WITH CURB, CARELESS DRIVING
05/08/09	1808	55TH BASELINE	0	0	INTERSECTION	FRONT TO REAR	SOUTH	DAYLIGHT	DRY	FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
07/02/09	0654	BASELINE 55TH	1	0	INTERSECTION	VEHICLE HIT BIKE	EAST	DAYLIGHT		VEHICLE TURNING LEFT FAILED TO YIELD TO BIKE
11/29/09	1827	55TH BASELINE	0	0	APPROACHING INTERSECTION	FRONT	NORTH			CARELSS DRIVING

CRASH HISTORY FOR BOULDER AT INTERSECTION OF 55TH STREET AND BASELINE
FOR THE YEARS 2005 THROUGH APPROXIMATELY OCTOBER 2009

CRASH HISTORY FOR BOULDER AT INTERSECTION OF 55TH STREET AND BASELINE
FOR THE YEARS 2005 THROUGH APPROXIMATELY OCTOBER 2009

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CRASH HISTORY FOR BOULDER AT INTERSECTION OF SOUTH BOULDER ROAD AND MANHATTAN CIRCLE FOR THE YEARS 2005 THROUGH APPROXIMATELY MAY 2009

DATE	TIME	CRASH LOCATION	NUM. INJURED	NUM. KIL	JUNCTION RELATION	MANNER OF COLLISION	DIRECTION	LIGHT COND	ROAD COND	DRIVER ACTION
2005										
07/29/05	1033	S BOULDER RD MANHATTAN CIRCLE	0	0	INTERSECTION	RT FRONT TO LFT FRONT REAR TO FRONT	EAST			IMPROPER RT TURN, THEN IMPROPER BACKING COLLISIONS WITH TWO VEHICLES
08/20/05	1449	MANHATTAN CIRCLE S BOULDER RD	0	0	INTERSECTION	REAR TO FRONT	NORTH	DAYLIGHT		REVERSED INTO VEHICLE BEHIND
08/30/05	0805	MANHATTAN CIRCLE S BOULDER RD	1	0	APPROACHING INTERSECTION	FRONT TO REAR	NORTH	DAYLIGHT		COLLIDED WITH VEHICLE WAITING TO TURN LFT INTO DAYS INN
11/12/05	0438	MANHATTAN CIRCLE S BOULDER RD	1	0	APPROACHING INTERSECTION	FRONT TO REAR	NORTH	DAYLIGHT		CARELESS DRIVING - COLLIDED WITH PARKED VEHICLE E. SIDE MANHATTAN CIRCLE
2006										
02/20/06	1702	S BOULDER RD MANHATTAN CIRCLE	0	0	INTERSECTION	RT FRONT TO LFT FRONT	WEST	DAYLIGHT		LFT TURN INTO WB INCOMING VEHICLE
04/03/06	1315	MANHATTAN CIRCLE S BOULDER RD	0	0	INTERSECTION	FRONT TO REAR	NORTH	DAYLIGHT		FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
12/03/06	0725	S BOULDER RD MANHATTAN CIRCLE	0	0	INTERSECTION	FRONT TO FRONT RIGHT	EAST			FAILURE TO YIELD ROW
2007										
09/22/07	0619	S BOULDER RD MANHATTAN CIRCLE	0	0	INTERSECTION	FRONT	WEST	DAYLIGHT		HIT MEDIAN AFTER SWERVING TO AVOID POSSIBLE ANIMAL
10/19/07	0752	S BOULDER RD MANHATTAN CIRCLE	0	1	APPROACHING INTERSECTION	FRONT TO PED	EAST	DAYLIGHT		VEHICLE HIT NB PED WHO "IMPROPERLY ENTERE ROADWAY"; SUNGLARE A FACTOR
10/22/07	1207	MANHATTAN CIRCLE S BOULDER RD	0	0	APPROACHING INTERSECTION	REAR TO FRONT	SOUTH	DAYLIGHT	DRY	IMPROPER BACKING
12/01/07	0245	S BOULDER RD MANHATTAN CIRCLE	0	0	INTERSECTION	RIGHT FRONT TO MEDIAN	WEST	DAYLIGHT		RECKLESS DRIVING
2008										
01/30/08	1854	S BOULDER RD MANHATTAN CIRCLE	0	0	INTERSECTION	SIDE TO SIDE	WEST	DAYLIGHT	ICY	VEHICLE SLIDES INTO VEHICLE IN NEXT LANE WHILE SLOWING DOWN FOR PED CROSSING
03/25/08	1040	MANHATTAN CIRCLE S BOULDER RD	0	0	INTERSECTION	RT SIDE TO LFT FRONT	SOUTH	DAYLIGHT		TURNING SB TO WB COLLIDED WITH VEHICLE PARKED IN WB LANE (FIRE TRUCKS BLOCKING)
04/07/08	1853	MANHATTAN CIRCLE S BOULDER RD	0	0	INTERSECTION	FRONT TO REAR	NORTH	DAYLIGHT		FAILURE TO AVOID INTERFERING WITH VEHICLE AHEAD
08/12/08	1247	S BOULDER RD MANHATTAN CIRCLE	0	0	INTERSECTION	REAR LFT TO FRONT RT	WEST	DAYLIGHT		IMPROPER LANE CHANGE
2009										
05/16/09	1555	S BOULDER RD MANHATTAN CIRCLE	0	0	APPROACHING INTERSECTION	FRONT	WEST	DAYLIGHT	DRY	LOST CONTROL HIT XCEL POLE (DOG JUMPED ON HIM)

CRASH HISTORY FOR BOULDER AT INTERSECTION OF SOUTH BOULDER ROAD AND MANHATTAN CIRCLE FOR THE YEARS 2005 THROUGH APPROXIMATELY MAY 2009

DATE	TIME	CRASH LOCATION	NUM. INJURED	NUM. KIL	JUNCTION RELATION	MANNER OF COLLISION	DIRECTION	LIGHT COND	ROAD COND	DRIVER ACTION
2010										
04/30/10	0038	S BOULDER RD MANHATTAN CIRCLE	0	0	INTERSECTION	COLLIDED WITH SEVERAL OBJECTS	EAST			CARELESS DRIVING - FAILED TO EXECUTE RT TURN

CRASH HISTORY FOR BOULDER AT INTERSECTION OF SOUTH BOULDER ROAD AND MANHATTAN CIRCLE FOR THE YEARS 2005 THROUGH APPROXIMATELY MAY 2009

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