

TRAFFIC IMPACT STUDY

Avenue South
Loveland, Colorado

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I. INTRODUCTION

McWhinney is planning to develop 150 acres of property in Loveland, Colorado, with a mix of residential, retail, and office land uses. **Figure 1** shows the location of the site. The development is bounded by Eisenhower Boulevard (US 34), the Great Western Railway (GWRR), Rocky Mountain Avenue (extended south), and Hahns Peak Drive. This study focuses on the access intersections onto US 34, as well as major intersections onto the extension of Rocky Mountain Avenue, Hahns Peak Drive, and along Boyd Lake Avenue. The proposed land uses include a mix of unit types totaling 3,367 dwelling units and approximately 415,000 square feet of commercial and office space. The residential counts analyzed in this study reflect a recent request to the Millennium General Development Plan to increase the allowable unit-count in this area from an entitlement standpoint. It is quite possible that the ultimate unit count for this property could be less.

Figure 2 shows the proposed Avenue South master plan, which does not yet show the additional units, but they would likely occur in areas B and C.

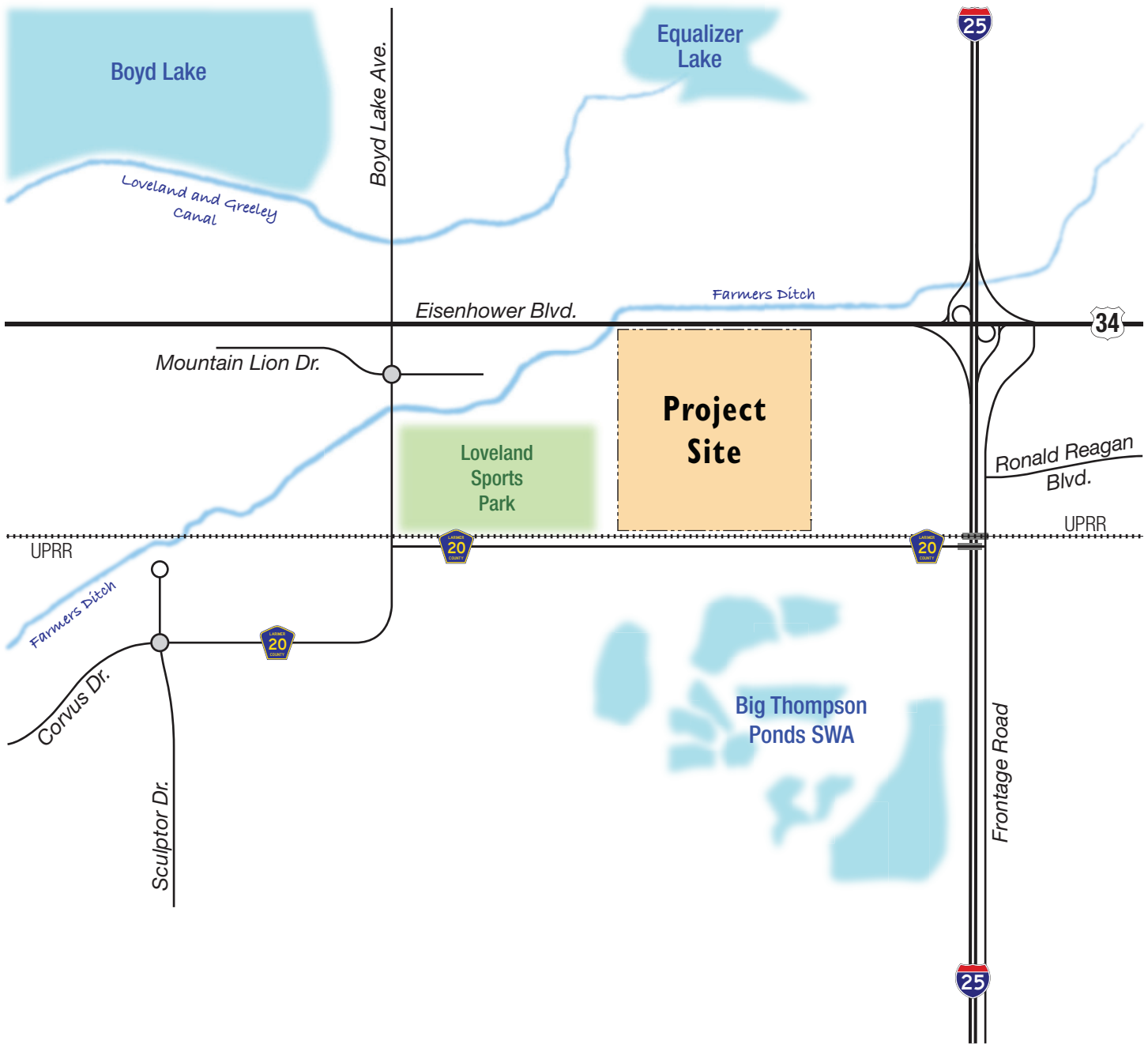
At completion, the site is anticipated to be served by two US 34 signalized full movement vehicular accesses via Rocky Mountain Avenue and Hahns Peak Drive, both of which exist. A Right-in/Right-Out (RIRO) intersection is also planned along US 34 in between these two signals, which is recognized in the US 34 Access Control Plan. A roundabout will serve the development along Hahns Peak Drive at Mountain Lion Drive and provide access into the development. Along Rocky Mountain Avenue, two roundabouts and a RIRO intersection will provide access into the development. Long-term, Rocky Mountain Avenue is planned to be extended south of US 34 to Larimer County Road (LCR) 20E, which has been incorporated into this study relative to the long-term analysis.

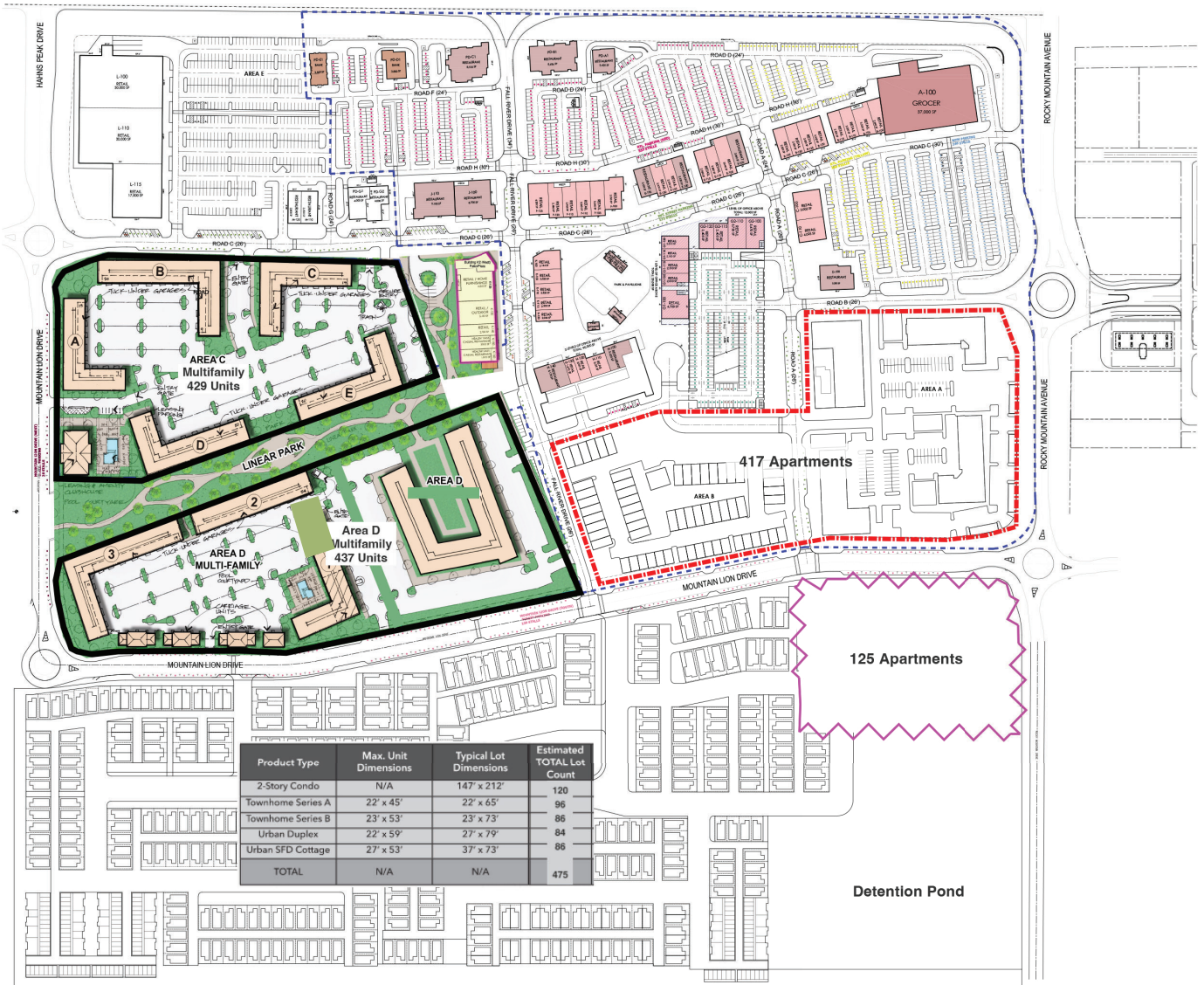
The purpose of this study is to assess the traffic impacts on the surrounding area roadways related to the proposed development. This report includes information on existing traffic conditions, vehicle trips associated with the planned development, total traffic volume projections, and recommendations on future roadway needs. This analysis focuses on the short- and long-term timeframe years of 2029 and 2045. The North Front Range (NFR) travel demand model has been among the tools used in this study. Other nearby traffic impact studies have also informed the preparation of the Avenue South traffic impact study.

Two future planning horizons were evaluated:

- **Short-Term Future (Year 2029).** By 2029, a subset of the development, roughly the northeastern quadrant of the master plan, is planned to be built out. This analysis year examines the impact that site generated traffic would have for just this portion of the development to help inform initial improvements while also incorporating traffic from the full development of neighboring properties. All access onto US 34 is planned to be included by this timeframe. The Rocky Mountain Avenue connection to LCR 20E is **not** assumed to be in place in this scenario.
- **Long-Term Future (Year 2045) With LCR 20E Connection.** This long-term planning horizon assumes a full build-out of the proposed development. The year 2045 is consistent with the NFR travel demand model forecast year. This scenario assumes that a connection across the GWRR to LCR 20E will be provided. Full development of the neighboring properties is also assumed.

An approved scoping package informing this study is provided in **Appendix H**.





II. EXISTING CONDITIONS

II.A. Roadway Network

This section describes the existing roadways within the study area.

- **US 34** provides major east-west regional access as a four-lane highway with some sections providing six lanes. It is classified as an expressway east of I-25 and a major arterial to the west. Access is limited with traffic signals at the major cross-streets. Auxiliary turn lanes are also provided at cross-street locations. An Access Control Plan was prepared that includes the Avenue South frontage.
- **Rocky Mountain Avenue** is a four-lane arterial running north-south from US 34 to Crossroads Boulevard running parallel to I-25's west. Many of the cross-street intersections have been constructed as roundabouts. This road is planned to be extended south of US 34 ultimately connecting to LCR 20E to serve future adjacent development, including Avenue South (on its west side) and Schmer Farm (on its east side). This connection will require approval from the Public Utilities Commission (PUC) due to crossing the GWRR.
- **Hahns Peak Drive**, a north-south collector road, serves the study area and extends north of US 34. The road is multilane near US 34 when considering the turn lanes, but it narrows as one moves south to a two-lane facility.
- **LCR 20E** runs east-west just south of the Avenue South site along the south side of the GWRR. This two-lane roadway extends from Boyd Lake Avenue to the east side of I-25 crossing over the interstate.
- **Boyd Lake Avenue** is an arterial roadway that runs north-south about 1.5 miles west of I-25, extending south of US 34 and north to SH 392. This road crosses the GWRR at-grade in close proximity to the LCR 20E intersection, and it curves southbound to westbound into 5th Street. Ultimately, this roadway is intended to be extended south to SH 402 as an arterial, and 5th Street would then "tee" into it.
- **Mountain Lion Drive** is an east-west collector located west of Avenue South. Its intersection with Boyd Lake Avenue is a roundabout, and a roundabout is also planned at its intersection with Hahns Peak Drive (which is not yet constructed). Ultimate plans include extending this road further south along the Hahns Peak Drive alignment and east through Avenue South to intersect with the Rocky Mountain Avenue extension. McWhinney has committed to be funding partner toward this extension.

II.B. Surrounding Land Uses

The surrounding area is partially developed. Chilson-Stroh to the west is underway. Uses include auto dealerships and apartments, and various commercial pads are slated to develop before too long. The Avenue South site is currently vacant, and development planning is currently underway for much of the property to the southeast of the US 34/Rocky Mountain Avenue intersection referred to as Schmer Farm.

II.C. Traffic Volumes

Two sources of traffic data counts were assembled for this study. Turning movement counts collected as part of the Schmer Farm Traffic Impact Study were extracted for some of the study area intersections from US 34/Hahns Peak Drive east. These data were collected in February 2024. The remainder of the study area intersections were counted by All Traffic Data/Rekor in September 2024. Weekday AM peak hour, PM peak hour, and Saturday peak hour turning movement counts (TMCs) were collected at the study area intersections. The peak hour traffic counts were collected in 15-minute intervals between the hours of 7:00 to 9:00 AM, 4:00 to 6:00 PM, and on a Saturday during the early afternoon hours. **Appendix A** contains the raw data collected in September, and Figure 3 illustrates all existing traffic volumes.

US 34 is the heaviest traveled roadway. The AM demands adjacent to the site are approximately 3,200 vehicles per hour, and the PM demands are just above 3,900 vehicles per hour (both directions combined). Boyd Lake Avenue serves 900 to 1,200 vehicles per hour during peak hours just south of US 34. The directionality of peak hour flow along both of these roads is fairly balanced. Rocky Mountain Avenue, north of US 34, serves between 900 and 1,450 vehicles per hour during the peak hours. The directionality favors the northbound direction in the AM and the southbound direction in the PM. Besides east-west through traffic, the US 34/Rocky Mountain Avenue intersection displays a heavy traffic pattern between the east leg (to/from I-25) and the north leg.

LCR 20E serves 400 to 500 vehicles per hour during each peak hour, and the least traveled road in the study area is Mountain Lion Drive, which sees 200 to 300 vehicles per hour at peaks.

The weekday PM peak hour tends to be the heaviest of the three peak hours counted. There are a couple of exceptions to this with one being along Boyd Lake Avenue north of the Loveland Sports Park, likely due to park activity on Saturdays. Other exceptions include Hahns Peak Avenue and Rocky Mountain Avenue north of US 34, in which the Saturday peak hour sees the greatest demand, likely due to the retail traffic that these roadways serve.

II.D. Traffic Operations

Traffic operations within the study area were evaluated according to techniques documented in the *Highway Capacity Manual (HCM)*, 7th Edition (2022) by the Transportation Research Board. Level of service (LOS) is a qualitative measure of traffic operational conditions, based on roadway capacity and vehicle delay. Levels of service are described by a letter designation ranging from LOS A to LOS F, with LOS A representing the best possible conditions and LOS F representing congested conditions. For unsignalized intersections, LOS is calculated for movements that must yield right-of-way to other traffic movements. For signalized traffic control, LOS represents an average of the delays for all movements at the intersection. Synchro traffic analysis software was used to develop the LOS calculations, based on the *HCM 7th Edition* methodology. The city provided signal timing information for current signalized intersections.

Figure 3 also summarizes the existing LOS analyses (worksheets are shown in **Appendix B**), and the resulting operations of each intersection are described, as follows.

US 34/Rocky Mountain Avenue

US 34 provides three through lanes in each direction at this tee intersection. Dual left turn lanes are provided along the eastbound and southbound approaches. The overall LOS is shown to be a C during all three peak hours being studied, but it is known that the southbound left turn movement is heavy at times causing backups to the roundabout at Foxtrail Drive.

US 34/Hahns Peak Drive

This intersection operates acceptably (LOS D) as a signalized intersection during the AM and Saturday peak hours. US 34 provides only two through lanes in each direction at this intersection.

US 34/Boyd Lake Avenue

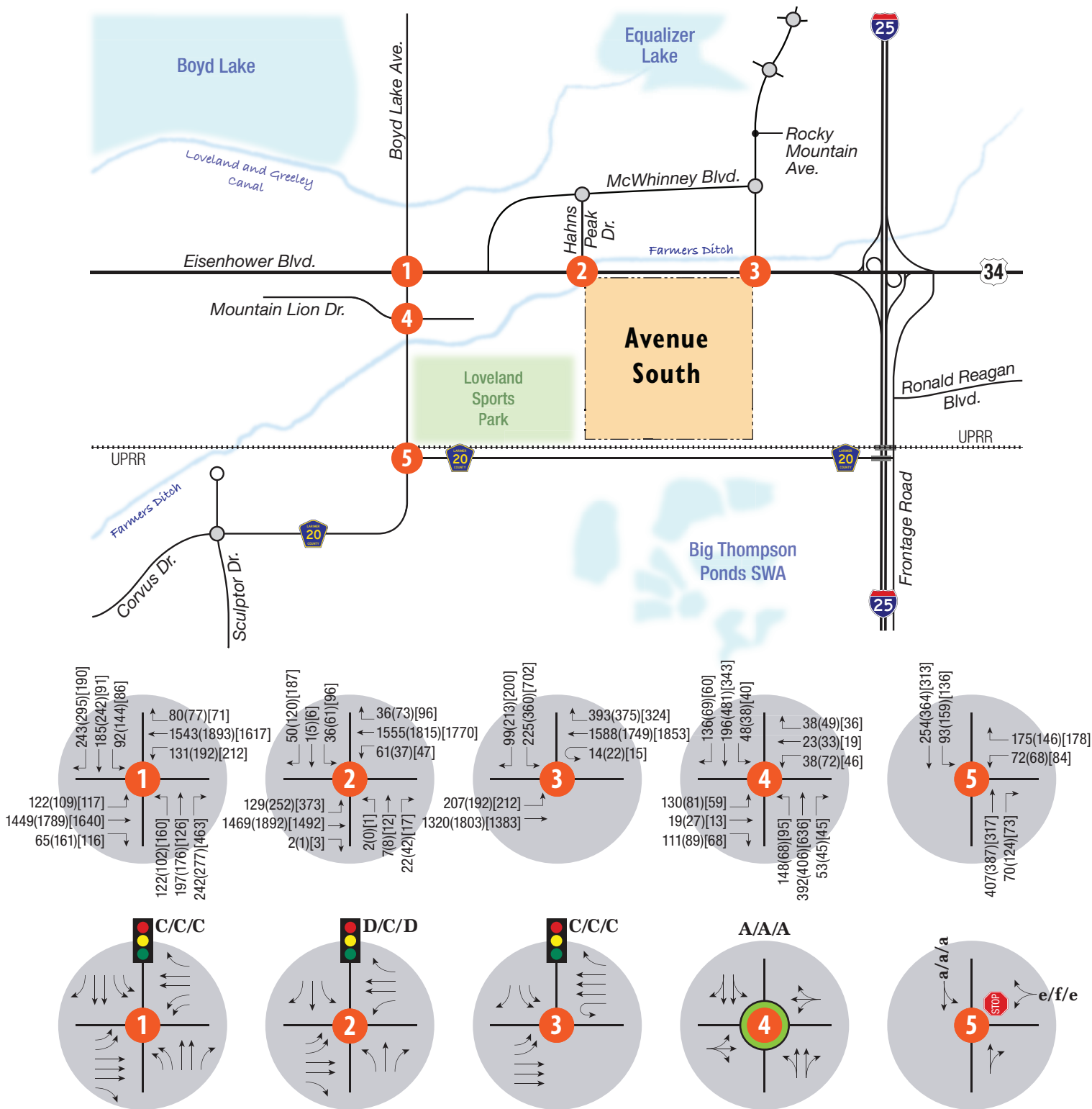
Currently this intersection operates at an acceptable LOS C during all three peak hours given its current lane geometry. Dual left turn lanes are provided along all four approaches, and three through lanes are provided in the eastbound direction, two in the westbound direction. North-south traffic is accommodated via two lanes in each direction.

Boyd Lake Avenue/Mountain Lion Drive

This intersection is controlled via a two-lane roundabout, and its operation during peak hours is currently LOS A.

Boyd Lake Avenue/ LCR 20E

This unsignalized intersection currently experiences delay as a side-street stop-controlled intersection. The westbound approach functions at either a LOS E or an LOS F during the peak hours. This intersection is located in very close proximity to the GWRR crossing of Boyd Lake Avenue.



LEGEND

xxx(xxx) = AM(PM)[SAT] Peak Hour Traffic Volumes
 X/X = AM/PM Peak Hour Signalized Intersection Level of Service
 x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service

STOP = Stop Sign
 = Traffic Signal
 = Roundabout
 = Study Intersection

III. PROPOSED PROJECT

III.A. Site Access

At completion, the proposed development would be served by vehicular accesses onto US 34, Rocky Mountain Avenue, and Hahns Peak Drive. Mountain Lion Drive will also serve the site by passing through the development. Its alignment will shift south as it passes through Avenue South (as compared to its alignment west of the site). Rocky Mountain Avenue and Hahns Peak Drive are signalized with US 34, and these signalized intersections will also serve the neighboring future developments. A connection to LCR 20E is also ultimately planned via Rocky Mountain Avenue, which is incorporated into this study as a long-term planning horizon network connection, but it is not assumed to be in place in the short-term planning horizon of 2029.

III.B. Land Use

The proposed development would include a mix of land uses. The trip generation section that follows illustrates the proposed land uses by Traffic Analysis Zone (TAZ) within the site, as shown on **Figure 4**. For purposes of this report, it was assumed that Phase I of the project would include TAZs 3, 4, 7, and 8, which would be completed by 2029. The remainder of the development would be built out by 2045.

III.C. Trip Generation

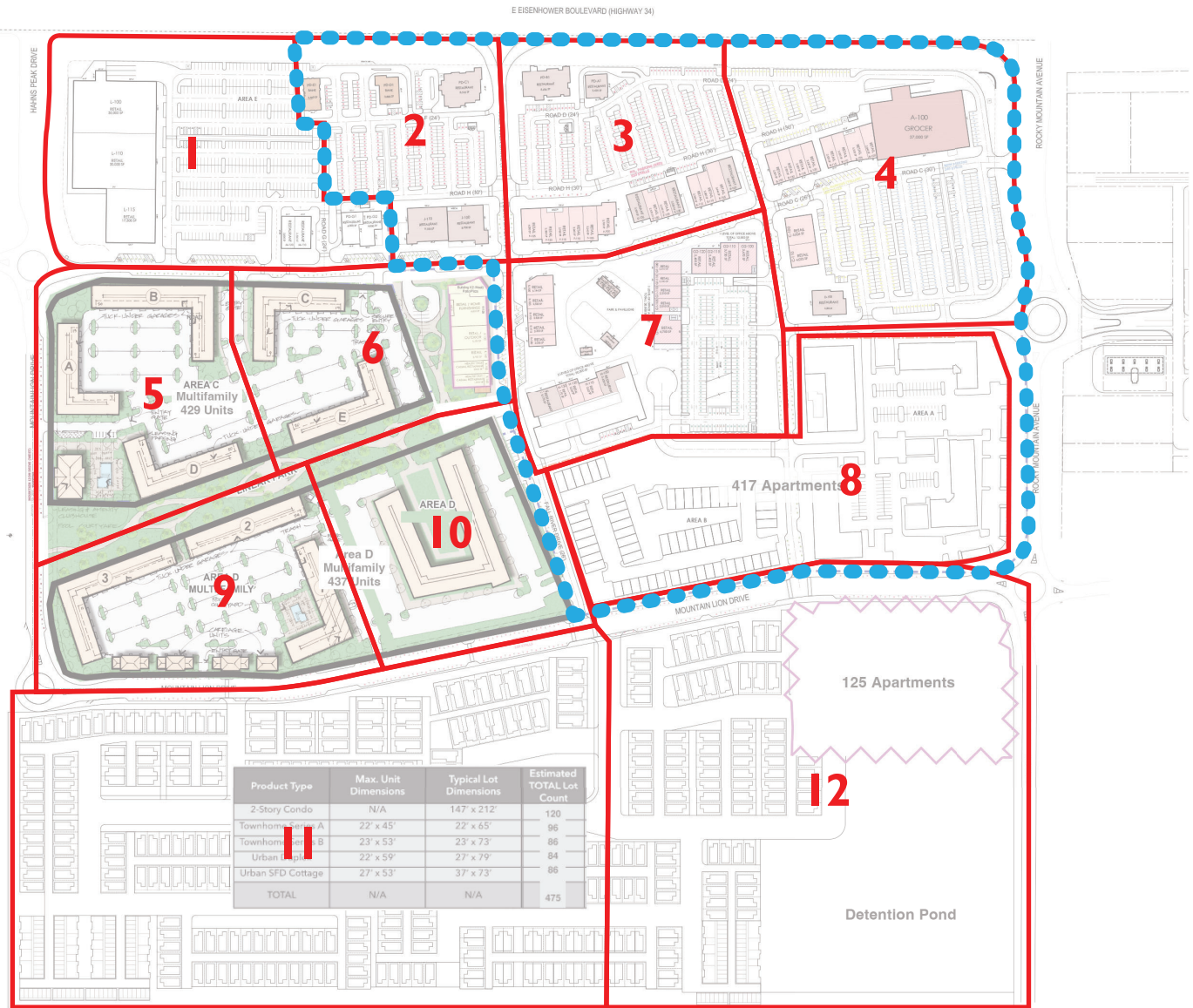
Trip generation rates and equations used in this study for the specific planned land uses are documented in *Trip Generation Manual, 11th Edition* (2021), by the Institute of Transportation Engineers (ITE). Being a mixed-use development, there will be trips between producing and attracting land uses that will not be external to the site. Many of these trips will not even be made via automobile given the close nature of residential and commercial uses. Using procedures outlined in NCHRP 684, trips remaining internal to Avenue South were estimated. This procedure considers the mix of uses and calculates the internal trip activity based on the nature of land uses. **Appendix C** shows the process, and the net effect from applying this procedure yielded an approximate 20 percent reduction in the total trip generation as remaining internal to Avenue South.

Beyond internal trip-making, pass-by traffic associated with retail uses is expected. Pass-by traffic is already traveling adjacent roads and visits the site's retail as a matter of convenience. ITE data provide information for pass-by traffic based on specific uses and each use's size; smaller centers typically experience higher pass-by percentage rates. For this study, unique pass-by percentages were applied to each use that is subject to pass-by traffic activity. The percentages were varied based on ITE data for each use and for each peak hour of analysis. **Table I** shows the pass-by percentages used in this study.

Table I. Avenue South Pass-by Percentages

Land Use	AM Peak Hour	PM Peak Hour	Saturday Peak Hour
Grocery	0	24	19
Bank	29	35	38
Fast Food	50	55	55
High Turnover Sit-down Restaurant	0	43	43
Retail	0	29	29

These pass-by trips will not be eliminated, rather they will be reflected in the analysis as a diversion of background traffic from/to US 34 into/out of the site.



LEGEND

-  = TAZ (Traffic Analysis Zone) Boundary
-  = Short-Term Boundary

Table 2 shows the overall trip generation estimates of the development. At build-out, the site is anticipated to generate approximately 32,400 external new vehicles per day (vpd), with 2,182 during the AM peak hour, 2,051 during the PM peak hour, and 1,956 trips during the Saturday peak hour. Phase I development (TAZs 3, 4, 7, and 8) is anticipated to generate 10,885 external new trips per day, with 808 during the AM peak hour, 666 during the PM peak hour, and 653 new external trips during the Saturday peak hour. Pass-by trips at buildout are estimated to be approximately 3,450 trips per day, 93 during the AM peak hour, 369 during the PM peak hour, and 456 during the Saturday peak hour.

Table 2. Avenue South Trip Generation Estimates

TAZ	Land Use	ITE Code	Unit	Quantity	Daily	AM Peak			PM Peak			Sat Mid-day		
						In	Out	Total	In	Out	Total	In	Out	Total
1	Shopping Center	820	KSF	77.5	2868	40	25	65	126	137	264	177	164	341
	Internal Trips				-981	-9	-9	-18	-79	-98	-178	-107	-115	-222
	Pass-by Trips				-547	0	0	0	-12	-12	-25	-17	-17	-34
	High-Turnover Restaurant	932	KSF	14.3	1533	75	62	137	79	50	129	82	78	160
	Internal Trips				-496	-21	-8	-29	-35	-35	-70	-40	-55	-94
	Pass-by Trips				-176	0	0	0	-13	-13	-26	-14	-14	-28
	Net New External Trips				2201	85	69	154	66	29	95	81	41	122
2	High-Turnover Restaurant	932	KSF	26.31	2820	138	113	252	145	93	238	150	144	294
	Internal Trips				-912	-39	-14	-53	-65	-64	-129	-73	-101	-173
	Pass-by Trips				-324	0	0	0	-23	-23	-47	-26	-26	-52
	Drive In Bank	912	KSF	7.3	702	40	30	70	74	73	147	94	90	184
	Internal Trips				0	0	0	0	0	0	0	0	0	0
	Pass-by Trips				-217	-10	-10	-20	-26	-26	-51	-35	-35	-70
	Net New External Trips				2070	129	119	248	105	52	158	110	73	183

TAZ	Land Use	ITE Code	Unit	Quantity	Daily	AM Peak			PM Peak			Sat Mid-day		
						In	Out	Total	In	Out	Total	In	Out	Total
3	Shopping Center	820	KSF	33.48	1239	17	11	28	55	59	114	77	71	147
	Internal Trips				-424	-4	-4	-8	-34	-42	-77	-46	-50	-96
	Pass-by Trips				-236	0	0	0	-5	-5	-11	-7	-7	-15
	High-Turnover Restaurant	932	KSF	17.366	1862	91	75	166	96	61	157	99	95	194
	Internal Trips				-602	-26	-10	-35	-43	-42	-85	-48	-66	-114
	Pass-by Trips				-214	0	0	0	-15	-15	-31	-17	-17	-34
	Fast Food With Drive Through	934	KSF	3.425	1601	78	75	153	59	54	113	97	93	189
	Internal Trips				-119	-5	-2	-7	-8	-8	-17	-9	-13	-23
	Pass-by Trips				-252	-36	-36	-73	-26	-26	-53	-46	-46	-92
	Net New External Trips				2855	115	108	224	77	34	111	98	59	157
4	Shopping Center	820	KSF	29.83	1104	16	10	25	49	53	101	68	63	131
	Internal Trips				-377	-4	-4	-7	-31	-38	-68	-41	-44	-86
	Pass-by Trips				-211	0	0	0	-5	-5	-10	-7	-7	-13
	High-Turnover Restaurant	932	KSF	17.366	1862	91	75	166	96	61	157	99	95	194
	Internal Trips				-602	-26	-10	-35	-43	-42	-85	-48	-66	-114
	Pass-by Trips				-214	0	0	0	-15	-15	-31	-17	-17	-34
	Grocery	850	KSF	37	3472	62	44	106	166	165	331	187	187	374
	Internal Trips				-468	-4	-4	-9	-38	-47	-85	-51	-55	-106
	Pass-by Trips				-721	0	0	0	-30	-30	-59	-25	-25	-51
	Net New External Trips				3844	135	111	246	150	102	252	165	130	295

TAZ	Land Use	ITE Code	Unit	Quantity	Daily	AM Peak			PM Peak			Sat Mid-day		
						In	Out	Total	In	Out	Total	In	Out	Total
5	Multi-Family Housing (Low-Rise)	220	Dwelling Units	945.5555556	6136	76	240	316	269	158	427	194	194	388
	Internal Trips				-642	-6	-33	-39	-53	-37	-90	-69	-43	-112
	Pass-by Trips				0	0	0	0	0	0	0	0	0	0
	Net New External Trips				5495	70	207	277	216	121	338	125	151	276
6	Multi-Family Housing (Low-Rise)	220	Dwelling Units	472.7777778	3106	41	129	169	141	83	224	97	97	194
	Internal Trips				-321	-3	-16	-19	-26	-18	-45	-34	-21	-56
	Pass-by Trips				0	0	0	0	0	0	0	0	0	0
	Net New External Trips				2785	38	112	150	115	64	179	63	75	138
7	Shopping Center	820	KSF	32	1184	17	10	27	52	57	109	73	68	141
	Internal Trips				-405	-4	-4	-8	-33	-41	-73	-44	-48	-92
	Pass-by Trips				-226	0	0	0	-5	-5	-10	-7	-7	-14
	High-Turnover Restaurant	932	KSF	8.8	943	46	38	84	49	31	80	50	48	98
	Internal Trips				-305	-13	-5	-18	-22	-22	-43	-24	-34	-58
	Pass-by Trips				-109	0	0	0	-8	-8	-16	-9	-9	-17
	Office	710	KSF	110	1192	147	20	167	27	131	158	31	27	58
	Internal Trips				-555	-31	-19	-50	-27	-34	-61	-30	-7	-37
	Pass-by Trips				0	0	0	0	0	0	0	0	0	0
	Net New External Trips				1721	162	41	203	33	110	143	41	39	79

TAZ	Land Use	ITE Code	Unit	Quantity	Daily	AM Peak			PM Peak			Sat Mid-day		
						In	Out	Total	In	Out	Total	In	Out	Total
8	Multi-Family Housing (Low-Rise)	220	Dwelling Units	417	2748	37	116	152	126	74	200	85	85	171
	Internal Trips				-283	-3	-14	-17	-23	-16	-40	-30	-19	-49
	Pass-by Trips				0	0	0	0	0	0	0	0	0	0
	Net New External Trips				2465	34	101	135	103	58	160	55	67	122
9	Multi-Family Housing (Low-Rise)	220	Dwelling Units	767.6666667	4996	63	198	261	221	130	351	157	157	315
	Internal Trips				-521	-5	-27	-31	-43	-30	-73	-56	-35	-91
	Pass-by Trips				0	0	0	0	0	0	0	0	0	0
	Net New External Trips				4475	58	172	229	178	100	278	102	122	224
10	Senior Adult Housing – Multifamily	252	Dwelling Units	164	499	11	21	32	23	18	41	28	23	52
	Internal Trips				-111	-1	-6	-7	-9	-6	-16	-12	-7	-19
	Pass-by Trips				0	0	0	0	0	0	0	0	0	0
	Net New External Trips				387	10	15	25	14	12	26	16	16	33
11	Single-Family Attached Housing	215	Dwelling Units	195	1435	24	72	96	67	46	113	55	60	115
	Single-Family Detached Housing	210	Dwelling Units	43	464	9	26	35	28	17	45	25	21	47
	Internal Trips				-162	-1	-8	-10	-13	-9	-23	-17	-11	-28
	Pass-by Trips				0	0	0	0	0	0	0	0	0	0
	Net New External Trips				1738	31	89	121	82	54	135	63	71	134

TAZ	Land Use	ITE Code	Unit	Quantity	Daily	AM Peak			PM Peak			Sat Mid-day		
						In	Out	Total	In	Out	Total	In	Out	Total
12	Single-Family Attached Housing	215	Dwelling Units	194	1428	24	71	95	66	46	112	55	60	115
	Single-Family Detached Housing	210	Dwelling Units	43	464	9	26	35	28	17	45	25	21	47
	Multi-Family Housing (Low-Rise)	220	Dwelling Units	125	877	15	47	62	47	27	74	26	26	51
	Internal Trips				-384	-2	-20	-22	-32	-22	-55	-5	-13	-19
	Pass-by Trips				0	0	0	0	0	0	0	0	0	0
	Net New External Trips				2385	45	125	169	109	68	177	101	94	194
Total					43660	1151	1485	2637	2042	1615	3657	2007	1942	3951
	Internal Trips				-8668	-207	-216	-423	-657	-653	-1310	-786	-804	-1590
	Pass-by Trips				-3448	-47	-47	-93	-185	-185	-369	-228	-228	-456
	Net New External Trips				32421	912	1270	2182	1247	804	2051	1018	936	1956

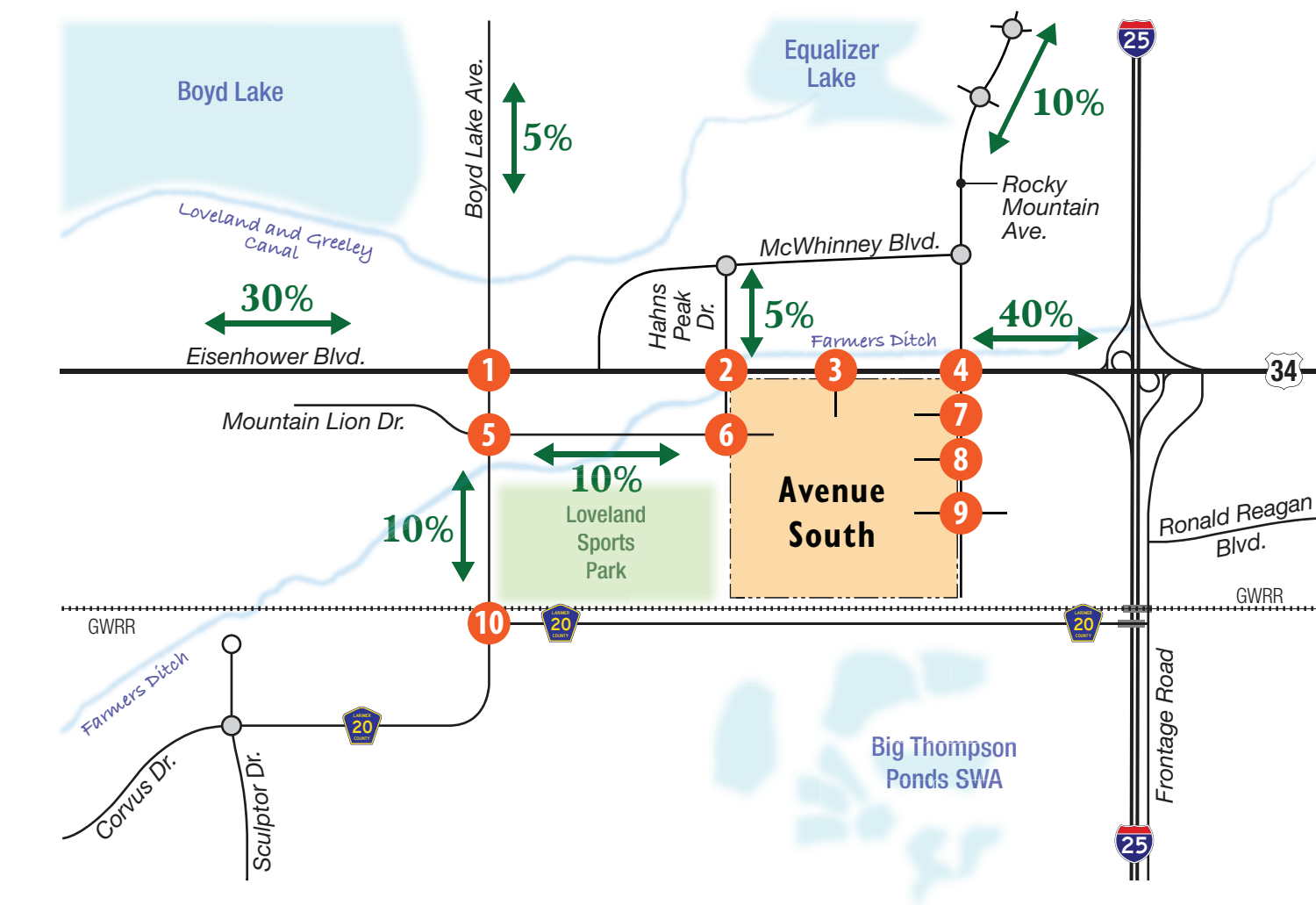
III.D. Trip Distribution and Traffic Assignment

The directional distribution of site trips was estimated by reviewing intersection traffic counts, existing traffic patterns in the area, the development's location relative to the major surrounding roadways, 2045 North Front Range (NFR) travel demand model trends, consultation with the project development team, and engineering judgment. The trip distribution percentages varied depending on planning horizon. The short-term planning horizon does not include the Rocky Mountain roadway connection to LCR 20E, whereas the long-term does and therefore offers an additional means of routing trips.

Figure 5 and **Figure 6** show the trip distribution percentages and resulting traffic assignments for the short-term and long-term timeframes, respectively. US 34 is expected to serve the lion's share of Avenue South traffic. Boyd Lake Avenue and Rocky Mountain Avenue (north of US 34) will each see a modest amount of site traffic, as well as the connections to the south, namely Rocky Mountain Avenue to LCR 20E and Boyd Lake Avenue (in the long-term planning horizon).

The connection to LCR 20E will afford Avenue South an alternate means of crossing I-25, as well as traveling to/from the south via Boyd Lake Avenue. More specifically, 15 percent of the Avenue South traffic would instead use LCR 20E, which would otherwise make use of US 34 to/from the east. With respect to the distribution assigned to/from the west, the LCR 20E connection would serve 7 percent of Avenue South traffic that would otherwise use US 34 to/from the west or Mountain Lion Drive.

From **Figure 5**, Phase I of the development is estimated to add 290 to 410 vehicles per hour onto US 34 adjacent to the site (just east of Hahns Peak Drive) during the peak hours. At buildout, this will increase to 520 to 610 vehicles per hour per **Figure 6**.



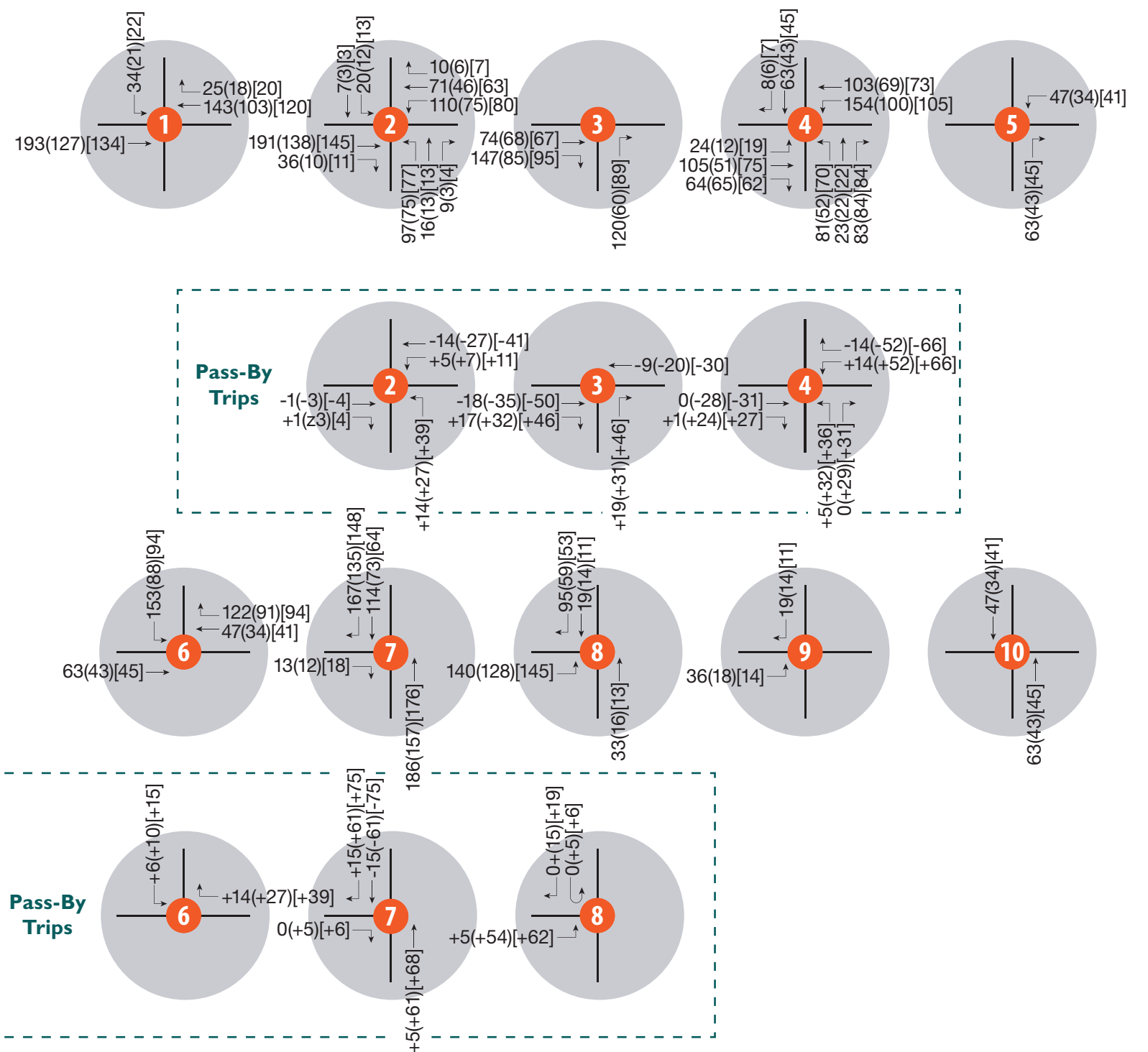
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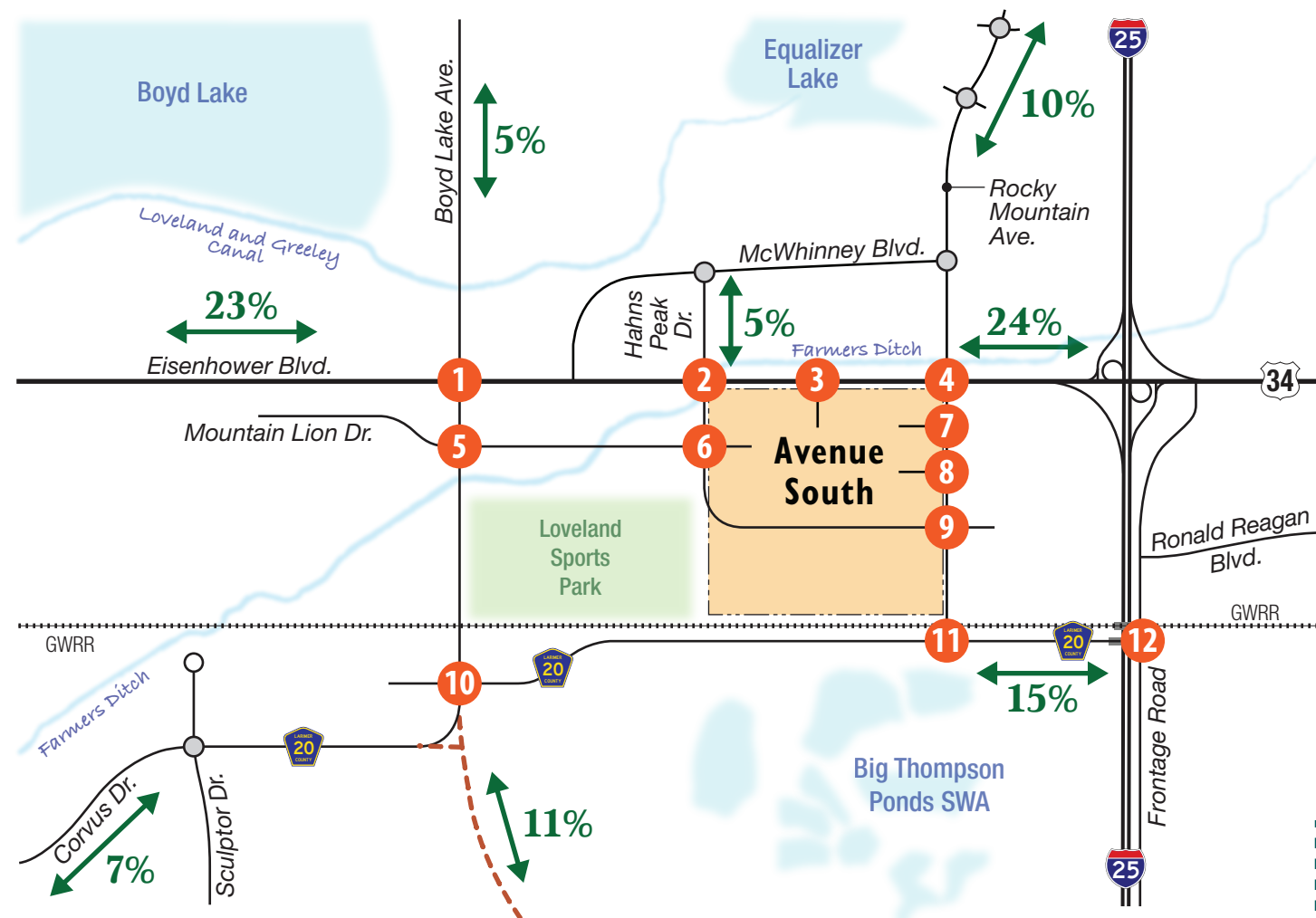
XXX(XXX)[XXX] = AM(PM)[SAT] Peak Hour Traffic Volumes

$\overleftrightarrow{XX\%}$ = Site Trip Distribution

X = Study Intersection

Short-Term Site Generated Traffic Pass-By Trips





- LEGEND**
- XXX(XXX)[XXX] = AM(PM)[SAT] Peak Hour Traffic Volumes
 - XX% = Site Trip Distribution
 - - - = Future Roadway
 - X = Study Intersection

NOTE: Drawing Not to Scale

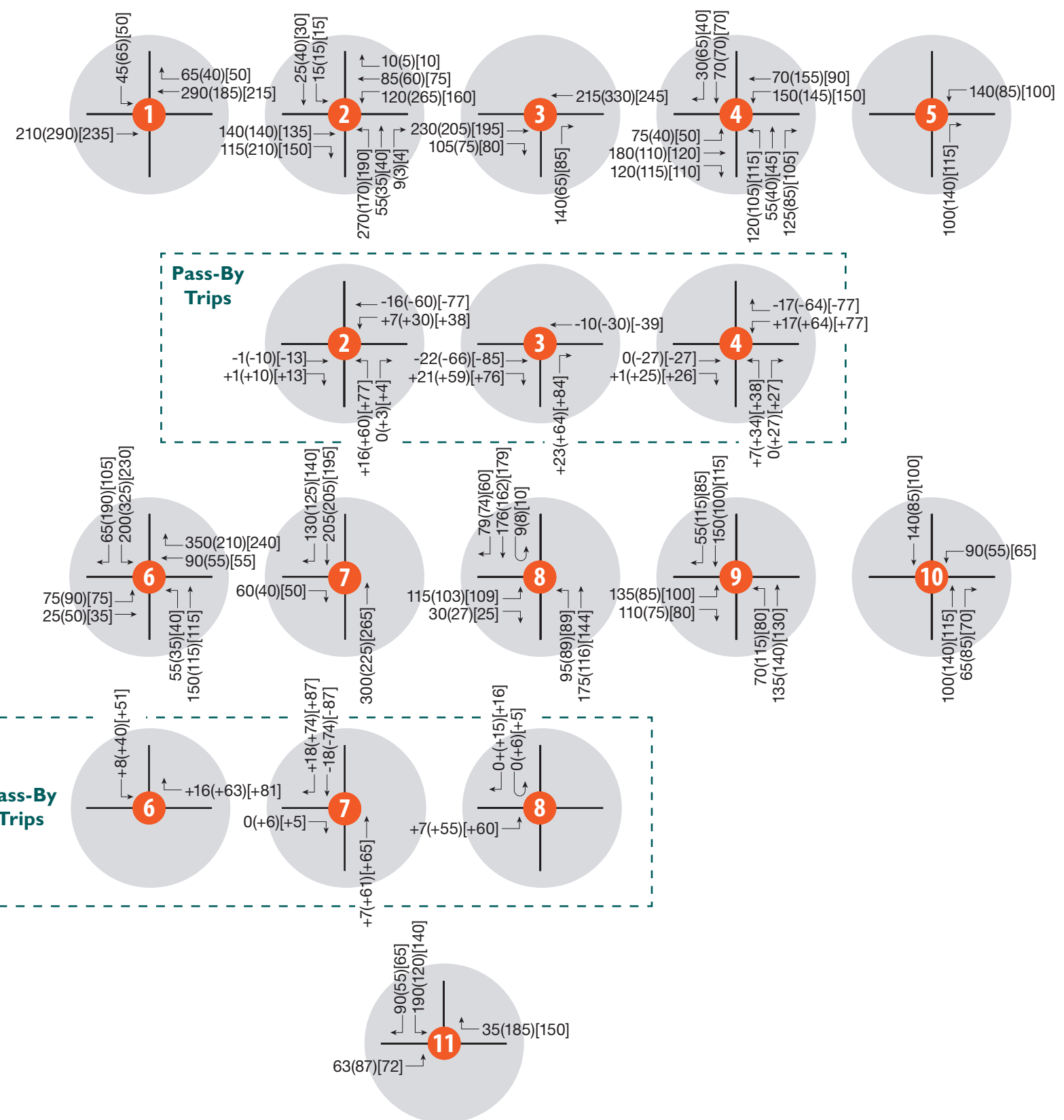


FIGURE 6
2045 Trip Distribution and Site Generated Traffic Volumes
with LCR 20E Connection

Centerra Avenue South DEC_24 UPDATE 124281-01 12/20/24

IV. BACKGROUND (WITHOUT SITE) TRAFFIC CONDITIONS

IV.A. *Future Roadway Network*

The City of Loveland recently updated their long-term transportation plan, referred to as Connect Loveland. The long-term roadway network reflects the following:

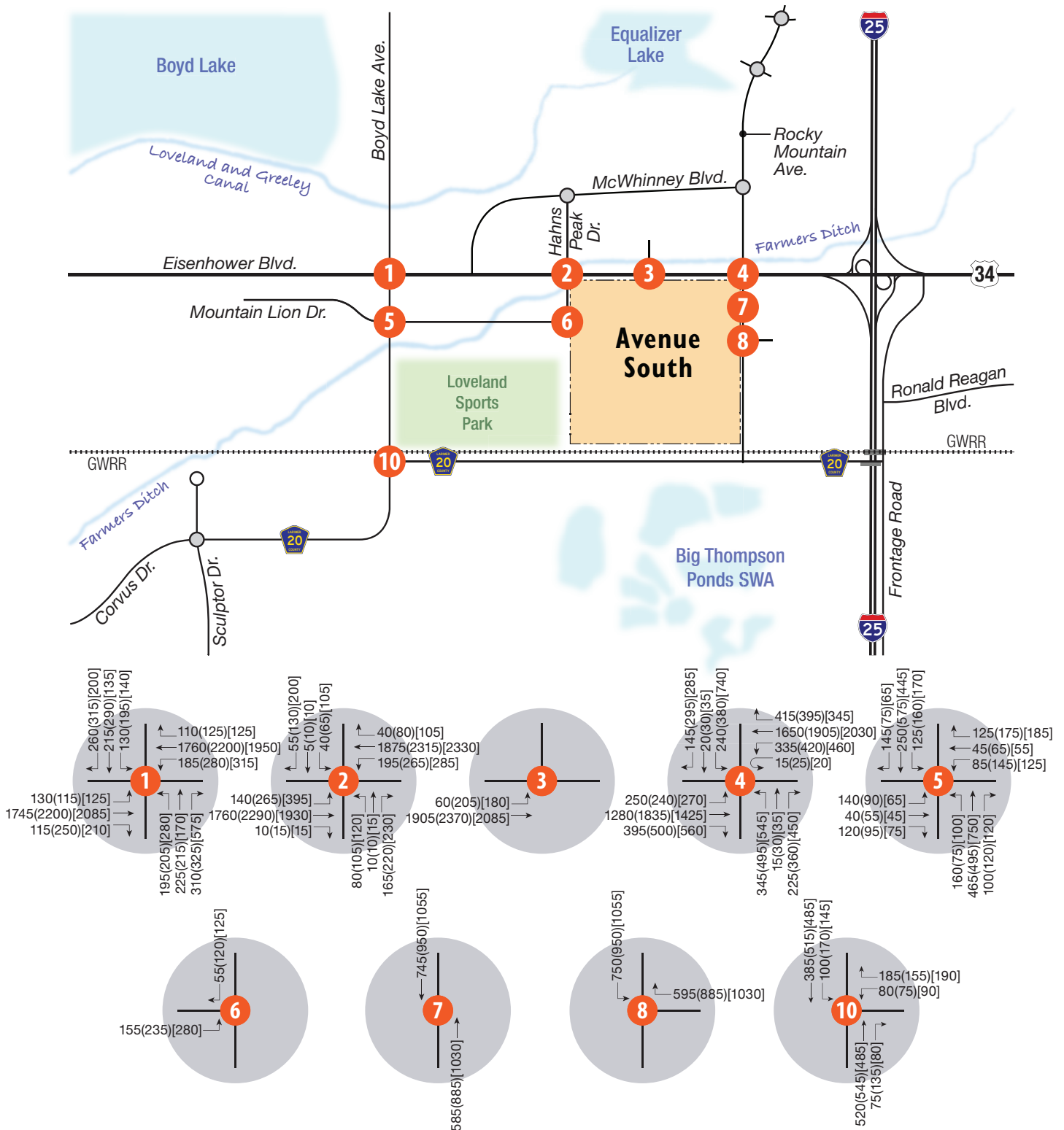
- **US 34 as a six-lane major arterial.** Today, US 34 provides four to six through-lanes of traffic (varies on location and by direction). Widening to six lanes through the Rocky Mountain Avenue intersection is a recent improvement adjacent to the site, and a full-six lane section along Avenue South's frontage is part of the future plans.
- **Rocky Mountain Avenue is a four-lane major arterial north of US 34.** An extension of Rocky Mountain Avenue south of US 34 is shown in Loveland's long-range plans, and maintaining a four-lane section south to LCR 20E is assumed based on other area studies, including a recent Millennium Amendment transportation study.
- **Boyd Lake Avenue as a four-lane arterial.** A future extension of Boyd Lake Avenue south to SH 402 is expected by the 2045 horizon. This extension will attract traffic volume given its improved connectivity. The Connect Loveland plan shows this improvement being completed in a 10-plus year timeframe, so this is not likely to be completed in the near term.
- **Hahns Peak Drive as a two-lane minor arterial.** This roadway south of US 34 was recently completed in which two through lanes are provided north-south across US 34 are provided. However, turn lanes were also built. This study will assess whether the recent construction is still appropriate in light of the Avenue south development plan.
- **Mountain Lion Drive as a two-lane minor arterial.** A center turn lane exists along much of its length. An extension east to Rocky Mountain Avenue is planned through the Avenue South master plan in which its alignment would be shifted south. The recent Millennium GDP Amendments study identifies this road to be two-lane minor arterial road.
- **LCR 20E will continue to be a two-lane minor arterial.** Its intersection with Boyd Lake Avenue is ultimately expected to be shifted south, between 5th Street and the current LCR 20E location to relocate it away from the rail crossing. This new intersection is planned to be controlled via a roundabout by 2045 in conjunction with the Stuart development plan on the west side of Boyd Lake Avenue (exact nature to be determined). Traffic projections shown in the recent Millennium Amendment Transportation Impact Study suggests a four-lane section will be appropriate east of the Rocky Mountain Avenue connection and that a two-lane section would be appropriate to the west.

IV.B. Short-Term (2029) Background Traffic Forecasts

Background traffic volumes represent the component of roadway volumes unrelated to the proposed development. The existing traffic volumes shown on Figure 3 and the Year 2045 NFR Travel Demand Model were used as a starting point toward developing background traffic forecasts.

Figure 7 depicts the projected short-term (Year 2029) background traffic volumes at the study area intersections. These projections were developed by applying a 1.0 percent annual growth factor to the existing counts. In addition, traffic estimated from the Chilson-Stroh residential and commercial sites west of Avenue South has been added atop. The Chilson-Stroh development will make use primarily of Mountain Lion Drive and Hahns Peak Drive for access to Boyd Lake Avenue and US 34, respectively. Portions of this development will also be served directly by US 34 via RI/RO access. The Chilson-Stroh residential and commercial development is ahead of Avenue South in obtaining approvals, so it is assumed that it will be completed by 2029. The traffic impact studies prepared for the Chilson-Stroh development helped inform the short-term background traffic of this study.

The Schmer Farm traffic impact study has also informed background traffic for this study. In addition to the 1.0 percent annual growth cited previously and the addition of the Chilson-Stroh traffic, Schmer Farm development traffic was also incorporated into the 2029 background traffic for Avenue South. Schmer Farm is a proposed commercial development located immediately east of Avenue South across Rocky Mountain Avenue. When built out, it is anticipated to generate approximately 14,000 external new trips during a weekday and 20,400 trips during a Saturday. Rocky Mountain Avenue will be its only access for purposes of this study (no access onto US 34 was assumed for Schmer Farm), serving the new trips as well as Schmer Farm's pass-by trips. A preliminary TIS prepared for the Schmer Farm partially informed the Avenue South's background traffic volumes.



LEGEND

xxx(xxx)[xxx] = AM(PM)[SAT] Peak Hour Traffic Volumes

X = Study Intersection

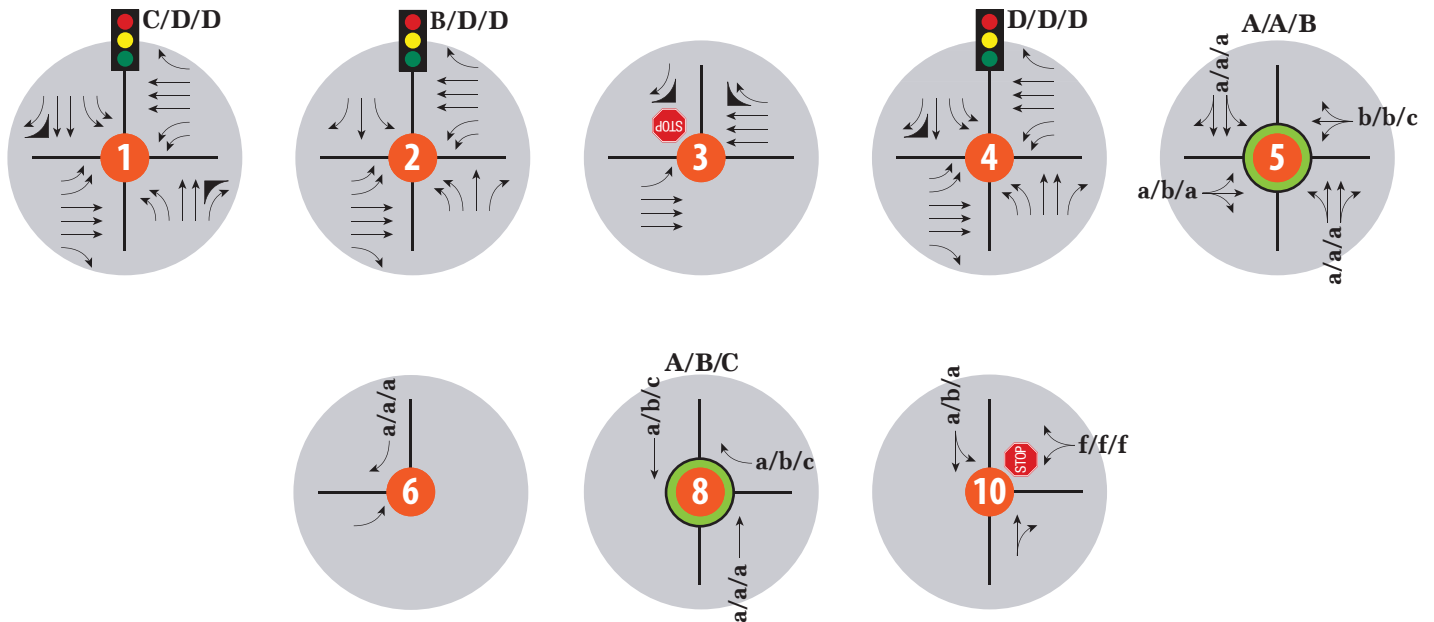
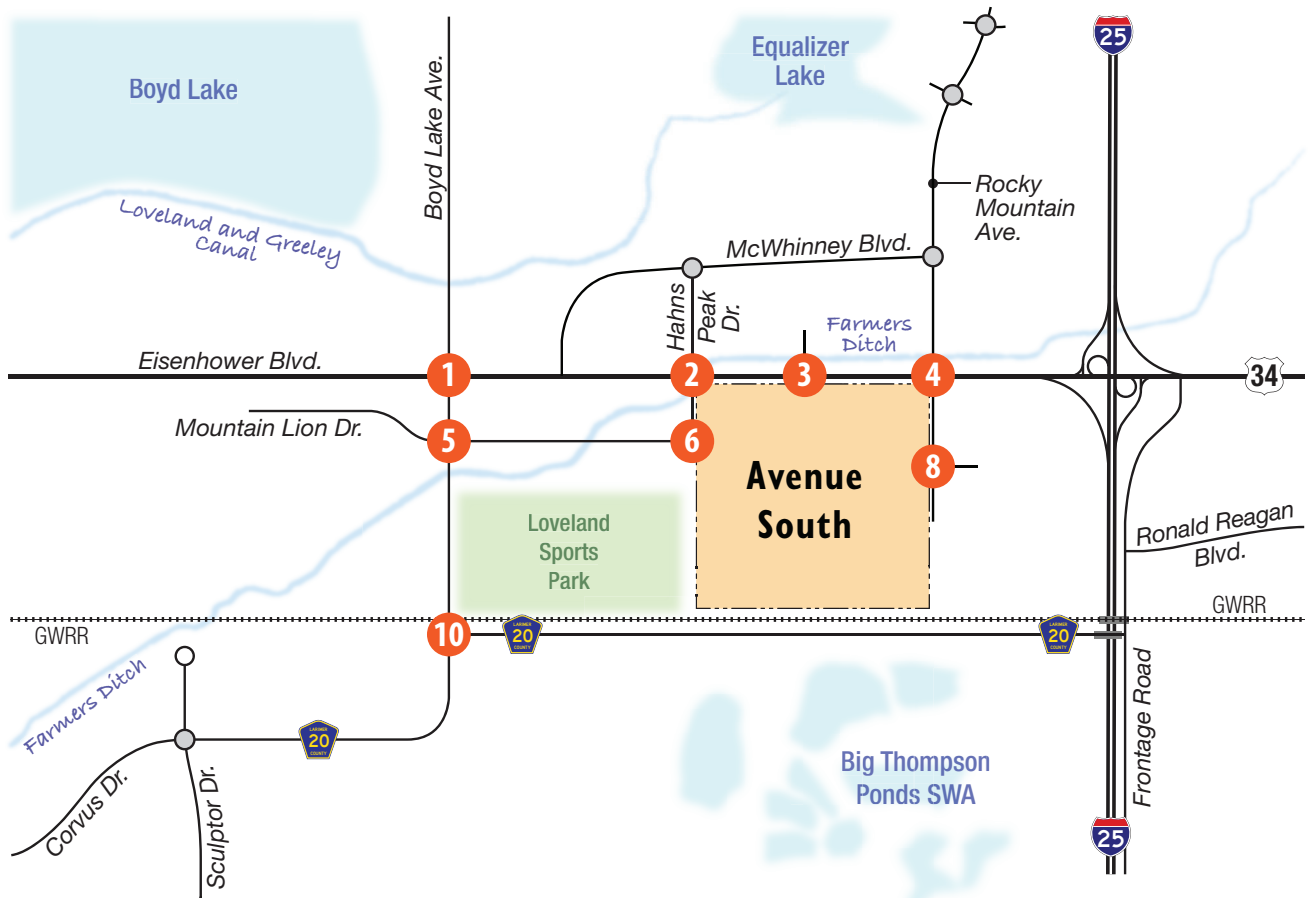
IV.C. Short-Term (2029) Background Traffic Operations

Traffic analysis procedures discussed previously were applied to the background volumes for the short-term planning horizon. Signal timings were optimized for all signalized intersections. **Figure 8** illustrates the short-term future background intersection geometry, traffic control, and capacity analyses. **Appendix D** contains the 2029 background LOS worksheets. A six-lane US 34 has been incorporated into the LOS calculations in light of recent construction and planned improvements. Cycle lengths entered into the analyses were based on the software's optimizing determination.

Most intersections are projected to function acceptably (LOS D or better). A few observations include the following:

- **US 34/Rocky Mountain Avenue.** Establishing six-through lanes along US 34 is beneficial to the functionality of this intersection relative to an overall LOS. The southbound left turn movement is heavy during the PM peak hour, and this movement regularly queues (sometimes back to the Foxtrail Drive roundabout), which is anticipated to occur in the 2029 timeframe. Dual left westbound turn lanes should be provided for the 2029 time period as should dual northbound left turn lanes. Two northbound through lanes should also be provided as well as a northbound free-flow right turn. The southbound striped-out lane should be converted to a single southbound through lane.
- **US 34/ Hahns Peak Drive.** The Chilson-Stroh development recently constructed a fourth leg (south leg) to this intersection. With US 34 being six lanes, this intersection will function at LOS D overall. *(Figure 8 depicts dual northbound lefts, but the analysis only incorporated a single northbound left turn lane; this will be corrected in the next version of the report)*
- **US 34/Boyd Lake Avenue.** This intersection is projected to operate at LOS D in 2029 given background traffic and the existing intersection lane geometry.

The Boyd Lake Avenue/Mountain Lion Drive roundabout intersection is projected to continue to function well at LOS D or better given 2029 background traffic. The Boyd Lake Avenue/LCR 20E intersection, being side-street stop controlled, will experience long delays for drivers along the westbound approach, not unlike the LOS's calculated under existing conditions. This intersection's westbound approach will continue to experience challenges under its current configuration.



LEGEND

X/X/X = AM/PM/SAT Peak Hour Signalized Intersection Level of Service
 x/x/x = AM/PM/SAT Peak Hour Unsignalized Intersection Level of Service

STOP = Stop Sign
 Traffic Signal = Traffic Signal
 Roundabout = Roundabout
 X = Study Intersection

IV.D. Long-Term Future (Year 2045) Background Traffic Forecasts

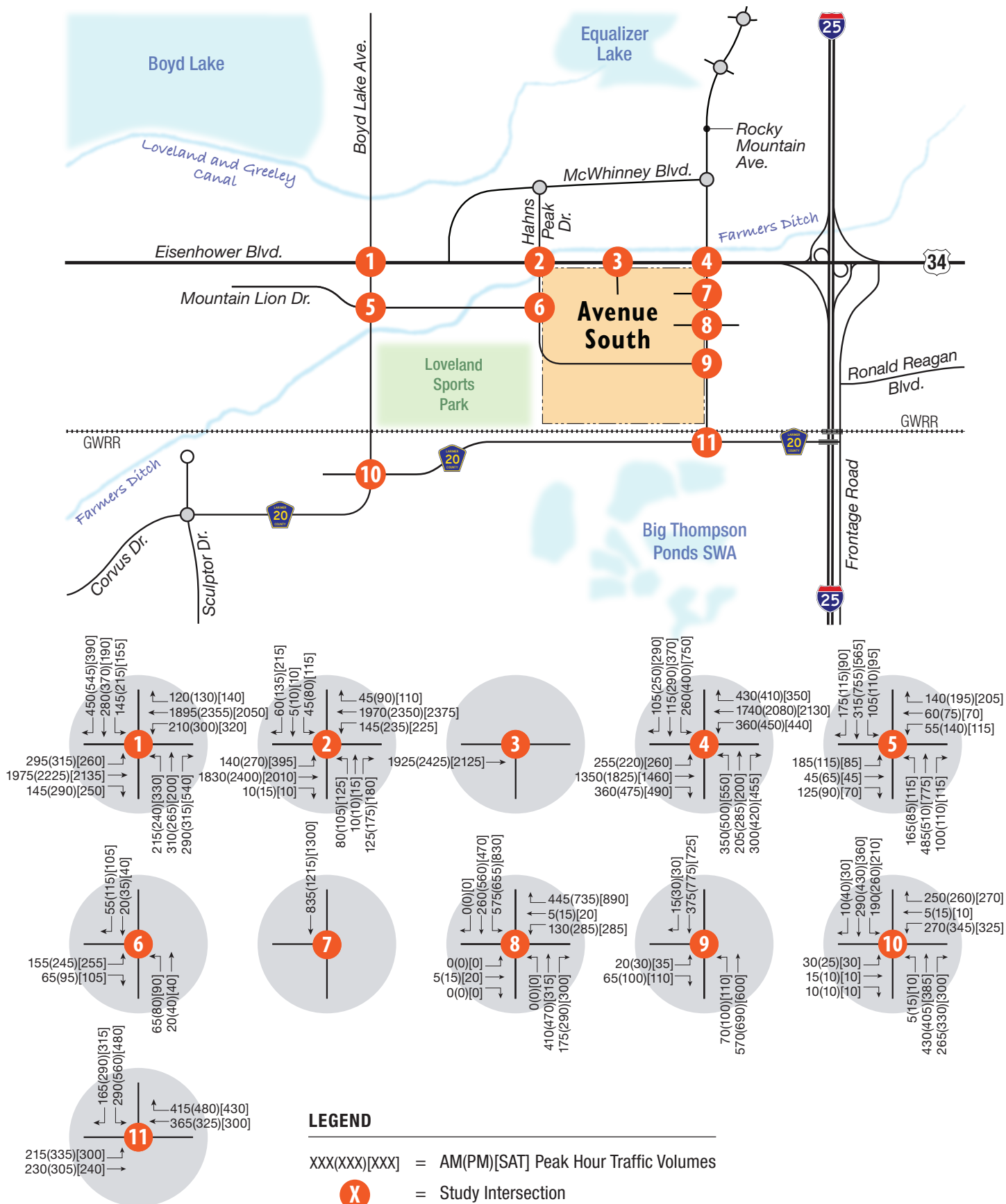
As mentioned previously, the long-term (Year 2045) planning horizon incorporates an extension of Rocky Mountain Avenue south to LCR 20E. **Figure 9** depicts the projected long-term (Year 2045) background traffic conditions at the study intersections with the addition of this connection. These projections advanced the short-term, background traffic projections by continuing with the 1.0 percent annual increase and maintaining traffic generated by the Schmer Farm development and Chilson-Stroh (as was done for the short-term planning horizon). Adjustments and shifts have been estimated to account for the Rocky Mountain Avenue connection to LCR 20E. This is not included in the NFR travel demand base model, but Felsburg Holt & Ullevig staff added the connection and used modeling results to compare against the no-connection model run results. This comparison help inform traffic shifts estimates associated with this connection. Knowing that traffic congestion will occur along US 34 near Rocky Mountain Avenue, further shifts were made to account for drivers who would divert out-of-direction to avoid the congestion

The following describes the process conducted in development long-term traffic forecasts. Each traffic shift associated with the Rocky Mountain Avenue connection to LCR 20E is described below:

- **Chilson-Stroh Traffic.** Some traffic associated with the Chilson-Stroh development is expected to leverage the connection to LCR 20E. Specifically, 13 percent of Chilson-Stroh traffic is assumed to use this connection as a means of crossing I-25. Of the estimated 13 percent, 3 percent were assumed to otherwise use Boyd Lake Avenue to LCR 20E and 10 percent were assumed to otherwise use US 34 to/from the east. This translates into less turning traffic at the US 34/ Hahns Peak Drive intersection, Boyd Lake Avenue/Mountain Lion Drive intersection, and Boyd Lake Avenue/LCR 20E intersection.
- **Schmer Farm Traffic.** Some traffic associated with Schmer Farm is expected to leverage the connection to LCR 20E. Specifically, 15 percent of Schmer is assumed to use this connection. Of the estimated 15 percent, 5 of these 15 were assumed to otherwise have used Boyd Lake Avenue to 5th Street and 10 percent were assumed to otherwise use US 34 to/from the east. This translates into less turning traffic at the US 34/Rocky Mountain Avenue intersection and the Boyd Lake Avenue/Mountain Lion Drive intersection. An increase in LCR 20E traffic at Boyd Lake Avenue is expected with this specific pattern shift.
- **Other Background Traffic.** A Rocky Mountain Avenue connection to LCR 20E will be a network adjustment, and trips destined to and originating from other areas surrounding the Chilson-Stroh/Schmer Farm/Avenue South development will make use of the connection. The NFR travel demand model was used to gauge these shifts (by comparing model runs with and without the connection) and understand other traffic shifts that would now be drawn to this connection. The following pattern shifts were discovered and incorporated into this study:
 - **US 34/Boyd Lake Avenue.** Fewer turning movements to/from the south and greater through traffic east/west.
 - **US 34/ Hahns Peak Drive.** Minor reduction to east-west through traffic.
 - **US 34/Rocky Mountain Avenue.** Fewer turning movements to/from the north leg, but this is more than offset by greater north-south through traffic, some of which is from Boyd Lake Avenue and some of which was drawn to the area from the east side of I-25. Movement between the east and south legs also decrease with this connection.
 - **Boyd Lake Avenue/LCR 20E.** Fewer turning movements to/from the north leg, and a greater amount of turning movements between the south and east legs.

Study area intersections located between the above intersections were adjusted accordingly with respect to background through traffic. These estimates resulted in approximately an additional projected 11,000 vehicles per day (which does not include Schmer Farm or Chilson-Stroh trips) that would use Rocky Mountain Avenue as an alternative cut-through route, many being oriented to/from locations north of US 34.

The above adjustments were applied in developing **Figure 9**. The pattern shifts were combined; some were additive to certain movements while others were subtractive. Rocky Mountain Avenue, south of US 34, will serve all of the Schmer Farm development traffic given the underlying assumption in this study that Schmer Farm would not be granted any other access to US 34. It is quite possible that Schmer Farm secures additional access to US 34, and this would reduce the traffic demand along Rocky Mountain Avenue. A key access point for Schmer Farm will be the planned roundabout south of US 34 where a heavy southbound left turn movement is projected, particularly during the PM peak hour, consisting entirely of inbound Schmer Farm traffic from US 34. Reflectively, a relatively heavy westbound right turn movement is projected made up of Schmer Farm traffic exiting their site and traveling north to access US 34. Both of these movements could be reduced with a RI/RO access onto US 34.



IV.E. Long-Term Future (Year 2045) Background Traffic Operations

Figure 10 illustrates the long-term future background intersection geometry, traffic control, and capacity analyses. **Appendix F** contains the background LOS worksheets. The following provides insight to each study area intersection's operation given this background traffic scenario.

US 34/Rocky Mountain Avenue

This intersection will be critical to serving north-south cut-through traffic (given Rocky Mountain Avenue's connection to LCR 20E) and to serving the Schmer Farm development. The northbound left turn movement will be significant enough to warrant dual left turn lanes (as was identified for the 2029 time frame). Also, the background traffic projections suggest that other lanes should be considered. While the projected background left turn movement for westbound left turn does not alone warrant triple lefts, they were recommended for the 2029 total traffic scenario and will be recommended for the 2045 total traffic scenario. As such, the triple lefts were included in the background traffic LOS analysis for a more direct comparison. Given these improvements, the intersection is projected to function at an overall LOS E in 2045 given the background traffic projections during the PM peak hour and the Saturday peak hour.

US 34/Hahns Peak Drive

The Chilson-Stroh development has constructed a fourth leg (south leg) to this intersection. With US 34 being six lanes, this intersection will function at LOS D during the PM peak hour given 2045 background traffic. The background conditions include a separate lane for each movement, northbound, consistent with the short-term planning horizon.

US 34/ Boyd Lake Avenue

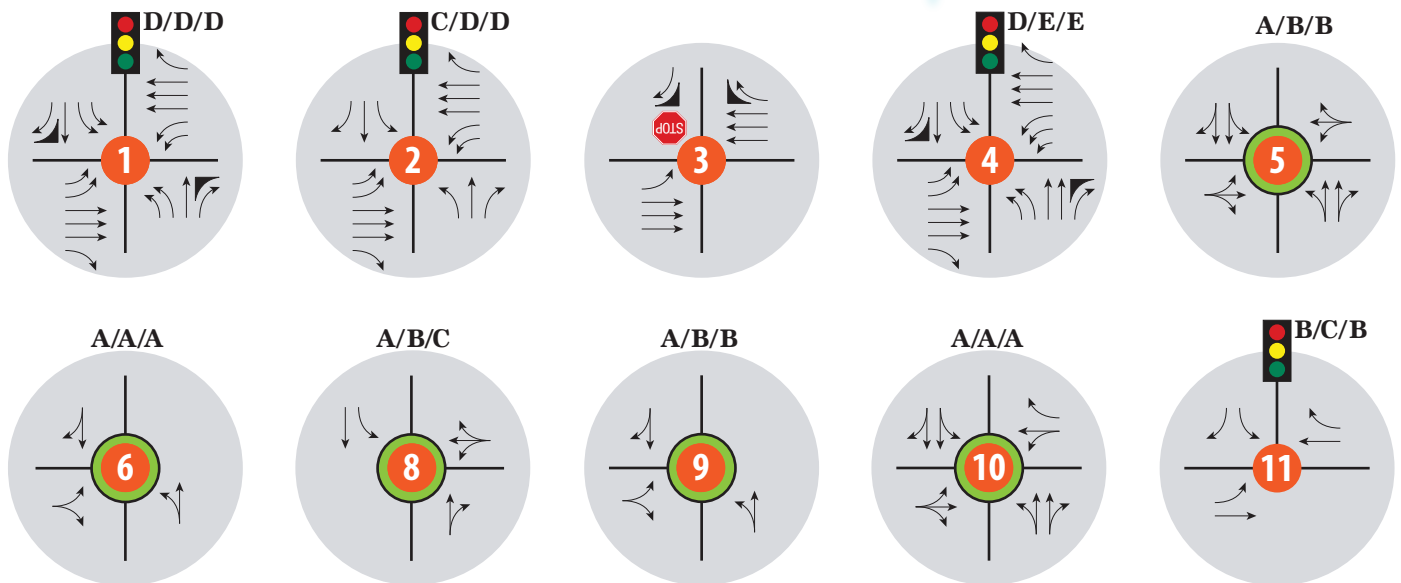
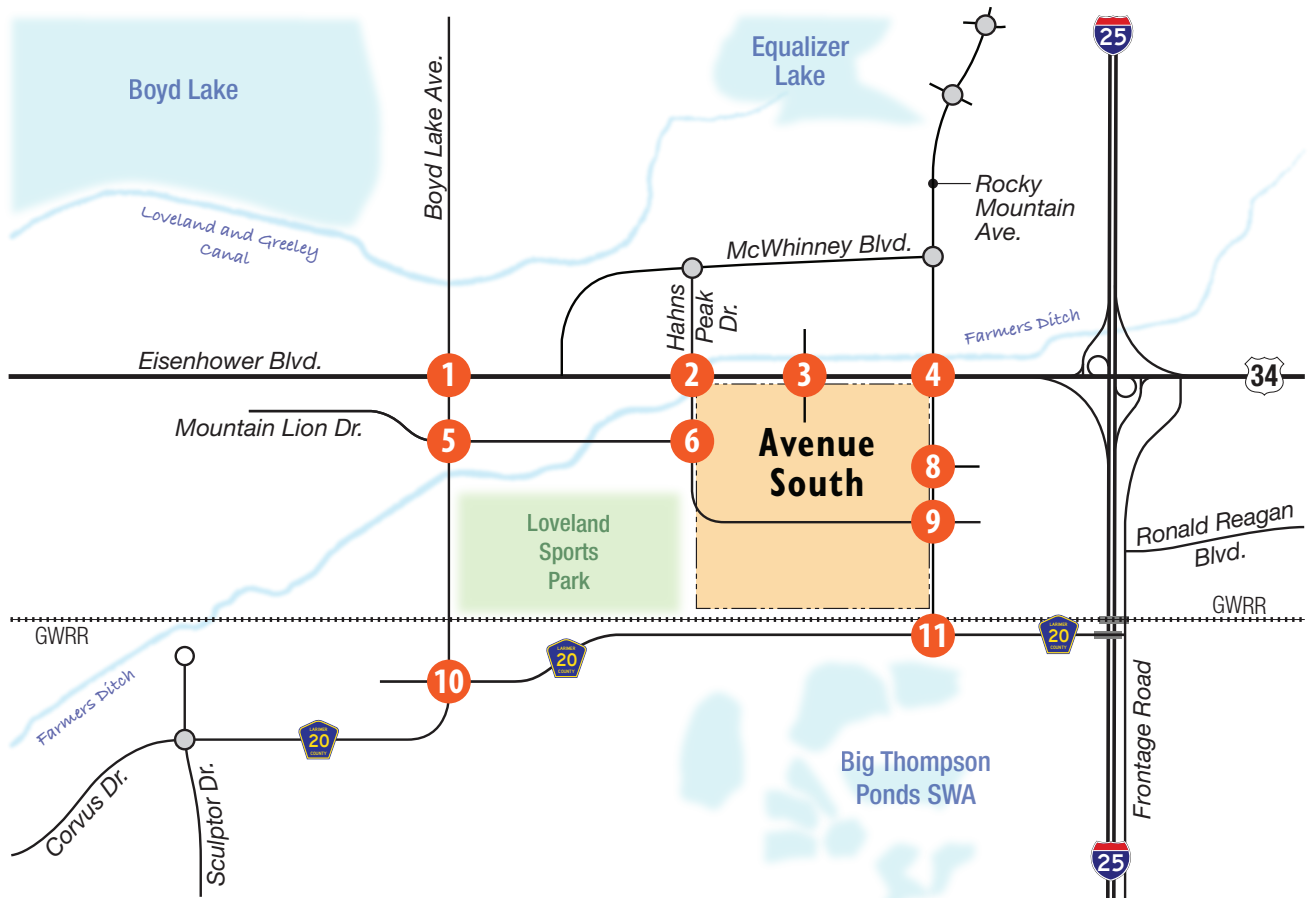
Traffic shifts due to the LCR 20E connection offer some traffic relief in background traffic passing through this intersection. The connection partially offsets the growth effect allowing the intersection to function at a LOS D during all three analysis hours, given 2045 background traffic. *Figure 10 depicts the northbound and southbound through movement being served by a single lane, but the analysis incorporated two through lanes north-south. The subsequent version of this report will update the figure.*

LCR 20E/Boyd Lake Avenue

This intersection is shown as a different configuration than what exists today. Specifically, the LCR 20E is shown to be shifted away from the GWRR to reduce complications in managing auto/rail conflicts. In addition, the intersection is shown to be a roundabout, which was the result of preliminary traffic planning associated with the Stuart parcel when development was being proposed there. For purposes of this study, the concept developed at that time was maintained. Further, this roundabout is shown to incorporate a four-lane Boyd Lake Avenue, which is planned to ultimately be extended south to SH 420 according to Connect Loveland (which will be depicted in a subsequent version).

LCR 20E/Rocky Mountain Avenue

2045 background traffic will necessitate an intersection in which turn lanes should be built. LCR 20E is currently a two-lane road and is planned as such in the long-term planning horizon, except east of Rocky Mountain Avenue in which a four-lane section has been recommended (per the latest Millennium Amendment Transportation Study). Minimum improvements include the need to add a center eastbound left turn lane, a westbound right turn lane, and separate southbound left and right turn lanes. Signalization will be warranted with 2045 background traffic. Resulting LOS for this intersection would be a LOS C or better.



LEGEND

X/X/X = AM/PM/SAT Peak Hour Signalized Intersection Level of Service

x/x/x = AM/PM/SAT Peak Hour Unsignalized Intersection Level of Service

STOP = Stop Sign

Traffic Signal = Traffic Signal

Roundabout = Roundabout

X = Study Intersection

V. TOTAL FUTURE TRAFFIC CONDITIONS

V.A. *Short-Term (2029) Total Traffic Volumes*

The site-generated traffic volumes were added to the background traffic volumes for each planning horizon/scenario to calculate total traffic volumes.

Figure 11 presents the projected short-term total traffic volumes derived by summing the traffic of **Figure 5** and **Figure 7**. In general, approximately 6 to 10 percent of the US 34 total AM, PM, and Saturday peak hour traffic (just east of Hahns Peak Drive adjacent to Avenue South) will be comprised of Avenue South Phase I traffic in 2029.

The site will add noticeably more peak hour traffic onto the Hahns Peak Drive approach to US 34, particularly the northbound left turn to westbound US 34. The US 34/Rocky Mountain Avenue intersection will also see an increase, but the site's proposed RIRO will serve traffic that would otherwise use either of these signalized intersections.

V.B. Short-Term (2029) Total Traffic Operations

LOS analyses were conducted to assess impact and identify improvements beyond those already programmed in the background conditions to mitigate the addition of site-generated traffic (Phase I), where needed.

Figure 12 illustrates geometry, traffic control, and capacity analysis for the short-term future condition and **Appendix G** contains LOS worksheets. The following are observations from the analysis.

US 34/Rocky Mountain Avenue

The additional south leg to this intersection will necessitate signal expansion to its control movements to and from the south leg related to Schmer Farm and Avenue South. Lane geometry options were explored and analyzed with respect to LOS, and it was found that obtaining acceptable LOS results required adding a triple left turn lane westbound to southbound. Conflicts between through traffic and left turn movements at the intersection will be significant, so incorporating this triple left was deemed necessary to achieve acceptable LOS results. Analysis was conducted for dual westbound left turn lanes with various adjustments in signal timing, but acceptable results were not obtainable. The westbound left turn is projected to reach 630 vph during the Saturday peak hour in the 2029 timeframe.

An eastbound right turn deceleration lane will also be needed along US 34. With three southbound lanes being needed leading away from US 34, the eastbound right turn movement should be controlled and not allowed to be a free-flowing movement. The northbound approach of this intersection should include five lanes including dual lefts, two through lanes, and one free-flowing right turn lane. This results in an eight-lane cross-section just south of US 34. It is possible that property from Avenue South and Schmer Farm may be needed to accommodate this first phase of construction. The overall intersection operations are projected to be LOS D with these improvements given year 2029 total traffic projections.

US 34/Hahns Peak Drive

With Chilson-Stroh assumed to be built out with the first phase of Avenue South, this intersection may need to be improved. While its overall functionality is projected to be LOS D, the northbound left turn movement is projected to be a LOS E with a 95th percentile queue of approximately 300 feet. As such, a second northbound left turn may be appropriate by 2029 (which will eventually be needed anyway once Avenue South is built out). Also, dual westbound left turn lanes should be constructed within US 34. This will necessitate providing two receiving lanes that extend south of US 34, potentially all the way to Mountain Lion Drive.

US 34/Boyd Lake Avenue

This intersection is expected to operate at LOS D given 2029 total traffic conditions and the current lane geometry.

Boyd Lake Avenue/Mountain Lion Drive

This multi-lane roundabout is projected to function acceptably, LOS B, given 2029 total traffic conditions.

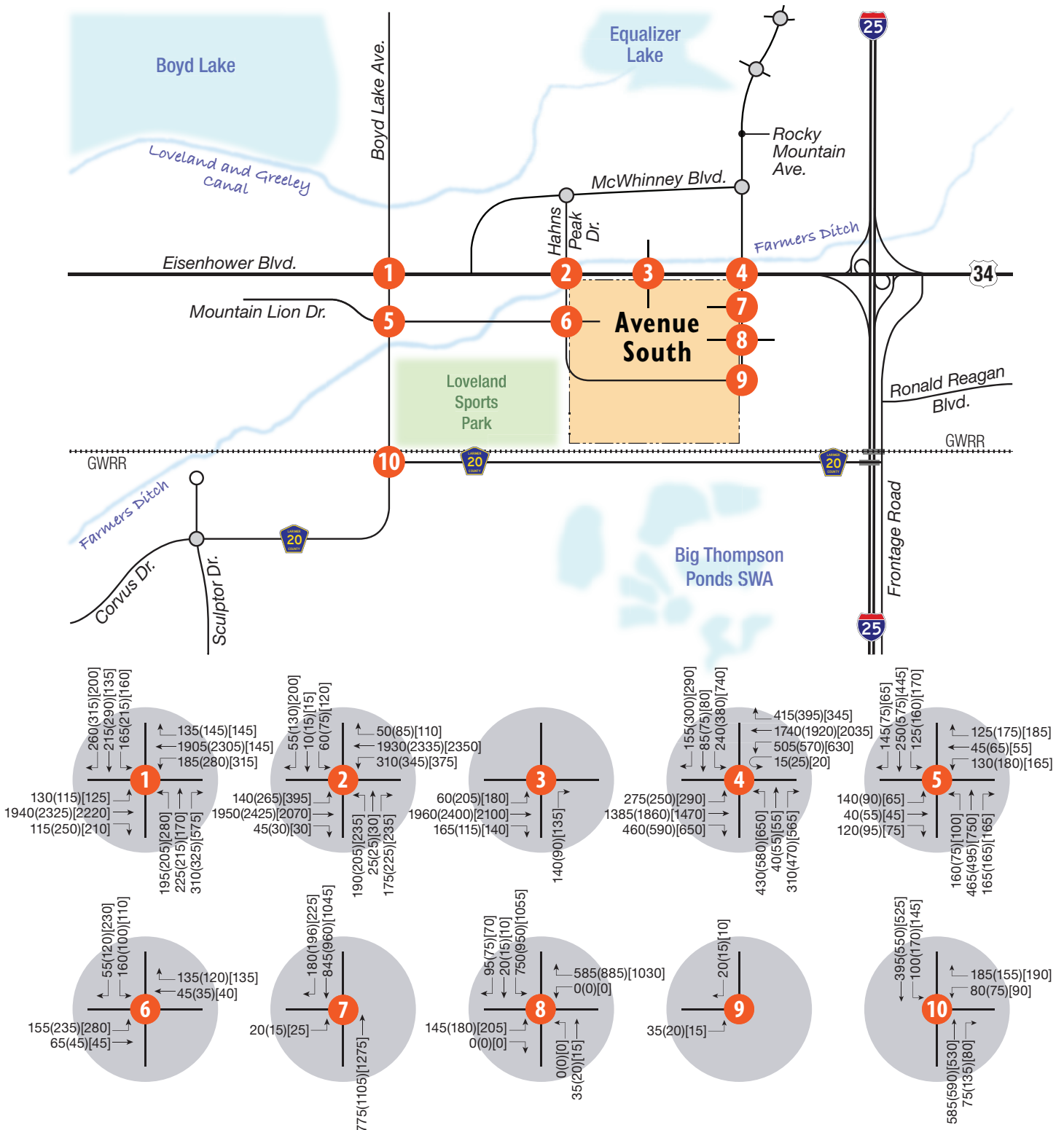
Boyd Lake Avenue/LCR 20E

In 2029, this intersection is anticipated to continue functioning under side-street-stop control. The side street LOS is projected to be a LOS F due primarily to an increase in Boyd Lake Avenue traffic. As mentioned, there is the potential that this intersection eventually is relocated to the south, away from the rail line, with the possibility of a roundabout intersection. This improvement is likely to occur in conjunction with the development of the Stuart property located on the southwest corner of the current Boyd Lake Avenue/LCR 20E intersection. This intersection will continue to experience challenges under its current side-street stop configuration.

Rocky Mountain Avenue

Ultimate plans include an extension of Rocky Mountain Avenue south of US 34 to LCR 20E as described previously. Two roundabout intersections are being proposed, one located approximately 700 feet south of US 34. With the access assumptions being applied in this study for Schmer Farm, all of that development's traffic would be served by the roundabout. A current conceptual plan of the roundabout shows one outbound lane from Schmer Farm, and the LOS for that outbound movement is LOS F during the Saturday peak hour; more than 1000 vph are projected to exit Schmer Farm. This roundabout should be expanded to include two westbound approach lanes existing Schmer Farm; one of these could perhaps be in the form of right-turn bypass lane. This could change if Schmer Farm is able to secure an additional RIRO access onto US 34.

The northbound approach of Rocky Mountain Avenue to US 34 could queue back into this roundabout. The 2029 LOS analyses worksheets (**Appendix F**) show a northbound left turn queue that could reach nearly 20 vehicles, which equates to approximately 500 feet (Saturday peak hour). From this, there should be enough storage given the proposed location of the roundabout in the 2029 timeframe.

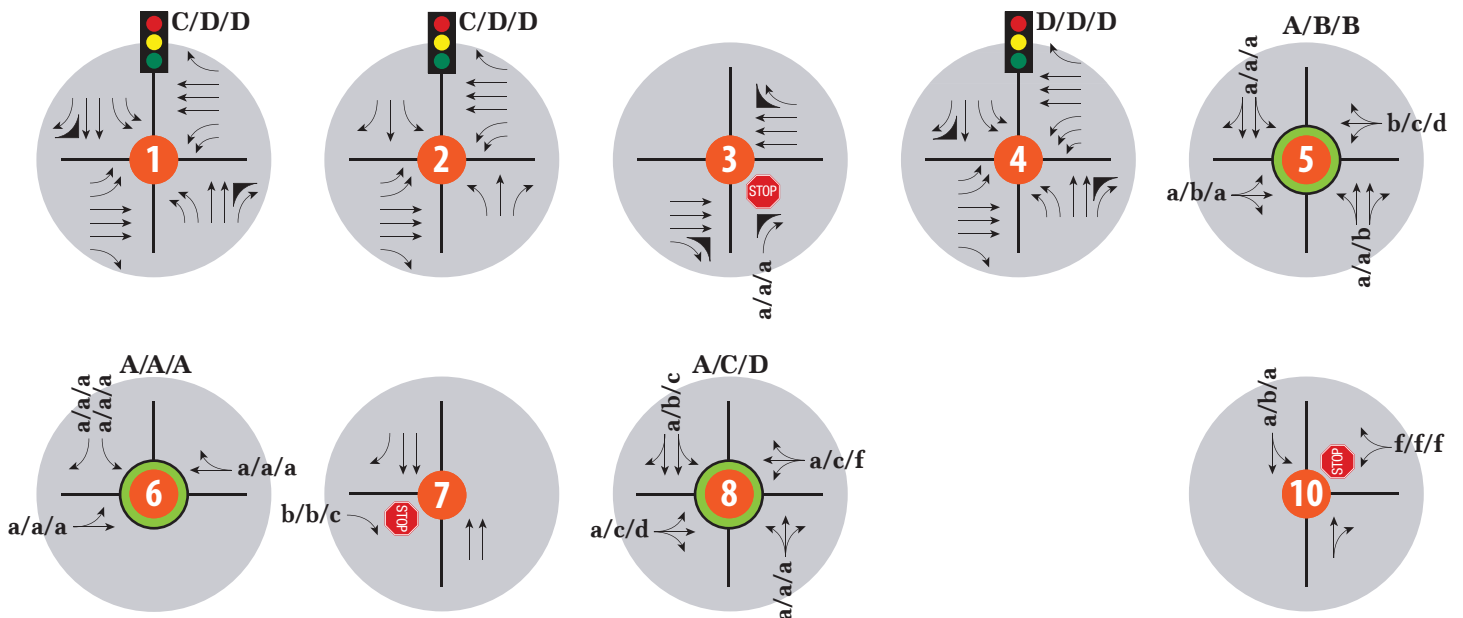
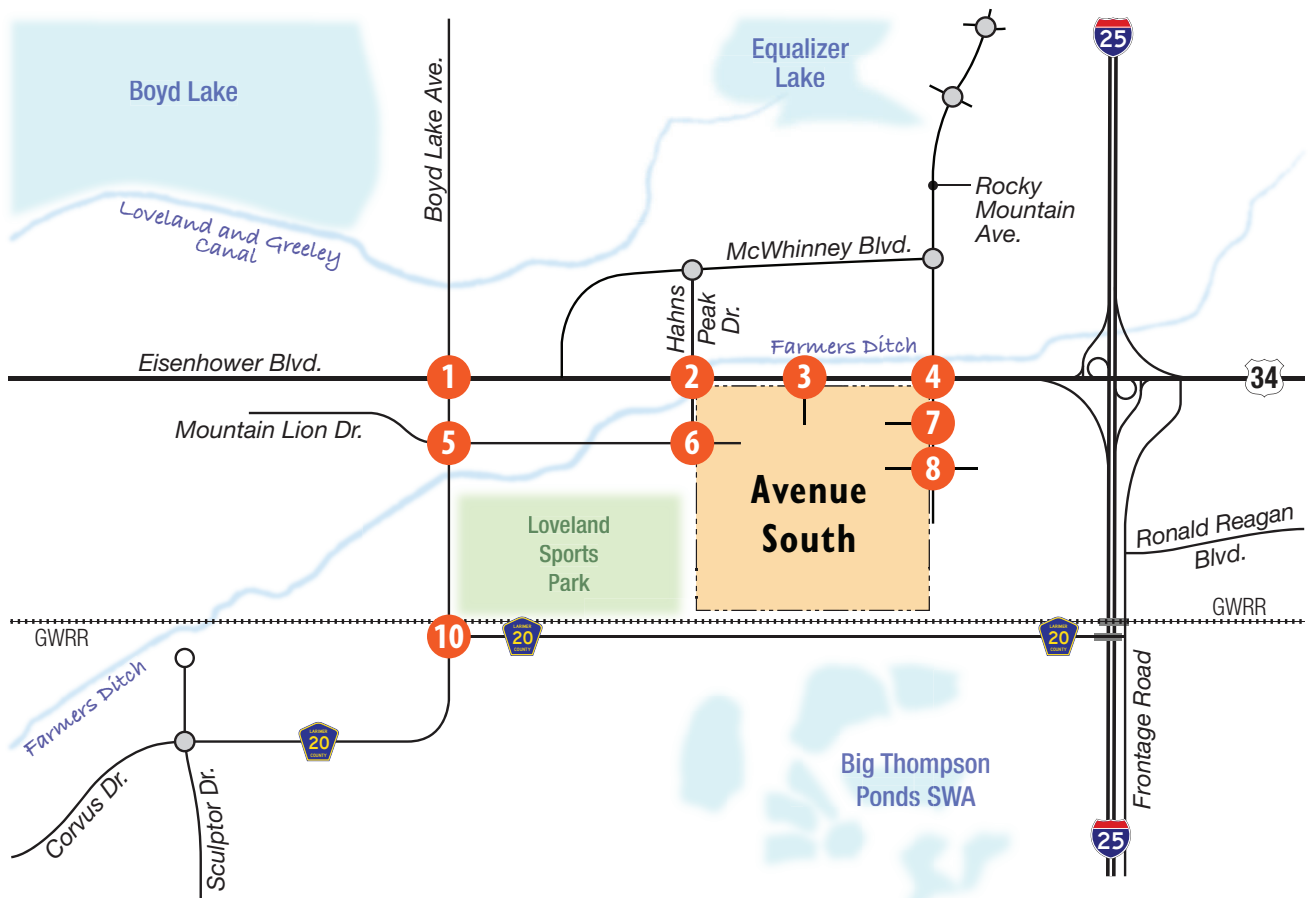


LEGEND

xxx(xxx)[xxx] = AM(PM)[SAT] Peak Hour Traffic Volumes



= Study Intersection



LEGEND

X/X/X = AM/PM/SAT Peak Hour Signalized Intersection Level of Service
 x/x/x = AM/PM/SAT Peak Hour Unsignalized Intersection Level of Service

STOP = Stop Sign
 Traffic Signal = Traffic Signal
 Roundabout = Roundabout
 X = Study Intersection

V.C. Long-Term (2045) Total Traffic Volumes

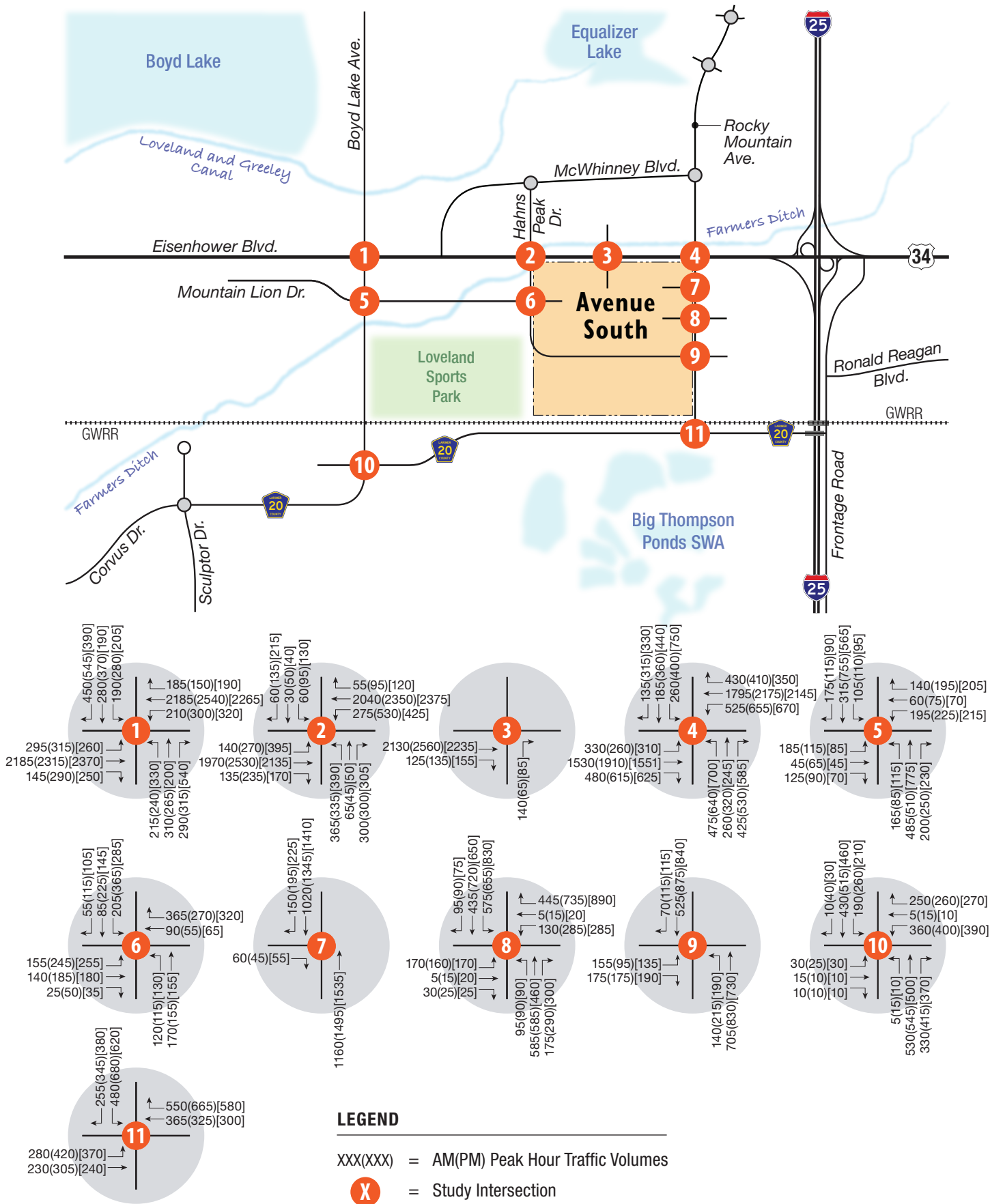
An assessment has also been made of the 2045 planning horizon in quantifying the impact of site traffic on long-term future traffic operations at the study area intersections, with full build of Avenue South to its maximum allowed. **Figure 13** illustrates total 2045 traffic projections, derived by summing the traffic flows depicted on **Figure 6** and **Figure 10**. A key difference in the 2045 analysis as compared to the 2029 planning horizon is the connection of Rocky Mountain Avenue connection to LCR 20E inherent in the analysis. This will serve as back-door access to the area and will thereby serve some of the Avenue South and Schmer Farm traffic; these developments' traffic would not rely entirely on US 34 for their access.

The previous sections of the report have described a myriad of traffic components that would shift given the new connection. In general, these include Avenue South traffic, Schmer Farm traffic, Chilson-Stroh traffic (which would now be cutting through Avenue South), and local area trips using the new network connection (informed by the NFR travel demand model).

Just south of US 34, Rocky Mountain Avenue is projected to serve up to 3170 vph during the Saturday peak hour. As mentioned, Rocky Mountain Avenue will be the only roadway to serve the future Schmer Farm development, but the assumption is that these trips will now have the option to travel south to/from LCR 20E and relieve US 34. The planned roundabout 700 feet south of US 34 will remain a key intersection, especially for Schmer Farm. North-south through traffic at US 34/Rocky Mountain Avenue will increase with the connection to LCR 20E.

At US 34/Hahns Peak Drive, the movement to/from the south will increase noticeably compared to the 2029 planning horizon. Much of the increase is due to the potential residential density that is being considered as part of the Millennium General Development Plan amendment. Much of this request would likely be located on the west side of Avenue South, where Hahns Peak Drive would be best positioned to serve the density.

LCR 20E will see a notable increase in traffic as a result of the Rocky Mountain Avenue connection. Just east of the connection intersection, LCR 20E is projected to carry a total of 1975 vph (weekday PM peak hour). Movements between the north and east legs of the Rocky Mountain Avenue/LCR 20E intersection will be predominant pattern at this intersection.



V.D. Long-Term (2045) Total Traffic Operations

LOS analyses were conducted to assess impact and identify improvements to accommodate year 2045 traffic beyond those already programmed in the background conditions (including the Rocky Mountain Avenue connection to LCR 20E) to mitigate the addition of site-generated traffic. **Figure 14** illustrates geometry, traffic control, and capacity analysis for the short-term future condition, and **Appendix H** contains LOS worksheets. This analysis has incorporated a longer than normal cycle length as one means of decreasing overall delays at the US 34 intersections. The following observations are provided:

US 34/Rocky Mountain Avenue

This intersection will remain the most challenging within the study area. The 2045 traffic projections with the connection to LCR 20E result in greater north-south through traffic along Rocky Mountain Avenue. US 34 will continue to be heavily traveled, and heavy left turn movements on all approaches are still anticipated. The PM peak hour and Saturday peak hour LOS would drop from LOS E to LOS F (as compared to the 2045 background traffic scenario) which includes westbound triple left turn lanes. Triple left turn lanes would necessitate the need for the eastbound right turn movement to NOT be a free-flow movement; its 95th percentile queue under this configuration would reach approximately 785 feet (Saturday peak hour is the critical time for this queue according to the worksheets provided in **Appendix G**); the site R/O access is located approximately 1300 feet west of Rocky Mountain Avenue. The northbound approach should continue to include dual left turn lanes, two through lanes, and a single right turn lane. With the need to receive triple left turn lanes from westbound US 34 and five lanes approaching US 34 northbound, the southern leg of Rocky Mountain Avenue at this intersection will need be 8 lanes wide. The southbound through movement would be served by only one lane due to the width constraints on the north leg of Rocky Mountain Avenue. The level of projected through traffic would suggest two southbound through lanes would be preferred and would also be beneficial relative to overall LOS. The Saturday peak hour analysis shows the southbound through movement at a LOS F with a 95th percentile queue that exceeds 1000 feet if only one southbound lane is provided.

In the extreme long-term planning horizon, this intersection has been identified to be grade-separated future. A high-level conceptual layout has been prepared to begin to assess its feasibility. This is a major improvement that would ultimately be realized through regional collaboration involving numerous parties; much of the traffic along US 34 is regional in nature. An improvement of this type at this intersection is not likely to occur soon. However, the construction of a grade-separated interchange would alleviate LOS challenges shown in **Figure 14**.

Another potential option is a partial displaced left turn alternative in which the eastbound and westbound left turns would cross-over the opposing through movement prior to reaching the intersection (via a customized traffic signal). Then once left-turning traffic reaches the main intersection, it would be able to proceed simultaneously with the opposing through movements, thereby eliminating the left turn phase at the primary intersection. A preliminary analysis showed that this could be beneficial for this intersection, but more detail on its benefits, impacts, and feasibility is needed.

US 34/Hahns Peak Drive

This intersection is projected to function at LOS D during all three peak hours given 2045 total traffic projections. Travel through this intersection is characterized by heavy east-west flows relatively heavy westbound left turn movements, and moderate left turn flows along the eastbound and northbound approaches. It is recommended that the eastbound, westbound, and northbound left turn movements be served with dual left turn lanes. Right turn lanes along all four approaches and six through lanes along US 34 should be provided.

US 34/Boyd Lake Avenue

This intersection is projected to operate at LOS D during all three peak hours in 2045. No other improvements are proposed. *Figure 14 depicts the northbound and southbound through movement being served by a single lane, but the analysis that led to a LOS D incorporated two through lanes each way. The subsequent version of this report will update the figure.*

Boyd Lake Avenue/Mountain Lion Drive

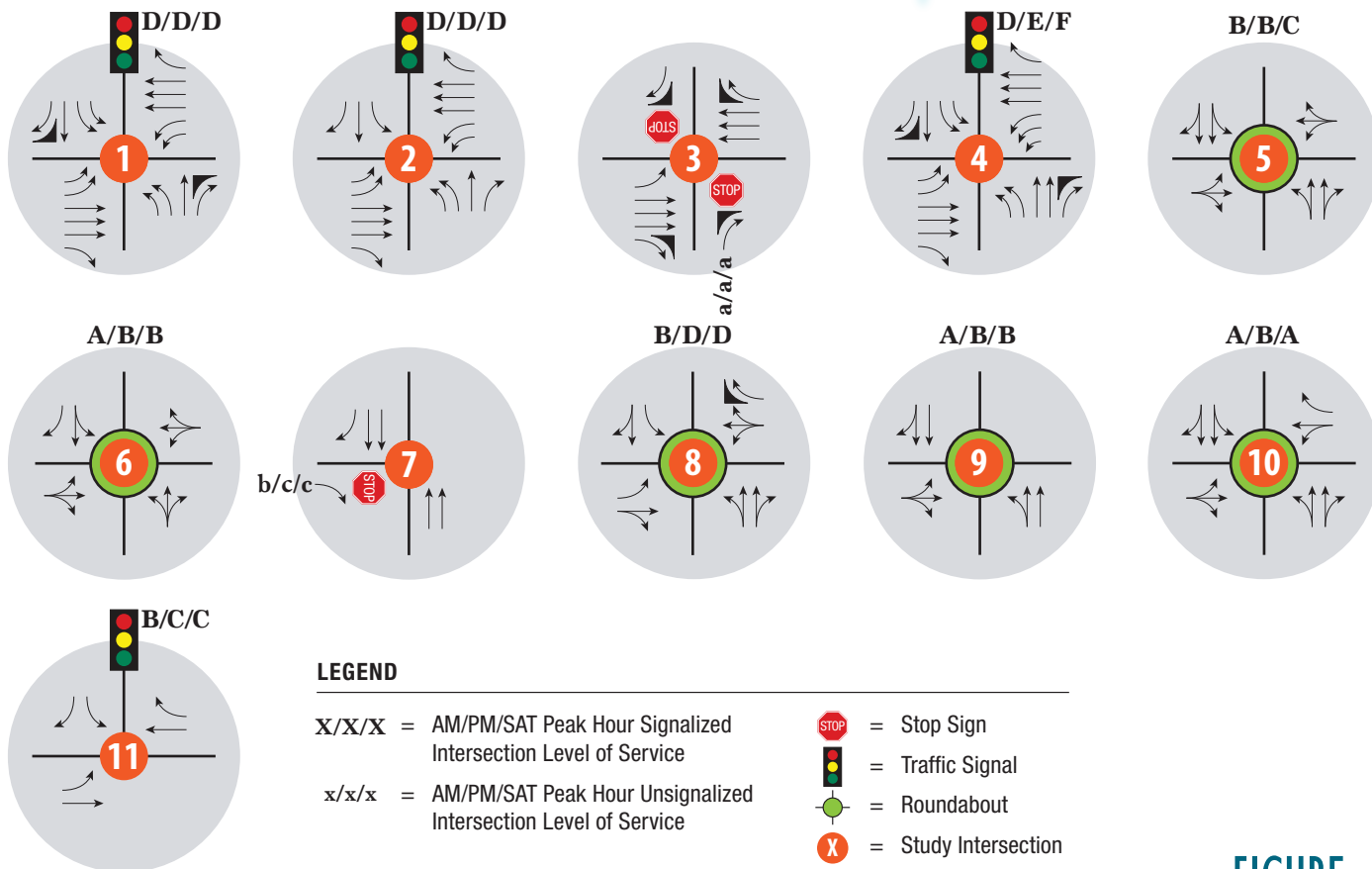
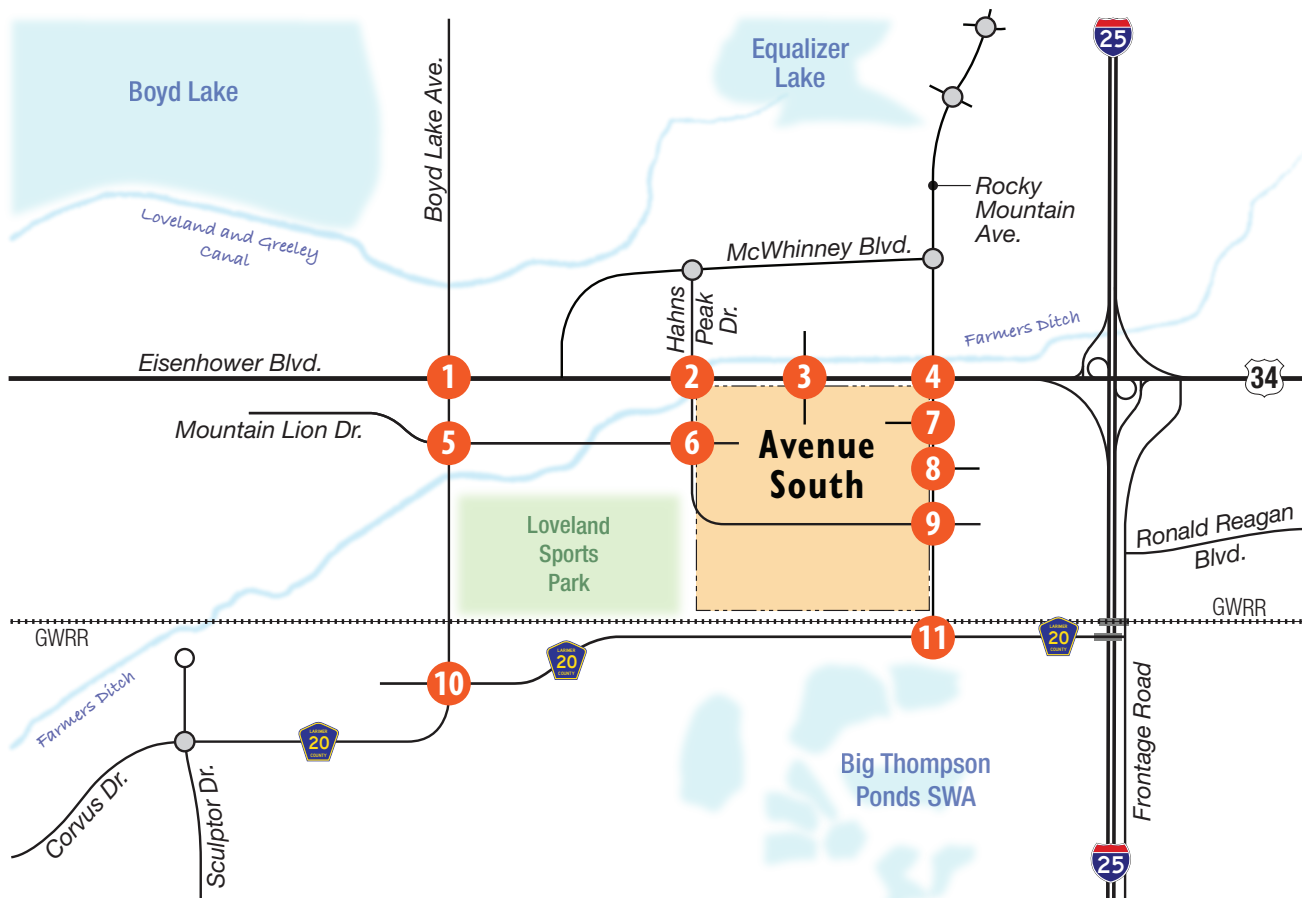
The functionality of this multi-lane roundabout is expected to function at LOS C or better given 2045 total traffic.

Boyd Lake Avenue/LCR 20E

This intersection is proposed to be relocated from the railroad to the south and controlled via a roundabout as part of the Stuart development. With the LCR 20E connection, additional traffic is expected on the east leg of the roundabout intersection. The overall result is a LOS B or better.

Rocky Mountain Avenue/LCR 20E

This new tee-intersection will require improving LCR 20E. Specifically, two southbound approach lanes will be needed (one for left turns and one for right turns). Along LCR 20E, a center eastbound left turn lane will be needed as will a westbound right turn lane. East of Rocky Mountain Avenue, LCR 20E should be widened to a four-lane arterial road as depicted in the recent Millennium Amendment traffic study. This intersection will warrant signalization, which will need to be designed and constructed with proper preemption configuration given the railroad. Other railroad crossing treatments will be required as well to ensure this new crossing is built to current practice standards.



Rocky Mountain Avenue

While the LCR 20E connection will offer development a back-door access without relying on US 34, it will also attract through traffic along Rocky Mountain Avenue unrelated to the adjacent developments. Long-term, Rocky Mountain Avenue should be planned to provide four-through lanes, with an 8-lane cross-section just south of US 34 when considering turn lanes. A RIRO into Avenue South is proposed about 250 feet south of US 34, and a right turn lane into this access should be provided and extended beyond the access to prevent a “trap lane” situation. Up to 225 vph are projected to turn right into this first access at peak times. The nature of their arrival will be heavily influenced by the US 34/Rocky Mountain Avenue traffic signal; this will tend to meter the southbound through and westbound left turn movement entering this area. With triple westbound left turn lanes, it is recommended to configure the US 34/Rocky Mountain Avenue intersection so as to prevent the eastbound right turn movement from US 34 from being free-flowing, thereby metering this movement as well. Additional analyses will be conducted to assess this configuration. Further, the entrance to the site via this RIRO should be configured so as to minimize conflicts and traffic interference within the Avenue South site which might otherwise cause a backup onto Rocky Mountain Avenue.

The roundabout intersection is planned to be located about 700 feet south of US 34, and as mentioned this will be critical for Schmer Farm. The Rocky Mountain Avenue Connection to LCR 20E will serve a portion of the area’s traffic, but there will still be a meaningful amount traveling to/from US 34. The northbound 95th percentile queue from US 34 is projected to be over 800 feet for the left turn movement during the Saturday peak hour. The weekday peak hours will not exceed 675, so the provided storage will be adequate for much of the time.

The roundabout’s functionality will necessitate dual lanes along all four approaches. Much of the traffic passing through this roundabout will be background traffic composed of Schmer Farm and of trips cutting through to leverage the connection to LCR 20E. The roundabout should ultimately be designed to provide two continuous lanes, southbound to eastbound, into the Schmer Farm property. A modification in Schmer Farm’s access that entails a RIRO onto US 34 would significantly relieve this roundabout (and possibly alter its design) by virtue of reducing the southbound left into Schmer Farm and the westbound right turn out of Schmer Farm. From the standpoint of this roundabout’s functionality, incorporating a RIRO onto US 34 would be beneficial, and the shifts it would produce might also provide slight improvement to the US 34/Rocky Mountain Avenue intersection.

Further south of this first roundabout, Rocky Mountain Avenue will be serving traffic levels indicative of a four-lane major arterial road (according to LCUASS), which was a finding in the recent Millennium Amendment Traffic Impact Study. The second roundabout south of US 34 will function adequately with two northbound and southbound entry lanes. Continuing south will require Rocky Mountain Avenue to remain a four-lane road as it approaches LCR 20E, where signalization will ultimately be warranted and single-turn lanes provided at this tee-intersection.

V.E. Delay Summary

Table 3 illustrates intersection delays for each scenario that has been analyzed. **Table 3** can be used to assess the impact associated with each subsequent scenario whether it is additional site traffic or the connection to LCR 20E. Because some intersections will vary between scenarios with respect to lane geometry, results are not necessarily directly comparable.

Table 3. Comprehensive Level of Service and Delay (seconds per vehicle) Results

Intersection	Existing			2029 Background			2029 Total			2045 Background			2045 Total		
	AM	PM	SAT	AM	PM	SAT	AM	PM	SAT	AM	PM	SAT	AM	PM	SAT
1. US 34 / Boyd Lake Avenue	C(26.3)	C(33.0)	C(31.4)	C(30.7)	D(38.2)	D(40.2)	C(32.4)	D(38.3)	D(37.3)	D(36.5)	D(45.7)	D(44.5)	D(49.6)	D(54.3)	D(46.6)
2. US 34 / Hahns Peak Drive	D(38.2)	C(34.0)	D(41.6)	B (19.9)	D(39.9)	D(38.8)	C(24.8)	D(40.2)	D(53.2)	C(30.1)	D(41.5)	D(42.2)	D(36.1)	D(47.3)	D(48.4)
4. US 34 / Rocky Mountain Avenue	C(22.8)	C(31.1)	C(22.3)	D(41.0)	D(45.9)	D(53.0)	D(37.1)	D(43.9)	D(51.6)	D(41.2)	E(57.1)	E(78.2)	D(49.3)	E(84.9)	F(106)
5. Boyd Lake Avenue / Mountain Lion Drive	A (5.7)	A (5.8)	A (5.9)	A (7.8)	A (9.5)	B (10.7)	A (8.8)	B(10.4)	B (12.5)	A (8.7)	B (11.5)	B (12.4)	B(11.6)	B(14.2)	C(19.8)
6. Mountain Lion Drive / Hahns Peak Drive	-	-	-	A (8.5)	A (8.8)	A (9.3)	A (3.8)	A (4.3)	A (4.8)	A (4.0)	A (4.9)	A (5.1)	A (9.8)	B(10.6)	B(12.2)
7. Rocky Mountain Avenue / RIRO Access	-	-	-	-	-	-	B (13.0)	B(13.9)	C(15.1)	-	-	-	B(13.8)	C(16.5)	C(17.7)
8. Rocky Mountain Avenue / Schmer Access Roundabout	-	-	-	A (8.2)	B (12.5)	C(16.8)	A (9.0)	C(17.4)	D(33.9)	A(8.5)	B(14.9)	C(18.0)	B (12.7)	D(26.1)	D(32.3)

Intersection	Existing			2029 Background			2029 Total			2045 Background			2045 Total		
	AM	PM	SAT	AM	PM	SAT	AM	PM	SAT	AM	PM	SAT	AM	PM	SAT
9. Rocky Mountain Avenue / Mountain Lion Roundabout	-	-	-	-	-	-	A (2.9)	A (2.8)	A(2.5) Est.	A (7.4)	B(12.7)	B (11.4)	A (8.5)	B(11.2)	B(10.6)
10. Boyd Lake Avenue / LCR 20E (VWB Approach, Roundabout in 2045)	E (45.1)	F (73.5)	E (41)	F (73.7)	F(247.7)	F(175.8)	F (108)	F (337)	F(248.8)	A (7.0)	A (8.5)	A (7.6)	A (8.8)	B(10.8)	A (9.4)
11. Rocky Mountain Avenue / LCR 20E	-	-	-	-	-	-	-	-	-	B(13.5)	C(20.7)	B(16.0)	B(17.5)	C(33.0)	C(22.0)

VI. INTERNAL SITE ROADWAYS AND INTERSECTIONS

VI.A. *Mountain Lion Drive*

Mountain Lion Drive is proposed to pass through the Avenue South site. Its alignment will be shifted to the south compared to the current Mountain Lion Drive west of Avenue South, and this will include a 90-degree turn made via a roundabout. Total 2045 traffic projections expected to travel this road will exceed the collector classification per LCUASS. Rather, the projected traffic loadings are characteristic of a minor arterial according to LCUASS in which the cross-section should ideally provide one through lane in each direction and a continuous center left turn lane for cross-streets/accesses. Bike lanes are proposed, but on-street parking should ideally not be provided given the projected traffic demands.

VI.B. *Fall River Road – Internal Drive*

The site's planned RIRO onto US 34, opposite Fall River Road, is currently planned to extend approximately 350 feet into the site before a cross-street drive aisle is introduced. The intent is to help prevent traffic "interference" of inbound traffic that could possibly lead to backup onto US 34. The peak hour projections for inbound movements at the access are projected to reach 155 vehicles per hour, which equates to one vehicle every 20 to 25 seconds, on average. Assuming an all-way stop at the first internal intersection, the average delay for an incoming vehicle at this intersection is approximately 10 seconds, and the 95th Percentile queue is under two vehicles based on a cursory-level all-way stop analysis. The proposed RIRO access road should function adequately relative to minimizing backups onto US 34.

The potential has been raised to possibly add a west-side only cross-street onto the internal Fall River Road that would be closer to US 34 and better serve future pad sites to be located southwest of US 34/Fall River Road. This has been added to the site plan shown in this report. This access would introduce the possibility of a little interference, but it would alleviate conflicts at the first internal intersection located approximately 350 feet from US 34. Being a tee intersection on just the west side of Fall River Road, this proposed access will limit left turn movements from the Fall River Road, which would be the primary concern that might back-up traffic to US 34.

Other potential movements at this proposed cross-street that could interfere with inbound traffic from US 34 include the left turn-out of the area (heading to US 34) and the left turn-in to the area (northbound to westbound). The right-in to the area would not introduce nearly as much conflict as the left turn movements could. For this reason, consideration could be given to provide a right-in only from Fall River Road, but no other movements should be allowed at this first cross-street location to help ensure inbound traffic from US 34 can continue to flow.

VII. MULTIMODAL ACCOMODATIONS

This chapter addresses the multimodal considerations relative to the Avenue South development including connections to surrounding destinations.

VII.A. Importance of Multimodal Considerations

Multimodal accommodation could be critical in light of the heavy traffic projections. Because crash trends have found that most vulnerable road users, bicyclists and pedestrians, are highly over-represented in severe/fatal crash data, designing streets and networks with their safety in mind is paramount to overall transportation safety.

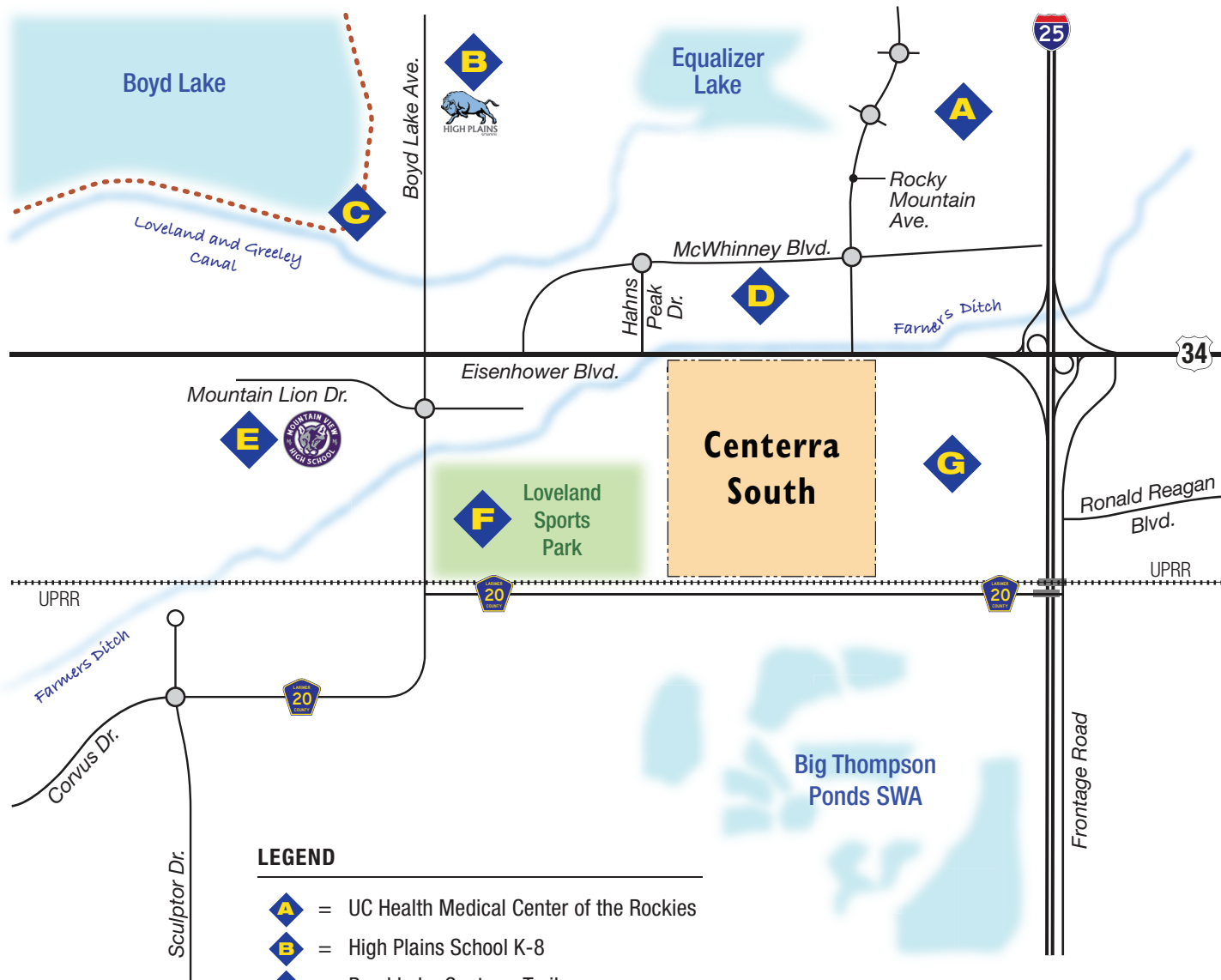
Because greenhouse gas emissions have also become a greater concern, providing safe and comfortable biking and walking connections will contribute to people using sustainable modes of transportation instead of single-occupant vehicles. Improved biking and walking connections to/from system transit stops can also encourage greater use of a local and regional transit system. Research shows that a large proportion of the general population has an increased interest in walking and biking for transportation reasons, but only if safe and comfortable facilities to do so are provided.

VII.B. Multimodal Trip Attractors

The following notable attractors existing around the area could attract or generate bicycling and pedestrian activity to/from Centerra South:

- Loveland Sports Park
- Boyd Lake and the Loveland Regional Trail via the Centerra Trail
- High Plains K-8 School
- Mountain View High School
- COLT Bus service (nearest stops are at Boyd Lake Avenue), which provides service to Downtown Loveland
- Commercial development on the north side of US 34 (Centerra Marketplace)
- Future commercial development of Schmer Farm (across Rocky Mountain Avenue)

Figure 15 shows these attractors in comparison to the Centerra South site.



VII.C. Multimodal Improvement Ideas/Considerations

Error! Reference source not found. depicts a vision for multimodal service within the study area. Existing trails are shown, including Centerra Trail along the Loveland and Greeley Canal, which runs east-west along the south end of Boyd Lake and then crosses Boyd Lake Avenue to connect with the trail system that surrounds Houts Reservoir and Equalizer Lake.

Future trail planning has also taken place for this area. The Centerra Trails Map identifies existing and future trails in the Avenue South area as does the *Loveland Parks, Recreational, Open Lands, and Trails Master Plan*. A summary of future trails planned for the area include:

- A regional trail along Big Thompson River referred to as the East Big Thompson Trail, is recognized in the *Loveland Parks, Recreational, Open Lands, and Trails Master Plan*. This future trail is planned to cross under I-25 adjacent to the Big Thompson River. Further, a trail “stub” is identified to its north along Boyd Lake Avenue to connect to the Loveland Sports Park.
- Another stub to the future East Big Thompson Trail shown in the Centerra Trails Plan conceptually extending southeast from Avenue South (possibly crossing the GWRR at the future Rocky Mountain Avenue GWRR crossing). Its exact alignment is yet to be defined.
- An east-west trail along the north side of GWRR is planned. As a “Rails with Trails” program facility, this would share the GWRR right-of-way. This trail is recognized in the Centerra Trails Plan and would extend along the south side of Sports Park, Avenue South, and Schmer Farm, crossing I-25 and ultimately extending further east and north to Eaton, Colorado.
- An east-west trail along the south side of US 34. This separated shared-use path along the north side of the study area would extend west to the Front Range Trail in western Loveland and east to the future South Platte/American Discovery Trail near Garden City (approximately 21.5 miles). This too is recognized in the Centerra Trails Plan.
- Within the study area, roadways will provide sidewalks, and a proposed linear park within the Avenue South development would connect to the Loveland Sports Park. Trails/walkways already exist through the Sports Park, thereby providing the Avenue South development bike/ped connectivity to Boyd Lake Avenue.

Also shown on **Figure 16** is the possible routing of a future COLT bus route through Avenue South, leveraging Mountain Lion Drive and Rocky Mountain Avenue. The exact route(s) that could serve the study area requires further assessment; it would be ideal to connect Avenue South (and the surrounding developments) to the Centerra Loveland Mobility Hub, area employment centers, and Mountain View High School. Additional input from COLT is needed, but the study area will provide a roadway system that would allow a bus to circulate through. The additional density in the area would tend to support direct local transit service. In addition, the Connect Loveland Transportation Plan identifies the vision of a Greeley Regional bus route, the details of which are yet to be determined. The plan shows this route using US 34 along the study area’s frontage.

Encouraging alternative modes of travel such as bicycling and walking requires adequate accommodations for these users. Since the most vulnerable road users, bicyclists and pedestrians are highly over-represented in severe/fatal crash data, designing streets and networks with their safety in mind is paramount to overall transportation safety and encouragement. Their usage is also encouraged where biking and walking connections are provided to transit stops. Many people are interested in walking and biking for transportation purposes, provided that safe and comfortable facilities are provided. In light of this, the multimodal connectivity of the area could be enhanced beyond that mentioned above. The following enhancements should be considered for the area:

- Incorporating a detached 10-foot shared-use path along the south side of US 34. Adding a similar facility along the north side of US 34 is recommended as well, with path connections across the Farmer's Ditch to Centerra Marketplace.
- Installing ADA-compliant curb ramps at all intersections. Consideration should be made for a pedestrian refuge area in the middle of US 34. Pedestrian and bicycle accommodation to cross US 34 at Rocky Mountain Avenue and Hahns Peak Drive should be made robust. Additional research is recommended to assess the feasibility of a grade-separated pedestrian crossing of US 34.
- Bike lanes should be provided along the entire length of Mountain Lion Drive from Boyd Lake Avenue to Rocky Mountain Avenue that tie into the existing bike lanes further west as a means of connecting to the high school
- Explore whether area internal roadways lend themselves to narrower (10 to 11 feet) drive lanes through and around the Avenue South site along Mountain Lion Drive to discourage speeding. Other traffic calming features could also be considered along these multimodal roads as a means of naturally reducing vehicular speeds. This measure will need to be balanced with the need to serve through-traffic as well.
- Explore shared mobility programs for the area in which area residents and employees could use scooters or bikes for short-to-medium length trips in lieu of a single-occupant automobile. This typically requires commitment from a service and formal permission by the city.
- As development occurs within the study area, explore adjustments to the COLT transit system for direct service through the study area. Mountain Lion Drive may be appropriate for routing a bus through the area. If the level of density occurs as is being requested, transit service could be heavily used, pending exact routing. Service that ultimately connects the study area to the Centerra Loveland Mobility Hub would be ideal. Any adjustments to the COLT routing through the area should be considered within the context of the overall COLT system, as transit-supporting development occurs.
- Establish a database of individuals interested in carpooling/ridesharing, along with their commute characteristics with the idea of a car-pool match program.
- Encourage a car-sharing agency to serve the Loveland area, thereby allowing residents and employees to possibly shed vehicle ownership and instead check-out a vehicle only at the times they need one. This may discourage vehicle-trip making if drivers need to pay a modest fee every time they make a trip, and they would likely save a significant amount of money related to car ownership.

These ideas require additional vetting and assessment. The Avenue South development can also incorporate certain attributes that would encourage alternative modes of travel, including providing the following:

- Bicycle racks and storage lockers for residents and employees.
- Locker rooms and showers for employees.
- Shuttle service that supplements Loveland's local/regional service, depending on the nature of COLT routing adjustments once study area development occurs.
- An enhanced pedestrian crossing of Rocky Mountain Avenue between Avenue South and Schmer Farm. This will be more important when both developments reach a critical mass AND when Rocky Mountain Avenue connects to LCR 20E. This could ultimately include a high-intensity activated crosswalk beacon (HAWK) pending conditions.
- A reduced parking supply in conjunction with its management, to ensure that drivers are all accommodated off-street.
- Transit passes to employees and/or residents as a perk to working or living in the study area.

All the ideas expressed above would be specific to improving walking and bicycling within the area. As mentioned, these ideas require additional vetting and assessment.

NOTE: Drawing Not to Scale



LEGEND

- | | |
|--|---|
| A = UC Health Medical Center of the Rockies |  = Walks Along Roadways |
| B = High Plains School K-8 |  = Enhanced Crossing |
| C = Boyd Lake Centerra Trail |  = Trail |
| D = Centerra Marketplace |  = Future East Big Thompson Trail |
| E = Mountain View High School |  = Explore Feasibility of Ped Crossing |
| F = Loveland Sports Park |  = Possible COLT Service |
| G = Schmer (future) | |

FIGURE 16
Area

Multi-Modal Vision

VIII. SUMMARY AND RECOMMENDATIONS

McWhinney is planning to develop 150 acres of property in Loveland, Colorado, with a mix of residential, retail, and office land uses. The proposed land uses include a mix of unit types totaling up to 3367 dwelling units and more than 400,000 square feet of commercial space. Access to the site is planned via Hahns Peak Drive and Rocky Mountain Avenue, both of which would be signalized with US 34. A right-in/right-out onto US 34 (opposite Fall River Road) will also provide access, and Mountain Lion Drive to the west will also serve the development as a direct connection to Boyd Lake Avenue. Future considerations include the extension of Rocky Mountain Avenue south to intersect with LCR 20E

At build out, Avenue South is estimated to generate approximately 32,400 net new external trips onto the roadway system. Phase I of the development, assumed to be in place in the short-term timeframe, will generate approximately 10,900 trips per day.

Roadway and intersections improvements are needed to serve the Avenue South development as well as other planned nearby development, namely Schmer Farm and Chilson Stroh. The following are key findings of the traffic impact study with respect to Phase I of the Avenue South development, which is assumed to coincide with the build out of Schmer Farm and Chilson Stroh by 2029.

- Incorporate triple left turn lanes along the westbound approach of US 34 at Rocky Mountain Avenue. The design should allow for the possible eventual widening to triple left turn lanes.
- Extend Rocky Mountain Avenue south as a four-lane arterial; the first stretch south of US 34 should be eight lanes. This includes three southbound lanes and five northbound lanes (just south of US 34) including dual left turns, two through lanes, and one free-flow right turn lane. This assumes that Schmer Farm would not be granted any access onto US 34. Right turn lanes should be provided along all four approaches, and the eastbound right turn lane should not be free flowing in light of westbound triple left turn lanes.
- Ensure that US 34 is widened to provide six through lanes of traffic through the Rocky Mountain Avenue, Hahn's Peak Drive, and Boyd Lake Avenue intersections.
- Incorporate a continuous accel/decel lane along the site's frontage of US 34. This would serve the US 34 intersections with Hahn's Peak Drive, the site's right-in/right-out, and Rocky Mountain Avenue.
- Plan for two-lane roundabout intersections along Rocky Mountain Avenue along the site's frontage. The roundabouts will not yet strictly be needed to serve the short-term planning horizon since only a portion of Avenue South will be completed, but the northern roundabout will be critical for Schmer Farm, especially if Schmer Farm is not allowed any other access onto US 34.
- Incorporate dual left turn lanes at the US 34/Hahn's Peak Drive intersection to serve the northbound, westbound, and eastbound approaches.

By 2045, traffic growth along US 34 may be partially moderated by congestion, thereby leading to traffic increases along other alternative roadways. Further, the 2045 planning horizon incorporates a key network enhancement in which Rocky Mountain Avenue would be connect south all the way down to LCR 20E. This will require crossing the GWRR, which will require Public Utilities Commission and GWRR approval, a likely lengthy process. This improvement would provide "back-door" access to the area giving Avenue South and Schmer Farm trips an alternative to US 34. However, this connection will also add cut-through traffic onto Rocky Mountain Avenue since it provides an alternative route for other trips in the area.

Additional findings and improvements needed by 2045 are summarized as follows:

- Rocky Mountain Avenue should be planned as a four-lane arterial road along its entire length down to LCR 20E.

- The US 34/Rocky Mountain Avenue intersection will experience operational challenges. Options to possibly alleviate (at least in part) these challenges entail exploring:
 - Adding a second southbound through lane along Rocky Mountain Avenue. The current construction of this roadway (north of US 34) provides only one southbound through lane to cross US 34 (which is striped out today). Future traffic demands suggest a second lane would be beneficial.
 - Exploring an alternative design intersection design, such as a displaced left turn intersection, from a feasibility stand-point. This configuration may provide greater capacity than a conventional intersection, even with westbound triple left turn lanes.
 - Explore the potential of providing triple southbound left turn lanes. The southbound left is a heavy movement today, and backups do sometimes occur back to the Foxtrail Drive roundabout. The constructed environment may restrict the ability to widen the southbound approach to accommodate this and/or a second southbound through lane, but the feasibility of doing so should be investigated.
- Complete the first roundabout south of US 34 and design this roundabout to contain two lanes. Depending on whether Schmer Farm secures an access directly onto US 34, two continuous lanes southbound to eastbound into Schmer Farm should be provided as well as two lanes outbound including a right-turn by-pass lane, westbound to northbound.
- The second roundabout south of US 34 will suffice with a single-lane east-west entries. The northbound and southbound approaches should each be two lanes in light of Rocky Mountain Avenue being a four-lane major arterial road.
- The Boyd Lake Avenue intersection with LCR 20E is planned to ultimately be shifted south (away from the GWRR) and built as a roundabout intersection. This would ideally be done in conjunction with the Stuart development on the west side of Boyd Lake Avenue. This configuration is projected to function acceptably in 2045. The side-street stop configuration that currently exists will not function well given future traffic demands.
- From the projected traffic loading onto Mountain Lion Drive through Avenue South, a two-lane minor arterial road should be planned. Bike lanes should be incorporated into the design. Its intersection with Hanh's Peak Drive (west side of Avenue South) should be a one-lane roundabout that incorporates a southbound to westbound right-turn by-pass lane. Two southbound lanes into this roundabout are anticipated in light of the need to receive dual left turn lanes from westbound US 34.
- The new intersection of LCR 20E/Rocky Mountain Avenue will require improvements as follows:
 - Signalization. Being close to the railroad, a preemption configuration will be required.
 - Rocky Mountain Avenue will need to be widened at LCR 20E to incorporate a southbound left turn lane and right turn lane in approaching LCR 20E.
 - LCR 20E will need to be widened to provide a center eastbound left turn lane which will require redirecting one or both of the through lanes.
 - LCR 20E will also need widening along its north side to provide a westbound right turn lane to northbound Rocky Mountain Avenue. The level of traffic projected along LCR 20E will necessitate a four-lane major arterial section east of Rocky Mountain Avenue, according to LCUASS.

Robust multi-modal facilities and development features should be provided in and around Avenue South and the surrounding developments as a step towards discouraging single-occupant automobile use. Reductions in trip-making for the study area can be further explored through enhancing alternative modes of travel and implementing Transportation Demand Management strategies. This report provides a menu of possible options

that should be explored with respect to potential effectiveness and cost to reduce study area trip-making. The options generally entail:

- Enhanced and safe bike and pedestrian facilities
- Traffic calming along shared roadways
- Secure bike racks and storage
- Transit and/or shuttle provisions
- Provision of information to travelers
- Locker/shower facilities
- Mobility share programs

APPENDIX A. TRAFFIC COUNTS



ALL TRAFFIC DATA SERVICES

(303) 216-2439

www.alltrafficdata.net

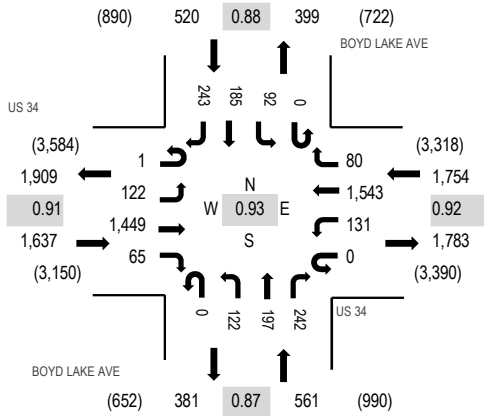
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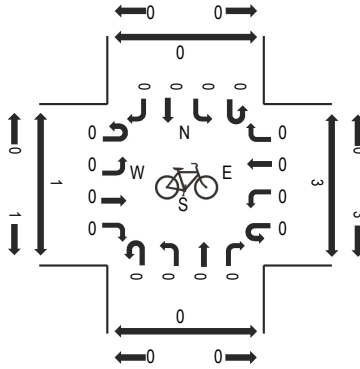
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Peak 15-Minutes: 07:45 AM - 08:00 AM

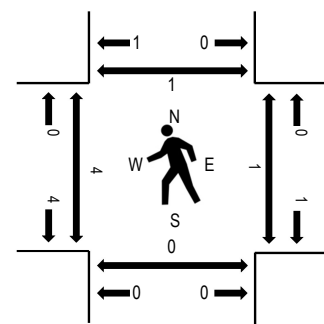
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	US 34				US 34				BOYD LAKE AVE				BOYD LAKE AVE				Total	Rolling Hour	Pedestrian Crossings			
	Eastbound				Westbound				Northbound				Southbound						West	East	South	North
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right						
7:00 AM	0	9	318	15	0	25	289	17	0	19	35	34	0	23	19	46	849	4,098	0	1	0	0
7:15 AM	0	22	392	10	0	20	370	16	0	16	48	38	0	16	26	55	1,029	4,339	0	0	0	0
7:30 AM	1	31	341	16	0	37	354	19	0	24	35	48	0	22	38	57	1,023	4,472	0	0	0	0
7:45 AM	0	37	395	20	0	30	427	23	0	21	53	67	0	20	38	66	1,197	4,458	3	0	0	0
8:00 AM	0	28	334	16	0	31	366	20	0	37	49	61	0	26	56	66	1,090	4,250	0	1	0	0
8:15 AM	0	26	379	13	0	33	396	18	0	40	60	66	0	24	53	54	1,162		1	0	0	1
8:30 AM	0	39	313	16	1	37	372	14	0	24	42	57	0	16	36	42	1,009		0	0	0	0
8:45 AM	1	25	335	18	0	21	365	17	0	29	39	48	0	16	28	47	989		0	0	0	0
Count Total	2	217	2,807	124	1	234	2,939	144	0	210	361	419	0	163	294	433	8,348		4	2	0	1
Peak Hour	1	122	1,449	65	0	131	1,543	80	0	122	197	242	0	92	185	243	4,472		4	1	0	1



ALL TRAFFIC DATA SERVICES

(303) 216-2439

www.alltrafficdata.net

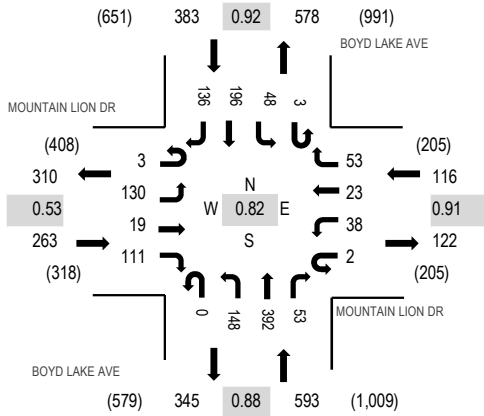
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Date: Tuesday, September 17, 2024

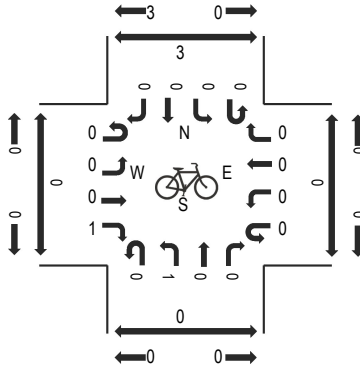
Peak Hour: 07:45 AM - 08:45 AM

Peak 15-Minutes: 08:15 AM - 08:30 AM

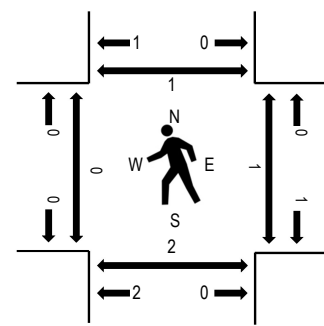
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	MOUNTAIN LION DR Eastbound				MOUNTAIN LION DR Westbound				BOYD LAKE AVE Northbound				BOYD LAKE AVE Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	12	0	3	0	8	1	5	0	4	70	9	2	8	43	8	173	917	0	0	0	1
7:15 AM	0	8	2	1	0	8	1	9	0	12	86	5	1	8	41	6	188	1,095	0	0	0	0
7:30 AM	0	6	2	3	0	16	4	12	0	14	82	14	1	9	55	17	235	1,319	0	0	0	0
7:45 AM	0	9	4	16	1	15	6	11	0	28	124	16	0	13	53	25	321	1,355	0	1	1	0
8:00 AM	2	38	6	27	1	5	6	13	0	39	98	12	2	12	51	39	351	1,266	0	0	1	0
8:15 AM	1	64	7	52	0	8	8	18	0	63	84	6	1	11	33	56	412		0	0	0	1
8:30 AM	0	19	2	16	0	10	3	11	0	18	86	19	0	12	59	16	271		0	0	0	0
8:45 AM	0	10	2	6	0	9	4	12	0	18	97	5	0	19	41	9	232		0	0	0	0
Count Total	3	166	25	124	2	79	33	91	0	196	727	86	7	92	376	176	2,183		0	1	2	2
Peak Hour	3	130	19	111	2	38	23	53	0	148	392	53	3	48	196	136	1,355		0	1	2	1



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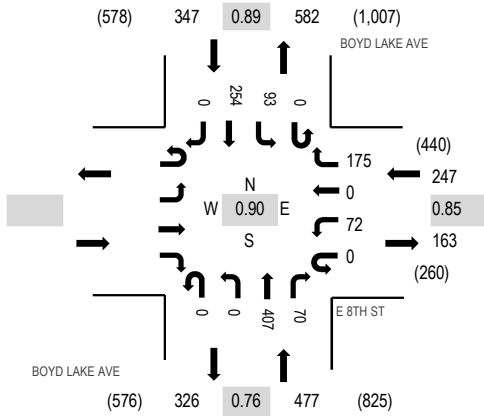
Location: 3 BOYD LAKE AVE & E 8TH ST AM

Date: Tuesday, September 17, 2024

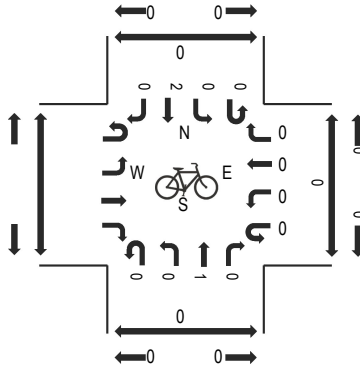
Peak Hour: 07:45 AM - 08:45 AM

Peak 15-Minutes: 07:45 AM - 08:00 AM

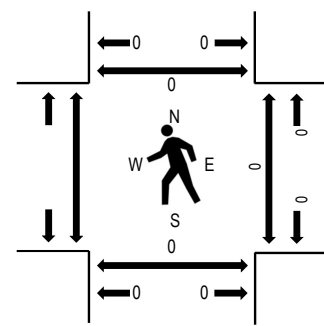
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	Eastbound				E 8TH ST Westbound				BOYD LAKE AVE Northbound				BOYD LAKE AVE Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM					0	19	0	26	0	0	58	8	0	6	47	0	164	871	0	0	0	0
7:15 AM					0	20	0	27	0	0	76	9	0	13	36	0	181	977	0	0	0	0
7:30 AM					0	24	0	26	0	0	91	18	0	18	53	0	230	1,069	0	0	0	0
7:45 AM					0	20	0	35	0	0	129	29	0	22	61	0	296	1,071	0	0	0	0
8:00 AM					0	18	0	54	0	0	102	11	0	28	57	0	270	972	0	0	0	0
8:15 AM					0	18	0	56	0	0	91	11	0	26	71	0	273		0	0	0	0
8:30 AM					0	16	0	30	0	0	85	19	0	17	65	0	232		0	0	0	0
8:45 AM					0	9	0	42	0	0	79	9	0	16	42	0	197		0	0	0	0
Count Total					0	144	0	296	0	0	711	114	0	146	432	0	1,843		0	0	0	0
Peak Hour					0	72	0	175	0	0	407	70	0	93	254	0	1,071		0	0	0	0



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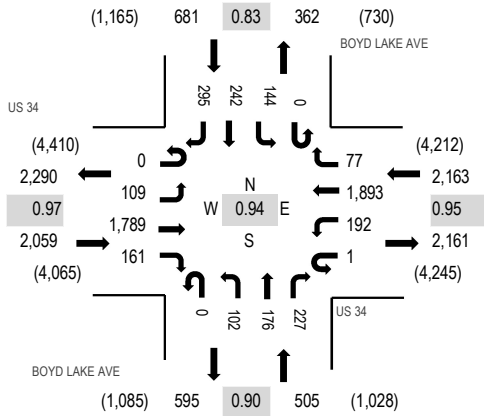
Location: 1 BOYD LAKE AVE & US 34 PM

Date: Tuesday, September 17, 2024

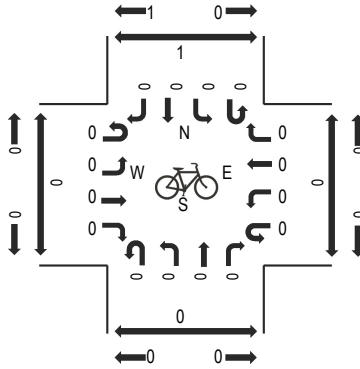
Peak Hour: 04:30 PM - 05:30 PM

Peak 15-Minutes: 05:00 PM - 05:15 PM

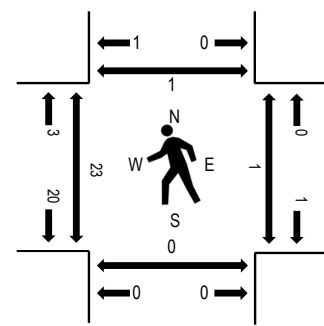
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	US 34 Eastbound				US 34 Westbound				BOYD LAKE AVE Northbound				BOYD LAKE AVE Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	1	31	462	22	0	45	467	17	0	39	55	69	0	30	48	73	1,359	5,290	0	3	0	0
4:15 PM	1	27	477	40	1	35	464	18	0	29	31	59	0	28	41	62	1,313	5,375	19	3	0	0
4:30 PM	0	27	455	24	0	33	477	12	0	27	32	54	0	37	67	80	1,325	5,408	3	0	0	1
4:45 PM	0	26	434	49	1	51	471	10	0	17	35	54	0	29	59	57	1,293	5,408	0	0	0	0
5:00 PM	0	27	450	41	0	56	489	27	0	30	57	62	0	39	70	96	1,444	5,180	20	1	0	0
5:15 PM	0	29	450	47	0	52	456	28	0	28	52	57	0	39	46	62	1,346		0	0	0	0
5:30 PM	0	41	468	34	0	53	457	27	0	29	43	72	0	18	44	39	1,325		0	0	0	0
5:45 PM	0	28	339	35	1	59	389	16	0	20	34	43	0	17	34	50	1,065		0	2	2	0
Count Total	2	236	3,535	292	3	384	3,670	155	0	219	339	470	0	237	409	519	10,470		42	9	2	1
Peak Hour	0	109	1,789	161	1	192	1,893	77	0	102	176	227	0	144	242	295	5,408		23	1	0	1



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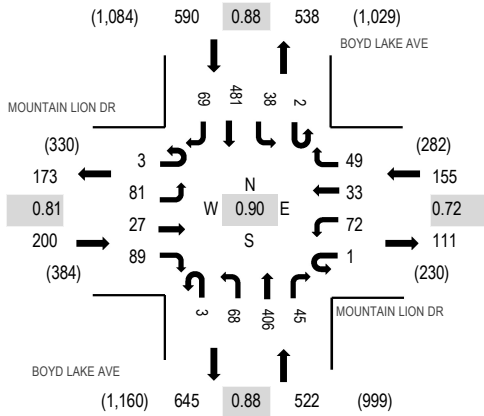
Location: 2 BOYD LAKE AVE & MOUNTAIN LION DR PM

Date: Tuesday, September 17, 2024

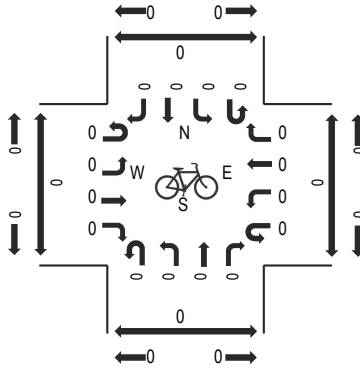
Peak Hour: 04:45 PM - 05:45 PM

Peak 15-Minutes: 05:00 PM - 05:15 PM

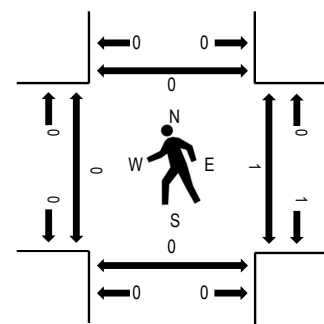
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	MOUNTAIN LION DR Eastbound				MOUNTAIN LION DR Westbound				BOYD LAKE AVE Northbound				BOYD LAKE AVE Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	1	48	8	28	0	15	3	16	0	21	93	16	0	12	86	24	371	1,331	0	1	4	1
4:15 PM	0	14	2	11	0	10	7	12	0	17	95	17	3	11	90	15	304	1,367	0	0	0	0
4:30 PM	0	11	4	22	0	19	6	14	0	11	90	8	1	17	96	13	312	1,415	1	0	0	0
4:45 PM	0	11	12	16	0	16	7	8	0	19	88	12	1	15	114	25	344	1,467	0	0	0	0
5:00 PM	1	30	3	28	1	25	10	19	1	13	98	11	0	10	144	13	407	1,418	0	1	0	0
5:15 PM	2	17	6	24	0	18	4	11	1	16	104	11	0	8	119	11	352		0	0	0	0
5:30 PM	0	23	6	21	0	13	12	11	1	20	116	11	1	5	104	20	364		0	0	0	0
5:45 PM	1	13	5	16	0	16	3	6	0	25	75	9	0	10	106	10	295		0	0	0	0
Count Total	5	167	46	166	1	132	52	97	3	142	759	95	6	88	859	131	2,749		1	2	4	1
Peak Hour	3	81	27	89	1	72	33	49	3	68	406	45	2	38	481	69	1,467		0	1	0	0



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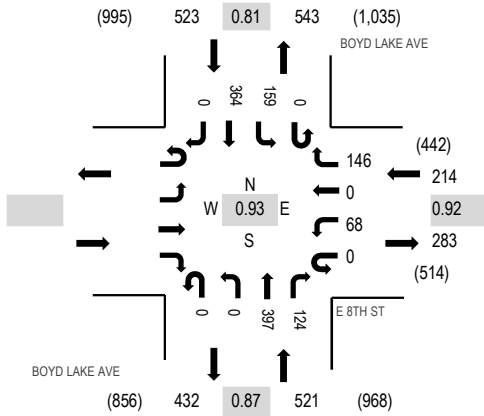
Location: 3 BOYD LAKE AVE & E 8TH ST PM

Date: Tuesday, September 17, 2024

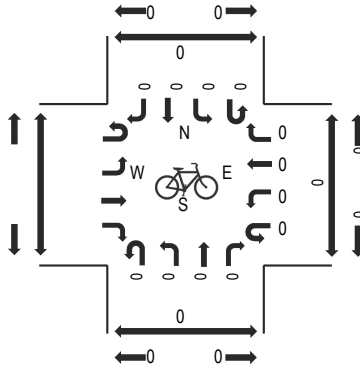
Peak Hour: 04:45 PM - 05:45 PM

Peak 15-Minutes: 05:00 PM - 05:15 PM

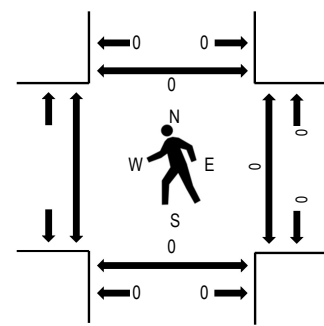
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



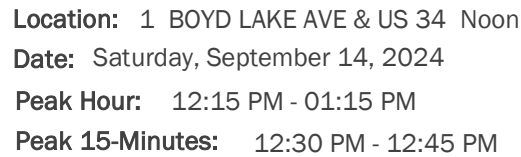
Peak Hour - Pedestrians



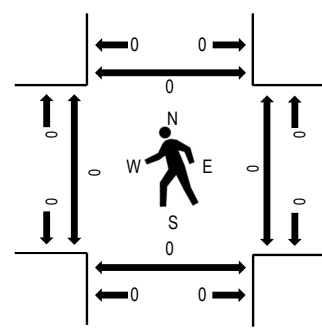
Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	Eastbound				E 8TH ST Westbound				BOYD LAKE AVE Northbound				BOYD LAKE AVE Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM					0	20	0	42	0	0	101	19	0	38	88	0	308	1,177	0	0	0	0
4:15 PM					0	23	0	34	0	0	93	27	0	32	64	0	273	1,208	0	0	0	0
4:30 PM					0	27	0	31	0	0	79	26	0	36	97	0	296	1,256	0	0	0	0
4:45 PM					0	18	0	33	0	0	107	25	0	33	84	0	300	1,258	0	0	0	0
5:00 PM					0	15	0	41	0	0	88	33	0	46	116	0	339	1,228	0	0	0	0
5:15 PM					0	18	0	44	0	0	111	38	0	37	73	0	321		0	0	0	0
5:30 PM					0	17	0	28	0	0	91	28	0	43	91	0	298		0	0	0	0
5:45 PM					0	22	0	29	0	0	83	19	0	34	83	0	270		0	0	0	0
Count Total					0	160	0	282	0	0	753	215	0	299	696	0	2,405		0	0	0	0
Peak Hour					0	68	0	146	0	0	397	124	0	159	364	0	1,258		0	0	0	0



Peak Hour - Pedestrians



Traffic Counts - Motorized Vehicles

Interval Start Time	US 34				US 34				BOYD LAKE AVE				BOYD LAKE AVE				Total	Rolling Hour	Pedestrian Crossings			
	Eastbound				Westbound				Northbound				Southbound						West	East	South	North
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right						
12:00 PM	1	41	421	25	1	55	391	8	0	26	44	72	0	26	24	37	1,172	4,824	0	1	0	0
12:15 PM	0	25	428	23	0	36	415	11	0	31	32	108	0	26	24	43	1,202	4,891	0	0	0	0
12:30 PM	1	28	415	34	0	61	405	22	0	52	26	131	0	17	30	49	1,271	4,772	0	0	0	0
12:45 PM	1	30	370	27	0	58	365	17	0	51	41	118	0	23	22	56	1,179	4,642	0	0	0	0
1:00 PM	0	34	427	32	0	57	432	21	0	26	27	106	0	20	15	42	1,239	4,556	0	0	0	0
1:15 PM	0	23	377	22	0	58	352	14	0	31	26	97	0	20	26	37	1,083		0	0	0	0
1:30 PM	0	25	409	21	0	50	392	16	0	39	26	91	0	17	20	35	1,141		0	0	0	0
1:45 PM	0	30	367	22	1	65	367	19	0	33	31	72	0	21	25	40	1,093		0	0	0	0
Count Total	3	236	3,214	206	2	440	3,119	128	0	289	253	795	0	170	186	339	9,380		0	1	0	0
Peak Hour	2	117	1,640	116	0	212	1,617	71	0	160	126	463	0	86	91	190	4,891		0	0	0	0



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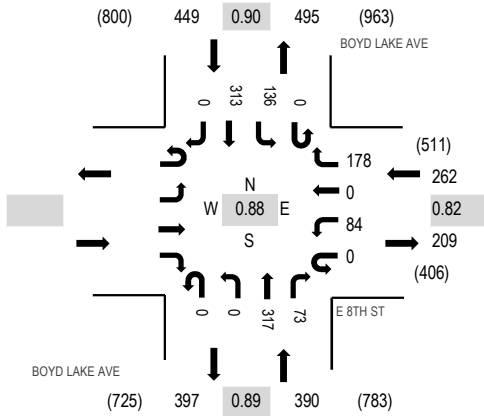
Location: 3 BOYD LAKE AVE & E 8TH ST Noon

Date: Saturday, September 14, 2024

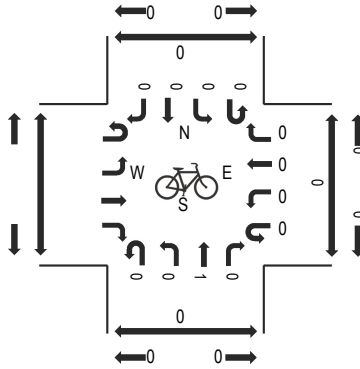
Peak Hour: 12:15 PM - 01:15 PM

Peak 15-Minutes: 12:30 PM - 12:45 PM

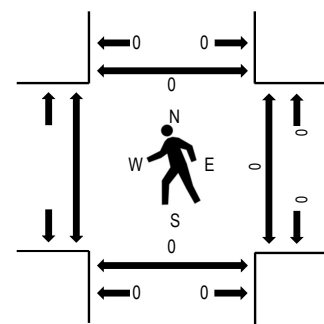
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	Eastbound				E 8TH ST Westbound				BOYD LAKE AVE Northbound				BOYD LAKE AVE Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
12:00 PM					0	24	0	36	0	0	83	24	0	23	43	0	233	1,086	0	0	0	0
12:15 PM					0	17	0	47	0	0	70	22	0	34	69	0	259	1,101	0	0	0	0
12:30 PM					0	20	0	64	0	0	81	23	0	38	87	0	313	1,100	0	0	0	0
12:45 PM					0	28	0	40	0	0	91	15	0	32	75	0	281	1,033	0	0	0	0
1:00 PM					0	19	0	27	0	0	75	13	0	32	82	0	248	1,008	0	0	0	0
1:15 PM					0	27	0	38	0	0	91	25	0	30	47	0	258		0	0	0	0
1:30 PM					0	20	0	38	0	0	58	22	0	34	74	0	246		0	0	0	0
1:45 PM					0	18	0	48	0	0	76	14	0	25	75	0	256		0	0	0	0
Count Total					0	173	0	338	0	0	625	158	0	248	552	0	2,094		0	0	0	0
Peak Hour					0	84	0	178	0	0	317	73	0	136	313	0	1,101		0	0	0	0

APPENDIX B. EXISTING TRAFFIC LEVEL OF SERVICE WORKSHEETS

Timings
1: Boyd Lake Ave & US 34

AM Peak Hour
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	122	1449	65	131	1543	80	122	197	242	92	185	243
Future Volume (vph)	122	1449	65	131	1543	80	122	197	242	92	185	243
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5		9.5	22.5	
Total Split (s)	9.5	42.4	42.4	15.1	48.0	48.0	9.5	23.0		9.5	23.0	
Total Split (%)	10.6%	47.1%	47.1%	16.8%	53.3%	53.3%	10.6%	25.6%		10.6%	25.6%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	5.0	38.4	38.4	10.1	43.5	43.5	5.0	20.4	90.0	5.0	18.5	90.0
Actuated g/C Ratio	0.06	0.43	0.43	0.11	0.48	0.48	0.06	0.23	1.00	0.06	0.21	1.00
v/c Ratio	0.69	0.72	0.09	0.71	0.97	0.10	0.69	0.26	0.16	0.52	0.27	0.16
Control Delay	61.4	23.8	0.2	59.1	39.4	1.2	61.4	30.6	0.2	51.6	31.3	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.4	23.8	0.2	59.1	39.4	1.2	61.4	30.6	0.2	51.6	31.3	0.2
LOS	E	C	A	E	D	A	E	C	A	D	C	A
Approach Delay		25.6			39.2			24.2			20.4	
Approach LOS		C			D			C			C	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 9.5 (11%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 30.2

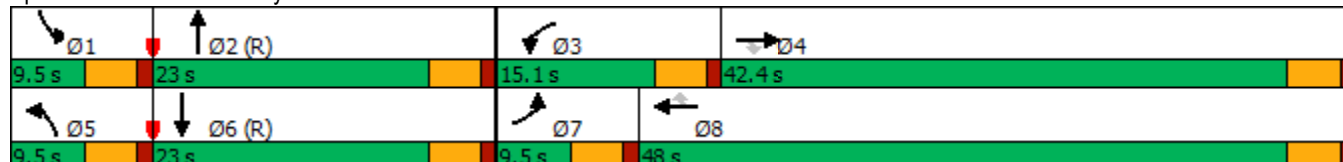
Intersection LOS: C

Intersection Capacity Utilization 71.4%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34



HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

AM Peak Hour
Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	122	1449	65	131	1543	80	122	197	242	92	185	243
Future Volume (veh/h)	122	1449	65	131	1543	80	122	197	242	92	185	243
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	131	1558	70	141	1659	86	131	212	0	99	199	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	192	2250	698	174	1715	765	192	750		176	734	
Arrive On Green	0.06	0.44	0.44	0.10	0.48	0.48	0.06	0.21	0.00	0.05	0.21	0.00
Sat Flow, veh/h	3456	5106	1585	1781	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	131	1558	70	141	1659	86	131	212	0	99	199	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1781	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	3.3	22.1	2.3	7.0	40.8	2.7	3.3	4.5	0.0	2.5	4.2	0.0
Cycle Q Clear(g_c), s	3.3	22.1	2.3	7.0	40.8	2.7	3.3	4.5	0.0	2.5	4.2	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	192	2250	698	174	1715	765	192	750		176	734	
V/C Ratio(X)	0.68	0.69	0.10	0.81	0.97	0.11	0.68	0.28		0.56	0.27	
Avail Cap(c_a), veh/h	192	2250	698	210	1718	766	192	750		192	734	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.09	0.09	0.09	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	41.7	20.3	14.7	39.8	22.6	12.7	41.7	29.8	0.0	41.7	30.0	0.0
Incr Delay (d2), s/veh	9.5	0.9	0.1	1.9	2.3	0.0	9.5	0.9	0.0	3.1	0.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.0	13.3	1.5	4.0	18.1	1.4	3.0	3.6	0.0	2.1	3.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.2	21.2	14.8	41.7	24.9	12.7	51.2	30.7	0.0	44.9	30.9	0.0
LnGrp LOS	D	C	B	D	C	B	D	C		D	C	
Approach Vol, veh/h		1759			1886			343			298	
Approach Delay, s/veh		23.2			25.6			38.5			35.6	
Approach LOS		C			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.1	23.5	13.3	44.2	9.5	23.1	9.5	47.9				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.0	18.5	10.6	37.9	5.0	18.5	5.0	43.5				
Max Q Clear Time (g_c+I1), s	4.5	6.5	9.0	24.1	5.3	6.2	5.3	42.8				
Green Ext Time (p_c), s	0.0	0.9	0.1	9.2	0.0	0.9	0.0	0.6				

Intersection Summary

HCM 6th Ctrl Delay	26.3
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Timings
2: US 34 & Hahns Peak Dr

AM Peak Hour
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	1469	2	61	1555	36	2	7	22	36	1	50
Future Volume (vph)	130	1469	2	61	1555	36	2	7	22	36	1	50
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	Free
Protected Phases	3	8		7	4			6			2	
Permitted Phases			8			4	6		6	2		Free
Detector Phase	3	8	8	7	4	4	6	6	6	2	2	
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Minimum Split (s)	9.5	24.0	24.0	9.5	32.0	32.0	32.0	32.0	32.0	32.0	32.0	
Total Split (s)	9.9	54.2	54.2	13.7	58.0	58.0	32.1	32.1	32.1	32.1	32.1	
Total Split (%)	9.9%	54.2%	54.2%	13.7%	58.0%	58.0%	32.1%	32.1%	32.1%	32.1%	32.1%	
Yellow Time (s)	3.5	4.0	4.0	3.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	6.0	6.0	4.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	None	None	None	Min	Min	Min	Min	Min	C-Min	C-Min	
Act Effect Green (s)	5.4	51.4	51.4	8.2	51.1	51.1	25.0	25.0	25.0	25.0	25.0	100.0
Actuated g/C Ratio	0.05	0.51	0.51	0.08	0.51	0.51	0.25	0.25	0.25	0.25	0.25	1.00
v/c Ratio	0.86	0.69	0.00	0.44	1.05	0.05	0.01	0.02	0.05	0.13	0.00	0.04
Control Delay	85.7	20.8	0.0	53.3	60.6	0.2	28.5	28.4	0.2	30.3	28.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	85.7	20.8	0.0	53.3	60.6	0.2	28.5	28.4	0.2	30.3	28.0	0.0
LOS	F	C	A	D	E	A	C	C	A	C	C	A
Approach Delay		26.0			59.0			8.1			12.9	
Approach LOS		C			E			A			B	

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:SBTL, Start of Yellow

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 41.7

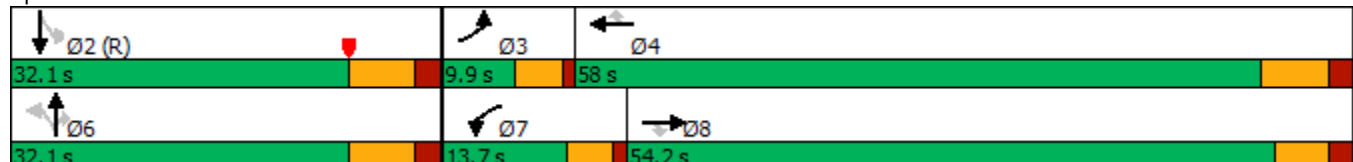
Intersection LOS: D

Intersection Capacity Utilization 86.7%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: US 34 & Hahns Peak Dr



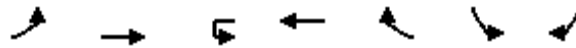
HCM 6th Signalized Intersection Summary 2: US 34 & Hahns Peak Dr

AM Peak Hour
Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	1469	2	61	1555	36	2	7	22	36	1	50
Future Volume (veh/h)	130	1469	2	61	1555	36	2	7	22	36	1	50
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	159	1791	2	64	1896	44	2	7	23	44	1	0
Peak Hour Factor	0.82	0.82	0.95	0.95	0.82	0.82	0.95	0.95	0.95	0.82	0.95	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	187	2643	820	83	1812	808	427	469	398	414	469	
Arrive On Green	0.05	0.52	0.52	0.05	0.51	0.51	0.25	0.25	0.25	0.25	0.25	0.00
Sat Flow, veh/h	3456	5106	1585	1781	3554	1585	1416	1870	1585	1380	1870	1585
Grp Volume(v), veh/h	159	1791	2	64	1896	44	2	7	23	44	1	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1781	1777	1585	1416	1870	1585	1380	1870	1585
Q Serve(g_s), s	4.6	26.1	0.1	3.6	51.0	1.4	0.1	0.3	1.1	2.5	0.0	0.0
Cycle Q Clear(g_c), s	4.6	26.1	0.1	3.6	51.0	1.4	0.1	0.3	1.1	2.8	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	187	2643	820	83	1812	808	427	469	398	414	469	
V/C Ratio(X)	0.85	0.68	0.00	0.77	1.05	0.05	0.00	0.01	0.06	0.11	0.00	
Avail Cap(c_a), veh/h	187	2643	820	164	1812	808	427	469	398	414	469	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.73	0.73	0.73	0.62	0.62	0.62	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	46.9	17.9	11.7	47.2	24.5	12.3	28.1	28.2	28.5	29.2	28.1	0.0
Incr Delay (d2), s/veh	22.1	0.4	0.0	9.2	30.3	0.0	0.0	0.0	0.0	0.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.5	14.2	0.0	3.2	35.5	0.9	0.1	0.2	0.8	1.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.1	18.3	11.7	56.3	54.8	12.4	28.1	28.2	28.5	29.7	28.1	0.0
LnGrp LOS	E	B	B	E	F	B	C	C	C	C	C	
Approach Vol, veh/h	1952				2004				32			
Approach Delay, s/veh	22.5				53.9				28.4			
Approach LOS	C				D				C			
Timer - Assigned Phs	2		3	4		6		7	8			
Phs Duration (G+Y+Rc), s	32.1		9.9	58.0		32.1		9.1	58.8			
Change Period (Y+Rc), s	7.0		4.5	7.0		7.0		4.5	* 7			
Max Green Setting (Gmax), s	25.1		5.4	51.0		25.1		9.2	* 48			
Max Q Clear Time (g_c+I1), s	4.8		6.6	53.0		3.1		5.6	28.1			
Green Ext Time (p_c), s	0.0		0.0	0.0		0.0		0.0	10.1			
Intersection Summary												
HCM 6th Ctrl Delay	38.2											
HCM 6th LOS	D											
Notes												
User approved pedestrian interval to be less than phase max green.												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.												

Timings
4: US 34 & Rocky Mountain Ave

AM Peak Hour
Avenue South



Lane Group	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (vph)	207	1320	14	1588	393	225	99
Future Volume (vph)	207	1320	14	1588	393	225	99
Turn Type	Prot	NA	Prot	NA	Perm	Prot	Free
Protected Phases	3	8	7	4		5	
Permitted Phases					4		Free
Detector Phase	3	8	7	4	4	5	
Switch Phase							
Minimum Initial (s)	5.0	25.0	5.0	25.0	25.0	5.0	
Minimum Split (s)	29.5	32.0	10.0	35.0	35.0	9.5	
Total Split (s)	29.5	54.5	10.0	35.0	35.0	10.5	
Total Split (%)	39.3%	72.7%	13.3%	46.7%	46.7%	14.0%	
Yellow Time (s)	3.5	5.0	3.5	5.0	5.0	3.5	
All-Red Time (s)	1.0	2.0	1.0	2.0	2.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	7.0	4.5	7.0	7.0	4.5	
Lead/Lag	Lead	Lag	Lead	Lag	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	Min	None	Min	Min	None	
Act Effect Green (s)	9.3	45.0	5.2	33.2	33.2	16.5	75.0
Actuated g/C Ratio	0.12	0.60	0.07	0.44	0.44	0.22	1.00
v/c Ratio	0.53	0.47	0.12	0.77	0.45	0.32	0.07
Control Delay	35.0	8.7	34.9	19.8	2.8	30.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	8.7	34.9	19.8	2.8	30.5	0.1
LOS	D	A	C	B	A	C	A
Approach Delay		12.3		16.6		21.2	
Approach LOS		B		B		C	

Intersection Summary

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2: and 6:, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 15.3

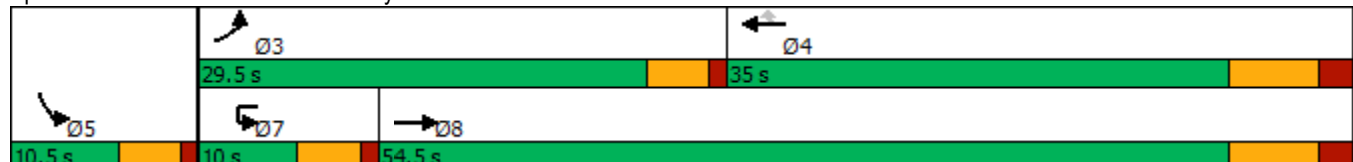
Intersection LOS: B

Intersection Capacity Utilization 56.3%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 4: US 34 & Rocky Mountain Ave



HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

AM Peak Hour
Avenue South



Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations	←←	↑↑↑	←	↑↑↑	→	←←	→
Traffic Volume (veh/h)	207	1320	14	1588	393	225	99
Future Volume (veh/h)	207	1320	14	1588	393	225	99
Initial Q (Qb), veh	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)	1.00				1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00		1.00	1.00	1.00	1.00
Work Zone On Approach		No		No		No	
Adj Sat Flow, veh/h/ln	1870	1870		1870	1870	1870	1870
Adj Flow Rate, veh/h	225	1435		1726	427	245	0
Peak Hour Factor	0.92	0.92		0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2		2	2	2	2
Cap, veh/h	324	2656		1870	581	1128	
Arrive On Green	0.09	0.52		0.37	0.37	0.33	0.00
Sat Flow, veh/h	3456	5274		5274	1585	3456	1585
Grp Volume(v), veh/h	225	1435		1726	427	245	0
Grp Sat Flow(s),veh/h/ln	1728	1702		1702	1585	1728	1585
Q Serve(g_s), s	4.7	14.1		24.3	17.5	3.9	0.0
Cycle Q Clear(g_c), s	4.7	14.1		24.3	17.5	3.9	0.0
Prop In Lane	1.00				1.00	1.00	1.00
Lane Grp Cap(c), veh/h	324	2656		1870	581	1128	
V/C Ratio(X)	0.69	0.54		0.92	0.74	0.22	
Avail Cap(c_a), veh/h	1152	3234		1906	592	1128	
HCM Platoon Ratio	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	0.70	0.70		1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	32.9	12.0		22.8	20.6	18.3	0.0
Incr Delay (d2), s/veh	0.7	0.0		7.8	4.1	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.5	7.7		15.6	10.9	2.7	0.0
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	33.6	12.1		30.5	24.7	18.4	0.0
LnGrp LOS	C	B		C	C	B	
Approach Vol, veh/h		1660		2153		245	
Approach Delay, s/veh		15.0		29.4		18.4	
Approach LOS		B		C		B	
Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		29.0	11.5	34.5			46.0
Change Period (Y+Rc), s		4.5	4.5	7.0			7.0
Max Green Setting (Gmax), s		6.0	25.0	28.0			47.5
Max Q Clear Time (g_c+I1), s		5.9	6.7	26.3			16.1
Green Ext Time (p_c), s		0.0	0.4	1.2			5.0
Intersection Summary							
HCM 6th Ctrl Delay			22.8				
HCM 6th LOS			C				
Notes							
User approved pedestrian interval to be less than phase max green.							
User approved ignoring U-Turning movement.							
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.							

Intersection						
Int Delay, s/veh	10.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	72	175	407	70	93	254
Future Vol, veh/h	72	175	407	70	93	254
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	85	85	76	76	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	85	206	536	92	104	285
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1075	582	0	0	628	0
Stage 1	582	-	-	-	-	-
Stage 2	493	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	243	513	-	-	954	-
Stage 1	559	-	-	-	-	-
Stage 2	614	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	211	513	-	-	954	-
Mov Cap-2 Maneuver	211	-	-	-	-	-
Stage 1	559	-	-	-	-	-
Stage 2	534	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	45.1	0	2.5			
HCM LOS	E					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	362	954	-	
HCM Lane V/C Ratio	-	-	0.803	0.11	-	
HCM Control Delay (s)	-	-	45.1	9.2	0	
HCM Lane LOS	-	-	E	A	A	
HCM 95th %tile Q(veh)	-	-	6.9	0.4	-	

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion Dr AM (Site Folder: General)]**

AM Peak Hour
Site Category: Existing Conditions
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Avenue														
3	L2	148	3.0	161	3.0	0.291	6.2	LOS A	1.3	34.1	0.40	0.28	0.40	33.3
8	T1	392	3.0	426	3.0	0.291	6.0	LOS A	1.3	34.1	0.38	0.27	0.38	34.2
18	R2	53	3.0	58	3.0	0.291	5.9	LOS A	1.3	33.4	0.38	0.26	0.38	33.7
Approach		593	3.0	645	3.0	0.291	6.0	LOS A	1.3	34.1	0.39	0.27	0.39	33.9
East: Mountain Lion Drive														
1	L2	38	3.0	41	3.0	0.148	6.5	LOS A	0.5	13.4	0.56	0.56	0.56	33.5
6	T1	23	3.0	25	3.0	0.148	6.5	LOS A	0.5	13.4	0.56	0.56	0.56	33.4
16	R2	38	3.0	41	3.0	0.148	6.5	LOS A	0.5	13.4	0.56	0.56	0.56	32.4
Approach		99	3.0	108	3.0	0.148	6.5	LOS A	0.5	13.4	0.56	0.56	0.56	33.0
North: Boyd Lake Avenue														
7	L2	48	3.0	51	3.0	0.183	5.1	LOS A	0.8	19.2	0.37	0.26	0.37	34.6
4	T1	196	3.0	206	3.0	0.183	5.0	LOS A	0.8	19.2	0.36	0.25	0.36	34.7
14	R2	136	3.0	143	3.0	0.183	4.8	LOS A	0.7	18.8	0.35	0.24	0.35	34.1
Approach		380	3.0	400	3.0	0.183	4.9	LOS A	0.8	19.2	0.36	0.25	0.36	34.5
West: Mountain Lion Drive														
5	L2	130	3.0	141	3.0	0.266	5.9	LOS A	1.1	29.0	0.43	0.34	0.43	33.5
2	T1	19	3.0	21	3.0	0.266	5.9	LOS A	1.1	29.0	0.43	0.34	0.43	33.4
12	R2	111	3.0	121	3.0	0.266	5.9	LOS A	1.1	29.0	0.43	0.34	0.43	32.4
Approach		260	3.0	283	3.0	0.266	5.9	LOS A	1.1	29.0	0.43	0.34	0.43	33.0
All Vehicles		1332	3.0	1435	3.0	0.291	5.7	LOS A	1.3	34.1	0.40	0.30	0.40	33.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Timings
1: Boyd Lake Ave & US 34

PM Peak Hour
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	1789	161	192	1893	77	102	176	227	144	242	295
Future Volume (vph)	109	1789	161	192	1893	77	102	176	227	144	242	295
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5		9.5	22.5	
Total Split (s)	9.5	55.4	55.4	21.1	67.0	67.0	10.0	23.3		10.2	23.5	
Total Split (%)	8.6%	50.4%	50.4%	19.2%	60.9%	60.9%	9.1%	21.2%		9.3%	21.4%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	5.0	52.0	52.0	15.5	62.5	62.5	5.5	18.8	110.0	5.7	19.0	110.0
Actuated g/C Ratio	0.05	0.47	0.47	0.14	0.57	0.57	0.05	0.17	1.00	0.05	0.17	1.00
v/c Ratio	0.74	0.79	0.21	0.82	1.00	0.09	0.64	0.31	0.15	0.86	0.42	0.20
Control Delay	79.6	27.8	4.5	71.0	44.9	1.4	68.6	41.5	0.2	92.0	43.0	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.6	27.8	4.5	71.0	44.9	1.4	68.6	41.5	0.2	92.0	43.0	0.3
LOS	E	C	A	E	D	A	E	D	A	F	D	A
Approach Delay		28.7			45.7			28.5			34.8	
Approach LOS		C			D			C			C	

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 10.2 (9%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 36.2

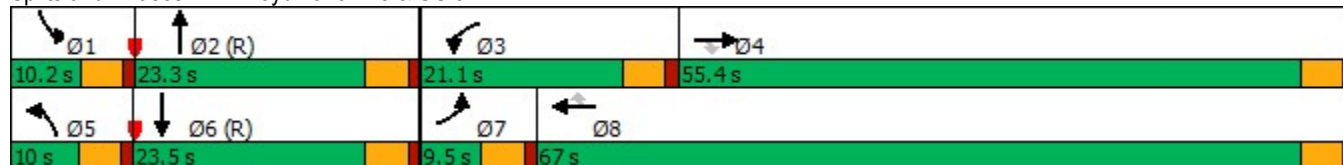
Intersection LOS: D

Intersection Capacity Utilization 82.4%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34



HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

PM Peak Hour

Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	109	1789	161	192	1893	77	102	176	227	144	242	295
Future Volume (veh/h)	109	1789	161	192	1893	77	102	176	227	144	242	295
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	116	1903	171	204	2014	82	109	187	0	153	257	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	157	2462	764	234	2019	901	164	607		179	623	
Arrive On Green	0.05	0.48	0.48	0.13	0.57	0.57	0.05	0.17	0.00	0.05	0.18	0.00
Sat Flow, veh/h	3456	5106	1585	1781	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	116	1903	171	204	2014	82	109	187	0	153	257	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1781	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	3.6	33.8	6.9	12.4	62.1	2.6	3.4	5.1	0.0	4.8	7.1	0.0
Cycle Q Clear(g_c), s	3.6	33.8	6.9	12.4	62.1	2.6	3.4	5.1	0.0	4.8	7.1	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	157	2462	764	234	2019	901	164	607		179	623	
V/C Ratio(X)	0.74	0.77	0.22	0.87	1.00	0.09	0.66	0.31		0.85	0.41	
Avail Cap(c_a), veh/h	157	2462	764	269	2019	901	173	607		179	623	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.18	0.18	0.18	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	51.9	23.5	16.5	46.9	23.7	10.8	51.5	39.9	0.0	51.7	40.3	0.0
Incr Delay (d2), s/veh	16.7	1.6	0.1	5.3	7.9	0.0	8.7	1.3	0.0	30.9	2.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.5	19.4	4.5	7.5	29.7	1.5	3.0	4.2	0.0	5.1	5.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.6	25.1	16.7	52.2	31.6	10.8	60.2	41.2	0.0	82.7	42.3	0.0
LnGrp LOS	E	C	B	D	C	B	E	D		F	D	
Approach Vol, veh/h	2190				2300				296			
Approach Delay, s/veh	26.7				32.7				48.2			
Approach LOS	C				C				D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.2	23.3	19.0	57.5	9.7	23.8	9.5	67.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.7	18.8	16.6	50.9	5.5	19.0	5.0	62.5				
Max Q Clear Time (g_c+I1), s	6.8	7.1	14.4	35.8	5.4	9.1	5.6	64.1				
Green Ext Time (p_c), s	0.0	0.8	0.1	11.7	0.0	1.1	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 33.0

HCM 6th LOS C

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Timings
2: US 34 & Hahns Peak Dr

PM Peak Hour
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	252	1892	1	37	1815	73	1	8	42	61	6	120
Future Volume (vph)	252	1892	1	37	1815	73	1	8	42	61	6	120
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	Free
Protected Phases	3	8		7	4			6			2	
Permitted Phases			8			4	6		6	2		Free
Detector Phase	3	8	8	7	4	4	6	6	6	2	2	
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Minimum Split (s)	9.5	24.0	24.0	9.5	32.0	32.0	32.0	32.0	32.0	32.0	32.0	
Total Split (s)	15.7	76.2	76.2	11.5	72.0	72.0	32.3	32.3	32.3	32.3	32.3	
Total Split (%)	13.1%	63.5%	63.5%	9.6%	60.0%	60.0%	26.9%	26.9%	26.9%	26.9%	26.9%	
Yellow Time (s)	3.5	4.0	4.0	3.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	6.0	6.0	4.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	None	None	None	Min	Min	Min	Min	Min	C-Min	C-Min	
Act Effect Green (s)	11.2	72.6	72.6	6.9	65.3	65.3	25.0	25.0	25.0	25.0	25.0	120.0
Actuated g/C Ratio	0.09	0.60	0.60	0.06	0.54	0.54	0.21	0.21	0.21	0.21	0.21	1.00
v/c Ratio	0.96	0.75	0.00	0.40	1.02	0.09	0.00	0.02	0.12	0.24	0.02	0.09
Control Delay	95.4	19.7	0.0	66.2	54.8	3.3	38.0	38.1	3.4	42.2	38.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	95.4	19.7	0.0	66.2	54.8	3.3	38.0	38.1	3.4	42.2	38.0	0.1
LOS	F	B	A	E	D	A	D	D	A	D	D	A
Approach Delay		28.5			53.1			9.6			15.1	
Approach LOS		C			D			A			B	

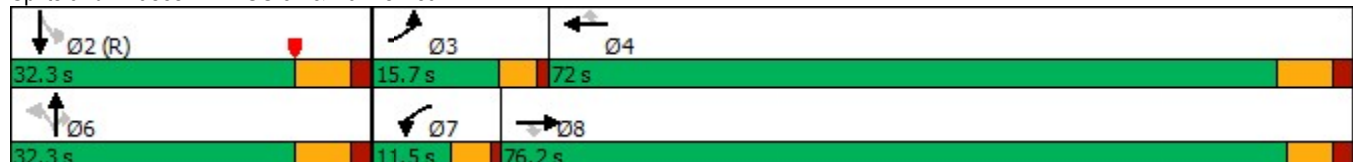
Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:SBTL, Start of Yellow
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 38.1
 Intersection Capacity Utilization 94.9%
 Analysis Period (min) 15

Intersection LOS: D

ICU Level of Service F

Splits and Phases: 2: US 34 & Hahns Peak Dr



HCM 6th Signalized Intersection Summary

2: US 34 & Hahns Peak Dr

PM Peak Hour
Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	252	1892	1	37	1815	73	1	8	42	61	6	120
Future Volume (veh/h)	252	1892	1	37	1815	73	1	8	42	61	6	120
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	307	2307	1	40	1973	79	1	9	46	70	7	0
Peak Hour Factor	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.87	0.92	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	323	3086	958	55	1925	859	353	394	334	339	394	
Arrive On Green	0.09	0.60	0.60	0.03	0.54	0.54	0.21	0.21	0.21	0.21	0.21	0.00
Sat Flow, veh/h	3456	5106	1585	1781	3554	1585	1409	1870	1585	1349	1870	1585
Grp Volume(v), veh/h	307	2307	1	40	1973	79	1	9	46	70	7	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1781	1777	1585	1409	1870	1585	1349	1870	1585
Q Serve(g_s), s	10.6	39.1	0.0	2.7	65.0	2.9	0.1	0.5	2.8	5.2	0.4	0.0
Cycle Q Clear(g_c), s	10.6	39.1	0.0	2.7	65.0	2.9	0.4	0.5	2.8	5.7	0.4	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	323	3086	958	55	1925	859	353	394	334	339	394	
V/C Ratio(X)	0.95	0.75	0.00	0.73	1.02	0.09	0.00	0.02	0.14	0.21	0.02	
Avail Cap(c_a), veh/h	323	3086	958	104	1925	859	353	394	334	339	394	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.61	0.61	0.61	0.28	0.28	0.28	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	54.1	17.1	9.4	57.7	27.5	13.3	37.7	37.5	38.5	39.8	37.5	0.0
Incr Delay (d2), s/veh	27.2	0.6	0.0	5.2	18.0	0.0	0.0	0.0	0.1	1.4	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.9	19.5	0.0	2.3	36.5	1.9	0.0	0.4	2.0	3.4	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	81.3	17.7	9.4	62.9	45.5	13.3	37.7	37.6	38.6	41.2	37.6	0.0
LnGrp LOS	F	B	A	E	F	B	D	D	D	D	D	
Approach Vol, veh/h	2615			2092			56			77		
Approach Delay, s/veh	25.2			44.6			38.4			40.8		
Approach LOS	C			D			D			D		
Timer - Assigned Phs	2			3			4			6		
Phs Duration (G+Y+Rc), s	32.3			15.7			72.0			32.3		
Change Period (Y+Rc), s	7.0			4.5			7.0			7.0		
Max Green Setting (Gmax), s	25.3			11.2			65.0			25.3		
Max Q Clear Time (g_c+I1), s	7.7			12.6			67.0			4.8		
Green Ext Time (p_c), s	0.0			0.0			0.0			0.0		
Intersection Summary												
HCM 6th Ctrl Delay	34.0											
HCM 6th LOS	C											
Notes												
User approved pedestrian interval to be less than phase max green.												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.												

Timings
4: US 34 & Rocky Mountain Ave

PM Peak Hour
Avenue South

							
Lane Group	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (vph)	192	1803	22	1749	375	360	213
Future Volume (vph)	192	1803	22	1749	375	360	213
Turn Type	Prot	NA	Prot	NA	Perm	Prot	Free
Protected Phases	3	8	7	4		5	
Permitted Phases					4		Free
Detector Phase	3	8	7	4	4	5	
Switch Phase							
Minimum Initial (s)	25.0	5.0	5.0	25.0	25.0	5.0	
Minimum Split (s)	32.0	24.0	10.0	35.0	35.0	9.5	
Total Split (s)	32.0	57.0	10.0	35.0	35.0	13.0	
Total Split (%)	40.0%	71.3%	12.5%	43.8%	43.8%	16.3%	
Yellow Time (s)	5.0	4.0	3.5	5.0	5.0	3.5	
All-Red Time (s)	2.0	2.0	1.0	2.0	2.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0	6.0	4.5	7.0	7.0	4.5	
Lead/Lag	Lead	Lag	Lead	Lag	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		
Recall Mode	Min	None	None	Min	Min	None	
Act Effect Green (s)	25.0	57.0	5.3	28.0	28.0	8.5	80.0
Actuated g/C Ratio	0.31	0.71	0.07	0.35	0.35	0.11	1.00
v/c Ratio	0.18	0.50	0.21	1.01	0.48	1.02	0.14
Control Delay	20.7	6.3	39.6	52.0	4.4	90.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.7	6.3	39.6	52.0	4.4	90.2	0.2
LOS	C	A	D	D	A	F	A
Approach Delay		7.8		43.5		56.7	
Approach LOS		A		D		E	

Intersection Summary

Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2: and 6:, Start of Yellow
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 30.3
 Intersection Capacity Utilization 80.3%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service D

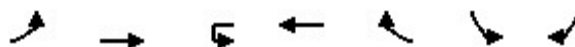
Splits and Phases: 4: US 34 & Rocky Mountain Ave



HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

PM Peak Hour
Avenue South



Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations	←←	↑↑↑	←	↑↑↑	→	←←	→
Traffic Volume (veh/h)	192	1803	22	1749	375	360	213
Future Volume (veh/h)	192	1803	22	1749	375	360	213
Initial Q (Qb), veh	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)	1.00				1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00		1.00	1.00	1.00	1.00
Work Zone On Approach		No		No		No	
Adj Sat Flow, veh/h/ln	1870	1870		1870	1870	1870	1870
Adj Flow Rate, veh/h	198	1803		1803	387	371	0
Peak Hour Factor	0.97	1.00		0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2		2	2	2	2
Cap, veh/h	1080	3830		1787	555	367	
Arrive On Green	0.31	0.75		0.35	0.35	0.11	0.00
Sat Flow, veh/h	3456	5274		5274	1585	3456	1585
Grp Volume(v), veh/h	198	1803		1803	387	371	0
Grp Sat Flow(s),veh/h/ln	1728	1702		1702	1585	1728	1585
Q Serve(g_s), s	3.3	10.9		28.0	16.8	8.5	0.0
Cycle Q Clear(g_c), s	3.3	10.9		28.0	16.8	8.5	0.0
Prop In Lane	1.00				1.00	1.00	1.00
Lane Grp Cap(c), veh/h	1080	3830		1787	555	367	
V/C Ratio(X)	0.18	0.47		1.01	0.70	1.01	
Avail Cap(c_a), veh/h	1080	3830		1787	555	367	
HCM Platoon Ratio	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	0.62	0.62		1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	20.1	3.9		26.0	22.4	35.8	0.0
Incr Delay (d2), s/veh	0.0	0.0		23.5	3.2	49.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.3	4.5		20.8	10.6	10.1	0.0
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	20.1	3.9		49.5	25.6	85.4	0.0
LnGrp LOS	C	A		F	C	F	
Approach Vol, veh/h		2001		2190		371	
Approach Delay, s/veh		5.5		45.3		85.4	
Approach LOS		A		D		F	
Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		13.0	32.0	35.0			67.0
Change Period (Y+Rc), s		4.5	7.0	7.0			* 7
Max Green Setting (Gmax), s		8.5	25.0	28.0			* 51
Max Q Clear Time (g_c+I1), s		10.5	5.3	30.0			12.9
Green Ext Time (p_c), s		0.0	0.1	0.0			13.3

Intersection Summary

HCM 6th Ctrl Delay	31.1
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection						
Int Delay, s/veh	12.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	68	146	387	124	159	364
Future Vol, veh/h	68	146	387	124	159	364
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	87	87	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	74	159	445	143	196	449
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1358	517	0	0	588	0
Stage 1	517	-	-	-	-	-
Stage 2	841	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	164	558	-	-	987	-
Stage 1	598	-	-	-	-	-
Stage 2	423	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	121	558	-	-	987	-
Mov Cap-2 Maneuver	121	-	-	-	-	-
Stage 1	598	-	-	-	-	-
Stage 2	311	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	73.5	0		2.9		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	- 260		987	-	
HCM Lane V/C Ratio	-	- 0.895		0.199	-	
HCM Control Delay (s)	-	- 73.5		9.6	0	
HCM Lane LOS	-	- F		A	A	
HCM 95th %tile Q(veh)	-	- 7.8		0.7	-	

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion Dr PM (Site Folder: General)]**

PM Peak Hour
Site Category: Existing Conditions
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Avenue														
3	L2	68	3.0	74	3.0	0.239	5.3	LOS A	1.1	27.2	0.31	0.19	0.31	34.4
8	T1	406	3.0	441	3.0	0.239	5.2	LOS A	1.1	27.2	0.30	0.18	0.30	34.8
18	R2	45	3.0	49	3.0	0.239	5.1	LOS A	1.0	26.6	0.29	0.17	0.29	34.1
Approach		519	3.0	564	3.0	0.239	5.2	LOS A	1.1	27.2	0.30	0.18	0.30	34.7
East: Mountain Lion Drive														
1	L2	72	3.0	78	3.0	0.206	6.6	LOS A	0.8	19.8	0.55	0.53	0.55	33.2
6	T1	33	3.0	36	3.0	0.206	6.6	LOS A	0.8	19.8	0.55	0.53	0.55	33.1
16	R2	49	3.0	53	3.0	0.206	6.6	LOS A	0.8	19.8	0.55	0.53	0.55	32.2
Approach		154	3.0	167	3.0	0.206	6.6	LOS A	0.8	19.8	0.55	0.53	0.55	32.9
North: Boyd Lake Avenue														
7	L2	38	3.0	41	3.0	0.282	6.0	LOS A	1.3	33.1	0.37	0.25	0.37	34.5
4	T1	481	3.0	523	3.0	0.282	5.8	LOS A	1.3	33.1	0.36	0.24	0.36	34.6
14	R2	69	3.0	75	3.0	0.282	5.7	LOS A	1.3	32.4	0.35	0.23	0.35	33.8
Approach		588	3.0	639	3.0	0.282	5.8	LOS A	1.3	33.1	0.36	0.24	0.36	34.5
West: Mountain Lion Drive														
5	L2	81	3.0	88	3.0	0.224	7.0	LOS A	0.8	21.6	0.57	0.57	0.57	32.9
2	T1	13	3.0	14	3.0	0.224	7.0	LOS A	0.8	21.6	0.57	0.57	0.57	32.8
12	R2	68	3.0	74	3.0	0.224	7.0	LOS A	0.8	21.6	0.57	0.57	0.57	31.9
Approach		162	3.0	176	3.0	0.224	7.0	LOS A	0.8	21.6	0.57	0.57	0.57	32.5
All Vehicles		1423	3.0	1547	3.0	0.282	5.8	LOS A	1.3	33.1	0.38	0.29	0.38	34.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Timings
1: Boyd Lake Ave & US 34

Saturday Mid-Day
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	  			 		 	 		 	 	
Traffic Volume (vph)	117	1640	116	212	1617	71	160	126	463	86	91	190
Future Volume (vph)	117	1640	116	212	1617	71	160	126	463	86	91	190
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5		9.5	22.5	
Total Split (s)	9.5	40.8	40.8	16.7	48.0	48.0	9.7	23.0		9.5	22.8	
Total Split (%)	10.6%	45.3%	45.3%	18.6%	53.3%	53.3%	10.8%	25.6%		10.6%	25.3%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	5.0	36.3	36.3	12.2	43.5	43.5	5.2	20.4	90.0	5.0	18.3	90.0
Actuated g/C Ratio	0.06	0.40	0.40	0.14	0.48	0.48	0.06	0.23	1.00	0.06	0.20	1.00
v/c Ratio	0.64	0.83	0.16	0.92	0.98	0.09	0.84	0.16	0.30	0.47	0.13	0.13
Control Delay	58.0	28.6	1.2	82.3	42.5	0.8	77.1	29.8	0.5	49.8	30.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.0	28.6	1.2	82.3	42.5	0.8	77.1	29.8	0.5	49.8	30.0	0.2
LOS	E	C	A	F	D	A	E	C	A	D	C	A
Approach Delay		28.7			45.4			21.8			19.2	
Approach LOS		C			D			C			B	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 9.5 (11%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 33.4

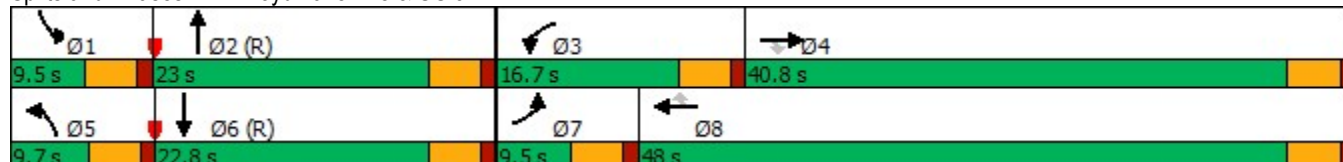
Intersection LOS: C

Intersection Capacity Utilization 72.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34



HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

Saturday Mid-Day

Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	1640	116	212	1617	71	160	126	463	86	91	190
Future Volume (veh/h)	117	1640	116	212	1617	71	160	126	463	86	91	190
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	122	1708	121	221	1684	74	167	131	0	90	95	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	187	2052	637	241	1718	766	200	756		172	728	
Arrive On Green	0.05	0.40	0.40	0.14	0.48	0.48	0.06	0.21	0.00	0.05	0.20	0.00
Sat Flow, veh/h	3456	5106	1585	1781	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	122	1708	121	221	1684	74	167	131	0	90	95	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1781	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	3.1	27.1	4.4	11.0	41.9	2.3	4.3	2.7	0.0	2.3	2.0	0.0
Cycle Q Clear(g_c), s	3.1	27.1	4.4	11.0	41.9	2.3	4.3	2.7	0.0	2.3	2.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	187	2052	637	241	1718	766	200	756		172	728	
V/C Ratio(X)	0.65	0.83	0.19	0.92	0.98	0.10	0.84	0.17		0.52	0.13	
Avail Cap(c_a), veh/h	192	2059	639	241	1718	766	200	756		192	728	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.24	0.24	0.24	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	41.7	24.2	17.4	38.4	22.8	12.6	42.0	29.0	0.0	41.7	29.2	0.0
Incr Delay (d2), s/veh	7.4	3.1	0.1	12.6	6.9	0.0	25.5	0.5	0.0	2.5	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.7	16.3	2.9	7.5	21.1	1.4	4.5	2.2	0.0	1.8	1.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.1	27.2	17.6	51.0	29.7	12.6	67.4	29.4	0.0	44.2	29.6	0.0
LnGrp LOS	D	C	B	D	C	B	E	C		D	C	
Approach Vol, veh/h	1951				1979				298			
Approach Delay, s/veh	28.0				31.4				50.7			
Approach LOS	C				C				D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.0	23.7	16.7	40.7	9.7	22.9	9.4	48.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.0	18.5	12.2	36.3	5.2	18.3	5.0	43.5				
Max Q Clear Time (g_c+I1), s	4.3	4.7	13.0	29.1	6.3	4.0	5.1	43.9				
Green Ext Time (p_c), s	0.0	0.5	0.0	5.8	0.0	0.4	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 31.4

HCM 6th LOS C

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Timings
2: US 34 & Hahns Peak Dr

Saturday Mid-Day
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	373	1492	3	47	1770	96	1	12	17	96	6	187
Future Volume (vph)	373	1492	3	47	1770	96	1	12	17	96	6	187
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	Free
Protected Phases	3	8		7	4			6			2	
Permitted Phases			8			4	6		6	2		Free
Detector Phase	3	8	8	7	4	4	6	6	6	2	2	
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Minimum Split (s)	9.5	24.0	24.0	9.5	32.0	32.0	32.0	32.0	32.0	32.0	32.0	
Total Split (s)	22.0	83.2	83.2	13.8	75.0	75.0	33.0	33.0	33.0	33.0	33.0	
Total Split (%)	16.9%	64.0%	64.0%	10.6%	57.7%	57.7%	25.4%	25.4%	25.4%	25.4%	25.4%	
Yellow Time (s)	3.5	4.0	4.0	3.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	6.0	6.0	4.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	None	None	None	Min	Min	Min	Min	Min	C-Min	C-Min	
Act Effect Green (s)	17.5	80.9	80.9	8.6	69.0	69.0	25.0	25.0	25.0	25.0	25.0	130.0
Actuated g/C Ratio	0.13	0.62	0.62	0.07	0.53	0.53	0.19	0.19	0.19	0.19	0.19	1.00
v/c Ratio	0.98	0.58	0.00	0.44	1.02	0.12	0.00	0.04	0.05	0.41	0.02	0.14
Control Delay	94.2	15.9	0.0	69.4	57.8	2.8	43.0	43.2	0.2	51.4	43.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	94.2	15.9	0.0	69.4	57.8	2.8	43.0	43.2	0.2	51.4	43.0	0.2
LOS	F	B	A	E	E	A	D	D	A	D	D	A
Approach Delay		31.6			55.3			19.0			18.1	
Approach LOS		C			E			B			B	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:SBTL, Start of Yellow

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 41.0

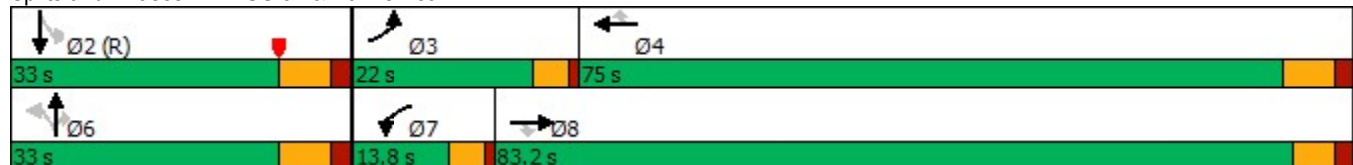
Intersection LOS: D

Intersection Capacity Utilization 95.8%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: US 34 & Hahns Peak Dr



HCM 6th Signalized Intersection Summary

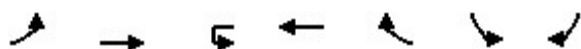
2: US 34 & Hahns Peak Dr

Saturday Mid-Day
Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	373	1492	3	47	1770	96	1	12	17	96	6	187
Future Volume (veh/h)	373	1492	3	47	1770	96	1	12	17	96	6	187
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	455	1820	3	51	1924	104	1	13	18	110	7	0
Peak Hour Factor	0.82	0.82	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.87	0.92	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	465	3169	984	66	1859	829	333	374	317	323	374	
Arrive On Green	0.13	0.62	0.62	0.04	0.52	0.52	0.20	0.20	0.20	0.20	0.20	0.00
Sat Flow, veh/h	3456	5106	1585	1781	3554	1585	1409	1870	1585	1378	1870	1585
Grp Volume(v), veh/h	455	1820	3	51	1924	104	1	13	18	110	7	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1781	1777	1585	1409	1870	1585	1378	1870	1585
Q Serve(g_s), s	17.1	27.3	0.1	3.7	68.0	4.4	0.1	0.7	1.2	9.1	0.4	0.0
Cycle Q Clear(g_c), s	17.1	27.3	0.1	3.7	68.0	4.4	0.5	0.7	1.2	9.8	0.4	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	465	3169	984	66	1859	829	333	374	317	323	374	
V/C Ratio(X)	0.98	0.57	0.00	0.77	1.04	0.13	0.00	0.03	0.06	0.34	0.02	
Avail Cap(c_a), veh/h	465	3169	984	127	1859	829	333	374	317	323	374	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.64	0.64	0.64	0.61	0.61	0.61	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	56.1	14.5	9.4	62.1	31.0	15.8	41.9	41.9	42.1	45.8	41.8	0.0
Incr Delay (d2), s/veh	27.8	0.1	0.0	11.1	26.3	0.0	0.0	0.0	0.0	2.8	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.2	14.4	0.1	3.4	43.5	2.9	0.0	0.6	0.9	6.1	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	83.8	14.6	9.4	73.2	57.3	15.8	41.9	41.9	42.1	48.7	41.8	0.0
LnGrp LOS	F	B	A	E	F	B	D	D	D	D	D	
Approach Vol, veh/h	2278			2079			32			117		
Approach Delay, s/veh	28.5			55.6			42.0			48.3		
Approach LOS	C			E			D			D		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	33.0			22.0			75.0			33.0		
Change Period (Y+Rc), s	7.0			4.5			7.0			4.5		
Max Green Setting (Gmax), s	26.0			17.5			68.0			26.0		
Max Q Clear Time (g_c+I1), s	11.8			19.1			70.0			3.2		
Green Ext Time (p_c), s	0.0			0.0			0.0			0.0		
Intersection Summary												
HCM 6th Ctrl Delay	41.6											
HCM 6th LOS	D											
Notes												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.												

Timings 4: US 34 & Rocky Mountain Ave

Saturday Mid-Day
Avenue South



Lane Group	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations	←←	→→→	←	→→→	←	←←	←
Traffic Volume (vph)	212	1383	15	1853	324	702	200
Future Volume (vph)	212	1383	15	1853	324	702	200
Turn Type	Prot	NA	Prot	NA	Perm	Prot	Free
Protected Phases	3	8	7	4		5	
Permitted Phases					4		Free
Detector Phase	3	8	7	4	4	5	
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	25.0	25.0	5.0	
Minimum Split (s)	29.5	24.0	10.0	35.0	35.0	9.5	
Total Split (s)	29.5	62.5	10.0	43.0	43.0	9.5	
Total Split (%)	36.0%	76.2%	12.2%	52.4%	52.4%	11.6%	
Yellow Time (s)	3.5	4.0	3.5	5.0	5.0	3.5	
All-Red Time (s)	1.0	2.0	1.0	2.0	2.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	6.0	4.5	7.0	7.0	4.5	
Lead/Lag	Lead	Lag	Lead	Lag	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	Min	Min	None	
Act Effect Green (s)	9.6	52.0	5.2	38.9	38.9	17.5	82.0
Actuated g/C Ratio	0.12	0.63	0.06	0.47	0.47	0.21	1.00
v/c Ratio	0.54	0.43	0.14	0.79	0.36	0.99	0.13
Control Delay	38.8	7.7	39.1	20.6	2.3	68.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	7.7	39.1	20.6	2.3	68.2	0.2
LOS	D	A	D	C	A	E	A
Approach Delay		12.0		18.0		53.1	
Approach LOS		B		B		D	

Intersection Summary

Cycle Length: 82

Actuated Cycle Length: 82

Offset: 13.5 (16%), Referenced to phase 2: and 6:, Start of Yellow

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 22.8

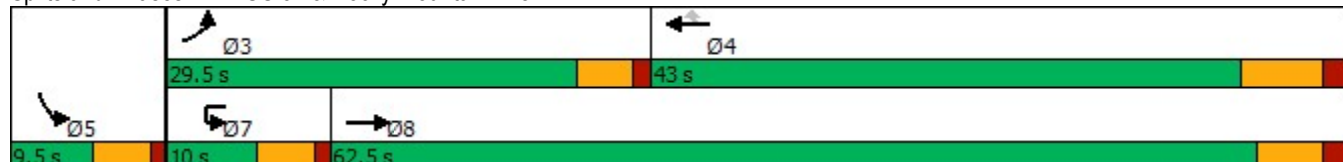
Intersection LOS: C

Intersection Capacity Utilization 75.2%

ICU Level of Service D

Analysis Period (min) 15

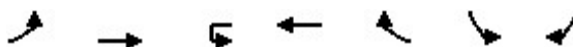
Splits and Phases: 4: US 34 & Rocky Mountain Ave



HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

Saturday Mid-Day
Avenue South



Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations	←←	↑↑↑	←	↑↑↑	←	←←	←
Traffic Volume (veh/h)	212	1383	15	1853	324	702	200
Future Volume (veh/h)	212	1383	15	1853	324	702	200
Initial Q (Qb), veh	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)	1.00				1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00		1.00	1.00	1.00	1.00
Work Zone On Approach		No		No		No	
Adj Sat Flow, veh/h/ln	1870	1870		1870	1870	1870	1870
Adj Flow Rate, veh/h	219	1383		1910	334	724	0
Peak Hour Factor	0.97	1.00		0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2		2	2	2	2
Cap, veh/h	310	2855		2117	657	1039	
Arrive On Green	0.09	0.56		0.41	0.41	0.30	0.00
Sat Flow, veh/h	3456	5274		5274	1585	3456	1585
Grp Volume(v), veh/h	219	1383		1910	334	724	0
Grp Sat Flow(s),veh/h/ln	1728	1702		1702	1585	1728	1585
Q Serve(g_s), s	5.1	13.4		28.7	12.8	15.2	0.0
Cycle Q Clear(g_c), s	5.1	13.4		28.7	12.8	15.2	0.0
Prop In Lane	1.00				1.00	1.00	1.00
Lane Grp Cap(c), veh/h	310	2855		2117	657	1039	
V/C Ratio(X)	0.71	0.48		0.90	0.51	0.70	
Avail Cap(c_a), veh/h	1054	3518		2242	696	1039	
HCM Platoon Ratio	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	0.81	0.81		1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.3	10.9		22.4	17.8	25.4	0.0
Incr Delay (d2), s/veh	0.9	0.0		5.1	0.2	2.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.8	7.7		17.2	7.9	10.4	0.0
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	37.2	11.0		27.6	18.0	27.4	0.0
LnGrp LOS	D	B		C	B	C	
Approach Vol, veh/h		1602		2244		724	
Approach Delay, s/veh		14.5		26.1		27.4	
Approach LOS		B		C		C	
Timer - Assigned Phs		2	3	4			8
Phs Duration (G+Y+Rc), s		29.1	11.9	41.0			52.9
Change Period (Y+Rc), s		4.5	4.5	7.0			* 7
Max Green Setting (Gmax), s		5.0	25.0	36.0			* 57
Max Q Clear Time (g_c+l1), s		17.2	7.1	30.7			15.4
Green Ext Time (p_c), s		0.0	0.4	3.3			8.9
Intersection Summary							
HCM 6th Ctrl Delay			22.3				
HCM 6th LOS			C				

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection						
Int Delay, s/veh	10.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	84	178	317	73	136	313
Future Vol, veh/h	84	178	317	73	136	313
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	95	202	360	83	155	356
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1068	402	0	0	443	0
Stage 1	402	-	-	-	-	-
Stage 2	666	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	245	648	-	-	1117	-
Stage 1	676	-	-	-	-	-
Stage 2	511	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	203	648	-	-	1117	-
Mov Cap-2 Maneuver	203	-	-	-	-	-
Stage 1	676	-	-	-	-	-
Stage 2	423	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	41	0		2.6		
HCM LOS	E					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	381	1117	-	
HCM Lane V/C Ratio	-	-	0.781	0.138	-	
HCM Control Delay (s)	-	-	41	8.7	0	
HCM Lane LOS	-	-	E	A	A	
HCM 95th %tile Q(veh)	-	-	6.6	0.5	-	

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion Dr Sat (Site Folder: General)]**

PM Peak Hour
Site Category: Existing Conditions
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Avenue														
3	L2	95	3.0	103	3.0	0.350	6.5	LOS A	1.8	45.8	0.32	0.19	0.32	33.9
8	T1	636	3.0	691	3.0	0.350	6.3	LOS A	1.8	45.8	0.31	0.18	0.31	34.2
18	R2	45	3.0	49	3.0	0.350	6.2	LOS A	1.7	44.7	0.31	0.18	0.31	33.5
Approach		776	3.0	843	3.0	0.350	6.3	LOS A	1.8	45.8	0.31	0.18	0.31	34.2
East: Mountain Lion Drive														
1	L2	46	3.0	50	3.0	0.169	7.5	LOS A	0.6	15.1	0.60	0.60	0.60	32.8
6	T1	19	3.0	21	3.0	0.169	7.5	LOS A	0.6	15.1	0.60	0.60	0.60	32.7
16	R2	36	3.0	39	3.0	0.169	7.5	LOS A	0.6	15.1	0.60	0.60	0.60	31.8
Approach		101	3.0	110	3.0	0.169	7.5	LOS A	0.6	15.1	0.60	0.60	0.60	32.4
North: Boyd Lake Avenue														
7	L2	40	3.0	43	3.0	0.210	5.1	LOS A	0.9	23.0	0.33	0.21	0.33	34.8
4	T1	343	3.0	373	3.0	0.210	5.0	LOS A	0.9	23.0	0.32	0.20	0.32	35.0
14	R2	60	3.0	65	3.0	0.210	4.9	LOS A	0.9	22.4	0.31	0.20	0.31	34.2
Approach		443	3.0	482	3.0	0.210	5.0	LOS A	0.9	23.0	0.32	0.20	0.32	34.8
West: Mountain Lion Drive														
5	L2	59	3.0	64	3.0	0.166	5.5	LOS A	0.6	16.0	0.48	0.42	0.48	33.9
2	T1	13	3.0	14	3.0	0.166	5.5	LOS A	0.6	16.0	0.48	0.42	0.48	33.8
12	R2	68	3.0	74	3.0	0.166	5.5	LOS A	0.6	16.0	0.48	0.42	0.48	32.8
Approach		140	3.0	152	3.0	0.166	5.5	LOS A	0.6	16.0	0.48	0.42	0.48	33.3
All Vehicles		1460	3.0	1587	3.0	0.350	5.9	LOS A	1.8	45.8	0.35	0.24	0.35	34.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX C. INTERNAL TRIP MAKING

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Avenue South			Organization:	Felsburg Holt & Ullevig
Project Location:	Loveland, CO			Performed By:	Yory Moncada
Scenario Description:	Buildout			Date:	10/21/2024
Analysis Year:	2045			Checked By:	
Analysis Period:	AM Street Peak Hour			Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office	710	46,500	SF	167	147	20
Retail	820	77,280	SF	251	152	99
Restaurant	932	87,580	SF	958	521	437
Cinema/Entertainment				0		
Residential	220,221	1,544	DUs	1,252	306	946
Hotel	310	750	Rooms	0		
All Other Land Uses ²				70	40	30
				2,698	1,166	1,532

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant	1.00			1.00		
Cinema/Entertainment	1.00			1.00		
Residential	1.00			1.00		
Hotel	1.00			1.00		
All Other Land Uses ²	1.00			1.00		

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	13	0	0	0
Retail	6		13	0	6	0
Restaurant	21	12		0	15	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	9	104	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	2,698	1,166	1,532
Internal Capture Percentage	15%	18%	14%
External Vehicle-Trips ⁵	2,280	957	1,323
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	21%	95%
Retail	18%	25%
Restaurant	25%	11%
Cinema/Entertainment	N/A	N/A
Residential	7%	12%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.
⁶ Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Avenue South
Analysis Period:	AM Street Peak Hour

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	147	147	1.00	20	20
Retail	1.00	152	152	1.00	99	99
Restaurant	1.00	521	521	1.00	437	437
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	306	306	1.00	946	946
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	13	0	0	0
Retail	29		13	0	14	0
Restaurant	135	61		0	17	13
Cinema/Entertainment	0	0	0		0	0
Residential	19	9	189	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		49	120	0	0	0
Retail	6		261	0	6	0
Restaurant	21	12		0	15	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	26	104	0		0
Hotel	4	6	31	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	31	116	147	116	0	0
Retail	27	125	152	125	0	0
Restaurant	130	391	521	391	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	21	285	306	285	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	40	40	40	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	19	1	20	1	0	0
Retail	25	74	99	74	0	0
Restaurant	48	389	437	389	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	117	829	946	829	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	30	30	30	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Avenue South			Organization:	Felsburg Holt & Ullevig
Project Location:	Loveland, CO			Performed By:	Yory Moncada
Scenario Description:	Buildout			Date:	10/21/2024
Analysis Year:	2045			Checked By:	
Analysis Period:	PM Street Peak Hour			Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office	710	66,000	SF	158	27	131
Retail	820	50,125	SF	919	448	471
Restaurant	932	66,075	SF	874	523	351
Cinema/Entertainment				0		
Residential	220,221	1,047	DUs	1,632	1,016	616
Hotel	310	620	Rooms	0		
All Other Land Uses ²				147	74	73
				3,730	2,088	1,642

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant	1.00			1.00		
Cinema/Entertainment	1.00			1.00		
Residential	1.00			1.00		
Hotel	1.00			1.00		
All Other Land Uses ²	1.00			1.00		

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		26	5	0	3	0
Retail	7		137	0	122	0
Restaurant	7	144		0	63	0
Cinema/Entertainment	0	0	0		0	0
Residential	13	45	73	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	3,730	2,088	1,642
Internal Capture Percentage	35%	31%	39%
External Vehicle-Trips ⁵	2,440	1,443	997
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	100%	26%
Retail	48%	56%
Restaurant	41%	61%
Cinema/Entertainment	N/A	N/A
Residential	19%	21%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.
⁶ Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Avenue South
Analysis Period:	PM Street Peak Hour

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	27	27	1.00	131	131
Retail	1.00	448	448	1.00	471	471
Restaurant	1.00	523	523	1.00	351	351
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	1016	1016	1.00	616	616
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		26	5	0	3	0
Retail	9		137	19	122	24
Restaurant	11	144		28	63	25
Cinema/Entertainment	0	0	0		0	0
Residential	25	259	129	0		18
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		36	10	0	41	0
Retail	8		152	0	467	0
Restaurant	8	224		0	163	0
Cinema/Entertainment	2	18	16		41	0
Residential	15	45	73	0		0
Hotel	0	9	26	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	27	0	27	0	0	0
Retail	215	233	448	233	0	0
Restaurant	215	308	523	308	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	188	828	1016	828	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	74	74	74	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	34	97	131	97	0	0
Retail	266	205	471	205	0	0
Restaurant	214	137	351	137	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	131	485	616	485	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	73	73	73	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Avenue South			Organization:	Felsburg Holt & Ullevig
Project Location:	Loveland, CO			Performed By:	Yory Moncada
Scenario Description:	Buildout			Date:	10/21/2024
Analysis Year:	2045			Checked By:	
Analysis Period:	Saturday Mid-Day			Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office	710	66,000	SF	58	31	27
Retail	820	50,125	SF	1,134	582	552
Restaurant	932	66,075	SF	1,131	577	554
Cinema/Entertainment				0		
Residential	220,221	1,047	DUs	1,493	748	745
Hotel	310	620	Rooms	0		
All Other Land Uses ²				184	94	90
				4,000	2,032	1,968

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant	1.00			1.00		
Cinema/Entertainment	1.00			1.00		
Residential	1.00			1.00		
Hotel	1.00			1.00		
All Other Land Uses ²	1.00			1.00		

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	1	0	1	0
Retail	8		160	0	144	0
Restaurant	8	227		0	100	0
Cinema/Entertainment	0	0	0		0	0
Residential	14	58	81	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	4,000	2,032	1,968
Internal Capture Percentage	40%	40%	41%
External Vehicle-Trips ⁵	2,386	1,225	1,161
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	97%	26%
Retail	50%	57%
Restaurant	42%	60%
Cinema/Entertainment	N/A	N/A
Residential	33%	21%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.
⁶ Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Avenue South
Analysis Period:	Saturday Mid-Day

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	31	31	1.00	27	27
Retail	1.00	582	582	1.00	552	552
Restaurant	1.00	577	577	1.00	554	554
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	748	748	1.00	745	745
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	1	0	1	0
Retail	11		160	22	144	28
Restaurant	17	227		44	100	39
Cinema/Entertainment	0	0	0		0	0
Residential	30	313	156	0		22
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		47	12	0	30	0
Retail	10		167	0	344	0
Restaurant	9	291		0	120	0
Cinema/Entertainment	2	23	17		30	0
Residential	18	58	81	0		0
Hotel	0	12	29	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	30	1	31	1	0	0
Retail	290	292	582	292	0	0
Restaurant	242	335	577	335	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	245	503	748	503	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	94	94	94	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	7	20	27	20	0	0
Retail	312	240	552	240	0	0
Restaurant	335	219	554	219	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	153	592	745	592	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	90	90	90	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Avenue South			Organization:	Felsburg Holt & Ullevig
Project Location:	Loveland, CO			Performed By:	Yory Moncada
Scenario Description:	Short Term AM			Date:	12/12/2024
Analysis Year:	2029			Checked By:	
Analysis Period:	AM Street Peak Hour			Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office	710	46,500	SF	167	147	20
Retail	820	77,280	SF	186	112	74
Restaurant	932	87,580	SF	822	446	376
Cinema/Entertainment				0		
Residential	220,221	1,544	DUs	153	37	116
Hotel	310	750	Rooms	0		
All Other Land Uses ²				70	40	30
				1,398	782	616

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant	1.00			1.00		
Cinema/Entertainment	1.00			1.00		
Residential	1.00			1.00		
Hotel	1.00			1.00		
All Other Land Uses ²	1.00			1.00		

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	13	0	0	0
Retail	6		10	0	1	0
Restaurant	21	9		0	2	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	1	23	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	1,398	782	616
Internal Capture Percentage	13%	12%	15%
External Vehicle-Trips ⁵	1,210	688	522
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	20%	95%
Retail	14%	23%
Restaurant	10%	9%
Cinema/Entertainment	N/A	N/A
Residential	8%	22%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.
⁶ Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Avenue South
Analysis Period:	AM Street Peak Hour

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	147	147	1.00	20	20
Retail	1.00	112	112	1.00	74	74
Restaurant	1.00	446	446	1.00	376	376
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	37	37	1.00	116	116
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	13	0	0	0
Retail	21		10	0	10	0
Restaurant	117	53		0	15	11
Cinema/Entertainment	0	0	0		0	0
Residential	2	1	23	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		36	103	0	0	0
Retail	6		223	0	1	0
Restaurant	21	9		0	2	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	19	89	0		0
Hotel	4	4	27	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	29	118	147	118	0	0
Retail	16	96	112	96	0	0
Restaurant	46	400	446	400	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	3	34	37	34	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	40	40	40	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	19	1	20	1	0	0
Retail	17	57	74	57	0	0
Restaurant	32	344	376	344	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	26	90	116	90	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	30	30	30	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Avenue South			Organization:	Felsburg Holt & Ullevig
Project Location:	Loveland, CO			Performed By:	Yory Moncada
Scenario Description:	Short Term			Date:	10/21/2024
Analysis Year:	2029			Checked By:	
Analysis Period:	PM Street Peak Hour			Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office	710	66,000	SF	158	27	131
Retail	820	50,125	SF	656	322	334
Restaurant	932	66,075	SF	745	444	301
Cinema/Entertainment				0		
Residential	220,221	1,047	DUs	200	126	74
Hotel	310	620	Rooms	0		
All Other Land Uses ²				147	74	73
				1,906	993	913

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant	1.00			1.00		
Cinema/Entertainment	1.00			1.00		
Residential	1.00			1.00		
Hotel	1.00			1.00		
All Other Land Uses ²	1.00			1.00		

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		26	5	0	3	0
Retail	7		97	0	58	0
Restaurant	8	123		0	20	0
Cinema/Entertainment	0	0	0		0	0
Residential	3	31	16	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	1,906	993	913
Internal Capture Percentage	42%	40%	43%
External Vehicle-Trips ⁵	1,112	596	516
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	67%	26%
Retail	56%	49%
Restaurant	27%	50%
Cinema/Entertainment	N/A	N/A
Residential	64%	68%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.
⁶ Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Avenue South
Analysis Period:	PM Street Peak Hour

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	27	27	1.00	131	131
Retail	1.00	322	322	1.00	334	334
Restaurant	1.00	444	444	1.00	301	301
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	126	126	1.00	74	74
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		26	5	0	3	0
Retail	7		97	13	87	17
Restaurant	9	123		24	54	21
Cinema/Entertainment	0	0	0		0	0
Residential	3	31	16	0		2
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		26	9	0	5	0
Retail	8		129	0	58	0
Restaurant	8	161		0	20	0
Cinema/Entertainment	2	13	13		5	0
Residential	15	32	62	0		0
Hotel	0	6	22	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	18	9	27	9	0	0
Retail	180	142	322	142	0	0
Restaurant	118	326	444	326	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	81	45	126	45	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	74	74	74	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	34	97	131	97	0	0
Retail	162	172	334	172	0	0
Restaurant	151	150	301	150	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	50	24	74	24	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	73	73	73	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Avenue South			Organization:	Felsburg Holt & Ullevig
Project Location:	Loveland, CO			Performed By:	Yory Moncada
Scenario Description:	Buildout			Date:	10/21/2024
Analysis Year:	2045			Checked By:	
Analysis Period:	Saturday Mid-Day			Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office	710	66,000	SF	58	31	27
Retail	820	50,125	SF	793	405	388
Restaurant	932	66,075	SF	971	495	476
Cinema/Entertainment				0		
Residential	220,221	1,047	DUs	170	85	85
Hotel	310	620	Rooms	0		
All Other Land Uses ²				184	94	90
				2,176	1,110	1,066

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant	1.00			1.00		
Cinema/Entertainment	1.00			1.00		
Residential	1.00			1.00		
Hotel	1.00			1.00		
All Other Land Uses ²	1.00			1.00		

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	1	0	1	0
Retail	8		113	0	39	0
Restaurant	9	195		0	14	0
Cinema/Entertainment	0	0	0		0	0
Residential	3	36	18	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	2,176	1,110	1,066
Internal Capture Percentage	41%	40%	41%
External Vehicle-Trips ⁵	1,292	668	624
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	65%	26%
Retail	58%	41%
Restaurant	27%	46%
Cinema/Entertainment	N/A	N/A
Residential	64%	67%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.
⁶ Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Avenue South
Analysis Period:	Saturday Mid-Day

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	31	31	1.00	27	27
Retail	1.00	405	405	1.00	388	388
Restaurant	1.00	495	495	1.00	476	476
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	85	85	1.00	85	85
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	1	0	1	0
Retail	8		113	16	101	19
Restaurant	14	195		38	86	33
Cinema/Entertainment	0	0	0		0	0
Residential	3	36	18	0		3
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		32	10	0	3	0
Retail	10		144	0	39	0
Restaurant	9	203		0	14	0
Cinema/Entertainment	2	16	15		3	0
Residential	18	41	69	0		0
Hotel	0	8	25	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	20	11	31	11	0	0
Retail	236	169	405	169	0	0
Restaurant	132	363	495	363	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	54	31	85	31	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	94	94	94	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	7	20	27	20	0	0
Retail	160	228	388	228	0	0
Restaurant	218	258	476	258	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	57	28	85	28	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	90	90	90	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

APPENDIX D. 2029 FUTURE BACKGROUND TRAFFIC LEVEL OF SERVICE WORKSHEETS

Timings
1: Boyd Lake Ave & US 34

AM Peak Hour
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	1745	115	185	1760	110	195	225	310	130	215	260
Future Volume (vph)	130	1745	115	185	1760	110	195	225	310	130	215	260
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5		9.5	22.5	
Total Split (s)	9.5	36.0	36.0	10.2	36.7	36.7	10.4	23.9		9.9	23.4	
Total Split (%)	11.9%	45.0%	45.0%	12.8%	45.9%	45.9%	13.0%	29.9%		12.4%	29.3%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	5.0	31.5	31.5	5.7	32.2	32.2	5.9	19.4	80.0	5.4	18.9	80.0
Actuated g/C Ratio	0.06	0.39	0.39	0.07	0.40	0.40	0.07	0.24	1.00	0.07	0.24	1.00
v/c Ratio	0.66	0.95	0.18	0.82	0.93	0.17	0.84	0.29	0.21	0.61	0.28	0.18
Control Delay	52.7	35.5	3.0	64.6	33.3	2.7	65.5	25.8	0.3	48.4	26.1	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.7	35.5	3.0	64.6	33.3	2.7	65.5	25.8	0.3	48.4	26.1	0.2
LOS	D	D	A	E	C	A	E	C	A	D	C	A
Approach Delay		34.7			34.5			25.6			19.8	
Approach LOS		C			C			C			B	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 31.7

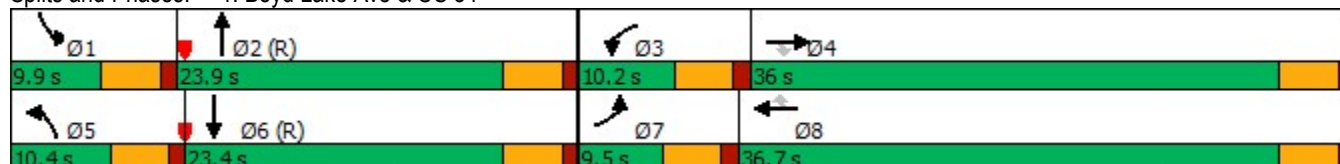
Intersection LOS: C

Intersection Capacity Utilization 65.5%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34



HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

AM Peak Hour
Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	1745	115	185	1760	110	195	225	310	130	215	260
Future Volume (veh/h)	130	1745	115	185	1760	110	195	225	310	130	215	260
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	141	1897	125	201	1913	120	212	245	0	141	234	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	214	2007	623	246	2053	637	255	883		215	842	
Arrive On Green	0.06	0.39	0.39	0.07	0.40	0.40	0.07	0.25	0.00	0.06	0.24	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	141	1897	125	201	1913	120	212	245	0	141	234	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	3.2	28.7	4.2	4.6	28.7	3.9	4.8	4.5	0.0	3.2	4.3	0.0
Cycle Q Clear(g_c), s	3.2	28.7	4.2	4.6	28.7	3.9	4.8	4.5	0.0	3.2	4.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	214	2007	623	246	2053	637	255	883		215	842	
V/C Ratio(X)	0.66	0.95	0.20	0.82	0.93	0.19	0.83	0.28		0.66	0.28	
Avail Cap(c_a), veh/h	216	2011	624	246	2055	638	255	883		233	842	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.24	0.24	0.24	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.7	23.5	16.0	36.6	22.9	15.5	36.6	24.3	0.0	36.7	24.9	0.0
Incr Delay (d2), s/veh	7.0	10.0	0.2	5.2	2.4	0.0	20.3	0.8	0.0	5.9	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.8	18.3	2.6	3.2	13.7	2.3	4.9	3.4	0.0	2.7	3.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.7	33.5	16.2	41.9	25.2	15.5	56.8	25.0	0.0	42.5	25.7	0.0
LnGrp LOS	D	C	B	D	C	B	E	C		D	C	
Approach Vol, veh/h	2163					2234		457		375		
Approach Delay, s/veh	33.2					26.2		39.8		32.1		
Approach LOS	C					C		D		C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.5	24.4	10.2	35.9	10.4	23.5	9.5	36.7				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.4	19.4	5.7	31.5	5.9	18.9	5.0	32.2				
Max Q Clear Time (g_c+I1), s	5.2	6.5	6.6	30.7	6.8	6.3	5.2	30.7				
Green Ext Time (p_c), s	0.0	1.2	0.0	0.7	0.0	1.1	0.0	1.4				
Intersection Summary												
HCM 6th Ctrl Delay	30.7											
HCM 6th LOS	C											

Timings 2: Hahns Peak Dr & US 34

AM Peak Hour
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	  		 	  					 		
Traffic Volume (vph)	140	1760	10	195	1875	40	80	10	165	40	5	55
Future Volume (vph)	140	1760	10	195	1875	40	80	10	165	40	5	55
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8	1		4	5
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	1	4	4	5
Switch Phase												
Minimum Initial (s)	5.0	25.0	25.0	5.0	25.0	25.0	25.0	25.0	5.0	25.0	25.0	5.0
Minimum Split (s)	9.5	32.0	32.0	9.5	32.0	32.0	32.0	32.0	9.5	32.0	32.0	9.5
Total Split (s)	10.0	46.9	46.9	11.1	48.0	48.0	32.0	32.0	11.1	32.0	32.0	10.0
Total Split (%)	11.1%	52.1%	52.1%	12.3%	53.3%	53.3%	35.6%	35.6%	12.3%	35.6%	35.6%	11.1%
Yellow Time (s)	3.5	5.0	5.0	3.5	5.0	5.0	5.0	5.0	3.5	5.0	5.0	3.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	7.0	7.0	4.5	7.0	7.0	7.0	7.0	4.5	7.0	7.0	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag			Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes			Yes			Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	Min	Min	None	Min	Min	None
Act Effect Green (s)	5.5	39.9	39.9	6.6	41.0	41.0	25.0	25.0	38.6	25.0	25.0	37.5
Actuated g/C Ratio	0.06	0.44	0.44	0.07	0.46	0.46	0.28	0.28	0.43	0.28	0.28	0.42
v/c Ratio	0.82	0.95	0.01	0.84	0.99	0.06	0.22	0.02	0.25	0.13	0.01	0.10
Control Delay	72.0	35.5	0.0	61.7	43.0	3.3	26.9	23.9	13.0	25.5	23.8	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.0	35.5	0.0	61.7	43.0	3.3	26.9	23.9	13.0	25.5	23.8	7.4
LOS	E	D	A	E	D	A	C	C	B	C	C	A
Approach Delay		38.0			43.8			17.8			15.4	
Approach LOS		D			D			B			B	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 51 (57%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 39.2

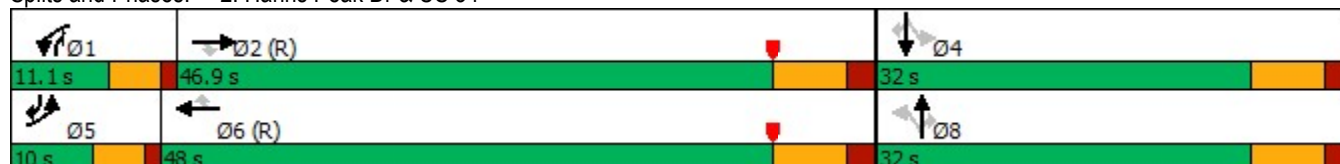
Intersection LOS: D

Intersection Capacity Utilization 80.5%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 2: Hahns Peak Dr & US 34



HCM 6th Signalized Intersection Summary

2: Hahns Peak Dr & US 34

AM Peak Hour
Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	1760	10	195	1875	40	80	10	165	40	5	55
Future Volume (veh/h)	140	1760	10	195	1875	40	80	10	165	40	5	55
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	171	2146	11	212	2287	49	87	11	179	49	5	67
Peak Hour Factor	0.82	0.82	0.92	0.92	0.82	0.82	0.92	0.92	0.92	0.82	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	211	2264	703	253	2326	722	469	520	557	406	520	537
Arrive On Green	0.06	0.44	0.44	0.15	0.91	0.91	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	1411	1870	1585	1193	1870	1585
Grp Volume(v), veh/h	171	2146	11	212	2287	49	87	11	179	49	5	67
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1411	1870	1585	1193	1870	1585
Q Serve(g_s), s	4.4	36.3	0.4	5.4	34.4	0.3	4.3	0.4	7.4	2.8	0.2	2.6
Cycle Q Clear(g_c), s	4.4	36.3	0.4	5.4	34.4	0.3	4.5	0.4	7.4	3.2	0.2	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	211	2264	703	253	2326	722	469	520	557	406	520	537
V/C Ratio(X)	0.81	0.95	0.02	0.84	0.98	0.07	0.19	0.02	0.32	0.12	0.01	0.12
Avail Cap(c_a), veh/h	211	2264	703	253	2326	722	469	520	557	406	520	537
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.46	0.46	0.46	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.7	24.1	14.0	37.9	3.7	2.2	25.1	23.6	21.4	24.8	23.5	20.5
Incr Delay (d2), s/veh	10.4	5.4	0.0	2.2	2.9	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.8	19.0	0.2	2.9	2.8	0.2	2.6	0.3	4.9	1.4	0.1	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.2	29.5	14.1	40.1	6.6	2.2	25.2	23.6	21.5	24.8	23.5	20.6
LnGrp LOS	D	C	B	D	A	A	C	C	C	C	C	C
Approach Vol, veh/h	2328			2548			277			121		
Approach Delay, s/veh	31.1			9.3			22.7			22.4		
Approach LOS	C			A			C			C		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.1	46.9		32.0	10.0	48.0		32.0				
Change Period (Y+Rc), s	4.5	7.0		7.0	4.5	7.0		7.0				
Max Green Setting (Gmax), s	6.6	39.9		25.0	5.5	41.0		25.0				
Max Q Clear Time (g_c+I1), s	7.4	38.3		5.2	6.4	36.4		9.4				
Green Ext Time (p_c), s	0.0	1.2		0.1	0.0	3.3		0.1				

Intersection Summary

HCM 6th Ctrl Delay 19.9
HCM 6th LOS B

Notes

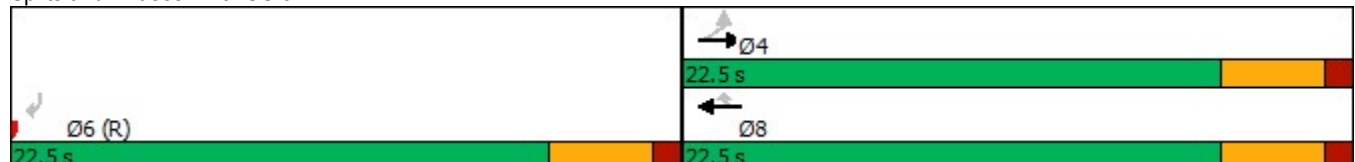
User approved pedestrian interval to be less than phase max green.

Timings
3: US 34

AM Peak Hour
Avenue South

					
Lane Group	EBL	EBT	WBT	WBR	SBR
Lane Configurations		  	  		
Traffic Volume (vph)	135	1830	2060	85	95
Future Volume (vph)	135	1830	2060	85	95
Turn Type	Perm	NA	NA	Perm	Perm
Protected Phases		4	8		
Permitted Phases	4			8	6
Detector Phase	4	4	8	8	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5
Total Split (s)	22.5	22.5	22.5	22.5	22.5
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	Max	Max	Max	Max	Max
Act Effct Green (s)	18.0	18.0	18.0	18.0	18.0
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40
v/c Ratio	0.89	0.98	1.10	0.13	0.16
Control Delay	59.7	43.0	70.8	3.2	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	59.7	43.0	70.8	3.2	9.5
LOS	E	D	E	A	A
Approach Delay		44.1	68.1		
Approach LOS		D	E		
Intersection Summary					
Cycle Length: 45					
Actuated Cycle Length: 45					
Offset: 0 (0%), Referenced to phase 2: and 6:SBR, Start of Green					
Natural Cycle: 50					
Control Type: Pretimed					
Maximum v/c Ratio: 1.10					
Intersection Signal Delay: 55.6			Intersection LOS: E		
Intersection Capacity Utilization 54.8%			ICU Level of Service A		
Analysis Period (min) 15					

Splits and Phases: 3: US 34



Timings 4: US 34 & Rocky Mountain Ave

AM Peak Hour
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	1280	395	335	1650	415	345	15	225	240	20	145
Future Volume (vph)	250	1280	395	335	1650	415	345	15	225	240	20	145
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free
Protected Phases	1	6	7	5	2	3	7	4	5	3	8	
Permitted Phases			6			2			4			Free
Detector Phase	1	6	7	5	2	3	7	4	5	3	8	
Switch Phase												
Minimum Initial (s)	5.0	25.0	5.0	5.0	25.0	5.0	5.0	25.0	5.0	5.0	25.0	
Minimum Split (s)	9.5	32.0	9.5	10.0	35.0	24.0	9.5	35.0	10.0	24.0	35.0	
Total Split (s)	16.0	46.0	23.4	24.0	54.0	30.0	23.4	35.0	24.0	30.0	41.6	
Total Split (%)	11.9%	34.1%	17.3%	17.8%	40.0%	22.2%	17.3%	25.9%	17.8%	22.2%	30.8%	
Yellow Time (s)	3.5	5.0	3.5	3.5	5.0	4.0	3.5	5.0	3.5	4.0	5.0	
All-Red Time (s)	1.0	2.0	1.0	1.0	2.0	2.0	1.0	2.0	1.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	7.0	4.5	4.5	7.0	6.0	4.5	7.0	4.5	6.0	7.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Min	None	None	C-Min	None	None	Min	None	None	Min	
Act Effect Green (s)	17.0	50.2	75.2	18.6	51.7	73.3	18.0	27.2	52.7	14.6	25.3	135.0
Actuated g/C Ratio	0.13	0.37	0.56	0.14	0.38	0.54	0.13	0.20	0.39	0.11	0.19	1.00
v/c Ratio	0.63	0.74	0.44	0.77	0.92	0.42	0.82	0.02	0.36	0.70	0.06	0.10
Control Delay	62.6	40.4	10.1	67.4	48.9	2.6	72.1	44.4	15.8	68.3	45.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.6	40.4	10.1	67.4	48.9	2.6	72.1	44.4	15.8	68.3	45.5	0.1
LOS	E	D	B	E	D	A	E	D	B	E	D	A
Approach Delay		37.1			43.5			49.7			42.8	
Approach LOS		D			D			D			D	

Intersection Summary

Cycle Length: 135

Actuated Cycle Length: 135

Offset: 0 (0%), Referenced to phase 2:WBT, Start of Yellow

Natural Cycle: 125

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 41.8

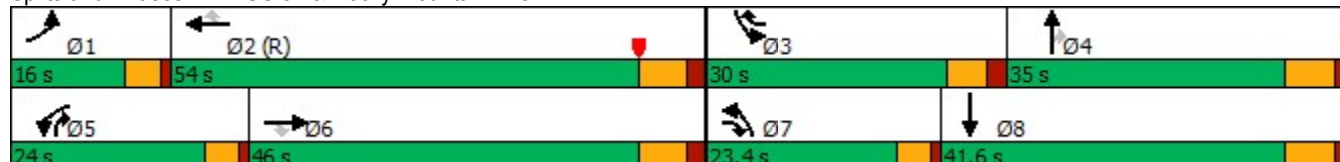
Intersection LOS: D

Intersection Capacity Utilization 75.3%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 4: US 34 & Rocky Mountain Ave



HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

AM Peak Hour
Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	250	1280	395	335	1650	415	345	15	225	240	20	145
Future Volume (veh/h)	250	1280	395	335	1650	415	345	15	225	240	20	145
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	272	1391	429	364	1793	451	375	16	245	261	22	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	294	2042	831	416	2222	835	429	733	518	317	346	
Arrive On Green	0.09	0.40	0.40	0.12	0.44	0.44	0.12	0.21	0.21	0.09	0.19	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	1870	1585
Grp Volume(v), veh/h	272	1391	429	364	1793	451	375	16	245	261	22	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1870	1585
Q Serve(g_s), s	10.6	30.3	23.8	14.0	41.3	25.4	14.4	0.5	16.6	10.0	1.3	0.0
Cycle Q Clear(g_c), s	10.6	30.3	23.8	14.0	41.3	25.4	14.4	0.5	16.6	10.0	1.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	294	2042	831	416	2222	835	429	733	518	317	346	
V/C Ratio(X)	0.92	0.68	0.52	0.87	0.81	0.54	0.87	0.02	0.47	0.82	0.06	
Avail Cap(c_a), veh/h	294	2042	831	499	2222	835	484	737	520	614	479	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.14	0.14	0.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	61.3	33.4	21.0	58.4	33.2	21.1	58.1	42.7	36.2	60.2	45.3	0.0
Incr Delay (d2), s/veh	7.5	0.1	0.0	12.4	3.3	2.5	14.9	0.0	0.2	2.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.3	14.7	10.6	11.1	24.4	15.1	11.6	0.4	10.7	8.0	1.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.8	33.5	21.0	70.8	36.5	23.6	73.0	42.7	36.4	62.3	45.4	0.0
LnGrp LOS	E	C	C	E	D	C	E	D	D	E	D	
Approach Vol, veh/h	2092				2608				636		283	
Approach Delay, s/veh	35.5				39.0				58.2		61.0	
Approach LOS	D				D				E		E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.0	65.7	18.4	34.9	20.8	61.0	21.3	32.0				
Change Period (Y+Rc), s	4.5	7.0	6.0	7.0	4.5	7.0	4.5	7.0				
Max Green Setting (Gmax), s	11.5	47.0	24.0	28.0	19.5	39.0	18.9	34.6				
Max Q Clear Time (g_c+l1), s	12.6	43.3	12.0	18.6	16.0	32.3	16.4	3.3				
Green Ext Time (p_c), s	0.0	2.4	0.4	0.1	0.3	3.0	0.4	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	41.0											
HCM 6th LOS	D											
Notes												
User approved pedestrian interval to be less than phase max green.												
User approved ignoring U-Turning movement.												
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.												

Intersection						
Int Delay, s/veh	7.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	155	0	0	0	0	55
Future Vol, veh/h	155	0	0	0	0	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	168	0	0	0	0	60
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	1	0	-	0	337	1
Stage 1	-	-	-	-	1	-
Stage 2	-	-	-	-	336	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1622	-	-	-	658	1084
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	724	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1622	-	-	-	590	1084
Mov Cap-2 Maneuver	-	-	-	-	590	-
Stage 1	-	-	-	-	916	-
Stage 2	-	-	-	-	724	-
Approach	EB	WB		SB		
HCM Control Delay, s	7.5	0		8.5		
HCM LOS	A					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1622	-	-	-	-	1084
HCM Lane V/C Ratio	0.104	-	-	-	-	0.055
HCM Control Delay (s)	7.5	-	-	-	0	8.5
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.2

Intersection						
Int Delay, s/veh	15.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	80	185	520	75	100	385
Future Vol, veh/h	80	185	520	75	100	385
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	87	201	565	82	109	418
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1242	606	0	0	647	0
Stage 1	606	-	-	-	-	-
Stage 2	636	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	193	497	-	-	939	-
Stage 1	545	-	-	-	-	-
Stage 2	527	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	164	497	-	-	939	-
Mov Cap-2 Maneuver	164	-	-	-	-	-
Stage 1	545	-	-	-	-	-
Stage 2	447	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	73.7	0		1.9		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	- 308		939	-	
HCM Lane V/C Ratio	-	- 0.935		0.116	-	
HCM Control Delay (s)	-	- 73.7		9.3	0	
HCM Lane LOS	-	- F		A	A	
HCM 95th %tile Q(veh)	-	- 9.2		0.4	-	

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion Dr AM (Site Folder: General)]**

AM Peak Hour
Site Category: Short Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Avenue														
3	L2	160	2.0	174	2.0	0.391	8.0	LOS A	1.9	48.5	0.53	0.45	0.53	32.6
8	T1	465	2.0	505	2.0	0.391	7.8	LOS A	1.9	48.5	0.52	0.44	0.52	33.3
18	R2	100	2.0	109	2.0	0.391	7.6	LOS A	1.9	47.9	0.51	0.43	0.51	32.8
Approach		725	2.0	788	2.0	0.391	7.8	LOS A	1.9	48.5	0.52	0.44	0.52	33.1
East: Mountain Lion Drive														
1	L2	85	2.0	92	2.0	0.409	11.0	LOS B	2.0	50.3	0.68	0.75	0.91	31.6
6	T1	45	2.0	49	2.0	0.409	11.0	LOS B	2.0	50.3	0.68	0.75	0.91	31.5
16	R2	125	2.0	136	2.0	0.409	11.0	LOS B	2.0	50.3	0.68	0.75	0.91	30.6
Approach		255	2.0	277	2.0	0.409	11.0	LOS B	2.0	50.3	0.68	0.75	0.91	31.1
North: Boyd Lake Avenue														
7	L2	125	2.0	136	2.0	0.277	6.4	LOS A	1.2	31.0	0.46	0.38	0.46	33.3
4	T1	250	2.0	272	2.0	0.277	6.3	LOS A	1.2	31.0	0.45	0.37	0.45	33.9
14	R2	145	2.0	158	2.0	0.277	6.1	LOS A	1.2	30.4	0.44	0.36	0.44	33.6
Approach		520	2.0	565	2.0	0.277	6.2	LOS A	1.2	31.0	0.45	0.37	0.45	33.6
West: Mountain Lion Drive														
5	L2	140	2.0	152	2.0	0.361	8.0	LOS A	1.6	40.2	0.57	0.55	0.57	32.6
2	T1	40	2.0	43	2.0	0.361	8.0	LOS A	1.6	40.2	0.57	0.55	0.57	32.5
12	R2	120	2.0	130	2.0	0.361	8.0	LOS A	1.6	40.2	0.57	0.55	0.57	31.6
Approach		300	2.0	326	2.0	0.361	8.0	LOS A	1.6	40.2	0.57	0.55	0.57	32.2
All Vehicles		1800	2.0	1957	2.0	0.409	7.8	LOS A	2.0	50.3	0.53	0.48	0.56	32.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 8 [Rocky Mountain Ave & Road B AM (Site Folder: General)]**

AM Peak Hour
Site Category: Short Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] ft				
South: Boyd Lake Avenue														
8	T1	1	2.0	1	2.0	0.003	5.3	LOS A	0.0	0.3	0.54	0.38	0.54	35.1
18	R2	1	2.0	1	2.0	0.003	5.3	LOS A	0.0	0.3	0.54	0.38	0.54	34.1
Approach		2	2.0	2	2.0	0.003	5.3	LOS A	0.0	0.3	0.54	0.38	0.54	34.6
East: Mountain Lion Drive														
1	L2	1	2.0	1	2.0	0.458	7.0	LOS A	2.9	74.4	0.02	0.00	0.02	34.3
16	R2	585	2.0	636	2.0	0.458	7.0	LOS A	2.9	74.4	0.02	0.00	0.02	33.2
Approach		586	2.0	637	2.0	0.458	7.0	LOS A	2.9	74.4	0.02	0.00	0.02	33.2
North: Boyd Lake Avenue														
7	L2	750	2.0	815	2.0	0.586	9.1	LOS A	4.9	123.3	0.03	0.00	0.03	30.9
4	T1	1	2.0	1	2.0	0.001	2.7	LOS A	0.0	0.1	0.01	0.00	0.01	36.6
Approach		751	2.0	816	2.0	0.586	9.1	LOS A	4.9	123.3	0.03	0.00	0.03	30.9
All Vehicles		1339	2.0	1455	2.0	0.586	8.2	LOS A	4.9	123.3	0.03	0.00	0.03	31.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Timings
1: Boyd Lake Ave & US 34

PM Peak Hour
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	2200	250	280	2200	125	205	215	325	195	290	315
Future Volume (vph)	115	2200	250	280	2200	125	205	215	325	195	290	315
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5		9.5	22.5	
Total Split (s)	9.5	51.0	51.0	14.0	55.5	55.5	11.7	23.3		11.7	23.3	
Total Split (%)	9.5%	51.0%	51.0%	14.0%	55.5%	55.5%	11.7%	23.3%		11.7%	23.3%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	5.0	46.5	46.5	9.5	51.0	51.0	7.2	18.8	100.0	7.2	18.8	100.0
Actuated g/C Ratio	0.05	0.46	0.46	0.10	0.51	0.51	0.07	0.19	1.00	0.07	0.19	1.00
v/c Ratio	0.73	1.01	0.31	0.93	0.92	0.16	0.90	0.35	0.22	0.86	0.47	0.22
Control Delay	71.7	48.7	3.0	81.4	30.0	2.7	84.1	37.1	0.3	77.0	38.9	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.7	48.7	3.0	81.4	30.0	2.7	84.1	37.1	0.3	77.0	38.9	0.3
LOS	E	D	A	F	C	A	F	D	A	E	D	A
Approach Delay		45.3			34.3			34.0			33.0	
Approach LOS		D			C			C			C	

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 38.3

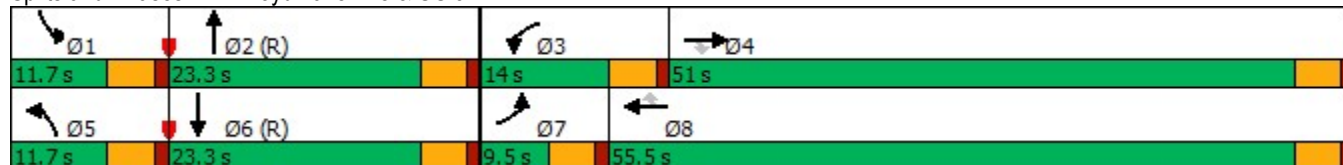
Intersection LOS: D

Intersection Capacity Utilization 79.4%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34



HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

PM Peak Hour
Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	2200	250	280	2200	125	205	215	325	195	290	315
Future Volume (veh/h)	115	2200	250	280	2200	125	205	215	325	195	290	315
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	125	2391	272	304	2391	136	223	234	0	212	315	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	173	2374	737	328	2604	808	249	668		249	668	
Arrive On Green	0.05	0.47	0.47	0.09	0.51	0.51	0.07	0.19	0.00	0.07	0.19	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	125	2391	272	304	2391	136	223	234	0	212	315	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	3.6	46.5	11.1	8.7	43.2	4.6	6.4	5.7	0.0	6.1	7.9	0.0
Cycle Q Clear(g_c), s	3.6	46.5	11.1	8.7	43.2	4.6	6.4	5.7	0.0	6.1	7.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	173	2374	737	328	2604	808	249	668		249	668	
V/C Ratio(X)	0.72	1.01	0.37	0.93	0.92	0.17	0.90	0.35		0.85	0.47	
Avail Cap(c_a), veh/h	173	2374	737	328	2604	808	249	668		249	668	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.17	0.17	0.17	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	46.8	26.8	17.3	44.9	22.6	13.1	46.0	35.3	0.0	45.9	36.2	0.0
Incr Delay (d2), s/veh	13.9	20.2	0.3	8.3	1.1	0.0	31.3	1.4	0.0	23.6	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.3	30.0	7.2	5.5	19.1	2.5	6.9	4.7	0.0	6.1	6.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.7	46.9	17.6	53.2	23.7	13.1	77.4	36.7	0.0	69.5	38.6	0.0
LnGrp LOS	E	F	B	D	C	B	E	D		E	D	
Approach Vol, veh/h	2788			2831			457			527		
Approach Delay, s/veh	44.7			26.4			56.6			51.0		
Approach LOS	D			C			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.7	23.3	14.0	51.0	11.7	23.3	9.5	55.5				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	7.2	18.8	9.5	46.5	7.2	18.8	5.0	51.0				
Max Q Clear Time (g_c+I1), s	8.1	7.7	10.7	48.5	8.4	9.9	5.6	45.2				
Green Ext Time (p_c), s	0.0	1.0	0.0	0.0	0.0	1.3	0.0	5.5				
Intersection Summary												
HCM 6th Ctrl Delay	38.2											
HCM 6th LOS	D											

Timings
2: Hahns Peak Dr & US 34

PM Peak Hour
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	  		 	  					 	 	
Traffic Volume (vph)	265	2290	15	265	2315	80	105	10	220	65	10	130
Future Volume (vph)	265	2290	15	265	2315	80	105	10	220	65	10	130
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8	1		4	5
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	1	4	4	5
Switch Phase												
Minimum Initial (s)	5.0	25.0	25.0	5.0	25.0	25.0	25.0	25.0	5.0	25.0	25.0	5.0
Minimum Split (s)	9.5	32.0	32.0	9.5	32.0	32.0	32.0	32.0	9.5	32.0	32.0	9.5
Total Split (s)	16.2	72.9	72.9	15.1	71.8	71.8	32.0	32.0	15.1	32.0	32.0	16.2
Total Split (%)	13.5%	60.8%	60.8%	12.6%	59.8%	59.8%	26.7%	26.7%	12.6%	26.7%	26.7%	13.5%
Yellow Time (s)	3.5	5.0	5.0	3.5	5.0	5.0	5.0	5.0	3.5	5.0	5.0	3.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	7.0	7.0	4.5	7.0	7.0	7.0	7.0	4.5	7.0	7.0	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag			Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes			Yes			Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	Min	Min	None	Min	Min	None
Act Effct Green (s)	11.7	65.9	65.9	10.6	64.8	64.8	25.0	25.0	42.6	25.0	25.0	43.7
Actuated g/C Ratio	0.10	0.55	0.55	0.09	0.54	0.54	0.21	0.21	0.36	0.21	0.21	0.36
v/c Ratio	0.97	1.00	0.02	0.95	1.03	0.11	0.39	0.03	0.41	0.27	0.03	0.27
Control Delay	95.8	44.4	0.1	95.2	52.8	4.6	45.7	38.2	27.1	42.9	38.2	21.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	95.8	44.4	0.1	95.2	52.8	4.6	45.7	38.2	27.1	42.9	38.2	21.9
LOS	F	D	A	F	D	A	D	D	C	D	D	C
Approach Delay		49.5			55.1			33.2			29.3	
Approach LOS		D			E			C			C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 81 (68%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 50.5

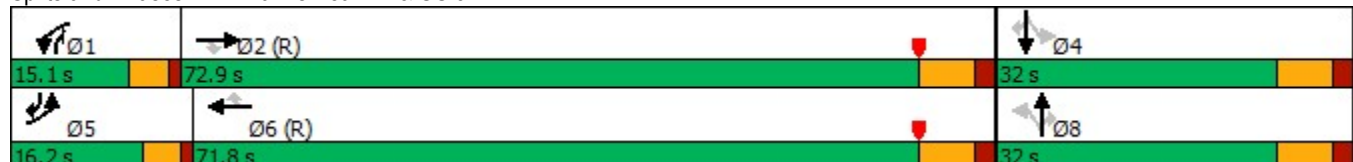
Intersection LOS: D

Intersection Capacity Utilization 94.1%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Hahns Peak Dr & US 34



HCM 6th Signalized Intersection Summary

2: Hahns Peak Dr & US 34

PM Peak Hour
Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	2290	15	265	2315	80	105	10	220	65	10	130
Future Volume (veh/h)	265	2290	15	265	2315	80	105	10	220	65	10	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	323	2793	16	288	2823	98	114	11	239	79	11	159
Peak Hour Factor	0.82	0.82	0.92	0.92	0.82	0.82	0.92	0.92	0.92	0.82	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	337	2804	870	305	2757	856	346	390	470	290	390	485
Arrive On Green	0.10	0.55	0.55	0.09	0.54	0.54	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	1404	1870	1585	1130	1870	1585
Grp Volume(v), veh/h	323	2793	16	288	2823	98	114	11	239	79	11	159
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1404	1870	1585	1130	1870	1585
Q Serve(g_s), s	11.2	65.3	0.6	9.9	64.8	3.6	8.4	0.6	15.0	7.2	0.6	9.3
Cycle Q Clear(g_c), s	11.2	65.3	0.6	9.9	64.8	3.6	9.0	0.6	15.0	7.7	0.6	9.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	337	2804	870	305	2757	856	346	390	470	290	390	485
V/C Ratio(X)	0.96	1.00	0.02	0.94	1.02	0.11	0.33	0.03	0.51	0.27	0.03	0.33
Avail Cap(c_a), veh/h	337	2804	870	305	2757	856	346	390	470	290	390	485
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.30	0.30	0.30	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.9	26.9	12.3	54.4	27.6	13.5	41.4	37.8	35.0	40.9	37.8	32.1
Incr Delay (d2), s/veh	17.8	8.4	0.0	6.4	12.8	0.0	0.2	0.0	0.4	0.2	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	7.8	31.8	0.4	5.6	31.4	1.9	5.3	0.5	9.8	3.6	0.5	6.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.7	35.4	12.3	60.8	40.4	13.6	41.6	37.8	35.3	41.1	37.8	32.3
LnGrp LOS	E	D	B	E	F	B	D	D	D	D	D	C
Approach Vol, veh/h	3132			3209			364			249		
Approach Delay, s/veh	39.0			41.4			37.4			35.3		
Approach LOS	D			D			D			D		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.1	72.9		32.0	16.2	71.8		32.0				
Change Period (Y+Rc), s	4.5	7.0		7.0	4.5	7.0		7.0				
Max Green Setting (Gmax), s	10.6	65.9		25.0	11.7	64.8		25.0				
Max Q Clear Time (g_c+I1), s	11.9	67.3		11.3	13.2	66.8		17.0				
Green Ext Time (p_c), s	0.0	0.0		0.2	0.0	0.0		0.2				
Intersection Summary												
HCM 6th Ctrl Delay	39.9											
HCM 6th LOS	D											

Timings 4: US 34 & Rocky Mountain Ave

PM Peak Hour
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	240	1835	500	420	1905	395	495	30	360	380	30	295
Future Volume (vph)	240	1835	500	420	1905	395	495	30	360	380	30	295
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free
Protected Phases	1	6	7	5	2	3	7	4	5	3	8	
Permitted Phases			6			2			4			Free
Detector Phase	1	6	7	5	2	3	7	4	5	3	8	
Switch Phase												
Minimum Initial (s)	5.0	25.0	5.0	5.0	25.0	5.0	5.0	25.0	5.0	5.0	5.0	
Minimum Split (s)	29.5	32.0	9.5	10.0	35.0	24.0	9.5	35.0	10.0	24.0	24.0	
Total Split (s)	29.5	62.5	36.5	28.0	61.0	28.5	36.5	26.0	28.0	28.5	18.0	
Total Split (%)	20.3%	43.1%	25.2%	19.3%	42.1%	19.7%	25.2%	17.9%	19.3%	19.7%	12.4%	
Yellow Time (s)	3.5	5.0	3.5	3.5	5.0	4.0	3.5	5.0	3.5	4.0	4.0	
All-Red Time (s)	1.0	2.0	1.0	1.0	2.0	2.0	1.0	2.0	1.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	7.0	4.5	4.5	7.0	6.0	4.5	7.0	4.5	6.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Min	None	None	C-Min	None	None	Min	None	None	None	
Act Effect Green (s)	15.4	57.0	97.1	22.1	63.6	91.2	33.1	20.9	50.0	20.6	13.1	145.0
Actuated g/C Ratio	0.11	0.39	0.67	0.15	0.44	0.63	0.23	0.14	0.34	0.14	0.09	1.00
v/c Ratio	0.72	1.00	0.48	0.88	0.93	0.38	0.69	0.06	0.66	0.85	0.20	0.20
Control Delay	73.8	63.6	8.5	78.3	47.2	2.5	57.5	55.4	38.3	77.3	63.9	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.8	63.6	8.5	78.3	47.2	2.5	57.5	55.4	38.3	77.3	63.9	0.3
LOS	E	E	A	E	D	A	E	E	D	E	E	A
Approach Delay		53.8			45.5			49.6			44.5	
Approach LOS		D			D			D			D	

Intersection Summary

Cycle Length: 145

Actuated Cycle Length: 145

Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 49.0

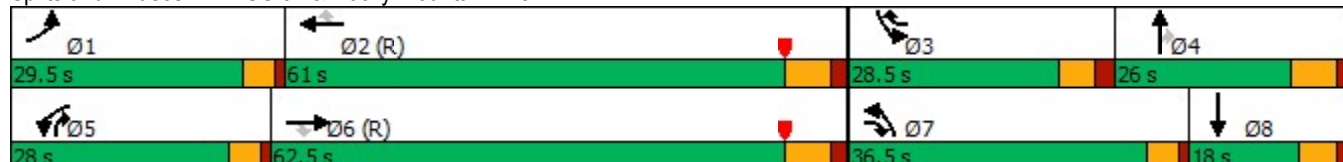
Intersection LOS: D

Intersection Capacity Utilization 83.7%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 4: US 34 & Rocky Mountain Ave



HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

PM Peak Hour
Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	240	1835	500	420	1905	395	495	30	360	380	30	295
Future Volume (veh/h)	240	1835	500	420	1905	395	495	30	360	380	30	295
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	261	1995	543	457	2071	429	538	33	391	413	33	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	314	2146	944	505	2428	966	605	466	439	462	187	
Arrive On Green	0.09	0.42	0.42	0.15	0.48	0.48	0.18	0.13	0.13	0.13	0.10	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	1870	1585
Grp Volume(v), veh/h	261	1995	543	457	2071	429	538	33	391	413	33	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1870	1585
Q Serve(g_s), s	10.8	53.9	30.6	18.9	51.9	21.0	22.1	1.2	19.0	17.1	2.3	0.0
Cycle Q Clear(g_c), s	10.8	53.9	30.6	18.9	51.9	21.0	22.1	1.2	19.0	17.1	2.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	314	2146	944	505	2428	966	605	466	439	462	187	
V/C Ratio(X)	0.83	0.93	0.58	0.91	0.85	0.44	0.89	0.07	0.89	0.89	0.18	
Avail Cap(c_a), veh/h	596	2146	944	560	2428	966	763	466	439	536	187	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	64.8	40.0	18.1	60.9	33.5	15.2	58.4	55.3	50.3	61.8	59.8	0.0
Incr Delay (d2), s/veh	0.2	1.0	0.2	16.3	4.0	1.5	10.6	0.0	19.1	14.6	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	5.8	24.9	12.8	14.5	29.8	12.6	15.9	1.0	22.5	13.2	2.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	65.0	41.0	18.3	77.3	37.6	16.7	69.0	55.3	69.4	76.4	60.0	0.0
LnGrp LOS	E	D	B	E	D	B	E	E	E	E	E	
Approach Vol, veh/h	2799				2957				962			
Approach Delay, s/veh	38.8				40.7				68.7			
Approach LOS	D				D				E			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.7	76.0	25.4	26.0	25.7	67.9	29.9	21.5				
Change Period (Y+Rc), s	4.5	7.0	6.0	7.0	4.5	7.0	4.5	* 7				
Max Green Setting (Gmax), s	25.0	54.0	22.5	19.0	23.5	55.5	32.0	* 12				
Max Q Clear Time (g_c+I1), s	12.8	53.9	19.1	21.0	20.9	55.9	24.1	4.3				
Green Ext Time (p_c), s	0.4	0.1	0.3	0.0	0.3	0.0	1.3	0.0				

Intersection Summary

HCM 6th Ctrl Delay	45.9
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection						
Int Delay, s/veh	8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	235	0	0	0	0	120
Future Vol, veh/h	235	0	0	0	0	120
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	255	0	0	0	0	130
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	1	0	-	0	511	1
Stage 1	-	-	-	-	1	-
Stage 2	-	-	-	-	510	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1622	-	-	-	523	1084
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	603	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1622	-	-	-	441	1084
Mov Cap-2 Maneuver	-	-	-	-	441	-
Stage 1	-	-	-	-	862	-
Stage 2	-	-	-	-	603	-
Approach	EB	WB		SB		
HCM Control Delay, s	7.6	0		8.8		
HCM LOS	A					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1622	-	-	-	-	1084
HCM Lane V/C Ratio	0.157	-	-	-	-	0.12
HCM Control Delay (s)	7.6	-	-	-	0	8.8
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	-	-	0.4

Intersection						
Int Delay, s/veh	36.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	75	155	545	135	170	515
Future Vol, veh/h	75	155	545	135	170	515
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	82	168	592	147	185	560
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1596	666	0	0	739	0
Stage 1	666	-	-	-	-	-
Stage 2	930	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	117	459	-	-	867	-
Stage 1	511	-	-	-	-	-
Stage 2	384	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 81	459	-	-	867	-
Mov Cap-2 Maneuver	~ 81	-	-	-	-	-
Stage 1	511	-	-	-	-	-
Stage 2	265	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	247.7	0		2.5		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	-	182	867	-	
HCM Lane V/C Ratio	-	-	1.374	0.213	-	
HCM Control Delay (s)	-	-	247.7	10.3	0	
HCM Lane LOS	-	-	F	B	A	
HCM 95th %tile Q(veh)	-	-	14.8	0.8	-	
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion Dr PM (Site Folder: General)]**

PM Peak Hour
Site Category: Short Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Avenue														
3	L2	75	2.0	82	2.0	0.372	7.8	LOS A	1.8	45.3	0.52	0.44	0.52	33.4
8	T1	495	2.0	538	2.0	0.372	7.6	LOS A	1.8	45.3	0.51	0.43	0.51	33.6
18	R2	120	2.0	130	2.0	0.372	7.3	LOS A	1.8	44.7	0.50	0.42	0.50	33.0
Approach		690	2.0	750	2.0	0.372	7.5	LOS A	1.8	45.3	0.51	0.43	0.51	33.5
East: Mountain Lion Drive														
1	L2	145	2.0	158	2.0	0.560	13.6	LOS B	3.8	97.3	0.73	0.89	1.20	30.4
6	T1	65	2.0	71	2.0	0.560	13.6	LOS B	3.8	97.3	0.73	0.89	1.20	30.3
16	R2	175	2.0	190	2.0	0.560	13.6	LOS B	3.8	97.3	0.73	0.89	1.20	29.5
Approach		385	2.0	418	2.0	0.560	13.6	LOS B	3.8	97.3	0.73	0.89	1.20	30.0
North: Boyd Lake Avenue														
7	L2	160	2.0	174	2.0	0.429	8.5	LOS A	2.2	55.9	0.54	0.45	0.54	32.5
4	T1	575	2.0	625	2.0	0.429	8.2	LOS A	2.2	55.9	0.52	0.44	0.52	33.2
14	R2	75	2.0	82	2.0	0.429	8.0	LOS A	2.2	55.2	0.52	0.43	0.52	32.7
Approach		810	2.0	880	2.0	0.429	8.3	LOS A	2.2	55.9	0.53	0.44	0.53	33.0
West: Mountain Lion Drive														
5	L2	90	2.0	98	2.0	0.429	12.5	LOS B	2.1	52.2	0.70	0.79	1.00	30.9
2	T1	55	2.0	60	2.0	0.429	12.5	LOS B	2.1	52.2	0.70	0.79	1.00	30.8
12	R2	95	2.0	103	2.0	0.429	12.5	LOS B	2.1	52.2	0.70	0.79	1.00	29.9
Approach		240	2.0	261	2.0	0.429	12.5	LOS B	2.1	52.2	0.70	0.79	1.00	30.5
All Vehicles		2125	2.0	2310	2.0	0.560	9.5	LOS A	3.8	97.3	0.58	0.56	0.70	32.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 8 [Rocky Mountain Ave & Road B PM (Site Folder: General)]**

AM Peak Hour
Site Category: Short Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] ft				
South: Boyd Lake Avenue														
8	T1	1	2.0	1	2.0	0.004	6.4	LOS A	0.0	0.3	0.59	0.46	0.59	34.6
18	R2	1	2.0	1	2.0	0.004	6.4	LOS A	0.0	0.3	0.59	0.46	0.59	33.5
Approach		2	2.0	2	2.0	0.004	6.4	LOS A	0.0	0.3	0.59	0.46	0.59	34.0
East: Mountain Lion Drive														
1	L2	1	2.0	1	2.0	0.692	11.7	LOS B	7.6	192.9	0.04	0.00	0.04	32.0
16	R2	885	2.0	962	2.0	0.692	11.7	LOS B	7.6	192.9	0.04	0.00	0.04	31.0
Approach		886	2.0	963	2.0	0.692	11.7	LOS B	7.6	192.9	0.04	0.00	0.04	31.0
North: Boyd Lake Avenue														
7	L2	950	2.0	1033	2.0	0.742	13.3	LOS B	9.6	243.9	0.05	0.00	0.05	29.3
4	T1	1	2.0	1	2.0	0.001	2.7	LOS A	0.0	0.1	0.01	0.00	0.01	36.6
Approach		951	2.0	1034	2.0	0.742	13.3	LOS B	9.6	243.9	0.05	0.00	0.05	29.3
All Vehicles		1839	2.0	1999	2.0	0.742	12.5	LOS B	9.6	243.9	0.04	0.00	0.04	30.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Timings
1: Boyd Lake Ave & US 34

Saturday Mid Day
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	2085	210	315	1950	125	280	170	575	140	135	200
Future Volume (vph)	125	2085	210	315	1950	125	280	170	575	140	135	200
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5		9.5	22.5	
Total Split (s)	10.7	48.0	14.0	15.0	52.3	13.2	14.0	23.8		13.2	23.0	
Total Split (%)	10.7%	48.0%	14.0%	15.0%	52.3%	13.2%	14.0%	23.8%		13.2%	23.0%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	6.2	43.5	57.5	10.5	47.8	60.7	9.5	19.6	100.0	8.4	18.5	100.0
Actuated g/C Ratio	0.06	0.44	0.58	0.10	0.48	0.61	0.10	0.20	1.00	0.08	0.18	1.00
v/c Ratio	0.64	1.02	0.23	0.95	0.87	0.13	0.93	0.27	0.39	0.53	0.22	0.14
Control Delay	60.4	54.6	1.9	82.0	28.5	1.8	81.4	35.5	0.7	51.0	35.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.4	54.6	1.9	82.0	28.5	1.8	81.4	35.5	0.7	51.0	35.7	0.2
LOS	E	D	A	F	C	A	F	D	A	D	D	A
Approach Delay		50.3			34.1			28.5			25.3	
Approach LOS		D			C			C			C	

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 38.7

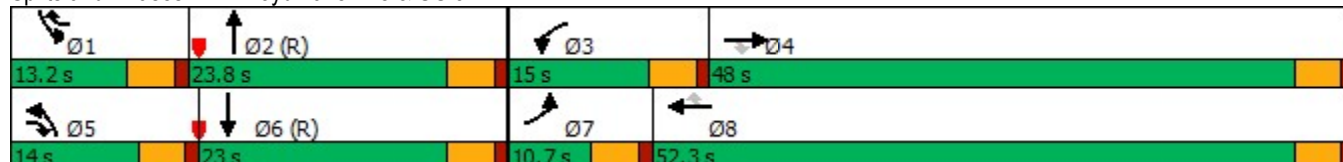
Intersection LOS: D

Intersection Capacity Utilization 76.4%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34



HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

Saturday Mid Day

Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	2085	210	315	1950	125	280	170	575	140	135	200
Future Volume (veh/h)	125	2085	210	315	1950	125	280	170	575	140	135	200
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	136	2266	228	342	2120	136	304	185	0	152	147	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	198	2221	840	363	2464	865	328	771		218	657	
Arrive On Green	0.06	0.44	0.44	0.10	0.48	0.48	0.09	0.22	0.00	0.06	0.19	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	136	2266	228	342	2120	136	304	185	0	152	147	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	3.9	43.5	7.9	9.8	36.7	4.3	8.7	4.3	0.0	4.3	3.5	0.0
Cycle Q Clear(g_c), s	3.9	43.5	7.9	9.8	36.7	4.3	8.7	4.3	0.0	4.3	3.5	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	198	2221	840	363	2464	865	328	771		218	657	
V/C Ratio(X)	0.69	1.02	0.27	0.94	0.86	0.16	0.93	0.24		0.70	0.22	
Avail Cap(c_a), veh/h	214	2221	840	363	2464	865	328	771		301	657	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.20	0.20	0.20	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	46.2	28.2	12.9	44.5	22.9	11.3	44.9	32.3	0.0	45.9	34.6	0.0
Incr Delay (d2), s/veh	8.0	24.4	0.2	10.5	0.7	0.0	31.3	0.7	0.0	4.1	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.4	29.9	4.9	6.3	16.8	2.3	8.8	3.5	0.0	3.5	2.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.2	52.6	13.1	55.0	23.6	11.3	76.2	33.1	0.0	50.0	35.4	0.0
LnGrp LOS	D	F	B	D	C	B	E	C		D	D	
Approach Vol, veh/h	2630			2598			489			299		
Approach Delay, s/veh	49.3			27.1			59.9			42.9		
Approach LOS	D			C			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.8	26.2	15.0	48.0	14.0	23.0	10.2	52.8				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	8.7	19.3	10.5	43.5	9.5	18.5	6.2	47.8				
Max Q Clear Time (g_c+I1), s	6.3	6.3	11.8	45.5	10.7	5.5	5.9	38.7				
Green Ext Time (p_c), s	0.1	0.8	0.0	0.0	0.0	0.6	0.0	7.9				
Intersection Summary												
HCM 6th Ctrl Delay	40.2											
HCM 6th LOS	D											

Timings
2: Hahns Peak Dr & US 34

Saturday Mid Day
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	395	1930	15	285	2330	105	120	15	230	105	10	200
Future Volume (vph)	395	1930	15	285	2330	105	120	15	230	105	10	200
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8	1		4	5
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	1	4	4	5
Switch Phase												
Minimum Initial (s)	5.0	25.0	25.0	5.0	25.0	25.0	25.0	25.0	5.0	25.0	25.0	5.0
Minimum Split (s)	9.5	32.0	32.0	9.5	32.0	32.0	32.0	32.0	9.5	32.0	32.0	9.5
Total Split (s)	24.2	87.0	87.0	21.0	83.8	83.8	32.0	32.0	21.0	32.0	32.0	24.2
Total Split (%)	17.3%	62.1%	62.1%	15.0%	59.9%	59.9%	22.9%	22.9%	15.0%	22.9%	22.9%	17.3%
Yellow Time (s)	3.5	5.0	5.0	3.5	5.0	5.0	5.0	5.0	3.5	5.0	5.0	3.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	7.0	7.0	4.5	7.0	7.0	7.0	7.0	4.5	7.0	7.0	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag			Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes			Yes			Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	Min	Min	None	Min	Min	None
Act Effect Green (s)	19.7	81.1	81.1	15.4	76.8	76.8	25.0	25.0	47.4	25.0	25.0	51.7
Actuated g/C Ratio	0.14	0.58	0.58	0.11	0.55	0.55	0.18	0.18	0.34	0.18	0.18	0.37
v/c Ratio	1.00	0.80	0.02	0.82	1.02	0.14	0.52	0.05	0.45	0.52	0.03	0.40
Control Delay	99.9	26.0	0.0	78.6	53.3	6.9	60.6	48.3	34.1	60.4	48.0	30.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	99.9	26.0	0.0	78.6	53.3	6.9	60.6	48.3	34.1	60.4	48.0	30.7
LOS	F	C	A	E	D	A	E	D	C	E	D	C
Approach Delay		38.3			53.9			43.4			41.1	
Approach LOS		D			D			D			D	

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 101 (72%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 46.2

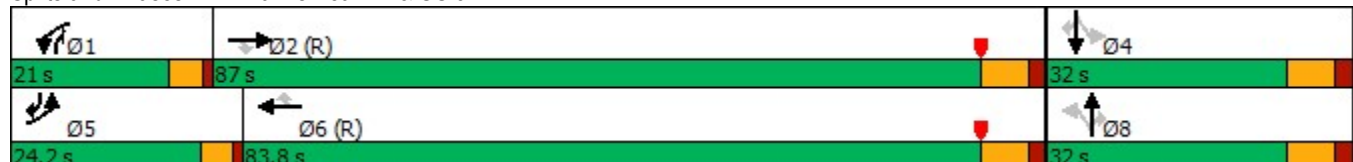
Intersection LOS: D

Intersection Capacity Utilization 93.7%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Hahns Peak Dr & US 34



HCM 6th Signalized Intersection Summary

2: Hahns Peak Dr & US 34

Saturday Mid Day
Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	395	1930	15	285	2330	105	120	15	230	105	10	200
Future Volume (veh/h)	395	1930	15	285	2330	105	120	15	230	105	10	200
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	482	2354	16	310	2841	128	130	16	250	128	11	244
Peak Hour Factor	0.82	0.82	0.92	0.92	0.82	0.82	0.92	0.92	0.92	0.82	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	486	2990	928	358	2801	870	295	334	447	242	334	506
Arrive On Green	0.14	0.59	0.59	0.10	0.55	0.55	0.18	0.18	0.18	0.18	0.18	0.18
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	1404	1870	1585	1113	1870	1585
Grp Volume(v), veh/h	482	2354	16	310	2841	128	130	16	250	128	11	244
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1404	1870	1585	1113	1870	1585
Q Serve(g_s), s	19.5	49.6	0.6	12.4	76.8	5.6	11.8	1.0	18.8	15.1	0.7	17.3
Cycle Q Clear(g_c), s	19.5	49.6	0.6	12.4	76.8	5.6	12.5	1.0	18.8	16.1	0.7	17.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	486	2990	928	358	2801	870	295	334	447	242	334	506
V/C Ratio(X)	0.99	0.79	0.02	0.87	1.01	0.15	0.44	0.05	0.56	0.53	0.03	0.48
Avail Cap(c_a), veh/h	486	2990	928	407	2801	870	295	334	447	242	334	506
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.37	0.37	0.37	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	60.1	22.3	12.1	61.8	31.6	15.5	52.7	47.6	42.8	54.3	47.5	38.3
Incr Delay (d2), s/veh	22.7	0.8	0.0	1.6	9.3	0.0	0.4	0.0	1.0	1.1	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.2	23.9	0.4	6.7	36.0	2.8	7.6	0.8	12.0	7.7	0.6	11.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	82.7	23.1	12.2	63.4	40.9	15.6	53.1	47.7	43.8	55.4	47.5	38.6
LnGrp LOS	F	C	B	E	F	B	D	D	D	E	D	D
Approach Vol, veh/h	2852			3279			396			383		
Approach Delay, s/veh	33.1			42.0			47.0			44.5		
Approach LOS	C			D			D			D		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	19.0	89.0		32.0	24.2	83.8		32.0				
Change Period (Y+Rc), s	4.5	7.0		7.0	4.5	7.0		7.0				
Max Green Setting (Gmax), s	16.5	80.0		25.0	19.7	76.8		25.0				
Max Q Clear Time (g_c+l1), s	14.4	51.6		19.3	21.5	78.8		20.8				
Green Ext Time (p_c), s	0.2	10.7		0.2	0.0	0.0		0.1				

Intersection Summary

HCM 6th Ctrl Delay	38.8
HCM 6th LOS	D

Notes

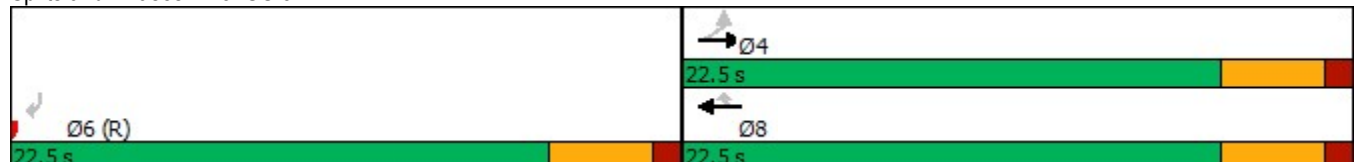
User approved pedestrian interval to be less than phase max green.

Timings
3: US 34

Saturday Mid Day
Avenue South

					
Lane Group	EBL	EBT	WBT	WBR	SBR
Lane Configurations		  	  		
Traffic Volume (vph)	180	2085	2720	145	255
Future Volume (vph)	180	2085	2720	145	255
Turn Type	Perm	NA	NA	Perm	Perm
Protected Phases		4	8		
Permitted Phases	4			8	6
Detector Phase	4	4	8	8	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5
Total Split (s)	22.5	22.5	22.5	22.5	22.5
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	Max	Max	Max	Max	Max
Act Effct Green (s)	18.0	18.0	18.0	18.0	18.0
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40
v/c Ratio	1.19	1.11	1.45	0.22	0.43
Control Delay	153.3	76.2	226.3	3.0	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	153.3	76.2	226.3	3.0	12.4
LOS	F	E	F	A	B
Approach Delay		82.4	214.9		
Approach LOS		F	F		
Intersection Summary					
Cycle Length: 45					
Actuated Cycle Length: 45					
Offset: 0 (0%), Referenced to phase 2: and 6:SBR, Start of Green					
Natural Cycle: 75					
Control Type: Pretimed					
Maximum v/c Ratio: 1.45					
Intersection Signal Delay: 149.6			Intersection LOS: F		
Intersection Capacity Utilization 75.8%			ICU Level of Service D		
Analysis Period (min) 15					

Splits and Phases: 3: US 34



Timings
4: US 34 & Rocky Mountain Ave

Saturday Mid Day
Avenue South

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	1425	560	460	2030	345	545	35	450	740	35	285
Future Volume (vph)	270	1425	560	460	2030	345	545	35	450	740	35	285
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			Free
Detector Phase	5	2	3	1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	5.0	25.0	5.0	5.0	25.0	5.0	5.0	5.0	5.0	5.0	25.0	
Minimum Split (s)	10.0	35.0	10.0	10.0	32.0	24.0	10.0	24.0	10.0	24.0	32.0	
Total Split (s)	16.0	55.0	31.0	27.0	66.0	39.0	31.0	24.0	27.0	39.0	32.0	
Total Split (%)	11.0%	37.9%	21.4%	18.6%	45.5%	26.9%	21.4%	16.6%	18.6%	26.9%	22.1%	
Yellow Time (s)	3.5	5.0	3.5	3.5	5.0	4.0	3.5	4.0	3.5	4.0	5.0	
All-Red Time (s)	1.0	2.0	1.0	1.0	2.0	2.0	1.0	2.0	1.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	7.0	4.5	4.5	7.0	6.0	4.5	6.0	4.5	6.0	7.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None	None	None	Min	
Act Effect Green (s)	11.8	48.0	81.2	22.8	59.0	103.5	26.2	15.4	42.0	37.5	25.0	145.0
Actuated g/C Ratio	0.08	0.33	0.56	0.16	0.41	0.71	0.18	0.11	0.29	0.26	0.17	1.00
v/c Ratio	1.05	0.92	0.60	0.93	1.07	0.30	0.95	0.10	0.91	0.91	0.12	0.20
Control Delay	130.2	56.5	12.2	84.6	81.5	1.4	84.9	57.0	60.3	67.1	51.9	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	130.2	56.5	12.2	84.6	81.5	1.4	84.9	57.0	60.3	67.1	51.9	0.3
LOS	F	E	B	F	F	A	F	E	E	E	D	A
Approach Delay		54.3			72.3			73.2			48.6	
Approach LOS		D			E			E			D	

Intersection Summary

Cycle Length: 145

Actuated Cycle Length: 145

Offset: 80 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 63.3

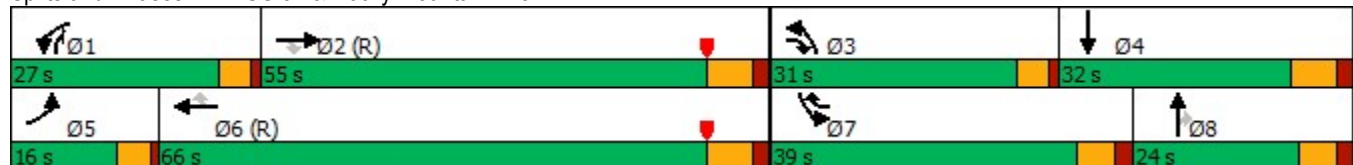
Intersection LOS: E

Intersection Capacity Utilization 91.1%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 4: US 34 & Rocky Mountain Ave



HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

Saturday Mid Day
Avenue South

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	270	1425	560	460	2030	345	545	35	450	740	35	285
Future Volume (veh/h)	270	1425	560	460	2030	345	545	35	450	740	35	285
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	293	1549	609	500	2207	375	592	38	489	804	38	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	274	2259	991	536	2647	1182	632	441	443	786	335	
Arrive On Green	0.08	0.44	0.44	0.16	0.52	0.52	0.18	0.12	0.12	0.23	0.18	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	1870	1585
Grp Volume(v), veh/h	293	1549	609	500	2207	375	592	38	489	804	38	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1870	1585
Q Serve(g_s), s	11.5	35.2	33.9	20.7	53.2	11.4	24.5	1.4	18.0	33.0	2.5	0.0
Cycle Q Clear(g_c), s	11.5	35.2	33.9	20.7	53.2	11.4	24.5	1.4	18.0	33.0	2.5	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	274	2259	991	536	2647	1182	632	441	443	786	335	
V/C Ratio(X)	1.07	0.69	0.61	0.93	0.83	0.32	0.94	0.09	1.10	1.02	0.11	
Avail Cap(c_a), veh/h	274	2259	991	536	2647	1182	632	441	443	786	335	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	66.8	32.3	16.5	60.5	29.6	6.1	58.4	56.2	52.3	56.0	49.8	0.0
Incr Delay (d2), s/veh	38.5	0.2	0.3	23.1	3.3	0.7	21.4	0.0	74.3	37.8	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.1	16.4	13.9	16.2	29.9	6.9	18.4	1.1	35.0	25.9	2.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	105.2	32.5	16.8	83.6	32.9	6.8	79.9	56.2	126.5	93.8	49.9	0.0
LnGrp LOS	F	C	B	F	C	A	E	E	F	F	D	
Approach Vol, veh/h	2451			3082			1119			842		
Approach Delay, s/veh	37.3			37.9			99.5			91.9		
Approach LOS	D			D			F			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	27.0	71.2	31.0	33.0	16.0	82.2	39.0	25.0				
Change Period (Y+Rc), s	4.5	7.0	4.5	7.0	4.5	7.0	6.0	* 7				
Max Green Setting (Gmax), s	22.5	48.0	26.5	25.0	11.5	59.0	33.0	* 18				
Max Q Clear Time (g_c+I1), s	22.7	37.2	26.5	4.5	13.5	55.2	35.0	20.0				
Green Ext Time (p_c), s	0.0	4.4	0.0	0.0	0.0	2.8	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 53.0
HCM 6th LOS D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection

Int Delay, s/veh 8.4

Movement EBL EBT WBT WBR SBL SBRLane Configurations      

Traffic Vol, veh/h 280 0 0 0 0 230

Future Vol, veh/h 280 0 0 0 0 230

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Free Free Free Free Stop Stop

RT Channelized - None - None - None

Storage Length 0 - - 0 0 0

Veh in Median Storage, # - 0 0 - 0 -

Grade, % - 0 0 - 0 -

Peak Hour Factor 92 92 92 92 92 92

Heavy Vehicles, % 2 2 2 2 2 2

Mvmt Flow 304 0 0 0 0 250

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 1 0 - 0 609 1

Stage 1 - - - - 1 -

Stage 2 - - - - 608 -

Critical Hdwy 4.12 - - - 6.42 6.22

Critical Hdwy Stg 1 - - - - 5.42 -

Critical Hdwy Stg 2 - - - - 5.42 -

Follow-up Hdwy 2.218 - - - 3.518 3.318

Pot Cap-1 Maneuver 1622 - - - 458 1084

Stage 1 - - - - 1022 -

Stage 2 - - - - 543 -

Platoon blocked, % - - - -

Mov Cap-1 Maneuver 1622 - - - 372 1084

Mov Cap-2 Maneuver - - - - 372 -

Stage 1 - - - - 831 -

Stage 2 - - - - 543 -

Approach EB WB SB

HCM Control Delay, s 7.7 0 9.3

HCM LOS A

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1 SBLn2

Capacity (veh/h) 1622 - - - - 1084

HCM Lane V/C Ratio 0.188 - - - - 0.231

HCM Control Delay (s) 7.7 - - - 0 9.3

HCM Lane LOS A - - - A A

HCM 95th %tile Q(veh) 0.7 - - - - 0.9

Intersection						
Int Delay, s/veh	34.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	90	190	485	80	145	485
Future Vol, veh/h	90	190	485	80	145	485
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	98	207	527	87	158	527
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1414	571	0	0	614	0
Stage 1	571	-	-	-	-	-
Stage 2	843	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	152	520	-	-	965	-
Stage 1	565	-	-	-	-	-
Stage 2	422	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	117	520	-	-	965	-
Mov Cap-2 Maneuver	117	-	-	-	-	-
Stage 1	565	-	-	-	-	-
Stage 2	324	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	175.8	0		2.2		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	247	965	-	
HCM Lane V/C Ratio	-	-	1.232	0.163	-	
HCM Control Delay (s)	-	-	175.8	9.5	0	
HCM Lane LOS	-	-	F	A	A	
HCM 95th %tile Q(veh)	-	-	14.9	0.6	-	

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion Dr SAT (Site Folder: General)]**

PM Peak Hour
Site Category: Short Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]				
		veh/h	%	veh/h	%	v/c	sec		veh	ft				mph
South: Boyd Lake Avenue														
3	L2	100	2.0	109	2.0	0.511	9.9	LOS A	3.5	88.1	0.58	0.54	0.68	32.4
8	T1	750	2.0	815	2.0	0.511	9.6	LOS A	3.5	88.1	0.57	0.52	0.66	32.7
18	R2	120	2.0	130	2.0	0.511	9.4	LOS A	3.3	84.1	0.56	0.50	0.63	32.0
Approach		970	2.0	1054	2.0	0.511	9.6	LOS A	3.5	88.1	0.57	0.52	0.66	32.6
East: Mountain Lion Drive														
1	L2	125	2.0	136	2.0	0.675	21.3	LOS C	4.8	122.0	0.81	1.05	1.61	27.6
6	T1	55	2.0	60	2.0	0.675	21.3	LOS C	4.8	122.0	0.81	1.05	1.61	27.5
16	R2	185	2.0	201	2.0	0.675	21.3	LOS C	4.8	122.0	0.81	1.05	1.61	26.9
Approach		365	2.0	397	2.0	0.675	21.3	LOS C	4.8	122.0	0.81	1.05	1.61	27.2
North: Boyd Lake Avenue														
7	L2	170	2.0	185	2.0	0.358	7.4	LOS A	1.7	43.5	0.49	0.41	0.49	32.8
4	T1	445	2.0	484	2.0	0.358	7.2	LOS A	1.7	43.5	0.48	0.39	0.48	33.6
14	R2	65	2.0	71	2.0	0.358	7.0	LOS A	1.7	42.9	0.47	0.38	0.47	33.1
Approach		680	2.0	739	2.0	0.358	7.2	LOS A	1.7	43.5	0.48	0.40	0.48	33.4
West: Mountain Lion Drive														
5	L2	65	2.0	71	2.0	0.290	8.8	LOS A	1.1	28.1	0.63	0.63	0.63	32.5
2	T1	45	2.0	49	2.0	0.290	8.8	LOS A	1.1	28.1	0.63	0.63	0.63	32.4
12	R2	75	2.0	82	2.0	0.290	8.8	LOS A	1.1	28.1	0.63	0.63	0.63	31.5
Approach		185	2.0	201	2.0	0.290	8.8	LOS A	1.1	28.1	0.63	0.63	0.63	32.1
All Vehicles		2200	2.0	2391	2.0	0.675	10.7	LOS B	4.8	122.0	0.59	0.58	0.76	31.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: I:\124281-01 Avenue South TIS Update\08_TRFAnalysis\SIDRA\short term background.sip9

MOVEMENT SUMMARY

 **Site: 8 [Rocky Mountain Ave & Road B SAT (Site Folder: General)]**

AM Peak Hour
Site Category: Short Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] ft				
South: Boyd Lake Avenue														
8	T1	1	2.0	1	2.0	0.004	7.0	LOS A	0.0	0.3	0.63	0.51	0.63	34.2
18	R2	1	2.0	1	2.0	0.004	7.0	LOS A	0.0	0.3	0.63	0.51	0.63	33.2
Approach		2	2.0	2	2.0	0.004	7.0	LOS A	0.0	0.3	0.63	0.51	0.63	33.7
East: Mountain Lion Drive														
1	L2	1	2.0	1	2.0	0.806	16.3	LOS C	13.5	342.6	0.06	0.01	0.06	30.0
16	R2	1030	2.0	1120	2.0	0.806	16.3	LOS C	13.5	342.6	0.06	0.01	0.06	29.1
Approach		1031	2.0	1121	2.0	0.806	16.3	LOS C	13.5	342.6	0.06	0.01	0.06	29.1
North: Boyd Lake Avenue														
7	L2	1055	2.0	1147	2.0	0.824	17.4	LOS C	15.1	384.0	0.07	0.01	0.07	27.9
4	T1	1	2.0	1	2.0	0.001	2.7	LOS A	0.0	0.1	0.01	0.00	0.01	36.6
Approach		1056	2.0	1148	2.0	0.824	17.4	LOS C	15.1	384.0	0.07	0.01	0.07	27.9
All Vehicles		2089	2.0	2271	2.0	0.824	16.8	LOS C	15.1	384.0	0.06	0.01	0.06	28.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX E. 2045 FUTURE BACKGROUND TRAFFIC LEVEL OF SERVICE WORKSHEETS WITH LCR 20E CONNECTION

Timings
1: Boyd Lake Ave & US 34

AM Peak Hour
2045 Background

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	295	1975	145	210	1895	120	215	310	290	145	280	450
Future Volume (vph)	295	1975	145	210	1895	120	215	310	290	145	280	450
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5		9.5	22.5	
Total Split (s)	13.9	44.4	11.6	11.5	42.0	11.0	11.6	23.1		11.0	22.5	
Total Split (%)	15.4%	49.3%	12.9%	12.8%	46.7%	12.2%	12.9%	25.7%		12.2%	25.0%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	9.4	39.9	51.5	7.0	37.5	48.5	7.1	18.6	90.0	6.5	18.0	90.0
Actuated g/C Ratio	0.10	0.44	0.57	0.08	0.42	0.54	0.08	0.21	1.00	0.07	0.20	1.00
v/c Ratio	0.90	0.95	0.17	0.85	0.97	0.14	0.87	0.46	0.20	0.64	0.43	0.31
Control Delay	68.8	35.6	3.6	39.0	49.9	11.4	71.8	33.7	0.3	53.3	33.7	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.8	35.6	3.6	39.0	49.9	11.4	71.8	33.7	0.3	53.3	33.7	0.5
LOS	E	D	A	D	D	B	E	C	A	D	C	A
Approach Delay		37.7			46.8			31.9			19.9	
Approach LOS		D			D			C			B	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 37.7

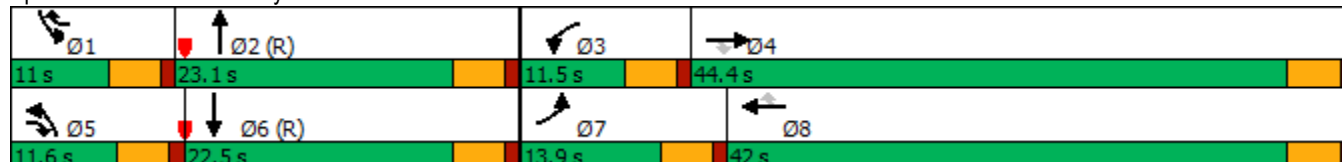
Intersection LOS: D

Intersection Capacity Utilization 73.9%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34



HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

AM Peak Hour
2045 Background

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	295	1975	145	210	1895	120	215	310	290	145	280	450
Future Volume (veh/h)	295	1975	145	210	1895	120	215	310	290	145	280	450
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	321	2147	158	228	2060	130	234	337	0	158	304	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	361	2264	828	269	2128	765	273	757		228	711	
Arrive On Green	0.10	0.44	0.44	0.05	0.28	0.28	0.08	0.21	0.00	0.07	0.20	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	321	2147	158	228	2060	130	234	337	0	158	304	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	8.3	36.4	4.8	5.9	35.9	5.0	6.0	7.4	0.0	4.0	6.7	0.0
Cycle Q Clear(g_c), s	8.3	36.4	4.8	5.9	35.9	5.0	6.0	7.4	0.0	4.0	6.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	361	2264	828	269	2128	765	273	757		228	711	
V/C Ratio(X)	0.89	0.95	0.19	0.85	0.97	0.17	0.86	0.45		0.69	0.43	
Avail Cap(c_a), veh/h	361	2264	828	269	2128	765	273	757		250	711	
HCM Platoon Ratio	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.14	0.14	0.14	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	39.8	24.1	11.4	42.1	31.8	16.5	41.0	30.8	0.0	41.1	31.5	0.0
Incr Delay (d2), s/veh	22.7	9.5	0.1	3.8	2.9	0.0	22.9	1.9	0.0	7.2	1.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.1	22.1	2.9	3.7	18.1	2.6	6.1	6.0	0.0	3.5	5.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	62.5	33.6	11.5	45.9	34.7	16.5	63.9	32.7	0.0	48.4	33.4	0.0
LnGrp LOS	E	C	B	D	C	B	E	C		D	C	
Approach Vol, veh/h	2626			2418			571			462		
Approach Delay, s/veh	35.8			34.8			45.5			38.5		
Approach LOS	D			C			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.4	23.7	11.5	44.4	11.6	22.5	13.9	42.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	6.5	18.6	7.0	39.9	7.1	18.0	9.4	37.5				
Max Q Clear Time (g_c+I1), s	6.0	9.4	7.9	38.4	8.0	8.7	10.3	37.9				
Green Ext Time (p_c), s	0.0	1.4	0.0	1.5	0.0	1.2	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	36.5
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary

2: Hahns Peak Dr & US 34

AM Peak Hour
2045 Background

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	1830	10	145	1970	45	80	10	125	45	5	60
Future Volume (veh/h)	140	1830	10	145	1970	45	80	10	125	45	5	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	171	2232	11	158	2402	55	87	11	136	55	5	73
Peak Hour Factor	0.82	0.82	0.92	0.92	0.82	0.82	0.92	0.92	0.92	0.82	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	204	2349	729	196	2337	726	469	520	530	419	520	534
Arrive On Green	0.06	0.46	0.46	0.11	0.92	0.92	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	1411	1870	1585	1241	1870	1585
Grp Volume(v), veh/h	171	2232	11	158	2402	55	87	11	136	55	5	73
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1411	1870	1585	1241	1870	1585
Q Serve(g_s), s	4.4	37.7	0.3	4.0	41.2	0.3	4.3	0.4	5.6	3.0	0.2	2.9
Cycle Q Clear(g_c), s	4.4	37.7	0.3	4.0	41.2	0.3	4.5	0.4	5.6	3.4	0.2	2.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	204	2349	729	196	2337	726	469	520	530	419	520	534
V/C Ratio(X)	0.84	0.95	0.02	0.81	1.03	0.08	0.19	0.02	0.26	0.13	0.01	0.14
Avail Cap(c_a), veh/h	204	2349	729	196	2337	726	469	520	530	419	520	534
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.42	0.42	0.42	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.9	23.3	13.2	39.4	3.8	2.1	25.1	23.6	21.8	24.9	23.5	20.8
Incr Delay (d2), s/veh	12.5	5.0	0.0	20.1	26.1	0.2	0.1	0.0	0.1	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.8	19.2	0.2	3.9	11.6	0.2	2.6	0.3	3.7	1.6	0.1	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.4	28.3	13.2	59.5	29.9	2.3	25.2	23.6	21.9	24.9	23.5	20.8
LnGrp LOS	D	C	B	E	F	A	C	C	C	C	C	C
Approach Vol, veh/h		2414			2615			234			133	
Approach Delay, s/veh		30.1			31.1			23.2			22.6	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.6	48.4		32.0	9.8	48.2		32.0				
Change Period (Y+Rc), s	4.5	7.0		7.0	4.5	7.0		7.0				
Max Green Setting (Gmax), s	5.1	41.4		25.0	5.3	41.2		25.0				
Max Q Clear Time (g_c+I1), s	6.0	39.7		5.4	6.4	43.2		7.6				
Green Ext Time (p_c), s	0.0	1.3		0.1	0.0	0.0		0.1				
Intersection Summary												
HCM 6th Ctrl Delay			30.1									
HCM 6th LOS			C									
Notes												
User approved pedestrian interval to be less than phase max green.												

Timings 4: US 34 & Rocky Mountain Ave

AM Peak Hour
2045 Background

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	255	1350	360	360	1740	430	350	205	300	260	115	105
Future Volume (vph)	255	1350	360	360	1740	430	350	205	300	260	115	105
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	1	6	7	5	2	3	7	4		3	8	
Permitted Phases			6			2			Free			Free
Detector Phase	1	6	7	5	2	3	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	25.0	5.0	5.0	25.0	5.0	5.0	25.0		5.0	25.0	
Minimum Split (s)	9.5	32.0	9.5	10.0	35.0	24.0	9.5	35.0		24.0	35.0	
Total Split (s)	16.0	46.0	23.4	24.0	54.0	30.0	23.4	35.0		30.0	41.6	
Total Split (%)	11.9%	34.1%	17.3%	17.8%	40.0%	22.2%	17.3%	25.9%		22.2%	30.8%	
Yellow Time (s)	3.5	5.0	3.5	3.5	5.0	4.0	3.5	5.0		4.0	5.0	
All-Red Time (s)	1.0	2.0	1.0	1.0	2.0	2.0	1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	7.0	4.5	4.5	7.0	6.0	4.5	7.0		6.0	7.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	Min	None	None	C-Min	None	None	Min		None	Min	
Act Effect Green (s)	16.9	53.4	78.4	14.9	51.3	74.0	18.1	26.6	135.0	15.7	25.7	135.0
Actuated g/C Ratio	0.13	0.40	0.58	0.11	0.38	0.55	0.13	0.20	1.00	0.12	0.19	1.00
v/c Ratio	0.64	0.73	0.39	0.71	0.98	0.49	0.83	0.32	0.21	0.71	0.35	0.07
Control Delay	63.4	38.1	9.2	65.3	57.4	12.2	72.6	48.3	0.3	67.3	50.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.4	38.1	9.2	65.3	57.4	12.2	72.6	48.3	0.3	67.3	50.4	0.1
LOS	E	D	A	E	E	B	E	D	A	E	D	A
Approach Delay		36.1			50.8			41.4			48.6	
Approach LOS		D			D			D			D	

Intersection Summary

Cycle Length: 135

Actuated Cycle Length: 135

Offset: 0 (0%), Referenced to phase 2:WBT, Start of Yellow

Natural Cycle: 125

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 44.3

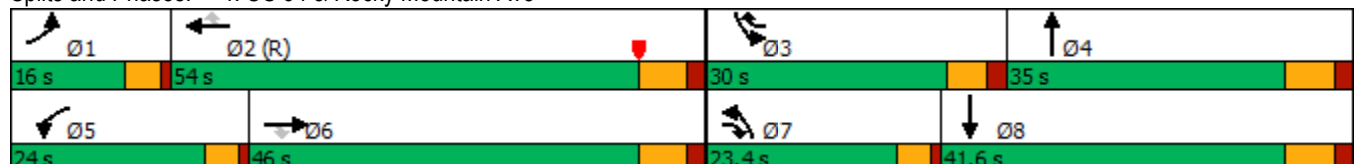
Intersection LOS: D

Intersection Capacity Utilization 90.9%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 4: US 34 & Rocky Mountain Ave



HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

AM Peak Hour
2045 Background

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	255	1350	360	360	1740	430	350	205	300	260	115	105
Future Volume (veh/h)	255	1350	360	360	1740	430	350	205	300	260	115	105
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	277	1467	391	391	1891	467	380	223	0	283	125	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	294	2164	871	478	2215	843	433	715		340	346	
Arrive On Green	0.09	0.42	0.42	0.10	0.43	0.43	0.13	0.20	0.00	0.10	0.19	0.00
Sat Flow, veh/h	3456	5106	1585	5023	5106	1585	3456	3554	1585	3456	1870	1585
Grp Volume(v), veh/h	277	1467	391	391	1891	467	380	223	0	283	125	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1674	1702	1585	1728	1777	1585	1728	1870	1585
Q Serve(g_s), s	10.8	31.4	19.9	10.3	45.0	26.4	14.6	7.2	0.0	10.9	7.9	0.0
Cycle Q Clear(g_c), s	10.8	31.4	19.9	10.3	45.0	26.4	14.6	7.2	0.0	10.9	7.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	294	2164	871	478	2215	843	433	715		340	346	
V/C Ratio(X)	0.94	0.68	0.45	0.82	0.85	0.55	0.88	0.31		0.83	0.36	
Avail Cap(c_a), veh/h	294	2164	871	726	2215	843	484	737		614	479	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	61.4	31.4	18.2	59.9	34.4	20.9	58.0	46.0	0.0	59.8	48.0	0.0
Incr Delay (d2), s/veh	6.4	0.1	0.0	2.5	4.4	2.6	15.3	0.1	0.0	2.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.1	14.6	8.6	8.0	26.5	15.6	11.7	5.8	0.0	8.5	6.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.8	31.5	18.2	62.4	38.8	23.6	73.4	46.0	0.0	61.8	48.3	0.0
LnGrp LOS	E	C	B	E	D	C	E	D		E	D	
Approach Vol, veh/h	2135			2749			603			408		
Approach Delay, s/veh	33.8			39.6			63.3			57.7		
Approach LOS	C			D			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.0	65.6	19.3	34.2	17.3	64.2	21.4	32.0				
Change Period (Y+Rc), s	4.5	7.0	6.0	7.0	4.5	7.0	4.5	7.0				
Max Green Setting (Gmax), s	11.5	47.0	24.0	28.0	19.5	39.0	18.9	34.6				
Max Q Clear Time (g_c+I1), s	12.8	47.0	12.9	9.2	12.3	33.4	16.6	9.9				
Green Ext Time (p_c), s	0.0	0.0	0.4	0.5	0.5	2.8	0.3	0.2				

Intersection Summary

HCM 6th Ctrl Delay	41.2
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

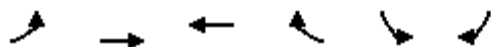
User approved ignoring U-Turning movement.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection												
Int Delay, s/veh	206.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	15	10	270	5	250	5	430	265	190	290	10
Future Vol, veh/h	30	15	10	270	5	250	5	430	265	190	290	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	0	-	0	0	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	16	11	293	5	272	5	467	288	207	315	11
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1489	1494	315	1369	1361	611	326	0	0	755	0	0
Stage 1	729	729	-	621	621	-	-	-	-	-	-	-
Stage 2	760	765	-	748	740	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	102	123	725	~ 124	148	494	1234	-	-	855	-	-
Stage 1	414	428	-	475	479	-	-	-	-	-	-	-
Stage 2	398	412	-	404	423	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	34	86	725	~ 81	104	494	1234	-	-	855	-	-
Mov Cap-2 Maneuver	34	86	-	~ 81	104	-	-	-	-	-	-	-
Stage 1	412	301	-	473	477	-	-	-	-	-	-	-
Stage 2	176	410	-	~ 265	298	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	189.3		\$ 672.9		0.1		4.1					
HCM LOS	F		F									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBL	SBT	SBR
Capacity (veh/h)	1234	-	-	34	86	725	81	104	494	855	-	-
HCM Lane V/C Ratio	0.004	-	-	0.959	0.19	0.015	3.623	0.052	0.55	0.242	-	-
HCM Control Delay (s)	7.9	-	-	\$ 315.6	56.4	\$ 1288.4	41.5	20.8	10.5	0	-	-
HCM Lane LOS	A	-	-	F	F	B	F	E	C	B	A	-
HCM 95th %tile Q(veh)	0	-	-	3.4	0.7	0	30.2	0.2	3.3	0.9	-	-
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon						

Timings
11: LCR 20 E & Rocky Mountain Avenue

AM Peak Hour
2045 Background



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	215	230	365	415	290	165
Future Volume (vph)	215	230	365	415	290	165
Turn Type	pm+pt	NA	NA	pm+ov	Prot	pm+ov
Protected Phases	7	4	8	6	6	7
Permitted Phases	4			8		6
Detector Phase	7	4	8	6	6	7
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	9.5
Total Split (s)	10.0	32.5	22.5	22.5	22.5	10.0
Total Split (%)	18.2%	59.1%	40.9%	40.9%	40.9%	18.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Recall Mode	None	None	None	C-Max	C-Max	None
Act Effect Green (s)	25.6	25.6	15.6	40.5	20.4	30.4
Actuated g/C Ratio	0.47	0.47	0.28	0.74	0.37	0.55
v/c Ratio	0.70	0.29	0.75	0.37	0.48	0.19
Control Delay	21.8	9.5	27.4	2.0	17.3	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	9.5	27.4	2.0	17.3	2.0
LOS	C	A	C	A	B	A
Approach Delay		15.5	13.9		11.7	
Approach LOS		B	B		B	

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 13.7

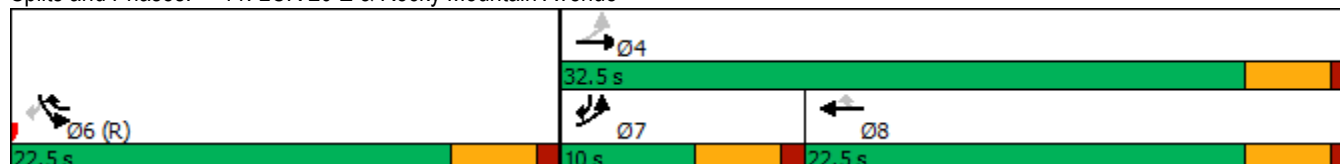
Intersection LOS: B

Intersection Capacity Utilization 58.4%

ICU Level of Service B

Analysis Period (min) 15

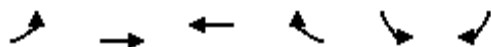
Splits and Phases: 11: LCR 20 E & Rocky Mountain Avenue



HCM 6th Signalized Intersection Summary

11: LCR 20 E & Rocky Mountain Avenue

AM Peak Hour
2045 Background



Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations							
Traffic Volume (veh/h)	215	230	365	415	290	165	
Future Volume (veh/h)	215	230	365	415	290	165	
Initial Q (Qb), veh	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	
Work Zone On Approach		No	No		No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	
Adj Flow Rate, veh/h	234	250	397	451	315	179	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	2	2	2	2	2	2	
Cap, veh/h	356	844	504	1037	686	769	
Arrive On Green	0.10	0.45	0.27	0.27	0.38	0.38	
Sat Flow, veh/h	1781	1870	1870	1585	1781	1585	
Grp Volume(v), veh/h	234	250	397	451	315	179	
Grp Sat Flow(s),veh/h/ln	1781	1870	1870	1585	1781	1585	
Q Serve(g_s), s	4.9	4.7	10.8	7.6	7.3	3.6	
Cycle Q Clear(g_c), s	4.9	4.7	10.8	7.6	7.3	3.6	
Prop In Lane	1.00			1.00	1.00	1.00	
Lane Grp Cap(c), veh/h	356	844	504	1037	686	769	
V/C Ratio(X)	0.66	0.30	0.79	0.43	0.46	0.23	
Avail Cap(c_a), veh/h	356	952	612	1129	686	769	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	
Uniform Delay (d), s/veh	13.3	9.6	18.6	4.6	12.6	8.2	
Incr Delay (d2), s/veh	4.3	0.2	5.6	0.3	2.2	0.7	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(95%),veh/ln	3.7	2.9	8.6	9.1	5.2	7.7	
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	17.7	9.7	24.2	4.9	14.8	8.9	
LnGrp LOS	B	A	C	A	B	A	
Approach Vol, veh/h		484	848		494		
Approach Delay, s/veh		13.6	13.9		12.7		
Approach LOS		B	B		B		
Timer - Assigned Phs				4	6	7	8
Phs Duration (G+Y+Rc), s				29.3	25.7	10.0	19.3
Change Period (Y+Rc), s				4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s				28.0	18.0	5.5	18.0
Max Q Clear Time (g_c+I1), s				6.7	9.3	6.9	12.8
Green Ext Time (p_c), s				1.4	1.1	0.0	2.0
Intersection Summary							
HCM 6th Ctrl Delay			13.5				
HCM 6th LOS			B				

MOVEMENT SUMMARY

 **Site: 8 [Rocky Mountain & Road B AM (Site Folder: General)]**

AM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Rocky Mountain Ave														
8	T1	410	3.0	446	3.0	0.420	10.4	LOS B	2.2	55.7	0.65	0.72	0.85	32.5
18	R2	175	3.0	190	3.0	0.420	9.9	LOS A	2.2	55.5	0.64	0.71	0.83	31.7
Approach		585	3.0	636	3.0	0.420	10.2	LOS B	2.2	55.7	0.65	0.72	0.84	32.3
East: Road B														
1	L2	130	3.0	141	3.0	0.350	8.2	LOS A	1.5	39.5	0.57	0.54	0.57	32.4
16	R2	445	3.0	484	3.0	0.350	7.9	LOS A	1.5	39.5	0.56	0.52	0.56	32.2
Approach		575	3.0	625	3.0	0.350	8.0	LOS A	1.5	39.5	0.56	0.53	0.56	32.3
North: Rocky Mountain Ave														
7u	U	5	3.0	5	3.0	0.522	8.8	LOS A	3.5	88.5	0.44	0.28	0.44	31.7
7	L2	575	3.0	625	3.0	0.522	8.8	LOS A	3.5	88.5	0.44	0.28	0.44	31.0
4	T1	260	3.0	283	3.0	0.234	5.1	LOS A	1.1	27.6	0.31	0.18	0.31	35.3
Approach		840	3.0	913	3.0	0.522	7.6	LOS A	3.5	88.5	0.40	0.25	0.40	32.2
All Vehicles		2000	3.0	2174	3.0	0.522	8.5	LOS A	3.5	88.5	0.52	0.47	0.57	32.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 9 [Rocky Mountain & Mtn Lion AM (Site Folder: General)]**

AM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Rocky Mountain Avenue														
3	L2	70	3.0	76	3.0	0.531	8.5	LOS A	4.4	111.4	0.19	0.06	0.19	33.2
8	T1	570	3.0	620	3.0	0.531	8.5	LOS A	4.4	111.4	0.19	0.06	0.19	33.2
Approach		640	3.0	696	3.0	0.531	8.5	LOS A	4.4	111.4	0.19	0.06	0.19	33.2
North: Rocky Mountain Ave														
4	T1	375	3.0	408	3.0	0.343	6.1	LOS A	2.0	51.0	0.28	0.13	0.28	34.6
14	R2	15	3.0	16	3.0	0.343	6.1	LOS A	2.0	51.0	0.28	0.13	0.28	33.6
Approach		390	3.0	424	3.0	0.343	6.1	LOS A	2.0	51.0	0.28	0.13	0.28	34.6
West: Mountain Lion Dr														
5	L2	20	3.0	22	3.0	0.106	5.1	LOS A	0.4	11.1	0.50	0.40	0.50	34.4
12	R2	65	3.0	71	3.0	0.106	5.1	LOS A	0.4	11.1	0.50	0.40	0.50	33.4
Approach		85	3.0	92	3.0	0.106	5.1	LOS A	0.4	11.1	0.50	0.40	0.50	33.6
All Vehicles		1115	3.0	1212	3.0	0.531	7.4	LOS A	4.4	111.4	0.24	0.11	0.24	33.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 6 [Hahns Peak & Mtn Lion AM (Site Folder: General)]**

AM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Moutain Lion Dr														
3	L2	65	3.0	71	3.0	0.082	3.9	LOS A	0.4	9.0	0.32	0.18	0.32	33.6
8	T1	20	3.0	22	3.0	0.082	3.9	LOS A	0.4	9.0	0.32	0.18	0.32	33.6
Approach		85	3.0	92	3.0	0.082	3.9	LOS A	0.4	9.0	0.32	0.18	0.32	33.6
North: Hahns Peak														
4	T1	20	3.0	22	3.0	0.066	3.4	LOS A	0.3	7.2	0.19	0.08	0.19	36.1
14	R2	55	3.0	60	3.0	0.066	3.4	LOS A	0.3	7.2	0.19	0.08	0.19	35.0
Approach		75	3.0	82	3.0	0.066	3.4	LOS A	0.3	7.2	0.19	0.08	0.19	35.2
West: Moutain Lion Dr														
5	L2	155	3.0	168	3.0	0.183	4.3	LOS A	0.9	23.0	0.11	0.03	0.11	33.6
12	R2	65	3.0	71	3.0	0.183	4.3	LOS A	0.9	23.0	0.11	0.03	0.11	32.6
Approach		220	3.0	239	3.0	0.183	4.3	LOS A	0.9	23.0	0.11	0.03	0.11	33.3
All Vehicles		380	3.0	413	3.0	0.183	4.0	LOS A	0.9	23.0	0.17	0.07	0.17	33.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 10 [Boyd Lake Ave & LCR 20 AM (Site Folder: General)]**

AM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Ave														
3	L2	5	3.0	5	3.0	0.357	7.2	LOS A	1.7	44.0	0.46	0.36	0.46	34.1
8	T1	430	3.0	467	3.0	0.357	7.1	LOS A	1.7	44.0	0.46	0.35	0.46	34.1
18	R2	265	3.0	288	3.0	0.357	6.9	LOS A	1.7	43.3	0.44	0.34	0.44	33.0
Approach		700	3.0	761	3.0	0.357	7.0	LOS A	1.7	44.0	0.45	0.35	0.45	33.7
East: LCR 20 E														
1	L2	270	3.0	293	3.0	0.337	7.8	LOS A	1.4	36.6	0.56	0.55	0.56	31.3
6	T1	5	3.0	5	3.0	0.337	7.8	LOS A	1.4	36.6	0.56	0.55	0.56	31.3
16	R2	250	3.0	272	3.0	0.335	8.3	LOS A	1.4	36.6	0.58	0.57	0.58	32.3
Approach		525	3.0	571	3.0	0.337	8.1	LOS A	1.4	36.6	0.57	0.56	0.57	31.8
North: Boyd Lake Ave														
7	L2	190	3.0	207	3.0	0.261	6.3	LOS A	1.1	28.8	0.45	0.36	0.45	32.4
4	T1	290	3.0	315	3.0	0.261	6.0	LOS A	1.1	28.8	0.44	0.34	0.44	34.3
14	R2	10	3.0	11	3.0	0.261	5.9	LOS A	1.1	28.3	0.43	0.34	0.43	33.7
Approach		490	3.0	533	3.0	0.261	6.1	LOS A	1.1	28.8	0.44	0.35	0.44	33.6
West: LCR 20 E														
5	L2	30	3.0	33	3.0	0.089	6.3	LOS A	0.3	7.7	0.57	0.56	0.57	33.1
2	T1	15	3.0	16	3.0	0.089	6.3	LOS A	0.3	7.7	0.57	0.56	0.57	33.0
12	R2	10	3.0	11	3.0	0.089	6.3	LOS A	0.3	7.7	0.57	0.56	0.57	32.1
Approach		55	3.0	60	3.0	0.089	6.3	LOS A	0.3	7.7	0.57	0.56	0.57	32.9
All Vehicles		1770	3.0	1924	3.0	0.357	7.0	LOS A	1.7	44.0	0.49	0.42	0.49	33.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion AM (Site Folder: General)]**

AM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Avenue														
3	L2	165	3.0	179	3.0	0.422	8.8	LOS A	2.1	53.3	0.56	0.51	0.57	32.2
8	T1	485	3.0	527	3.0	0.422	8.5	LOS A	2.1	53.3	0.55	0.49	0.55	32.9
18	R2	100	3.0	109	3.0	0.422	8.3	LOS A	2.0	52.2	0.54	0.48	0.54	32.5
Approach		750	3.0	815	3.0	0.422	8.5	LOS A	2.1	53.3	0.55	0.49	0.56	32.7
East: Mountain Lion Dr														
1	L2	55	3.0	60	3.0	0.445	12.6	LOS B	2.2	56.2	0.70	0.80	1.02	31.0
6	T1	60	3.0	65	3.0	0.445	12.6	LOS B	2.2	56.2	0.70	0.80	1.02	30.9
16	R2	140	3.0	152	3.0	0.445	12.6	LOS B	2.2	56.2	0.70	0.80	1.02	30.1
Approach		255	3.0	277	3.0	0.445	12.6	LOS B	2.2	56.2	0.70	0.80	1.02	30.5
North: Boyd Lake Ave														
7	L2	105	3.0	114	3.0	0.317	6.9	LOS A	1.4	36.8	0.48	0.39	0.48	33.3
4	T1	315	3.0	342	3.0	0.317	6.8	LOS A	1.4	36.8	0.47	0.38	0.47	33.6
14	R2	175	3.0	190	3.0	0.317	6.6	LOS A	1.4	36.2	0.46	0.37	0.46	33.2
Approach		595	3.0	647	3.0	0.317	6.8	LOS A	1.4	36.8	0.47	0.38	0.47	33.4
West: Mountain Lion Dr														
5	L2	185	3.0	201	3.0	0.440	9.5	LOS A	2.4	62.5	0.62	0.68	0.78	31.6
2	T1	45	3.0	49	3.0	0.440	9.5	LOS A	2.4	62.5	0.62	0.68	0.78	31.6
12	R2	125	3.0	136	3.0	0.440	9.5	LOS A	2.4	62.5	0.62	0.68	0.78	30.7
Approach		355	3.0	386	3.0	0.440	9.5	LOS A	2.4	62.5	0.62	0.68	0.78	31.3
All Vehicles		1955	3.0	2125	3.0	0.445	8.7	LOS A	2.4	62.5	0.56	0.53	0.63	32.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Timings

1: Boyd Lake Ave & US 34

PM Peak Hour
2045 Background

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	315	2225	290	300	2355	110	240	265	315	215	370	545
Future Volume (vph)	315	2225	290	300	2355	110	240	265	315	215	370	545
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5		9.5	22.5	
Total Split (s)	17.0	64.1	14.4	16.9	64.0	13.8	14.4	25.2		13.8	24.6	
Total Split (%)	14.2%	53.4%	12.0%	14.1%	53.3%	11.5%	12.0%	21.0%		11.5%	20.5%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	12.5	59.6	74.0	12.4	59.5	73.3	9.9	20.7	120.0	9.3	20.1	120.0
Actuated g/C Ratio	0.10	0.50	0.62	0.10	0.50	0.61	0.08	0.17	1.00	0.08	0.17	1.00
v/c Ratio	0.96	0.96	0.32	0.92	1.02	0.12	0.92	0.47	0.22	0.88	0.68	0.37
Control Delay	91.8	39.7	9.8	85.0	52.3	4.1	91.7	47.7	0.3	86.4	53.5	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.8	39.7	9.8	85.0	52.3	4.1	91.7	47.7	0.3	86.4	53.5	0.7
LOS	F	D	A	F	D	A	F	D	A	F	D	A
Approach Delay		42.5			53.9			42.4			34.3	
Approach LOS		D			D			D			C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 45.4

Intersection LOS: D

Intersection Capacity Utilization 86.6%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34

			
Ø1	Ø2 (R)	Ø3	Ø4
13.8 s	25.2 s	16.9 s	64.1 s
			
Ø5	Ø6 (R)	Ø7	Ø8
14.4 s	24.6 s	17 s	64 s

HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

PM Peak Hour
2045 Background

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	315	2225	290	300	2355	110	240	265	315	215	370	545
Future Volume (veh/h)	315	2225	290	300	2355	110	240	265	315	215	370	545
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	342	2418	315	326	2560	120	261	288	0	234	402	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	360	2536	918	357	2532	909	285	613		268	595	
Arrive On Green	0.10	0.50	0.50	0.10	0.50	0.50	0.08	0.17	0.00	0.08	0.17	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	342	2418	315	326	2560	120	261	288	0	234	402	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	11.8	54.3	12.5	11.2	59.5	4.2	9.0	8.8	0.0	8.0	12.7	0.0
Cycle Q Clear(g_c), s	11.8	54.3	12.5	11.2	59.5	4.2	9.0	8.8	0.0	8.0	12.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	360	2536	918	357	2532	909	285	613		268	595	
V/C Ratio(X)	0.95	0.95	0.34	0.91	1.01	0.13	0.92	0.47		0.87	0.68	
Avail Cap(c_a), veh/h	360	2536	918	357	2532	909	285	613		268	595	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.24	0.24	0.24	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	53.4	28.9	13.3	53.3	30.2	11.8	54.6	44.7	0.0	54.8	46.9	0.0
Incr Delay (d2), s/veh	34.6	9.3	0.2	8.9	11.7	0.0	32.1	2.6	0.0	25.7	6.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	11.1	31.4	7.9	7.2	30.4	2.4	8.9	7.4	0.0	7.9	10.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	88.0	38.2	13.5	62.2	41.9	11.8	86.8	47.3	0.0	80.5	52.9	0.0
LnGrp LOS	F	D	B	E	F	B	F	D		F	D	
Approach Vol, veh/h	3075			3006			549			636		
Approach Delay, s/veh	41.2			42.9			66.1			63.1		
Approach LOS	D			D			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.8	25.2	16.9	64.1	14.4	24.6	17.0	64.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	9.3	20.7	12.4	59.6	9.9	20.1	12.5	59.5				
Max Q Clear Time (g_c+I1), s	10.0	10.8	13.2	56.3	11.0	14.7	13.8	61.5				
Green Ext Time (p_c), s	0.0	1.2	0.0	3.1	0.0	1.2	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	45.7
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Timings
2: Hahns Peak Dr & US 34

PM Peak Hour
2045 Background

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	2400	15	235	2350	90	105	10	175	80	10	135
Future Volume (vph)	270	2400	15	235	2350	90	105	10	175	80	10	135
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8	1		4	5
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	1	4	4	5
Switch Phase												
Minimum Initial (s)	5.0	25.0	25.0	5.0	25.0	25.0	25.0	25.0	5.0	25.0	25.0	5.0
Minimum Split (s)	9.5	32.0	32.0	9.5	32.0	32.0	32.0	32.0	9.5	32.0	32.0	9.5
Total Split (s)	17.3	82.8	82.8	15.2	80.7	80.7	32.0	32.0	15.2	32.0	32.0	17.3
Total Split (%)	13.3%	63.7%	63.7%	11.7%	62.1%	62.1%	24.6%	24.6%	11.7%	24.6%	24.6%	13.3%
Yellow Time (s)	3.5	5.0	5.0	3.5	5.0	5.0	5.0	5.0	3.5	5.0	5.0	3.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	7.0	7.0	4.5	7.0	7.0	7.0	7.0	4.5	7.0	7.0	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag			Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes			Yes			Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	Min	Min	None	Min	Min	None
Act Effct Green (s)	12.8	75.8	75.8	10.7	73.7	73.7	25.0	25.0	42.7	25.0	25.0	44.8
Actuated g/C Ratio	0.10	0.58	0.58	0.08	0.57	0.57	0.19	0.19	0.33	0.19	0.19	0.34
v/c Ratio	0.97	0.99	0.02	0.90	0.99	0.12	0.43	0.03	0.35	0.37	0.03	0.29
Control Delay	100.9	40.7	0.0	92.8	43.6	5.3	51.9	43.1	29.1	50.2	43.1	26.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	100.9	40.7	0.0	92.8	43.6	5.3	51.9	43.1	29.1	50.2	43.1	26.0
LOS	F	D	A	F	D	A	D	D	C	D	D	C
Approach Delay		46.5			46.2			37.8			35.3	
Approach LOS		D			D			D			D	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 45.5

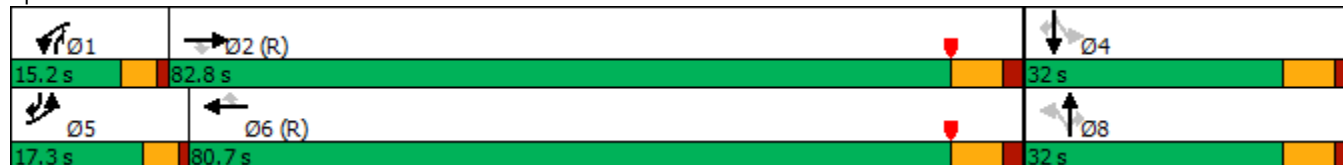
Intersection LOS: D

Intersection Capacity Utilization 93.5%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Hahns Peak Dr & US 34



HCM 6th Signalized Intersection Summary

2: Hahns Peak Dr & US 34

PM Peak Hour
2045 Background

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	  		 	  					 	 	
Traffic Volume (veh/h)	270	2400	15	235	2350	90	105	10	175	80	10	135
Future Volume (veh/h)	270	2400	15	235	2350	90	105	10	175	80	10	135
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	329	2927	16	255	2866	110	114	11	190	98	11	165
Peak Hour Factor	0.82	0.82	0.92	0.92	0.82	0.82	0.92	0.92	0.92	0.82	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	340	2977	924	284	2895	899	319	360	435	277	360	461
Arrive On Green	0.10	0.58	0.58	0.08	0.57	0.57	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	1404	1870	1585	1181	1870	1585
Grp Volume(v), veh/h	329	2927	16	255	2866	110	114	11	190	98	11	165
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1404	1870	1585	1181	1870	1585
Q Serve(g_s), s	12.3	72.8	0.6	9.5	72.0	4.2	9.3	0.6	12.8	9.6	0.6	10.7
Cycle Q Clear(g_c), s	12.3	72.8	0.6	9.5	72.0	4.2	10.0	0.6	12.8	10.2	0.6	10.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	340	2977	924	284	2895	899	319	360	435	277	360	461
V/C Ratio(X)	0.97	0.98	0.02	0.90	0.99	0.12	0.36	0.03	0.44	0.35	0.03	0.36
Avail Cap(c_a), veh/h	340	2977	924	284	2895	899	319	360	435	277	360	461
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.38	0.38	0.38	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.4	26.5	11.4	59.1	27.8	13.1	46.7	42.7	38.9	46.8	42.7	36.5
Incr Delay (d2), s/veh	22.3	7.0	0.0	27.8	14.6	0.3	0.3	0.0	0.3	0.3	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.0	35.2	0.4	9.0	40.9	2.8	6.0	0.5	8.8	5.1	0.5	7.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	80.7	33.5	11.4	86.9	42.3	13.4	47.0	42.7	39.1	47.1	42.7	36.7
LnGrp LOS	F	C	B	F	D	B	D	D	D	D	D	D
Approach Vol, veh/h	3272				3231				315		274	
Approach Delay, s/veh	38.1				44.9				42.1		40.6	
Approach LOS	D				D				D		D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.2	82.8		32.0	17.3	80.7		32.0				
Change Period (Y+Rc), s	4.5	7.0		7.0	4.5	7.0		7.0				
Max Green Setting (Gmax), s	10.7	75.8		25.0	12.8	73.7		25.0				
Max Q Clear Time (g_c+I1), s	11.5	74.8		12.7	14.3	74.0		14.8				
Green Ext Time (p_c), s	0.0	0.9		0.2	0.0	0.0		0.1				

Intersection Summary

HCM 6th Ctrl Delay 41.5
HCM 6th LOS D

Notes

User approved pedestrian interval to be less than phase max green.

Timings
4: US 34 & Rocky Mountain Ave

PM Peak Hour
2045 Background

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	1825	475	450	2080	410	500	285	420	400	290	250
Future Volume (vph)	220	1825	475	450	2080	410	500	285	420	400	290	250
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	1	6	7	5	2	3	7	4		3	8	
Permitted Phases			6			2			Free			Free
Detector Phase	1	6	7	5	2	3	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	25.0	5.0	5.0	25.0	5.0	5.0	18.0		5.0	5.0	
Minimum Split (s)	20.0	32.0	9.5	10.0	35.0	24.0	9.5	25.0		24.0	24.0	
Total Split (s)	22.0	60.0	30.0	28.0	66.0	31.0	30.0	26.0		31.0	27.0	
Total Split (%)	15.2%	41.4%	20.7%	19.3%	45.5%	21.4%	20.7%	17.9%		21.4%	18.6%	
Yellow Time (s)	3.5	5.0	3.5	3.5	5.0	4.0	3.5	5.0		4.0	4.0	
All-Red Time (s)	1.0	2.0	1.0	1.0	2.0	2.0	1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	7.0	4.5	4.5	7.0	6.0	4.5	7.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	C-Min	None	None	C-Min	None	None	Min		None	None	
Act Effect Green (s)	14.2	58.0	90.2	18.5	62.3	91.3	25.2	22.0	145.0	22.0	21.3	145.0
Actuated g/C Ratio	0.10	0.40	0.62	0.13	0.43	0.63	0.17	0.15	1.00	0.15	0.15	1.00
v/c Ratio	0.71	0.98	0.51	0.77	1.04	0.44	0.91	0.58	0.29	0.84	1.15	0.17
Control Delay	75.1	57.7	14.2	69.5	69.4	13.0	79.3	62.7	0.5	74.2	155.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.1	57.7	14.2	69.5	69.4	13.0	79.3	62.7	0.5	74.2	155.2	0.2
LOS	E	E	B	E	E	B	E	E	A	E	F	A
Approach Delay		51.0			61.6			47.9			79.5	
Approach LOS		D			E			D			E	

Intersection Summary

Cycle Length: 145
 Actuated Cycle Length: 145
 Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.15
 Intersection Signal Delay: 58.1
 Intersection Capacity Utilization 94.3%
 Analysis Period (min) 15

Intersection LOS: E
 ICU Level of Service F

Splits and Phases: 4: US 34 & Rocky Mountain Ave

			
Ø1	Ø2 (R)	Ø3	Ø4
22 s	66 s	31 s	26 s
			
Ø5	Ø6 (R)	Ø7	Ø8
28 s	60 s	30 s	27 s

HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

PM Peak Hour
2045 Background

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	1825	475	450	2080	410	500	285	420	400	290	250
Future Volume (veh/h)	220	1825	475	450	2080	410	500	285	420	400	290	250
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	239	1984	516	489	2261	446	543	310	0	435	315	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	288	2103	923	574	2261	925	589	583		486	271	
Arrive On Green	0.08	0.41	0.41	0.11	0.44	0.44	0.17	0.16	0.00	0.14	0.14	0.00
Sat Flow, veh/h	3456	5106	1585	5023	5106	1585	3456	3554	1585	3456	1870	1585
Grp Volume(v), veh/h	239	1984	516	489	2261	446	543	310	0	435	315	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1674	1702	1585	1728	1777	1585	1728	1870	1585
Q Serve(g_s), s	9.9	54.2	29.2	13.8	64.2	23.6	22.4	11.6	0.0	17.9	21.0	0.0
Cycle Q Clear(g_c), s	9.9	54.2	29.2	13.8	64.2	23.6	22.4	11.6	0.0	17.9	21.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	288	2103	923	574	2261	925	589	583		486	271	
V/C Ratio(X)	0.83	0.94	0.56	0.85	1.00	0.48	0.92	0.53		0.89	1.16	
Avail Cap(c_a), veh/h	417	2103	923	814	2261	925	608	583		596	271	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	65.4	41.0	18.8	63.0	40.4	17.5	59.2	55.5	0.0	61.2	62.0	0.0
Incr Delay (d2), s/veh	0.6	1.2	0.2	4.5	18.9	1.8	19.5	0.5	0.0	12.5	106.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	5.4	25.1	12.3	10.2	39.4	14.0	17.0	9.0	0.0	13.6	26.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.0	42.2	19.0	67.5	59.3	19.3	78.7	56.0	0.0	73.7	168.1	0.0
LnGrp LOS	E	D	B	E	F	B	E	E		E	F	
Approach Vol, veh/h	2739			3196			853			750		
Approach Delay, s/veh	39.9			55.0			70.4			113.4		
Approach LOS	D			D			E			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.6	71.2	26.4	30.8	21.1	66.7	29.2	28.0				
Change Period (Y+Rc), s	4.5	7.0	6.0	7.0	4.5	7.0	4.5	* 7				
Max Green Setting (Gmax), s	17.5	59.0	25.0	19.0	23.5	53.0	25.5	* 21				
Max Q Clear Time (g_c+I1), s	11.9	66.2	19.9	13.6	15.8	56.2	24.4	23.0				
Green Ext Time (p_c), s	0.2	0.0	0.5	0.4	0.7	0.0	0.3	0.0				

Intersection Summary

HCM 6th Ctrl Delay 57.1
HCM 6th LOS E

Notes

User approved pedestrian interval to be less than phase max green.

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection												
Int Delay, s/veh	783.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱			↱	↰
Traffic Vol, veh/h	25	10	10	345	15	260	15	405	330	260	430	40
Future Vol, veh/h	25	10	10	345	15	260	15	405	330	260	430	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	0	-	0	0	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	11	11	375	16	283	16	440	359	283	467	43

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1834	1864	467	1718	1728	620	510	0	0	799	0	0
Stage 1	1033	1033	-	652	652	-	-	-	-	-	-	-
Stage 2	801	831	-	1066	1076	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	59	73	596	~ 71	88	488	1055	-	-	824	-	-
Stage 1	281	310	-	457	464	-	-	-	-	-	-	-
Stage 2	378	384	-	~ 269	296	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	~ 11	37	596	~ 34	45	488	1055	-	-	824	-	-
Mov Cap-2 Maneuver	~ 11	37	-	~ 34	45	-	-	-	-	-	-	-
Stage 1	277	160	-	450	457	-	-	-	-	-	-	-
Stage 2	151	378	-	~ 127	153	-	-	-	-	-	-	-

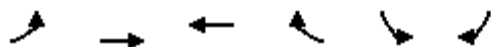
Approach	EB	WB	NB	SB
HCM Control Delay, s	783.8	\$ 2648.5	0.2	4.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBL	SBT	SBR
Capacity (veh/h)	1055	-	-	11	37	596	34	45	488	824	-	-
HCM Lane V/C Ratio	0.015	-	-	2.47	0.294	0.018	11.029	0.362	0.579	0.343	-	-
HCM Control Delay (s)	8.5	-	-	\$ 1351	138.6	11.2	\$ 4737.7	124.9	22	11.6	0	-
HCM Lane LOS	A	-	-	F	F	B	F	F	C	B	A	-
HCM 95th %tile Q(veh)	0	-	-	4.4	1	0.1	45.7	1.3	3.6	1.5	-	-

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

Timings
11: LCR 20 E & Rocky Mountain Avenue

PM Peak Hour
2045 Background



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	335	305	325	480	560	290
Future Volume (vph)	335	305	325	480	560	290
Turn Type	pm+pt	NA	NA	pm+ov	Prot	pm+ov
Protected Phases	7	4	8	6	6	7
Permitted Phases	4			8		6
Detector Phase	7	4	8	6	6	7
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	9.5
Total Split (s)	15.0	37.5	22.5	32.5	32.5	15.0
Total Split (%)	21.4%	53.6%	32.1%	46.4%	46.4%	21.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Recall Mode	None	None	None	C-Max	C-Max	None
Act Effect Green (s)	31.5	31.5	16.5	50.5	29.5	44.5
Actuated g/C Ratio	0.45	0.45	0.24	0.72	0.42	0.64
v/c Ratio	0.96	0.40	0.80	0.44	0.82	0.29
Control Delay	54.2	14.2	40.4	4.3	29.9	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.2	14.2	40.4	4.3	29.9	3.4
LOS	D	B	D	A	C	A
Approach Delay		35.1	18.9		20.9	
Approach LOS		D	B		C	

Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 24.1

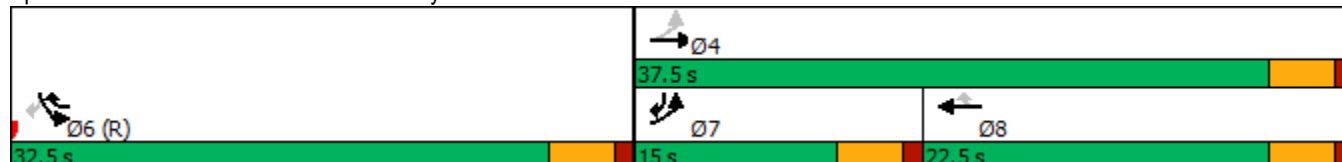
Intersection LOS: C

Intersection Capacity Utilization 77.9%

ICU Level of Service D

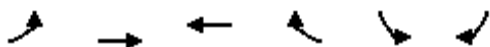
Analysis Period (min) 15

Splits and Phases: 11: LCR 20 E & Rocky Mountain Avenue



HCM 6th Signalized Intersection Summary 11: LCR 20 E & Rocky Mountain Avenue

PM Peak Hour
2045 Background



Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations							
Traffic Volume (veh/h)	335	305	325	480	560	290	
Future Volume (veh/h)	335	305	325	480	560	290	
Initial Q (Qb), veh	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	
Work Zone On Approach		No	No		No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	
Adj Flow Rate, veh/h	364	332	353	522	609	315	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	2	2	2	2	2	2	
Cap, veh/h	421	829	428	1042	763	916	
Arrive On Green	0.15	0.44	0.23	0.23	0.43	0.43	
Sat Flow, veh/h	1781	1870	1870	1585	1781	1585	
Grp Volume(v), veh/h	364	332	353	522	609	315	
Grp Sat Flow(s),veh/h/ln	1781	1870	1870	1585	1781	1585	
Q Serve(g_s), s	10.5	8.4	12.6	11.8	20.8	7.3	
Cycle Q Clear(g_c), s	10.5	8.4	12.6	11.8	20.8	7.3	
Prop In Lane	1.00			1.00	1.00	1.00	
Lane Grp Cap(c), veh/h	421	829	428	1042	763	916	
V/C Ratio(X)	0.86	0.40	0.82	0.50	0.80	0.34	
Avail Cap(c_a), veh/h	421	882	481	1086	763	916	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	
Uniform Delay (d), s/veh	17.7	13.2	25.6	6.1	17.4	7.8	
Incr Delay (d2), s/veh	16.8	0.3	10.2	0.4	8.5	1.0	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(95%),veh/ln	9.9	5.9	10.7	13.6	14.5	13.9	
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	34.5	13.5	35.8	6.5	25.9	8.8	
LnGrp LOS	C	B	D	A	C	A	
Approach Vol, veh/h							
		696	875	924			
Approach Delay, s/veh							
		24.5	18.3	20.1			
Approach LOS							
		C	B	C			
Timer - Assigned Phs				4	6	7	8
Phs Duration (G+Y+Rc), s				35.5	34.5	15.0	20.5
Change Period (Y+Rc), s				4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s				33.0	28.0	10.5	18.0
Max Q Clear Time (g_c+I1), s				10.4	22.8	12.5	14.6
Green Ext Time (p_c), s				2.0	1.7	0.0	1.5
Intersection Summary							
HCM 6th Ctrl Delay			20.7				
HCM 6th LOS			C				

MOVEMENT SUMMARY

 **Site: 8 [Rocky Mountain & Road B PM (Site Folder: General)]**

PM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Rocky Mountain Avenue														
8	T1	470	3.0	511	3.0	0.599	16.1	LOS C	4.3	110.9	0.76	0.95	1.34	30.1
18	R2	290	3.0	315	3.0	0.599	15.1	LOS C	4.3	110.9	0.75	0.94	1.32	29.5
Approach		760	3.0	826	3.0	0.599	15.7	LOS C	4.3	110.9	0.76	0.95	1.33	29.9
East: Road B														
1	L2	285	3.0	310	3.0	0.669	16.6	LOS C	6.7	171.6	0.79	1.03	1.47	28.8
16	R2	735	3.0	799	3.0	0.669	15.8	LOS C	6.9	175.9	0.77	1.02	1.45	28.9
Approach		1020	3.0	1109	3.0	0.669	16.0	LOS C	6.9	175.9	0.78	1.02	1.45	28.9
North: Rocky Mountain Ave														
7u	U	20	3.0	22	3.0	0.711	15.2	LOS C	11.0	280.8	0.77	0.94	1.36	29.2
7	L2	655	3.0	712	3.0	0.711	15.2	LOS C	11.0	280.8	0.77	0.94	1.36	28.6
4	T1	560	3.0	609	3.0	0.590	11.3	LOS B	5.7	144.8	0.65	0.68	0.91	32.1
Approach		1235	3.0	1342	3.0	0.711	13.4	LOS B	11.0	280.8	0.72	0.82	1.15	30.1
All Vehicles		3015	3.0	3277	3.0	0.711	14.9	LOS B	11.0	280.8	0.75	0.92	1.30	29.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 9 [Rocky Mountain & Mtn Lion PM (Site Folder: General)]**

PM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Rocky Mountain Avenue														
3	L2	100	3.0	109	3.0	0.663	11.4	LOS B	7.1	182.3	0.31	0.11	0.31	31.8
8	T1	690	3.0	750	3.0	0.663	11.4	LOS B	7.1	182.3	0.31	0.11	0.31	31.8
Approach		790	3.0	859	3.0	0.663	11.4	LOS B	7.1	182.3	0.31	0.11	0.31	31.8
North: Rocky Mountain Ave														
4	T1	775	3.0	842	3.0	0.732	14.4	LOS B	8.0	205.3	0.64	0.38	0.64	30.8
14	R2	30	3.0	33	3.0	0.732	14.4	LOS B	8.0	205.3	0.64	0.38	0.64	30.0
Approach		805	3.0	875	3.0	0.732	14.4	LOS B	8.0	205.3	0.64	0.38	0.64	30.7
West: Mountain Lion Dr														
5	L2	30	3.0	33	3.0	0.256	10.0	LOS B	1.0	25.9	0.69	0.69	0.69	32.0
12	R2	100	3.0	109	3.0	0.256	10.0	LOS B	1.0	25.9	0.69	0.69	0.69	31.1
Approach		130	3.0	141	3.0	0.256	10.0	LOS B	1.0	25.9	0.69	0.69	0.69	31.3
All Vehicles		1725	3.0	1875	3.0	0.732	12.7	LOS B	8.0	205.3	0.49	0.28	0.49	31.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 6 [Hahns Peak & Mtn Lion PM (Site Folder: General)]**

PM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Mountain Lion Dr														
3	L2	80	3.0	87	3.0	0.129	4.7	LOS A	0.6	14.2	0.42	0.29	0.42	33.5
8	T1	40	3.0	43	3.0	0.129	4.7	LOS A	0.6	14.2	0.42	0.29	0.42	33.5
Approach		120	3.0	130	3.0	0.129	4.7	LOS A	0.6	14.2	0.42	0.29	0.42	33.5
North: Hahns Peak														
4	T1	35	3.0	38	3.0	0.133	4.1	LOS A	0.6	15.6	0.23	0.11	0.23	35.7
14	R2	115	3.0	125	3.0	0.133	4.1	LOS A	0.6	15.6	0.23	0.11	0.23	34.6
Approach		150	3.0	163	3.0	0.133	4.1	LOS A	0.6	15.6	0.23	0.11	0.23	34.9
West: Mountain Lion Dr														
5	L2	245	3.0	266	3.0	0.287	5.4	LOS A	1.6	40.7	0.17	0.06	0.17	33.0
12	R2	95	3.0	103	3.0	0.287	5.4	LOS A	1.6	40.7	0.17	0.06	0.17	32.1
Approach		340	3.0	370	3.0	0.287	5.4	LOS A	1.6	40.7	0.17	0.06	0.17	32.7
All Vehicles		610	3.0	663	3.0	0.287	4.9	LOS A	1.6	40.7	0.24	0.12	0.24	33.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 10 [Boyd Lake Ave & LCR 20 PM (Site Folder: General)]**

PM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Ave														
3	L2	15	3.0	16	3.0	0.406	8.3	LOS A	2.0	51.0	0.53	0.45	0.53	33.5
8	T1	405	3.0	440	3.0	0.406	8.2	LOS A	2.0	51.0	0.53	0.45	0.53	33.5
18	R2	330	3.0	359	3.0	0.406	7.8	LOS A	2.0	50.3	0.51	0.43	0.51	32.5
Approach		750	3.0	815	3.0	0.406	8.0	LOS A	2.0	51.0	0.52	0.44	0.52	33.0
East: LCR 20 E														
1	L2	345	3.0	375	3.0	0.415	8.9	LOS A	2.1	54.4	0.59	0.61	0.68	30.8
6	T1	15	3.0	16	3.0	0.361	8.6	LOS A	1.6	40.5	0.59	0.57	0.59	33.2
16	R2	260	3.0	283	3.0	0.361	8.6	LOS A	1.6	40.5	0.59	0.57	0.59	32.2
Approach		620	3.0	674	3.0	0.415	8.7	LOS A	2.1	54.4	0.59	0.59	0.64	31.4
North: Boyd Lake Ave														
7	L2	260	3.0	283	3.0	0.428	9.2	LOS A	2.3	57.9	0.59	0.58	0.65	31.3
4	T1	430	3.0	467	3.0	0.428	8.7	LOS A	2.3	57.9	0.57	0.55	0.62	32.9
14	R2	40	3.0	43	3.0	0.428	8.6	LOS A	2.2	55.9	0.57	0.54	0.61	32.4
Approach		730	3.0	793	3.0	0.428	8.9	LOS A	2.3	57.9	0.58	0.56	0.63	32.3
West: LCR 20 E														
5	L2	25	3.0	27	3.0	0.095	8.2	LOS A	0.3	7.9	0.65	0.65	0.65	32.1
2	T1	10	3.0	11	3.0	0.095	8.2	LOS A	0.3	7.9	0.65	0.65	0.65	32.1
12	R2	10	3.0	11	3.0	0.095	8.2	LOS A	0.3	7.9	0.65	0.65	0.65	31.2
Approach		45	3.0	49	3.0	0.095	8.2	LOS A	0.3	7.9	0.65	0.65	0.65	31.9
All Vehicles		2145	3.0	2332	3.0	0.428	8.5	LOS A	2.3	57.9	0.56	0.53	0.60	32.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion PM (Site Folder: General)]**

PM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Ave														
3	L2	85	3.0	92	3.0	0.380	7.8	LOS A	1.8	46.6	0.51	0.43	0.51	33.1
8	T1	510	3.0	554	3.0	0.380	7.6	LOS A	1.8	46.6	0.50	0.42	0.50	33.5
18	R2	110	3.0	120	3.0	0.380	7.4	LOS A	1.8	45.9	0.49	0.41	0.49	32.9
Approach		705	3.0	766	3.0	0.380	7.6	LOS A	1.8	46.6	0.50	0.42	0.50	33.3
East: Mountain Lion Dr														
1	L2	140	3.0	152	3.0	0.635	16.8	LOS C	4.8	123.5	0.78	0.99	1.44	29.1
6	T1	75	3.0	82	3.0	0.635	16.8	LOS C	4.8	123.5	0.78	0.99	1.44	29.0
16	R2	195	3.0	212	3.0	0.635	16.8	LOS C	4.8	123.5	0.78	0.99	1.44	28.3
Approach		410	3.0	446	3.0	0.635	16.8	LOS C	4.8	123.5	0.78	0.99	1.44	28.7
North: Boyd Lake Ave														
7	L2	110	3.0	120	3.0	0.533	10.6	LOS B	4.0	103.3	0.61	0.62	0.79	31.9
4	T1	755	3.0	821	3.0	0.533	10.3	LOS B	4.0	103.3	0.60	0.60	0.77	32.3
14	R2	115	3.0	125	3.0	0.533	10.0	LOS B	3.9	100.7	0.59	0.58	0.75	31.7
Approach		980	3.0	1065	3.0	0.533	10.3	LOS B	4.0	103.3	0.60	0.60	0.77	32.2
West: Mountain Lion Dr														
5	L2	115	3.0	125	3.0	0.554	17.7	LOS C	3.0	76.2	0.78	0.93	1.31	28.6
2	T1	65	3.0	71	3.0	0.554	17.7	LOS C	3.0	76.2	0.78	0.93	1.31	28.6
12	R2	90	3.0	98	3.0	0.554	17.7	LOS C	3.0	76.2	0.78	0.93	1.31	27.9
Approach		270	3.0	293	3.0	0.554	17.7	LOS C	3.0	76.2	0.78	0.93	1.31	28.3
All Vehicles		2365	3.0	2571	3.0	0.635	11.5	LOS B	4.8	123.5	0.62	0.65	0.87	31.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Timings
1: Boyd Lake Ave & US 34

Saturday Mid Day
2045 Background

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	2135	250	320	2050	140	330	200	540	155	190	390
Future Volume (vph)	260	2135	250	320	2050	140	330	200	540	155	190	390
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5		9.5	22.5	
Total Split (s)	14.6	54.0	16.4	16.1	55.5	14.7	16.4	25.2		14.7	23.5	
Total Split (%)	13.3%	49.1%	14.9%	14.6%	50.5%	13.4%	14.9%	22.9%		13.4%	21.4%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	10.1	49.5	65.9	11.6	51.0	65.1	11.9	21.3	110.0	9.6	19.0	110.0
Actuated g/C Ratio	0.09	0.45	0.60	0.11	0.46	0.59	0.11	0.19	1.00	0.09	0.17	1.00
v/c Ratio	0.90	1.01	0.27	0.96	0.95	0.15	0.97	0.32	0.37	0.56	0.34	0.27
Control Delay	80.5	53.0	5.1	88.2	38.1	1.9	88.8	39.8	0.7	55.8	41.8	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.5	53.0	5.1	88.2	38.1	1.9	88.8	39.8	0.7	55.8	41.8	0.4
LOS	F	D	A	F	D	A	F	D	A	E	D	A
Approach Delay		51.2			42.5			35.2			22.8	
Approach LOS		D			D			D			C	

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 42.6

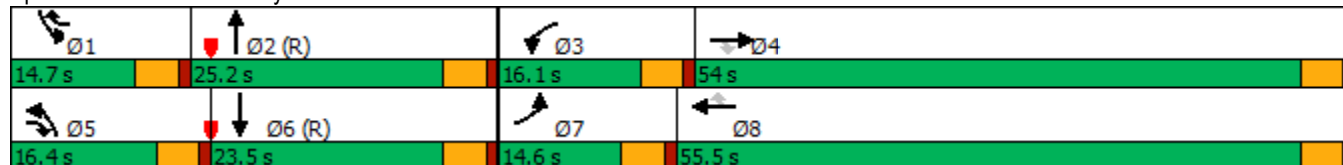
Intersection LOS: D

Intersection Capacity Utilization 80.0%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34



HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

Saturday Mid Day
2045 Background

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	2135	250	320	2050	140	330	200	540	155	190	390
Future Volume (veh/h)	260	2135	250	320	2050	140	330	200	540	155	190	390
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	283	2321	272	348	2228	152	359	217	0	168	207	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	317	2298	885	364	2367	841	374	761		231	614	
Arrive On Green	0.09	0.45	0.45	0.11	0.46	0.46	0.11	0.21	0.00	0.07	0.17	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	283	2321	272	348	2228	152	359	217	0	168	207	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	8.9	49.5	10.1	11.0	45.7	5.5	11.4	5.6	0.0	5.2	5.6	0.0
Cycle Q Clear(g_c), s	8.9	49.5	10.1	11.0	45.7	5.5	11.4	5.6	0.0	5.2	5.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	317	2298	885	364	2367	841	374	761		231	614	
V/C Ratio(X)	0.89	1.01	0.31	0.95	0.94	0.18	0.96	0.29		0.73	0.34	
Avail Cap(c_a), veh/h	317	2298	885	364	2367	841	374	761		320	614	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.22	0.22	0.22	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	49.4	30.3	13.0	48.9	28.1	13.4	48.8	36.2	0.0	50.4	40.0	0.0
Incr Delay (d2), s/veh	25.5	21.3	0.2	13.0	2.2	0.0	36.1	0.9	0.0	5.1	1.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.6	32.2	6.4	7.2	21.6	3.0	11.0	4.6	0.0	4.4	4.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	74.9	51.5	13.2	62.0	30.3	13.4	84.9	37.1	0.0	55.5	41.5	0.0
LnGrp LOS	E	F	B	E	C	B	F	D		E	D	
Approach Vol, veh/h	2876			2728			576			375		
Approach Delay, s/veh	50.2			33.4			66.9			47.7		
Approach LOS	D			C			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.8	28.1	16.1	54.0	16.4	23.5	14.6	55.5				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	10.2	20.7	11.6	49.5	11.9	19.0	10.1	51.0				
Max Q Clear Time (g_c+I1), s	7.2	7.6	13.0	51.5	13.4	7.6	10.9	47.7				
Green Ext Time (p_c), s	0.1	1.0	0.0	0.0	0.0	0.9	0.0	3.1				

Intersection Summary

HCM 6th Ctrl Delay	44.5
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Timings
2: Hahns Peak Dr & US 34

Saturday Mid Day
2045 Background

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	395	2010	10	225	2375	110	125	10	180	115	10	215
Future Volume (vph)	395	2010	10	225	2375	110	125	10	180	115	10	215
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8	1		4	5
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	1	4	4	5
Switch Phase												
Minimum Initial (s)	5.0	25.0	25.0	5.0	25.0	25.0	25.0	25.0	5.0	25.0	25.0	5.0
Minimum Split (s)	9.5	32.0	32.0	9.5	32.0	32.0	32.0	32.0	9.5	32.0	32.0	9.5
Total Split (s)	26.0	96.4	96.4	21.6	92.0	92.0	32.0	32.0	21.6	32.0	32.0	26.0
Total Split (%)	17.3%	64.3%	64.3%	14.4%	61.3%	61.3%	21.3%	21.3%	14.4%	21.3%	21.3%	17.3%
Yellow Time (s)	3.5	5.0	5.0	3.5	5.0	5.0	5.0	5.0	3.5	5.0	5.0	3.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	7.0	7.0	4.5	7.0	7.0	7.0	7.0	4.5	7.0	7.0	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag			Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes			Yes			Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	Min	Min	None	Min	Min	None
Act Effect Green (s)	21.5	91.9	91.9	14.6	85.0	85.0	25.0	25.0	46.6	25.0	25.0	53.5
Actuated g/C Ratio	0.14	0.61	0.61	0.10	0.57	0.57	0.17	0.17	0.31	0.17	0.17	0.36
v/c Ratio	0.98	0.79	0.01	0.74	1.01	0.14	0.59	0.04	0.38	0.60	0.04	0.45
Control Delay	99.0	24.4	0.0	79.0	50.3	7.1	69.0	52.9	36.2	69.9	52.9	35.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	99.0	24.4	0.0	79.0	50.3	7.1	69.0	52.9	36.2	69.9	52.9	35.6
LOS	F	C	A	E	D	A	E	D	D	E	D	D
Approach Delay		36.5			50.6			49.8			47.7	
Approach LOS		D			D			D			D	

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 44.5

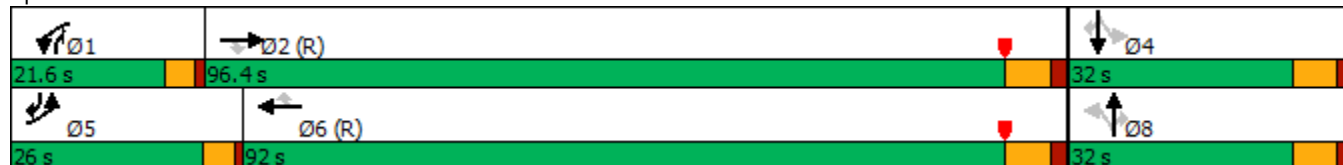
Intersection LOS: D

Intersection Capacity Utilization 95.5%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Hahns Peak Dr & US 34



HCM 6th Signalized Intersection Summary

2: Hahns Peak Dr & US 34

Saturday Mid Day
2045 Background

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	  		 	  					 	 	
Traffic Volume (veh/h)	395	2010	10	225	2375	110	125	10	180	115	10	215
Future Volume (veh/h)	395	2010	10	225	2375	110	125	10	180	115	10	215
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	482	2451	11	245	2896	134	136	11	196	140	11	262
Peak Hour Factor	0.82	0.82	0.92	0.92	0.82	0.82	0.92	0.92	0.92	0.82	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	495	3194	991	292	2893	898	275	312	398	238	312	491
Arrive On Green	0.14	0.63	0.63	0.08	0.57	0.57	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	1404	1870	1585	1175	1870	1585
Grp Volume(v), veh/h	482	2451	11	245	2896	134	136	11	196	140	11	262
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1404	1870	1585	1175	1870	1585
Q Serve(g_s), s	20.8	51.9	0.4	10.5	85.0	6.0	13.5	0.7	15.8	17.0	0.7	20.5
Cycle Q Clear(g_c), s	20.8	51.9	0.4	10.5	85.0	6.0	14.2	0.7	15.8	17.7	0.7	20.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	495	3194	991	292	2893	898	275	312	398	238	312	491
V/C Ratio(X)	0.97	0.77	0.01	0.84	1.00	0.15	0.49	0.04	0.49	0.59	0.04	0.53
Avail Cap(c_a), veh/h	495	3194	991	394	2893	898	275	312	398	238	312	491
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.38	0.38	0.38	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.0	20.2	10.6	67.7	32.5	15.4	58.4	52.4	48.0	59.8	52.4	42.8
Incr Delay (d2), s/veh	18.8	0.7	0.0	8.7	16.9	0.4	0.5	0.0	0.4	2.6	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.7	24.7	0.3	8.7	48.5	4.2	8.5	0.6	10.5	9.0	0.6	12.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	82.7	20.9	10.6	76.4	49.4	15.7	58.9	52.4	48.3	62.4	52.4	43.4
LnGrp LOS	F	C	B	E	F	B	E	D	D	E	D	D
Approach Vol, veh/h	2944			3275			343			413		
Approach Delay, s/veh	31.0			50.1			52.6			50.1		
Approach LOS	C			D			D			D		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	17.2	100.8		32.0	26.0	92.0		32.0				
Change Period (Y+Rc), s	4.5	7.0		7.0	4.5	7.0		7.0				
Max Green Setting (Gmax), s	17.1	89.4		25.0	21.5	85.0		25.0				
Max Q Clear Time (g_c+l1), s	12.5	53.9		22.5	22.8	87.0		17.8				
Green Ext Time (p_c), s	0.2	12.4		0.1	0.0	0.0		0.1				

Intersection Summary

HCM 6th Ctrl Delay 42.2
HCM 6th LOS D

Notes

User approved pedestrian interval to be less than phase max green.

Timings 4: US 34 & Rocky Mountain Ave

Saturday Mid Day
2045 Background

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	1460	490	440	2130	350	550	200	455	750	370	290
Future Volume (vph)	260	1460	490	440	2130	350	550	200	455	750	370	290
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2	3	1	6	7	3	8		7	4	
Permitted Phases			2			6			Free			Free
Detector Phase	5	2	3	1	6	7	3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	25.0	5.0	5.0	25.0	5.0	5.0	5.0		5.0	25.0	
Minimum Split (s)	10.0	35.0	10.0	10.0	32.0	24.0	10.0	24.0		24.0	32.0	
Total Split (s)	16.0	57.0	27.0	27.0	68.0	37.0	27.0	24.0		37.0	34.0	
Total Split (%)	11.0%	39.3%	18.6%	18.6%	46.9%	25.5%	18.6%	16.6%		25.5%	23.4%	
Yellow Time (s)	3.5	5.0	3.5	3.5	5.0	4.0	3.5	4.0		4.0	5.0	
All-Red Time (s)	1.0	2.0	1.0	1.0	2.0	2.0	1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	7.0	4.5	4.5	7.0	6.0	4.5	6.0		6.0	7.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None		None	Min	
Act Effect Green (s)	11.5	54.3	83.8	18.2	61.0	99.0	22.5	18.0	145.0	31.0	27.0	145.0
Actuated g/C Ratio	0.08	0.37	0.58	0.13	0.42	0.68	0.16	0.12	1.00	0.21	0.19	1.00
v/c Ratio	1.04	0.83	0.55	0.76	1.08	0.34	1.12	0.49	0.31	1.11	1.16	0.20
Control Delay	128.4	46.3	16.0	69.6	85.9	8.6	131.9	63.5	0.5	119.6	150.6	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	128.4	46.3	16.0	69.6	85.9	8.6	131.9	63.5	0.5	119.6	150.6	0.3
LOS	F	D	B	E	F	A	F	E	A	F	F	A
Approach Delay		49.3			74.2			70.9			103.2	
Approach LOS		D			E			E			F	

Intersection Summary

Cycle Length: 145

Actuated Cycle Length: 145

Offset: 80 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.16

Intersection Signal Delay: 71.8

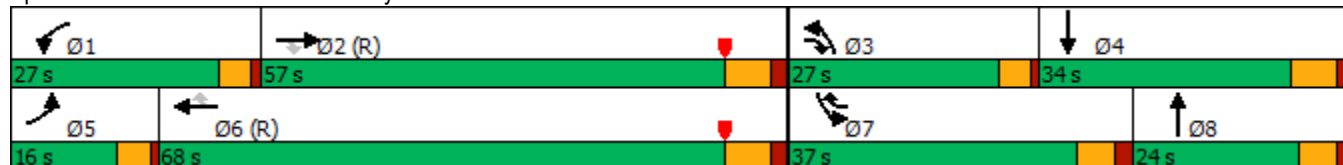
Intersection LOS: E

Intersection Capacity Utilization 104.3%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 4: US 34 & Rocky Mountain Ave



HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

Saturday Mid Day
2045 Background

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	1460	490	440	2130	350	550	200	455	750	370	290
Future Volume (veh/h)	260	1460	490	440	2130	350	550	200	455	750	370	290
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	283	1587	533	478	2315	380	598	217	0	815	402	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	274	1982	861	562	2148	1006	536	417		739	348	
Arrive On Green	0.08	0.39	0.39	0.11	0.42	0.42	0.16	0.12	0.00	0.21	0.19	0.00
Sat Flow, veh/h	3456	5106	1585	5023	5106	1585	3456	3554	1585	3456	1870	1585
Grp Volume(v), veh/h	283	1587	533	478	2315	380	598	217	0	815	402	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1674	1702	1585	1728	1777	1585	1728	1870	1585
Q Serve(g_s), s	11.5	40.0	33.5	13.5	61.0	16.7	22.5	8.3	0.0	31.0	27.0	0.0
Cycle Q Clear(g_c), s	11.5	40.0	33.5	13.5	61.0	16.7	22.5	8.3	0.0	31.0	27.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	274	1982	861	562	2148	1006	536	417		739	348	
V/C Ratio(X)	1.03	0.80	0.62	0.85	1.08	0.38	1.12	0.52		1.10	1.15	
Avail Cap(c_a), veh/h	274	1982	861	779	2148	1006	536	441		739	348	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	66.8	39.4	22.8	63.2	42.0	12.7	61.2	60.2	0.0	57.0	59.0	0.0
Incr Delay (d2), s/veh	25.4	0.3	0.3	4.9	44.2	1.1	74.5	0.4	0.0	65.0	97.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	7.4	18.8	14.3	10.1	46.1	10.3	23.0	6.8	0.0	29.1	32.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	92.2	39.7	23.1	68.1	86.2	13.8	135.7	60.5	0.0	122.0	156.1	0.0
LnGrp LOS	F	D	C	E	F	B	F	E		F	F	
Approach Vol, veh/h	2403			3173			815			1217		
Approach Delay, s/veh	42.2			74.8			115.7			133.3		
Approach LOS	D			E			F			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.7	63.3	27.0	34.0	16.0	68.0	37.0	24.0				
Change Period (Y+Rc), s	4.5	7.0	4.5	7.0	4.5	7.0	6.0	* 7				
Max Green Setting (Gmax), s	22.5	50.0	22.5	27.0	11.5	61.0	31.0	* 18				
Max Q Clear Time (g_c+I1), s	15.5	42.0	24.5	29.0	13.5	63.0	33.0	10.3				
Green Ext Time (p_c), s	0.7	3.8	0.0	0.0	0.0	0.0	0.0	0.5				

Intersection Summary

HCM 6th Ctrl Delay 78.2

HCM 6th LOS E

Notes

User approved pedestrian interval to be less than phase max green.

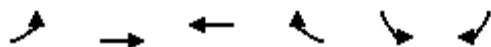
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection												
Int Delay, s/veh	360.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱			↱	↰
Traffic Vol, veh/h	30	10	10	325	10	270	10	385	300	210	360	30
Future Vol, veh/h	30	10	10	325	10	270	10	385	300	210	360	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	0	-	0	0	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	11	11	353	11	293	11	418	326	228	391	33
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1602	1613	391	1478	1483	581	424	0	0	744	0	0
Stage 1	847	847	-	603	603	-	-	-	-	-	-	-
Stage 2	755	766	-	875	880	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	85	104	658	~ 104	125	514	1135	-	-	864	-	-
Stage 1	357	378	-	486	488	-	-	-	-	-	-	-
Stage 2	401	412	-	~ 344	365	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 24	67	658	~ 66	81	514	1135	-	-	864	-	-
Mov Cap-2 Maneuver	~ 24	67	-	~ 66	81	-	-	-	-	-	-	-
Stage 1	353	247	-	481	483	-	-	-	-	-	-	-
Stage 2	167	408	-	~ 211	238	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	345.4		\$ 1129.3		0.1		3.7					
HCM LOS	F		F									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBL	SBT	SBR
Capacity (veh/h)	1135	-	-	24	67	658	66	81	514	864	-	-
HCM Lane V/C Ratio	0.01	-	-	1.359	0.162	0.017	5.352	0.134	0.571	0.264	-	-
HCM Control Delay (s)	8.2	-	-	\$ 549.1	68.9	10.5	\$ 2083.1	56.2	20.9	10.7	0	-
HCM Lane LOS	A	-	-	F	F	B	F	F	C	B	A	-
HCM 95th %tile Q(veh)	0	-	-	4.1	0.5	0.1	39.3	0.4	3.5	1.1	-	-
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon						

Timings
11: LCR 20 E & Rocky Mountain Avenue

Saturday Mid Day
2045 Background



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	300	240	300	430	480	315
Future Volume (vph)	300	240	300	430	480	315
Turn Type	pm+pt	NA	NA	pm+ov	Prot	pm+ov
Protected Phases	7	4	8	6	6	7
Permitted Phases	4			8		6
Detector Phase	7	4	8	6	6	7
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	9.5
Total Split (s)	12.0	34.5	22.5	25.5	25.5	12.0
Total Split (%)	20.0%	57.5%	37.5%	42.5%	42.5%	20.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Recall Mode	None	None	None	C-Max	C-Max	None
Act Effect Green (s)	26.9	26.9	14.9	43.5	24.1	36.1
Actuated g/C Ratio	0.45	0.45	0.25	0.72	0.40	0.60
v/c Ratio	0.84	0.31	0.71	0.39	0.73	0.32
Control Delay	33.7	11.1	28.9	2.9	25.1	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.7	11.1	28.9	2.9	25.1	2.8
LOS	C	B	C	A	C	A
Approach Delay		23.7	13.6		16.3	
Approach LOS		C	B		B	

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 17.3

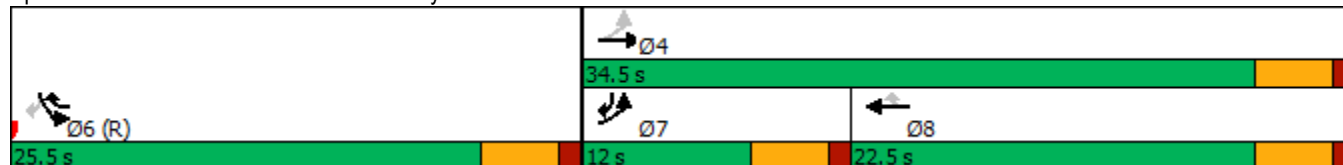
Intersection LOS: B

Intersection Capacity Utilization 70.3%

ICU Level of Service C

Analysis Period (min) 15

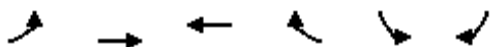
Splits and Phases: 11: LCR 20 E & Rocky Mountain Avenue



HCM 6th Signalized Intersection Summary

11: LCR 20 E & Rocky Mountain Avenue

Saturday Mid Day
2045 Background



Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations							
Traffic Volume (veh/h)	300	240	300	430	480	315	
Future Volume (veh/h)	300	240	300	430	480	315	
Initial Q (Qb), veh	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	
Work Zone On Approach		No	No		No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	
Adj Flow Rate, veh/h	326	261	326	467	522	342	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	2	2	2	2	2	2	
Cap, veh/h	415	805	431	1030	747	863	
Arrive On Green	0.13	0.43	0.23	0.23	0.42	0.42	
Sat Flow, veh/h	1781	1870	1870	1585	1781	1585	
Grp Volume(v), veh/h	326	261	326	467	522	342	
Grp Sat Flow(s),veh/h/ln	1781	1870	1870	1585	1781	1585	
Q Serve(g_s), s	7.5	5.5	9.7	8.8	14.4	7.5	
Cycle Q Clear(g_c), s	7.5	5.5	9.7	8.8	14.4	7.5	
Prop In Lane	1.00			1.00	1.00	1.00	
Lane Grp Cap(c), veh/h	415	805	431	1030	747	863	
V/C Ratio(X)	0.79	0.32	0.76	0.45	0.70	0.40	
Avail Cap(c_a), veh/h	415	935	561	1140	747	863	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	
Uniform Delay (d), s/veh	16.2	11.3	21.5	5.2	14.3	7.9	
Incr Delay (d2), s/veh	9.7	0.2	4.3	0.3	5.4	1.4	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(95%),veh/ln	7.2	3.7	7.9	10.7	10.2	13.4	
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	25.8	11.5	25.8	5.5	19.7	9.3	
LnGrp LOS	C	B	C	A	B	A	
Approach Vol, veh/h		587	793		864		
Approach Delay, s/veh		19.5	13.8		15.6		
Approach LOS		B	B		B		
Timer - Assigned Phs				4	6	7	8
Phs Duration (G+Y+Rc), s				30.3	29.7	12.0	18.3
Change Period (Y+Rc), s				4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s				30.0	21.0	7.5	18.0
Max Q Clear Time (g_c+l1), s				7.5	16.4	9.5	11.7
Green Ext Time (p_c), s				1.5	1.5	0.0	2.1
Intersection Summary							
HCM 6th Ctrl Delay			16.0				
HCM 6th LOS			B				

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion SAT (Site Folder: General)]**

Saturday Mid Day
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Avenue														
3	L2	115	3.0	125	3.0	0.508	9.5	LOS A	2.9	74.8	0.54	0.43	0.54	32.4
8	T1	775	3.0	842	3.0	0.508	9.3	LOS A	2.9	74.8	0.53	0.41	0.53	32.7
18	R2	115	3.0	125	3.0	0.508	9.1	LOS A	2.9	73.9	0.52	0.40	0.52	32.1
Approach		1005	3.0	1092	3.0	0.508	9.3	LOS A	2.9	74.8	0.53	0.41	0.53	32.6
East: Mountain Lion Dr														
1	L2	115	3.0	125	3.0	0.778	29.8	LOS D	6.5	167.1	0.86	1.22	2.08	24.9
6	T1	70	3.0	76	3.0	0.778	29.8	LOS D	6.5	167.1	0.86	1.22	2.08	24.9
16	R2	205	3.0	223	3.0	0.778	29.8	LOS D	6.5	167.1	0.86	1.22	2.08	24.4
Approach		390	3.0	424	3.0	0.778	29.8	LOS D	6.5	167.1	0.86	1.22	2.08	24.6
North: Boyd Lake Ave														
7	L2	95	3.0	103	3.0	0.408	8.3	LOS A	2.0	51.2	0.53	0.46	0.53	32.9
4	T1	565	3.0	614	3.0	0.408	8.1	LOS A	2.0	51.2	0.52	0.45	0.52	33.3
14	R2	90	3.0	98	3.0	0.408	7.9	LOS A	2.0	50.6	0.51	0.43	0.51	32.7
Approach		750	3.0	815	3.0	0.408	8.1	LOS A	2.0	51.2	0.52	0.45	0.52	33.1
West: Mountain Lion Dr														
5	L2	85	3.0	92	3.0	0.330	9.8	LOS A	1.3	34.5	0.65	0.68	0.75	31.7
2	T1	45	3.0	49	3.0	0.330	9.8	LOS A	1.3	34.5	0.65	0.68	0.75	31.7
12	R2	70	3.0	76	3.0	0.330	9.8	LOS A	1.3	34.5	0.65	0.68	0.75	30.8
Approach		200	3.0	217	3.0	0.330	9.8	LOS A	1.3	34.5	0.65	0.68	0.75	31.4
All Vehicles		2345	3.0	2549	3.0	0.778	12.4	LOS B	6.5	167.1	0.59	0.58	0.80	31.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 8 [Rocky Mountain & Road B SAT (Site Folder: General)]**

Saturday Mid Day
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Rocky Mountain Avenue														
8	T1	315	3.0	342	3.0	0.576	17.9	LOS C	3.5	90.0	0.77	0.94	1.33	29.4
18	R2	300	3.0	326	3.0	0.576	16.4	LOS C	3.5	90.0	0.76	0.93	1.32	29.0
Approach		615	3.0	668	3.0	0.576	17.2	LOS C	3.5	90.0	0.76	0.93	1.33	29.2
East: Road B														
1	L2	285	3.0	310	3.0	0.662	14.4	LOS B	7.8	199.9	0.73	0.91	1.27	29.7
16	R2	890	3.0	967	3.0	0.662	13.9	LOS B	7.9	202.4	0.72	0.89	1.24	29.6
Approach		1175	3.0	1277	3.0	0.662	14.0	LOS B	7.9	202.4	0.72	0.89	1.24	29.7
North: Rocky Mountain Ave														
7u	U	20	3.0	22	3.0	0.896	28.8	LOS D	29.3	751.1	1.00	1.61	2.59	25.0
7	L2	830	3.0	902	3.0	0.896	28.8	LOS D	29.3	751.1	1.00	1.61	2.59	24.5
4	T1	470	3.0	511	3.0	0.495	9.3	LOS A	3.1	79.5	0.58	0.52	0.64	33.1
Approach		1320	3.0	1435	3.0	0.896	21.9	LOS C	29.3	751.1	0.85	1.22	1.89	27.0
All Vehicles		3110	3.0	3380	3.0	0.896	18.0	LOS C	29.3	751.1	0.79	1.04	1.54	28.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 9 [Rocky Mountain & Mtn Lion SAT (Site Folder: General)]**

Saturday Mid Day
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Rocky Mountain Avenue														
3	L2	110	3.0	120	3.0	0.599	9.9	LOS A	5.5	141.1	0.29	0.11	0.29	32.4
8	T1	600	3.0	652	3.0	0.599	9.9	LOS A	5.5	141.1	0.29	0.11	0.29	32.4
Approach		710	3.0	772	3.0	0.599	9.9	LOS A	5.5	141.1	0.29	0.11	0.29	32.4
North: Rocky Mountain Ave														
4	T1	725	3.0	788	3.0	0.694	13.1	LOS B	6.9	175.5	0.61	0.38	0.61	31.3
14	R2	30	3.0	33	3.0	0.694	13.1	LOS B	6.9	175.5	0.61	0.38	0.61	30.5
Approach		755	3.0	821	3.0	0.694	13.1	LOS B	6.9	175.5	0.61	0.38	0.61	31.3
West: Mountain Lion Dr														
5	L2	35	3.0	38	3.0	0.269	9.7	LOS A	1.1	27.9	0.68	0.68	0.68	32.1
12	R2	110	3.0	120	3.0	0.269	9.7	LOS A	1.1	27.9	0.68	0.68	0.68	31.2
Approach		145	3.0	158	3.0	0.269	9.7	LOS A	1.1	27.9	0.68	0.68	0.68	31.4
All Vehicles		1610	3.0	1750	3.0	0.694	11.4	LOS B	6.9	175.5	0.47	0.29	0.47	31.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 6 [Hahns Peak & Mtn Lion SAT (Site Folder: General)]**

Saturday Mid Day
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Mountain Lion Dr														
3	L2	90	3.0	98	3.0	0.141	4.9	LOS A	0.6	15.7	0.43	0.31	0.43	33.4
8	T1	40	3.0	43	3.0	0.141	4.9	LOS A	0.6	15.7	0.43	0.31	0.43	33.3
Approach		130	3.0	141	3.0	0.141	4.9	LOS A	0.6	15.7	0.43	0.31	0.43	33.3
North: Hahns Peak														
4	T1	40	3.0	43	3.0	0.130	4.1	LOS A	0.6	15.1	0.25	0.12	0.25	35.7
14	R2	105	3.0	114	3.0	0.130	4.1	LOS A	0.6	15.1	0.25	0.12	0.25	34.6
Approach		145	3.0	158	3.0	0.130	4.1	LOS A	0.6	15.1	0.25	0.12	0.25	34.9
West: Mountain Lion Dr														
5	L2	255	3.0	277	3.0	0.306	5.6	LOS A	1.7	44.2	0.19	0.07	0.19	32.9
12	R2	105	3.0	114	3.0	0.306	5.6	LOS A	1.7	44.2	0.19	0.07	0.19	32.0
Approach		360	3.0	391	3.0	0.306	5.6	LOS A	1.7	44.2	0.19	0.07	0.19	32.7
All Vehicles		635	3.0	690	3.0	0.306	5.1	LOS A	1.7	44.2	0.25	0.13	0.25	33.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 10 [Boyd Lake Ave & LCR 20 SAT (Site Folder: General)]**

Saturday Mid Day
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Ave														
3	L2	10	3.0	11	3.0	0.360	7.3	LOS A	1.7	44.1	0.47	0.38	0.47	34.0
8	T1	385	3.0	418	3.0	0.360	7.3	LOS A	1.7	44.1	0.47	0.37	0.47	33.9
18	R2	300	3.0	326	3.0	0.360	7.0	LOS A	1.7	43.4	0.45	0.35	0.45	33.0
Approach		695	3.0	755	3.0	0.360	7.1	LOS A	1.7	44.1	0.46	0.36	0.46	33.5
East: LCR 20 E														
1	L2	325	3.0	353	3.0	0.384	8.3	LOS A	1.7	44.4	0.57	0.54	0.58	31.1
6	T1	10	3.0	11	3.0	0.360	8.4	LOS A	1.6	40.7	0.58	0.55	0.58	33.2
16	R2	270	3.0	293	3.0	0.360	8.4	LOS A	1.6	40.7	0.58	0.55	0.58	32.2
Approach		605	3.0	658	3.0	0.384	8.3	LOS A	1.7	44.4	0.57	0.55	0.58	31.6
North: Boyd Lake Ave														
7	L2	210	3.0	228	3.0	0.341	7.6	LOS A	1.5	39.4	0.53	0.47	0.53	32.0
4	T1	360	3.0	391	3.0	0.341	7.3	LOS A	1.5	39.4	0.51	0.45	0.51	33.6
14	R2	30	3.0	33	3.0	0.341	7.2	LOS A	1.5	38.8	0.51	0.44	0.51	33.0
Approach		600	3.0	652	3.0	0.341	7.4	LOS A	1.5	39.4	0.52	0.46	0.52	33.0
West: LCR 20 E														
5	L2	30	3.0	33	3.0	0.092	7.2	LOS A	0.3	7.8	0.60	0.60	0.60	32.5
2	T1	10	3.0	11	3.0	0.092	7.2	LOS A	0.3	7.8	0.60	0.60	0.60	32.4
12	R2	10	3.0	11	3.0	0.092	7.2	LOS A	0.3	7.8	0.60	0.60	0.60	31.6
Approach		50	3.0	54	3.0	0.092	7.2	LOS A	0.3	7.8	0.60	0.60	0.60	32.3
All Vehicles		1950	3.0	2120	3.0	0.384	7.6	LOS A	1.7	44.4	0.52	0.46	0.52	32.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX F. PHASE I (2029) FUTURE TOTAL TRAFFIC LEVEL OF SERVICE WORKSHEETS

Timings

1: Boyd Lake Ave & US 34

AM Peak Hour

Short Term Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	1940	115	185	1905	135	195	225	310	165	215	260
Future Volume (vph)	130	1940	115	185	1905	135	195	225	310	165	215	260
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5		9.5	22.5	
Total Split (s)	9.5	44.0	44.0	11.0	45.5	45.5	11.1	24.8		10.2	23.9	
Total Split (%)	10.6%	48.9%	48.9%	12.2%	50.6%	50.6%	12.3%	27.6%		11.3%	26.6%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	5.0	39.5	39.5	6.5	41.0	41.0	6.6	20.3	90.0	5.7	19.4	90.0
Actuated g/C Ratio	0.06	0.44	0.44	0.07	0.46	0.46	0.07	0.23	1.00	0.06	0.22	1.00
v/c Ratio	0.74	0.95	0.16	0.81	0.89	0.18	0.84	0.31	0.21	0.82	0.31	0.18
Control Delay	66.0	34.9	3.4	67.1	28.9	3.2	70.6	30.3	0.3	71.9	31.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.0	34.9	3.4	67.1	28.9	3.2	70.6	30.3	0.3	71.9	31.0	0.2
LOS	E	C	A	E	C	A	E	C	A	E	C	A
Approach Delay		35.0			30.5			28.3			29.0	
Approach LOS		D			C			C			C	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 31.8

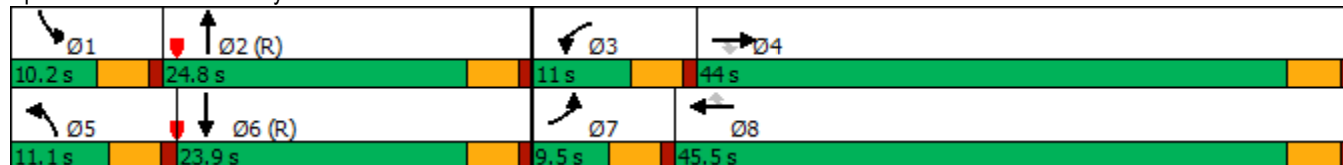
Intersection LOS: C

Intersection Capacity Utilization 69.3%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34



HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

AM Peak Hour
Short Term Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	1940	115	185	1905	135	195	225	310	165	215	260
Future Volume (veh/h)	130	1940	115	185	1905	135	195	225	310	165	215	260
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	141	2109	125	201	2071	147	212	245	0	179	234	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	192	2234	694	250	2319	720	253	806		219	771	
Arrive On Green	0.06	0.44	0.44	0.07	0.45	0.45	0.07	0.23	0.00	0.06	0.22	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	141	2109	125	201	2071	147	212	245	0	179	234	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	3.6	35.6	4.3	5.2	33.5	5.0	5.5	5.2	0.0	4.6	5.0	0.0
Cycle Q Clear(g_c), s	3.6	35.6	4.3	5.2	33.5	5.0	5.5	5.2	0.0	4.6	5.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	192	2234	694	250	2319	720	253	806		219	771	
V/C Ratio(X)	0.73	0.94	0.18	0.81	0.89	0.20	0.84	0.30		0.82	0.30	
Avail Cap(c_a), veh/h	192	2241	696	250	2326	722	253	806		219	771	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	0.53	0.53	0.53	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	41.8	24.3	15.5	41.1	22.6	14.8	41.2	28.9	0.0	41.6	29.5	0.0
Incr Delay (d2), s/veh	13.6	9.1	0.1	9.9	2.7	0.1	21.0	1.0	0.0	21.0	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.4	21.7	2.8	4.4	17.4	3.2	5.5	4.1	0.0	4.6	4.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.4	33.3	15.6	51.0	25.2	14.8	62.2	29.9	0.0	62.6	30.6	0.0
LnGrp LOS	E	C	B	D	C	B	E	C		E	C	
Approach Vol, veh/h	2375			2419			457			413		
Approach Delay, s/veh	33.7			26.8			44.9			44.5		
Approach LOS	C			C			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.2	24.9	11.0	43.9	11.1	24.0	9.5	45.4				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.7	20.3	6.5	39.5	6.6	19.4	5.0	41.0				
Max Q Clear Time (g_c+I1), s	6.6	7.2	7.2	37.6	7.5	7.0	5.6	35.5				
Green Ext Time (p_c), s	0.0	1.2	0.0	1.8	0.0	1.1	0.0	4.9				

Intersection Summary

HCM 6th Ctrl Delay	32.4
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Timings
2: Hahns Peak Dr & US 34

AM Peak Hour
Short Term Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	  		 	  							
Traffic Volume (vph)	140	1950	45	310	1930	50	190	25	175	60	10	55
Future Volume (vph)	140	1950	45	310	1930	50	190	25	175	60	10	55
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8	1		4	5
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	1	4	4	5
Switch Phase												
Minimum Initial (s)	5.0	25.0	25.0	5.0	25.0	25.0	13.0	13.0	5.0	13.0	13.0	5.0
Minimum Split (s)	9.5	32.0	32.0	9.5	32.0	32.0	20.0	20.0	9.5	20.0	20.0	9.5
Total Split (s)	10.5	62.0	62.0	15.0	66.5	66.5	23.0	23.0	15.0	23.0	23.0	10.5
Total Split (%)	10.5%	62.0%	62.0%	15.0%	66.5%	66.5%	23.0%	23.0%	15.0%	23.0%	23.0%	10.5%
Yellow Time (s)	3.5	5.0	5.0	3.5	5.0	5.0	5.0	5.0	3.5	5.0	5.0	3.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	7.0	7.0	4.5	7.0	7.0	7.0	7.0	4.5	7.0	7.0	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag			Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes			Yes			Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	Min	Min	None	Min	Min	None
Act Effect Green (s)	6.5	54.8	54.8	10.5	58.8	58.8	16.2	16.2	33.7	16.2	16.2	29.7
Actuated g/C Ratio	0.06	0.55	0.55	0.10	0.59	0.59	0.16	0.16	0.34	0.16	0.16	0.30
v/c Ratio	0.77	0.85	0.05	0.94	0.79	0.06	0.92	0.09	0.34	0.33	0.04	0.13
Control Delay	69.6	23.1	0.5	79.3	18.2	0.9	85.2	36.6	20.8	41.7	36.0	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.6	23.1	0.5	79.3	18.2	0.9	85.2	36.6	20.8	41.7	36.0	13.0
LOS	E	C	A	E	B	A	F	D	C	D	D	B
Approach Delay		25.8			25.3			53.2			28.6	
Approach LOS		C			C			D			C	

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 61 (61%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 27.6

Intersection LOS: C

Intersection Capacity Utilization 79.1%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 2: Hahns Peak Dr & US 34



HCM 6th Signalized Intersection Summary

2: Hahns Peak Dr & US 34

AM Peak Hour
Short Term Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	  		 	  					 		
Traffic Volume (veh/h)	140	1950	45	310	1930	50	190	25	175	60	10	55
Future Volume (veh/h)	140	1950	45	310	1930	50	190	25	175	60	10	55
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	171	2378	49	337	2354	61	207	27	190	73	11	67
Peak Hour Factor	0.82	0.82	0.92	0.92	0.82	0.82	0.92	0.92	0.92	0.82	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	207	2808	872	363	3038	943	290	299	420	244	299	349
Arrive On Green	0.06	0.55	0.55	0.10	0.60	0.60	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	1404	1870	1585	1164	1870	1585
Grp Volume(v), veh/h	171	2378	49	337	2354	61	207	27	190	73	11	67
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1404	1870	1585	1164	1870	1585
Q Serve(g_s), s	4.9	39.2	1.4	9.7	34.6	1.6	14.6	1.2	10.0	5.7	0.5	3.4
Cycle Q Clear(g_c), s	4.9	39.2	1.4	9.7	34.6	1.6	15.1	1.2	10.0	6.9	0.5	3.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	207	2808	872	363	3038	943	290	299	420	244	299	349
V/C Ratio(X)	0.82	0.85	0.06	0.93	0.77	0.06	0.71	0.09	0.45	0.30	0.04	0.19
Avail Cap(c_a), veh/h	207	2808	872	363	3038	943	290	299	420	244	299	349
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.42	0.42	0.42	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.5	19.0	10.4	44.4	15.2	8.5	41.9	35.8	30.7	38.8	35.5	31.8
Incr Delay (d2), s/veh	10.9	1.5	0.1	29.3	2.0	0.1	7.0	0.0	0.3	0.3	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.0	18.7	0.9	9.5	18.6	1.0	9.4	1.0	6.9	2.9	0.4	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.4	20.4	10.5	73.7	17.2	8.7	48.9	35.8	31.0	39.0	35.5	31.9
LnGrp LOS	E	C	B	E	B	A	D	D	C	D	D	C
Approach Vol, veh/h	2598			2752			424			151		
Approach Delay, s/veh	22.7			23.9			40.0			35.6		
Approach LOS	C			C			D			D		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.0	62.0		23.0	10.5	66.5		23.0				
Change Period (Y+Rc), s	4.5	7.0		7.0	4.5	7.0		7.0				
Max Green Setting (Gmax), s	10.5	55.0		16.0	6.0	59.5		16.0				
Max Q Clear Time (g_c+I1), s	11.7	41.2		8.9	6.9	36.6		17.1				
Green Ext Time (p_c), s	0.0	7.8		0.1	0.0	9.9		0.0				

Intersection Summary

HCM 6th Ctrl Delay	24.8
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection												
Int Delay, s/veh	2.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↑	↱		↑↑↑	↱			↱			↱
Traffic Vol, veh/h	60	1960	165	0	2220	0	0	0	140	0	0	0
Future Vol, veh/h	60	1960	165	0	2220	0	0	0	140	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Free	-	-	Free	-	-	Free	-	-	None
Storage Length	150	-	150	-	-	150	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	65	2130	179	0	2413	0	0	0	152	0	0	0
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2413	0	-	-	-	0	-	-	-	-	-	1207
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	77	-	0	0	-	0	0	0	0	0	0	151
Stage 1	-	-	0	0	-	0	0	0	0	0	0	-
Stage 2	-	-	0	0	-	0	0	0	0	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	77	-	-	-	-	-	-	-	-	-	-	151
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	4.6			0			0			0		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBL	WBT	SBLn1						
Capacity (veh/h)	-	77	-	-	-	-						
HCM Lane V/C Ratio	-	0.847	-	-	-	-						
HCM Control Delay (s)	0	155.2	-	-	-	0						
HCM Lane LOS	A	F	-	-	-	A						
HCM 95th %tile Q(veh)	-	4.3	-	-	-	-						

Timings 4: US 34 & Rocky Mountain Ave

AM Peak Hour
Short Term Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	1385	460	505	1740	415	430	40	310	240	85	155
Future Volume (vph)	275	1385	460	505	1740	415	430	40	310	240	85	155
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	1	6	7	5	2	3	7	4		3	8	
Permitted Phases			6			2			Free			Free
Detector Phase	1	6	7	5	2	3	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	25.0	5.0	5.0	25.0	5.0	5.0	18.0		5.0	13.0	
Minimum Split (s)	9.5	32.0	9.5	10.0	35.0	24.0	9.5	25.0		24.0	20.0	
Total Split (s)	28.0	44.0	33.0	28.0	44.0	28.0	33.0	25.0		28.0	20.0	
Total Split (%)	22.4%	35.2%	26.4%	22.4%	35.2%	22.4%	26.4%	20.0%		22.4%	16.0%	
Yellow Time (s)	3.5	5.0	3.5	3.5	5.0	4.0	3.5	5.0		4.0	5.0	
All-Red Time (s)	1.0	2.0	1.0	1.0	2.0	2.0	1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	7.0	4.5	4.5	7.0	6.0	4.5	7.0		6.0	7.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	Min	None	None	C-Min	None	None	Min		None	Min	
Act Effect Green (s)	16.1	47.9	77.9	18.1	49.8	70.6	23.1	20.7	125.0	13.9	13.0	125.0
Actuated g/C Ratio	0.13	0.38	0.62	0.14	0.40	0.56	0.18	0.17	1.00	0.11	0.10	1.00
v/c Ratio	0.67	0.77	0.48	0.76	0.93	0.43	0.74	0.07	0.21	0.69	0.48	0.11
Control Delay	59.5	38.2	11.0	58.6	46.4	4.9	55.1	43.8	0.3	62.8	61.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.5	38.2	11.0	58.6	46.4	4.9	55.1	43.8	0.3	62.8	61.7	0.1
LOS	E	D	B	E	D	A	E	D	A	E	E	A
Approach Delay		35.1			42.3			32.7			42.4	
Approach LOS		D			D			C			D	

Intersection Summary

Cycle Length: 125	
Actuated Cycle Length: 125	
Offset: 0 (0%), Referenced to phase 2:WBT, Start of Yellow	
Natural Cycle: 105	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 38.5	Intersection LOS: D
Intersection Capacity Utilization 75.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: US 34 & Rocky Mountain Ave

 Ø1	 Ø2 (R)	 Ø3	 Ø4
28 s	44 s	28 s	25 s
 Ø5	 Ø6	 Ø7	 Ø8
28 s	44 s	33 s	20 s

HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

AM Peak Hour
Short Term Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	275	1385	460	505	1740	415	430	40	310	240	85	155
Future Volume (veh/h)	275	1385	460	505	1740	415	430	40	310	240	85	155
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	299	1505	500	549	1891	451	467	43	0	261	92	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	369	2167	923	651	2284	857	545	557		321	195	
Arrive On Green	0.11	0.42	0.42	0.13	0.45	0.45	0.16	0.16	0.00	0.09	0.10	0.00
Sat Flow, veh/h	3456	5106	1585	5023	5106	1585	3456	3554	1585	3456	1870	1585
Grp Volume(v), veh/h	299	1505	500	549	1891	451	467	43	0	261	92	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1674	1702	1585	1728	1777	1585	1728	1870	1585
Q Serve(g_s), s	10.6	30.1	24.1	13.3	40.6	22.8	16.4	1.3	0.0	9.3	5.8	0.0
Cycle Q Clear(g_c), s	10.6	30.1	24.1	13.3	40.6	22.8	16.4	1.3	0.0	9.3	5.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	369	2167	923	651	2284	857	545	557		321	195	
V/C Ratio(X)	0.81	0.69	0.54	0.84	0.83	0.53	0.86	0.08		0.81	0.47	
Avail Cap(c_a), veh/h	650	2167	923	944	2284	857	788	557		608	195	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	54.6	29.4	15.9	53.1	30.3	18.5	51.3	45.0	0.0	55.6	52.8	0.0
Incr Delay (d2), s/veh	4.3	0.8	0.4	3.3	3.6	2.3	6.5	0.0	0.0	1.9	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.4	18.1	13.4	9.8	23.9	13.6	12.1	1.0	0.0	7.4	5.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.9	30.2	16.3	56.4	33.9	20.8	57.7	45.0	0.0	57.5	53.4	0.0
LnGrp LOS	E	C	B	E	C	C	E	D		E	D	
Approach Vol, veh/h	2304			2891			510			353		
Approach Delay, s/veh	30.9			36.2			56.6			56.4		
Approach LOS	C			D			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.9	62.9	17.6	26.6	20.7	60.1	24.2	20.0				
Change Period (Y+Rc), s	4.5	7.0	6.0	7.0	4.5	7.0	4.5	7.0				
Max Green Setting (Gmax), s	23.5	37.0	22.0	18.0	23.5	37.0	28.5	13.0				
Max Q Clear Time (g_c+I1), s	12.6	42.6	11.3	3.3	15.3	32.1	18.4	7.8				
Green Ext Time (p_c), s	0.8	0.0	0.4	0.0	0.9	2.6	1.3	0.1				

Intersection Summary

HCM 6th Ctrl Delay	37.1
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

User approved ignoring U-Turning movement.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗	↘	↗↘	↗↘	
Traffic Vol, veh/h	0	15	0	785	850	195
Future Vol, veh/h	0	15	0	785	850	195
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	16	0	853	924	212
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	568	1136	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	466	611	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	466	611	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	13	0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	611	-	466	-	-	
HCM Lane V/C Ratio	-	-	0.035	-	-	
HCM Control Delay (s)	0	-	13	-	-	
HCM Lane LOS	A	-	B	-	-	
HCM 95th %tile Q(veh)	0	-	0.1	-	-	

Intersection						
Int Delay, s/veh	20.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	80	185	585	75	100	395
Future Vol, veh/h	80	185	585	75	100	395
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	87	201	636	82	109	429
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1324	677	0	0	718	0
Stage 1	677	-	-	-	-	-
Stage 2	647	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	172	453	-	-	883	-
Stage 1	505	-	-	-	-	-
Stage 2	521	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	144	453	-	-	883	-
Mov Cap-2 Maneuver	144	-	-	-	-	-
Stage 1	505	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	108	0		1.9		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	- 275		883	-	
HCM Lane V/C Ratio	-	- 1.047		0.123	-	
HCM Control Delay (s)	-	- 108		9.6	0	
HCM Lane LOS	-	- F		A	A	
HCM 95th %tile Q(veh)	-	- 11.2		0.4	-	

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion Dr AM (Site Folder: General)]**

AM Peak Hour
Site Category: Short Term Total
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Ave														
3	L2	160	3.0	174	3.0	0.432	8.7	LOS A	2.2	55.4	0.55	0.48	0.55	32.3
8	T1	465	3.0	505	3.0	0.432	8.5	LOS A	2.2	55.4	0.54	0.47	0.54	32.8
18	R2	165	3.0	179	3.0	0.432	8.3	LOS A	2.1	54.7	0.53	0.45	0.53	32.4
Approach		790	3.0	859	3.0	0.432	8.5	LOS A	2.2	55.4	0.54	0.47	0.54	32.6
East: Mountain Lion Dr														
1	L2	130	3.0	141	3.0	0.490	12.9	LOS B	2.7	69.1	0.71	0.83	1.09	30.4
6	T1	45	3.0	49	3.0	0.490	12.9	LOS B	2.7	69.1	0.71	0.83	1.09	30.3
16	R2	125	3.0	136	3.0	0.490	12.9	LOS B	2.7	69.1	0.71	0.83	1.09	29.6
Approach		300	3.0	326	3.0	0.490	12.9	LOS B	2.7	69.1	0.71	0.83	1.09	30.0
North: Boyd Lake Ave														
7	L2	125	3.0	136	3.0	0.293	6.9	LOS A	1.3	32.5	0.50	0.43	0.50	32.9
4	T1	250	3.0	272	3.0	0.293	6.7	LOS A	1.3	32.5	0.49	0.42	0.49	33.5
14	R2	145	3.0	158	3.0	0.293	6.5	LOS A	1.3	32.0	0.48	0.41	0.48	33.2
Approach		520	3.0	565	3.0	0.293	6.7	LOS A	1.3	32.5	0.49	0.42	0.49	33.3
West: Mountain Lion Dr														
5	L2	140	3.0	152	3.0	0.382	8.7	LOS A	1.8	45.9	0.60	0.63	0.67	32.1
2	T1	40	3.0	43	3.0	0.382	8.7	LOS A	1.8	45.9	0.60	0.63	0.67	32.0
12	R2	120	3.0	130	3.0	0.382	8.7	LOS A	1.8	45.9	0.60	0.63	0.67	31.2
Approach		300	3.0	326	3.0	0.382	8.7	LOS A	1.8	45.9	0.60	0.63	0.67	31.7
All Vehicles		1910	3.0	2076	3.0	0.490	8.8	LOS A	2.7	69.1	0.56	0.54	0.63	32.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 6 [Hahns Peak & Mtn Lion Dr AM (Site Folder: General)]**

AM Peak Hour
Site Category: Short Term Total
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] ft				
East: Road C														
6	T1	35	3.0	38	3.0	0.108	4.1	LOS A	0.5	12.1	0.33	0.19	0.33	35.7
16	R2	77	3.0	84	3.0	0.108	4.1	LOS A	0.5	12.1	0.33	0.19	0.33	34.6
Approach		112	3.0	122	3.0	0.108	4.1	LOS A	0.5	12.1	0.33	0.19	0.33	34.9
North: Hahns Peak Drive														
7	L2	44	3.0	48	3.0	0.036	3.0	LOS A	0.1	3.5	0.12	0.03	0.12	33.4
14	R2	55	3.0	60	3.0	0.045	3.1	LOS A	0.2	4.5	0.12	0.04	0.12	35.2
Approach		99	3.0	108	3.0	0.045	3.0	LOS A	0.2	4.5	0.12	0.04	0.12	34.4
West: Mountain Lion Drive														
5	L2	155	3.0	168	3.0	0.154	4.1	LOS A	0.7	18.5	0.17	0.06	0.17	33.3
2	T1	25	3.0	27	3.0	0.154	4.1	LOS A	0.7	18.5	0.17	0.06	0.17	33.2
Approach		180	3.0	196	3.0	0.154	4.1	LOS A	0.7	18.5	0.17	0.06	0.17	33.3
All Vehicles		391	3.0	425	3.0	0.154	3.8	LOS A	0.7	18.5	0.20	0.09	0.20	34.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 8 [Rocky Mountain & Road B AM (Site Folder: General)]**

AM Peak hour
Site Category: Short Term Total
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Rocky Mountain Avenue														
3	L2	5	3.0	5	3.0	0.084	7.2	LOS A	0.3	7.1	0.60	0.60	0.60	33.9
8	T1	35	3.0	38	3.0	0.084	7.2	LOS A	0.3	7.1	0.60	0.60	0.60	33.8
18	R2	5	3.0	5	3.0	0.084	7.2	LOS A	0.3	7.1	0.60	0.60	0.60	32.8
Approach		45	3.0	49	3.0	0.084	7.2	LOS A	0.3	7.1	0.60	0.60	0.60	33.7
East: RoadName														
1	L2	5	3.0	5	3.0	0.010	3.4	LOS A	0.0	0.9	0.30	0.15	0.30	34.7
6	T1	5	3.0	5	3.0	0.010	3.4	LOS A	0.0	0.9	0.30	0.15	0.30	34.6
16	R2	585	3.0	636	3.0	0.553	9.7	LOS A	3.4	88.0	0.51	0.38	0.51	31.7
Approach		595	3.0	647	3.0	0.553	9.6	LOS A	3.4	88.0	0.51	0.37	0.51	31.8
North: Rocky Mountain Ave														
7u	U	5	3.0	5	3.0	0.604	9.6	LOS A	5.0	127.8	0.15	0.04	0.15	31.3
7	L2	750	3.0	815	3.0	0.604	9.6	LOS A	5.0	127.8	0.15	0.04	0.15	30.7
4	T1	20	3.0	22	3.0	0.097	3.6	LOS A	0.4	9.8	0.08	0.02	0.08	36.0
14	R2	95	3.0	103	3.0	0.097	3.6	LOS A	0.4	9.8	0.08	0.02	0.08	34.8
Approach		870	3.0	946	3.0	0.604	8.8	LOS A	5.0	127.8	0.14	0.04	0.14	31.2
West: Road B														
5	L2	145	3.0	158	3.0	0.240	8.4	LOS A	0.9	22.3	0.62	0.62	0.62	31.2
2	T1	5	3.0	5	3.0	0.019	6.3	LOS A	0.1	1.6	0.58	0.50	0.58	34.5
12	R2	5	3.0	5	3.0	0.019	6.3	LOS A	0.1	1.6	0.58	0.50	0.58	33.4
Approach		155	3.0	168	3.0	0.240	8.3	LOS A	0.9	22.3	0.62	0.61	0.62	31.3
All Vehicles		1665	3.0	1810	3.0	0.604	9.0	LOS A	5.0	127.8	0.33	0.23	0.33	31.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Timings
1: Boyd Lake Ave & US 34

PM Peak Hour
Short Term Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	2325	250	280	2305	145	205	215	325	215	290	315
Future Volume (vph)	115	2325	250	280	2305	145	205	215	325	215	290	315
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5		9.5	22.5	
Total Split (s)	9.5	59.0	59.0	15.0	64.5	64.5	12.6	19.0		17.0	23.4	
Total Split (%)	8.6%	53.6%	53.6%	13.6%	58.6%	58.6%	11.5%	17.3%		15.5%	21.3%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	5.0	54.5	54.5	10.5	60.0	60.0	8.1	15.4	110.0	11.6	18.9	110.0
Actuated g/C Ratio	0.05	0.50	0.50	0.10	0.55	0.55	0.07	0.14	1.00	0.11	0.17	1.00
v/c Ratio	0.80	1.00	0.30	0.93	0.90	0.17	0.88	0.47	0.22	0.65	0.52	0.22
Control Delay	86.5	46.9	2.7	84.8	28.2	2.4	84.6	47.5	0.3	55.8	44.9	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.5	46.9	2.7	84.8	28.2	2.4	84.6	47.5	0.3	55.8	44.9	0.3
LOS	F	D	A	F	C	A	F	D	A	E	D	A
Approach Delay		44.4			32.7			37.1			30.7	
Approach LOS		D			C			D			C	

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 37.4

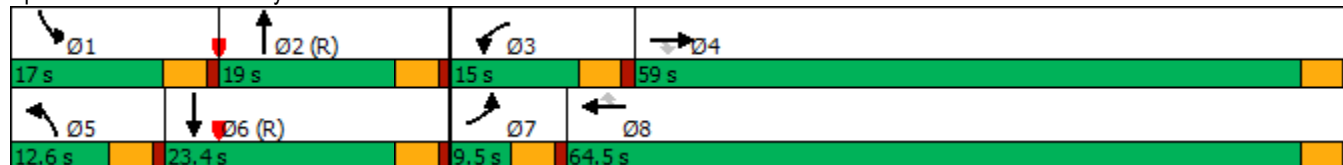
Intersection LOS: D

Intersection Capacity Utilization 81.8%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34



HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

PM Peak Hour

Short Term Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	2325	250	280	2305	145	205	215	325	215	290	315
Future Volume (veh/h)	115	2325	250	280	2305	145	205	215	325	215	290	315
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	125	2527	272	304	2505	158	223	234	0	234	315	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	157	2530	785	330	2785	865	254	564		299	611	
Arrive On Green	0.05	0.50	0.50	0.10	0.55	0.55	0.07	0.16	0.00	0.09	0.17	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	125	2527	272	304	2505	158	223	234	0	234	315	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	3.9	54.4	11.5	9.6	48.2	5.5	7.0	6.5	0.0	7.3	8.9	0.0
Cycle Q Clear(g_c), s	3.9	54.4	11.5	9.6	48.2	5.5	7.0	6.5	0.0	7.3	8.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	157	2530	785	330	2785	865	254	564		299	611	
V/C Ratio(X)	0.80	1.00	0.35	0.92	0.90	0.18	0.88	0.41		0.78	0.52	
Avail Cap(c_a), veh/h	157	2530	785	330	2785	865	254	564		393	611	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.31	0.31	0.31	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	52.0	27.7	16.9	49.3	22.3	12.6	50.5	41.7	0.0	49.2	41.4	0.0
Incr Delay (d2), s/veh	24.1	17.6	0.3	12.8	1.5	0.0	27.2	2.2	0.0	7.3	3.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.0	33.2	7.5	6.7	22.3	3.2	7.2	5.5	0.0	6.2	7.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	76.1	45.3	17.2	62.1	23.8	12.7	77.6	43.9	0.0	56.6	44.5	0.0
LnGrp LOS	E	D	B	E	C	B	E	D		E	D	
Approach Vol, veh/h	2924			2967			457			549		
Approach Delay, s/veh	44.0			27.1			60.3			49.6		
Approach LOS	D			C			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.0	22.0	15.0	59.0	12.6	23.4	9.5	64.5				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	12.5	14.5	10.5	54.5	8.1	18.9	5.0	60.0				
Max Q Clear Time (g_c+I1), s	9.3	8.5	11.6	56.4	9.0	10.9	5.9	50.2				
Green Ext Time (p_c), s	0.2	0.7	0.0	0.0	0.0	1.2	0.0	9.2				

Intersection Summary

HCM 6th Ctrl Delay 38.3

HCM 6th LOS D

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Timings 2: Hahns Peak Dr & US 34

PM Peak Hour
Short Term Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	  		 	  							
Traffic Volume (vph)	265	2425	30	345	2335	85	205	25	225	75	15	130
Future Volume (vph)	265	2425	30	345	2335	85	205	25	225	75	15	130
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8	1		4	5
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	1	4	4	5
Switch Phase												
Minimum Initial (s)	5.0	25.0	25.0	5.0	25.0	25.0	18.0	18.0	5.0	18.0	18.0	5.0
Minimum Split (s)	9.5	32.0	32.0	9.5	32.0	32.0	25.0	25.0	9.5	25.0	25.0	9.5
Total Split (s)	18.7	85.0	85.0	25.0	91.3	91.3	30.0	30.0	25.0	30.0	30.0	18.7
Total Split (%)	13.4%	60.7%	60.7%	17.9%	65.2%	65.2%	21.4%	21.4%	17.9%	21.4%	21.4%	13.4%
Yellow Time (s)	3.5	5.0	5.0	3.5	5.0	5.0	5.0	5.0	3.5	5.0	5.0	3.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	7.0	7.0	4.5	7.0	7.0	7.0	7.0	4.5	7.0	7.0	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag			Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes			Yes			Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	Min	Min	None	Min	Min	None
Act Effect Green (s)	14.2	80.0	80.0	18.5	84.3	84.3	23.0	23.0	48.5	23.0	23.0	44.2
Actuated g/C Ratio	0.10	0.57	0.57	0.13	0.60	0.60	0.16	0.16	0.35	0.16	0.16	0.32
v/c Ratio	0.93	1.02	0.03	0.83	0.93	0.11	0.98	0.09	0.43	0.40	0.05	0.29
Control Delay	95.0	51.3	0.1	74.9	32.1	4.7	111.9	50.6	32.8	58.5	50.0	22.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	95.0	51.3	0.1	74.9	32.1	4.7	111.9	50.6	32.8	58.5	50.0	22.3
LOS	F	D	A	E	C	A	F	D	C	E	D	C
Approach Delay		55.0			36.0			69.4			36.3	
Approach LOS		E			D			E			D	

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 46.8

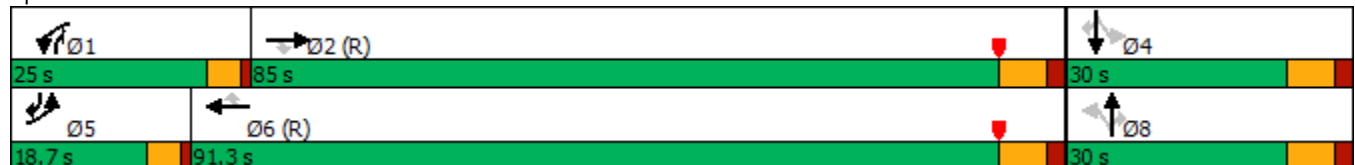
Intersection LOS: D

Intersection Capacity Utilization 91.2%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Hahns Peak Dr & US 34



HCM 6th Signalized Intersection Summary 2: Hahns Peak Dr & US 34

PM Peak Hour
Short Term Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	2425	30	345	2335	85	205	25	225	75	15	130
Future Volume (veh/h)	265	2425	30	345	2335	85	205	25	225	75	15	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	323	2957	33	375	2848	104	223	27	245	91	16	159
Peak Hour Factor	0.82	0.82	0.92	0.92	0.82	0.82	0.92	0.92	0.92	0.82	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	351	2964	920	426	3075	954	271	307	456	220	307	421
Arrive On Green	0.10	0.58	0.58	0.12	0.60	0.60	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	1397	1870	1585	1107	1870	1585
Grp Volume(v), veh/h	323	2957	33	375	2848	104	223	27	245	91	16	159
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1397	1870	1585	1107	1870	1585
Q Serve(g_s), s	13.0	80.8	1.2	14.9	70.3	3.9	22.0	1.7	18.2	10.6	1.0	11.5
Cycle Q Clear(g_c), s	13.0	80.8	1.2	14.9	70.3	3.9	23.0	1.7	18.2	12.3	1.0	11.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	351	2964	920	426	3075	954	271	307	456	220	307	421
V/C Ratio(X)	0.92	1.00	0.04	0.88	0.93	0.11	0.82	0.09	0.54	0.41	0.05	0.38
Avail Cap(c_a), veh/h	351	2964	920	506	3075	954	271	307	456	220	307	421
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.34	0.34	0.34	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	62.3	29.3	12.6	60.4	25.1	11.9	59.2	49.6	42.0	54.8	49.3	42.0
Incr Delay (d2), s/veh	13.1	9.1	0.0	13.2	6.2	0.2	17.2	0.0	0.7	0.5	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.8	39.5	0.8	11.8	37.6	2.6	14.2	1.5	11.7	5.4	0.9	8.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	75.5	38.4	12.6	73.6	31.3	12.1	76.3	49.7	42.7	55.3	49.3	42.2
LnGrp LOS	E	D	B	E	C	B	E	D	D	E	D	D
Approach Vol, veh/h	3313			3327			495			266		
Approach Delay, s/veh	41.8			35.4			58.3			47.1		
Approach LOS	D			D			E			D		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	21.7	88.3		30.0	18.7	91.3		30.0				
Change Period (Y+Rc), s	4.5	7.0		7.0	4.5	7.0		7.0				
Max Green Setting (Gmax), s	20.5	78.0		23.0	14.2	84.3		23.0				
Max Q Clear Time (g_c+I1), s	16.9	82.8		14.3	15.0	72.3		25.0				
Green Ext Time (p_c), s	0.3	0.0		0.2	0.0	8.7		0.0				

Intersection Summary

HCM 6th Ctrl Delay	40.2
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Intersection												
Int Delay, s/veh	79.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↱	↱↱↱	↱		↱↱↱	↱			↱			↱
Traffic Vol, veh/h	205	2400	115	0	2655	0	90	0	85	0	0	0
Future Vol, veh/h	205	2400	115	0	2655	0	90	0	85	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Free	-	-	Free	-	-	Free	-	-	None
Storage Length	150	-	150	-	-	150	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	223	2609	125	0	2886	0	98	0	92	0	0	0

Major/Minor	Major1		Major2		Minor1		Minor2	
Conflicting Flow All	2886	0	-	-	0	4209	-	-
Stage 1	-	-	-	-	-	3055	-	-
Stage 2	-	-	-	-	-	1154	-	-
Critical Hdwy	5.34	-	-	-	-	6.44	-	-
Critical Hdwy Stg 1	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	3.82	-	-
Pot Cap-1 Maneuver	~ 43	-	0	0	-	0	0	0
Stage 1	-	-	0	0	-	0	0	0
Stage 2	-	-	0	0	-	0	0	0
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	~ 43	-	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	~ 6	-	-
Stage 2	-	-	-	-	-	188	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	162.8	0		0
HCM LOS			-	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	-	~ 43	-	-	-
HCM Lane V/C Ratio	-	5.182	-	-	-
HCM Control Delay (s)	\$	2069.2	-	-	0
HCM Lane LOS	-	F	-	-	A
HCM 95th %tile Q(veh)	-	25.7	-	-	-

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

Timings 4: US 34 & Rocky Mountain Ave

PM Peak Hour
Short Term Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	1860	590	570	1920	395	580	50	470	380	75	300
Future Volume (vph)	250	1860	590	570	1920	395	580	50	470	380	75	300
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	1	6	7	5	2	3	7	4		3	8	
Permitted Phases			6			2			Free			Free
Detector Phase	1	6	7	5	2	3	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	25.0	5.0	5.0	25.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	29.5	32.0	9.5	10.0	35.0	24.0	9.5	12.0		24.0	18.0	
Total Split (s)	33.0	63.0	33.0	31.0	61.0	39.0	33.0	12.0		39.0	18.0	
Total Split (%)	22.8%	43.4%	22.8%	21.4%	42.1%	26.9%	22.8%	8.3%		26.9%	12.4%	
Yellow Time (s)	3.5	5.0	3.5	3.5	5.0	4.0	3.5	5.0		4.0	4.0	
All-Red Time (s)	1.0	2.0	1.0	1.0	2.0	2.0	1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	7.0	4.5	4.5	7.0	6.0	4.5	7.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	C-Min	None	None	C-Min	None	None	Min		None	None	
Act Effect Green (s)	15.9	62.4	97.8	22.2	68.8	97.8	28.4	13.8	145.0	22.0	10.0	145.0
Actuated g/C Ratio	0.11	0.43	0.67	0.15	0.47	0.67	0.20	0.10	1.00	0.15	0.07	1.00
v/c Ratio	0.72	0.92	0.59	0.81	0.87	0.38	0.94	0.16	0.32	0.79	0.64	0.21
Control Delay	73.5	47.6	14.8	68.2	39.4	7.0	79.9	62.6	0.5	70.5	87.7	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.5	47.6	14.8	68.2	39.4	7.0	79.9	62.6	0.5	70.5	87.7	0.3
LOS	E	D	B	E	D	A	E	E	A	E	F	A
Approach Delay		42.8			40.7			45.2			44.4	
Approach LOS		D			D			D			D	

Intersection Summary

Cycle Length: 145

Actuated Cycle Length: 145

Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 42.5

Intersection LOS: D

Intersection Capacity Utilization 85.4%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 4: US 34 & Rocky Mountain Ave



HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

PM Peak Hour
Short Term Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	250	1860	590	570	1920	395	580	50	470	380	75	300
Future Volume (veh/h)	250	1860	590	570	1920	395	580	50	470	380	75	300
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	272	2022	641	620	2087	429	630	54	0	413	82	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	326	2300	1022	709	2540	1004	672	368		470	104	
Arrive On Green	0.09	0.45	0.45	0.14	0.50	0.50	0.19	0.10	0.00	0.14	0.06	0.00
Sat Flow, veh/h	3456	5106	1585	5023	5106	1585	3456	3554	1585	3456	1870	1585
Grp Volume(v), veh/h	272	2022	641	620	2087	429	630	54	0	413	82	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1674	1702	1585	1728	1777	1585	1728	1870	1585
Q Serve(g_s), s	11.2	52.2	35.0	17.5	50.4	19.7	26.0	2.0	0.0	17.0	6.3	0.0
Cycle Q Clear(g_c), s	11.2	52.2	35.0	17.5	50.4	19.7	26.0	2.0	0.0	17.0	6.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	326	2300	1022	709	2540	1004	672	368		470	104	
V/C Ratio(X)	0.84	0.88	0.63	0.87	0.82	0.43	0.94	0.15		0.88	0.79	
Avail Cap(c_a), veh/h	679	2300	1022	918	2540	1004	679	368		786	155	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	64.6	36.2	15.3	61.0	31.0	13.4	57.5	59.2	0.0	61.5	67.7	0.0
Incr Delay (d2), s/veh	2.2	5.2	2.9	6.4	3.1	1.3	20.6	0.1	0.0	3.3	8.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.7	30.4	19.0	12.5	28.7	11.8	19.3	1.6	0.0	12.2	5.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.7	41.4	18.3	67.4	34.1	14.7	78.2	59.2	0.0	64.8	75.8	0.0
LnGrp LOS	E	D	B	E	C	B	E	E		E	E	
Approach Vol, veh/h	2935			3136			684			495		
Approach Delay, s/veh	38.7			38.1			76.7			66.6		
Approach LOS	D			D			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.2	79.1	25.7	22.0	25.0	72.3	32.7	15.0				
Change Period (Y+Rc), s	4.5	7.0	6.0	7.0	4.5	7.0	4.5	* 7				
Max Green Setting (Gmax), s	28.5	54.0	33.0	5.0	26.5	56.0	28.5	* 12				
Max Q Clear Time (g_c+I1), s	13.2	52.4	19.0	4.0	19.5	54.2	28.0	8.3				
Green Ext Time (p_c), s	0.4	1.3	0.7	0.0	0.9	1.4	0.1	0.1				

Intersection Summary

HCM 6th Ctrl Delay	43.9
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗	↘	↗↘	↗↘	
Traffic Vol, veh/h	0	15	0	1110	965	210
Future Vol, veh/h	0	15	0	1110	965	210
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	16	0	1207	1049	228
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	639	1277	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	419	540	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	419	540	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	13.9	0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	540	-	419	-	-	
HCM Lane V/C Ratio	-	-	0.039	-	-	
HCM Control Delay (s)	0	-	13.9	-	-	
HCM Lane LOS	A	-	B	-	-	
HCM 95th %tile Q(veh)	0	-	0.1	-	-	

Intersection						
Int Delay, s/veh	47.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	75	155	590	135	170	550
Future Vol, veh/h	75	155	590	135	170	550
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	82	168	641	147	185	598
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1683	715	0	0	788	0
Stage 1	715	-	-	-	-	-
Stage 2	968	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	104	431	-	-	831	-
Stage 1	485	-	-	-	-	-
Stage 2	368	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 69	431	-	-	831	-
Mov Cap-2 Maneuver	~ 69	-	-	-	-	-
Stage 1	485	-	-	-	-	-
Stage 2	245	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	\$ 337	0		2.5		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	-	159	831	-	
HCM Lane V/C Ratio	-	-	1.572	0.222	-	
HCM Control Delay (s)	-	-	\$ 337	10.6	0	
HCM Lane LOS	-	-	F	B	A	
HCM 95th %tile Q(veh)	-	-	16.9	0.8	-	
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion Dr PM (Site Folder: General)]**

PM Peak Hour
Site Category: Short Term Total
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] ft				
South: Boyd Lake Ave														
3	L2	75	3.0	82	3.0	0.402	8.3	LOS A	2.0	50.0	0.53	0.46	0.53	33.0
8	T1	495	3.0	538	3.0	0.402	8.1	LOS A	2.0	50.0	0.53	0.45	0.53	33.3
18	R2	165	3.0	179	3.0	0.402	7.8	LOS A	1.9	49.3	0.51	0.44	0.51	32.6
Approach		735	3.0	799	3.0	0.402	8.0	LOS A	2.0	50.0	0.52	0.45	0.52	33.1
East: Mountain Lion Dr														
1	L2	180	3.0	196	3.0	0.621	15.7	LOS C	4.8	121.9	0.76	0.97	1.38	29.3
6	T1	65	3.0	71	3.0	0.621	15.7	LOS C	4.8	121.9	0.76	0.97	1.38	29.3
16	R2	175	3.0	190	3.0	0.621	15.7	LOS C	4.8	121.9	0.76	0.97	1.38	28.6
Approach		420	3.0	457	3.0	0.621	15.7	LOS C	4.8	121.9	0.76	0.97	1.38	29.0
North: Boyd Lake Ave														
7	L2	160	3.0	174	3.0	0.449	9.1	LOS A	2.4	62.5	0.57	0.52	0.61	32.1
4	T1	575	3.0	625	3.0	0.449	8.8	LOS A	2.4	62.5	0.56	0.50	0.58	32.8
14	R2	75	3.0	82	3.0	0.449	8.6	LOS A	2.3	59.4	0.55	0.49	0.57	32.3
Approach		810	3.0	880	3.0	0.449	8.9	LOS A	2.4	62.5	0.56	0.50	0.59	32.6
West: Mountain Lion Dr														
5	L2	90	3.0	98	3.0	0.452	13.5	LOS B	2.2	55.8	0.72	0.82	1.06	30.3
2	T1	55	3.0	60	3.0	0.452	13.5	LOS B	2.2	55.8	0.72	0.82	1.06	30.2
12	R2	95	3.0	103	3.0	0.452	13.5	LOS B	2.2	55.8	0.72	0.82	1.06	29.4
Approach		240	3.0	261	3.0	0.452	13.5	LOS B	2.2	55.8	0.72	0.82	1.06	29.9
All Vehicles		2205	3.0	2397	3.0	0.621	10.4	LOS B	4.8	121.9	0.60	0.61	0.77	31.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 6 [Hahns Peak & Mtn Lion Dr PM (Site Folder: General)]**

PM Peak Hour
Site Category: Short Term Total
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
East: Road B														
6	T1	28	3.0	30	3.0	0.126	4.7	LOS A	0.5	14.0	0.41	0.28	0.41	35.4
16	R2	91	3.0	99	3.0	0.126	4.7	LOS A	0.5	14.0	0.41	0.28	0.41	34.3
Approach		119	3.0	129	3.0	0.126	4.7	LOS A	0.5	14.0	0.41	0.28	0.41	34.5
North: Hahn's Peak														
7	L2	19	3.0	21	3.0	0.015	2.8	LOS A	0.1	1.5	0.10	0.03	0.10	33.5
14	R2	120	3.0	130	3.0	0.097	3.5	LOS A	0.4	10.2	0.11	0.03	0.11	34.9
Approach		139	3.0	151	3.0	0.097	3.4	LOS A	0.4	10.2	0.11	0.03	0.11	34.7
West: Road B														
5	L2	235	3.0	255	3.0	0.221	4.6	LOS A	1.1	29.0	0.11	0.03	0.11	33.0
2	T1	31	3.0	34	3.0	0.221	4.6	LOS A	1.1	29.0	0.11	0.03	0.11	32.9
Approach		266	3.0	289	3.0	0.221	4.6	LOS A	1.1	29.0	0.11	0.03	0.11	33.0
All Vehicles		524	3.0	570	3.0	0.221	4.3	LOS A	1.1	29.0	0.18	0.09	0.18	33.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 8 [Rocky Mountain & Road B PM (Site Folder: General)]**

AM Peak hour
Site Category: Short Term Total
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Rocky Mountain Avenue														
3	L2	5	3.0	5	3.0	0.071	8.7	LOS A	0.2	5.7	0.68	0.68	0.68	33.0
8	T1	20	3.0	22	3.0	0.071	8.7	LOS A	0.2	5.7	0.68	0.68	0.68	32.9
18	R2	5	3.0	5	3.0	0.071	8.7	LOS A	0.2	5.7	0.68	0.68	0.68	32.0
Approach		30	3.0	33	3.0	0.071	8.7	LOS A	0.2	5.7	0.68	0.68	0.68	32.8
East: RoadName														
1	L2	5	3.0	5	3.0	0.010	3.5	LOS A	0.0	0.9	0.33	0.17	0.33	34.7
6	T1	5	3.0	5	3.0	0.010	3.5	LOS A	0.0	0.9	0.33	0.17	0.33	34.6
16	R2	885	3.0	962	3.0	0.860	23.4	LOS C	27.5	704.6	0.95	1.32	2.06	26.6
Approach		895	3.0	973	3.0	0.860	23.1	LOS C	27.5	704.6	0.94	1.31	2.04	26.6
North: Rocky Mountain Ave														
7u	U	15	3.0	16	3.0	0.772	14.8	LOS B	10.3	263.9	0.25	0.07	0.25	29.3
7	L2	950	3.0	1033	3.0	0.772	14.8	LOS B	10.3	263.9	0.25	0.07	0.25	28.7
4	T1	15	3.0	16	3.0	0.076	3.4	LOS A	0.3	7.5	0.07	0.02	0.07	36.1
14	R2	75	3.0	82	3.0	0.076	3.4	LOS A	0.3	7.5	0.07	0.02	0.07	34.9
Approach		1055	3.0	1147	3.0	0.772	13.8	LOS B	10.3	263.9	0.24	0.07	0.24	29.2
West: Road B														
5	L2	180	3.0	196	3.0	0.362	12.2	LOS B	1.5	38.2	0.71	0.77	0.91	29.7
2	T1	5	3.0	5	3.0	0.023	7.9	LOS A	0.1	1.9	0.64	0.61	0.64	33.7
12	R2	5	3.0	5	3.0	0.023	7.9	LOS A	0.1	1.9	0.64	0.61	0.64	32.7
Approach		190	3.0	207	3.0	0.362	12.0	LOS B	1.5	38.2	0.70	0.76	0.90	29.8
All Vehicles		2170	3.0	2359	3.0	0.860	17.4	LOS C	27.5	704.6	0.57	0.65	1.04	28.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Timings
1: Boyd Lake Ave & US 34

Saturday Mid Day
Short Term Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	2220	210	315	2070	145	280	170	575	160	135	200
Future Volume (vph)	125	2220	210	315	2070	145	280	170	575	160	135	200
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5		9.5	22.5	
Total Split (s)	22.6	56.6	17.0	16.0	50.0	14.4	17.0	23.0		14.4	20.4	
Total Split (%)	20.5%	51.5%	15.5%	14.5%	45.5%	13.1%	15.5%	20.9%		13.1%	18.5%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	9.7	52.1	68.9	11.5	53.9	67.8	12.3	19.0	110.0	9.4	16.1	110.0
Actuated g/C Ratio	0.09	0.47	0.63	0.10	0.49	0.62	0.11	0.17	1.00	0.09	0.15	1.00
v/c Ratio	0.45	1.00	0.22	0.96	0.90	0.15	0.80	0.30	0.39	0.59	0.28	0.14
Control Delay	52.0	48.2	2.9	87.2	32.4	1.8	63.7	41.5	0.7	57.1	43.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	48.2	2.9	87.2	32.4	1.8	63.7	41.5	0.7	57.1	43.6	0.2
LOS	D	D	A	F	C	A	E	D	A	E	D	A
Approach Delay		44.7			37.4			24.7			30.4	
Approach LOS		D			D			C			C	

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 37.7

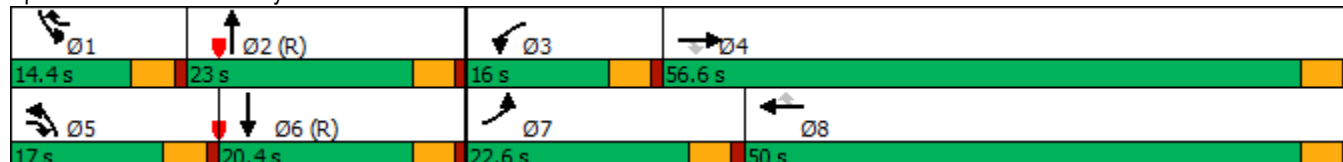
Intersection LOS: D

Intersection Capacity Utilization 79.0%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34



HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

Saturday Mid Day

Short Term Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	2220	210	315	2070	145	280	170	575	160	135	200
Future Volume (veh/h)	125	2220	210	315	2070	145	280	170	575	160	135	200
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	136	2413	228	342	2250	158	304	185	0	174	147	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	202	2418	918	361	2654	932	365	675		236	542	
Arrive On Green	0.06	0.47	0.47	0.10	0.52	0.52	0.11	0.19	0.00	0.07	0.15	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	136	2413	228	342	2250	158	304	185	0	174	147	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	4.2	51.9	7.8	10.8	41.6	5.0	9.5	4.9	0.0	5.4	4.0	0.0
Cycle Q Clear(g_c), s	4.2	51.9	7.8	10.8	41.6	5.0	9.5	4.9	0.0	5.4	4.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	202	2418	918	361	2654	932	365	675		236	542	
V/C Ratio(X)	0.67	1.00	0.25	0.95	0.85	0.17	0.83	0.27		0.74	0.27	
Avail Cap(c_a), veh/h	569	2418	918	361	2654	932	393	675		311	542	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.09	0.09	0.09	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	50.8	28.9	11.4	48.9	22.7	10.4	48.2	38.1	0.0	50.3	41.2	0.0
Incr Delay (d2), s/veh	3.9	17.8	0.1	5.9	0.3	0.0	13.5	1.0	0.0	6.3	1.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.5	32.1	4.8	6.0	17.8	2.3	8.3	4.0	0.0	4.6	3.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.6	46.6	11.5	54.8	22.9	10.4	61.8	39.1	0.0	56.5	42.4	0.0
LnGrp LOS	D	D	B	D	C	B	E	D		E	D	
Approach Vol, veh/h	2777				2750				489			
Approach Delay, s/veh	44.1				26.2				53.2			
Approach LOS	D				C				D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.0	25.4	16.0	56.6	16.1	21.3	10.9	61.7				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	9.9	18.5	11.5	52.1	12.5	15.9	18.1	45.5				
Max Q Clear Time (g_c+I1), s	7.4	6.9	12.8	53.9	11.5	6.0	6.2	43.6				
Green Ext Time (p_c), s	0.1	0.8	0.0	0.0	0.1	0.5	0.3	1.8				

Intersection Summary

HCM 6th Ctrl Delay 37.3

HCM 6th LOS D

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Timings
2: Hahns Peak Dr & US 34

Saturday Mid Day
Short Term Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	395	2070	30	375	2350	110	235	30	235	120	15	200
Future Volume (vph)	395	2070	30	375	2350	110	235	30	235	120	15	200
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8	1		4	5
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	1	4	4	5
Switch Phase												
Minimum Initial (s)	5.0	25.0	25.0	5.0	25.0	25.0	25.0	25.0	5.0	25.0	25.0	5.0
Minimum Split (s)	9.5	32.0	32.0	9.5	32.0	32.0	32.0	32.0	9.5	32.0	32.0	9.5
Total Split (s)	28.0	83.3	83.3	24.7	80.0	80.0	32.0	32.0	24.7	32.0	32.0	28.0
Total Split (%)	20.0%	59.5%	59.5%	17.6%	57.1%	57.1%	22.9%	22.9%	17.6%	22.9%	22.9%	20.0%
Yellow Time (s)	3.5	5.0	5.0	3.5	5.0	5.0	5.0	5.0	3.5	5.0	5.0	3.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	7.0	7.0	4.5	7.0	7.0	7.0	7.0	4.5	7.0	7.0	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag			Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes			Yes			Yes
Recall Mode	None	Min	Min	None	Min	Min	Min	Min	None	Min	Min	None
Act Effect Green (s)	22.4	76.4	76.4	19.1	73.0	73.0	25.0	25.0	51.1	25.0	25.0	54.5
Actuated g/C Ratio	0.16	0.55	0.55	0.14	0.53	0.53	0.18	0.18	0.37	0.18	0.18	0.39
v/c Ratio	0.87	0.90	0.04	0.87	1.07	0.15	1.02	0.10	0.42	0.59	0.05	0.38
Control Delay	73.7	33.8	0.4	77.7	73.2	8.3	117.9	49.1	31.2	63.7	48.3	28.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.7	33.8	0.4	77.7	73.2	8.3	117.9	49.1	31.2	63.7	48.3	28.1
LOS	E	C	A	E	E	A	F	D	C	E	D	C
Approach Delay		39.8			71.2			73.0			41.7	
Approach LOS		D			E			E			D	

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 139

Natural Cycle: 140

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 56.8

Intersection LOS: E

Intersection Capacity Utilization 94.0%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Hahns Peak Dr & US 34



HCM 6th Signalized Intersection Summary

2: Hahns Peak Dr & US 34

Saturday Mid Day
Short Term Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	  		 	  					 		
Traffic Volume (veh/h)	395	2070	30	375	2350	110	235	30	235	120	15	200
Future Volume (veh/h)	395	2070	30	375	2350	110	235	30	235	120	15	200
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	482	2524	33	408	2866	134	255	33	255	146	16	244
Peak Hour Factor	0.82	0.82	0.92	0.92	0.82	0.82	0.92	0.92	0.92	0.82	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	536	2820	875	457	2703	839	296	339	497	234	339	533
Arrive On Green	0.16	0.55	0.55	0.13	0.53	0.53	0.18	0.18	0.18	0.18	0.18	0.18
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	1397	1870	1585	1091	1870	1585
Grp Volume(v), veh/h	482	2524	33	408	2866	134	255	33	255	146	16	244
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1397	1870	1585	1091	1870	1585
Q Serve(g_s), s	18.9	60.4	1.3	16.0	73.0	6.0	24.0	2.0	18.1	17.8	1.0	16.6
Cycle Q Clear(g_c), s	18.9	60.4	1.3	16.0	73.0	6.0	25.0	2.0	18.1	19.8	1.0	16.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	536	2820	875	457	2703	839	296	339	497	234	339	533
V/C Ratio(X)	0.90	0.90	0.04	0.89	1.06	0.16	0.86	0.10	0.51	0.62	0.05	0.46
Avail Cap(c_a), veh/h	589	2825	877	506	2703	839	296	339	497	234	339	533
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.2	27.3	14.1	58.9	32.5	16.7	57.5	47.0	38.7	55.3	46.6	35.9
Incr Delay (d2), s/veh	15.8	4.0	0.0	15.8	36.0	0.0	21.2	0.0	0.4	3.8	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	14.5	33.0	0.9	12.7	50.5	4.0	16.1	1.7	11.6	8.9	0.8	10.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	73.0	31.4	14.1	74.7	68.4	16.7	78.7	47.1	39.1	59.1	46.6	36.1
LnGrp LOS	E	C	B	E	F	B	E	D	D	E	D	D
Approach Vol, veh/h	3039			3408			543			406		
Approach Delay, s/veh	37.8			67.1			58.2			44.8		
Approach LOS	D			E			E			D		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	22.7	83.2		32.0	25.9	80.0		32.0				
Change Period (Y+Rc), s	4.5	7.0		7.0	4.5	7.0		7.0				
Max Green Setting (Gmax), s	20.2	76.3		25.0	23.5	73.0		25.0				
Max Q Clear Time (g_c+I1), s	18.0	62.4		21.8	20.9	75.0		27.0				
Green Ext Time (p_c), s	0.2	8.4		0.2	0.5	0.0		0.0				
Intersection Summary												
HCM 6th Ctrl Delay	53.2											
HCM 6th LOS	D											
Notes												

Intersection												
Int Delay, s/veh	80.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰		↰↰↰	↰			↰			↰
Traffic Vol, veh/h	180	2100	140	0	2820	0	0	0	135	0	0	0
Future Vol, veh/h	180	2100	140	0	2820	0	0	0	135	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Free	-	-	Free	-	-	Free	-	-	None
Storage Length	150	-	150	-	-	150	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	196	2283	152	0	3065	0	0	0	147	0	0	0
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	3065	0	-	-	-	0	-	-	-	-	-	1533
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	~ 35	-	0	0	-	0	0	0	0	0	0	90
Stage 1	-	-	0	0	-	0	0	0	0	0	0	-
Stage 2	-	-	0	0	-	0	0	0	0	0	0	-
Platoon blocked, %		-			-							
Mov Cap-1 Maneuver	~ 35	-	-	-	-	-	-	-	-	-	-	90
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	180.9			0			0			0		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	SBLn1							
Capacity (veh/h)	-	~ 35	-	-	-							
HCM Lane V/C Ratio	-	5.59	-	-	-							
HCM Control Delay (s)	\$	2291.9	-	-	0							
HCM Lane LOS	A	F	-	-	A							
HCM 95th %tile Q(veh)	-	23.2	-	-	-							
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined				*: All major volume in platoon				

Timings
4: US 34 & Rocky Mountain Ave

Saturday Mid Day
Short Term Total

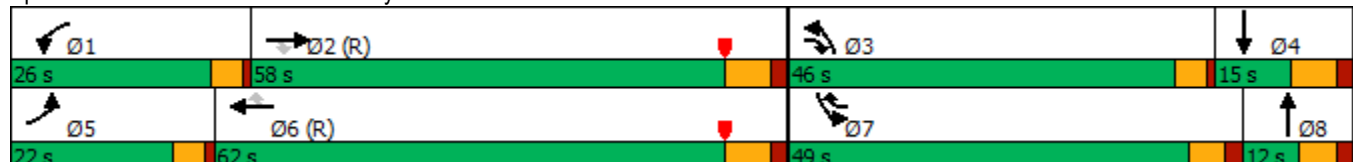
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	1470	650	630	2035	345	650	55	565	740	80	290
Future Volume (vph)	290	1470	650	630	2035	345	650	55	565	740	80	290
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2	3	1	6	7	3	8		7	4	
Permitted Phases			2			6			Free			Free
Detector Phase	5	2	3	1	6	7	3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	25.0	5.0	5.0	25.0	5.0	5.0	5.0		5.0	8.0	
Minimum Split (s)	10.0	35.0	10.0	10.0	32.0	24.0	10.0	12.0		24.0	15.0	
Total Split (s)	22.0	58.0	46.0	26.0	62.0	49.0	46.0	12.0		49.0	15.0	
Total Split (%)	15.2%	40.0%	31.7%	17.9%	42.8%	33.8%	31.7%	8.3%		33.8%	10.3%	
Yellow Time (s)	3.5	5.0	3.5	3.5	5.0	4.0	3.5	4.0		4.0	5.0	
All-Red Time (s)	1.0	2.0	1.0	1.0	2.0	2.0	1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	7.0	4.5	4.5	7.0	6.0	4.5	6.0		6.0	7.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None		None	Min	
Act Effect Green (s)	16.3	54.9	97.0	22.2	60.8	108.1	35.1	6.3	145.0	40.4	9.8	145.0
Actuated g/C Ratio	0.11	0.38	0.67	0.15	0.42	0.75	0.24	0.04	1.00	0.28	0.07	1.00
v/c Ratio	0.82	0.83	0.65	0.90	1.04	0.31	0.85	0.39	0.39	0.84	0.70	0.20
Control Delay	80.0	46.2	16.2	75.5	71.1	6.2	62.7	75.0	0.7	58.5	92.5	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.0	46.2	16.2	75.5	71.1	6.2	62.7	75.0	0.7	58.5	92.5	0.3
LOS	E	D	B	E	E	A	E	E	A	E	F	A
Approach Delay		42.2			64.6			35.7			45.7	
Approach LOS		D			E			D			D	

Intersection Summary

Cycle Length: 145
 Actuated Cycle Length: 145
 Offset: 80 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 115
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.04
 Intersection Signal Delay: 50.3
 Intersection Capacity Utilization 90.8%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service E

Splits and Phases: 4: US 34 & Rocky Mountain Ave



HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

Saturday Mid Day
Short Term Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	290	1470	650	630	2035	345	650	55	565	740	80	290
Future Volume (veh/h)	290	1470	650	630	2035	345	650	55	565	740	80	290
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	315	1598	707	685	2212	375	707	60	0	804	87	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	362	2049	988	745	2271	1101	768	112		864	130	
Arrive On Green	0.10	0.40	0.40	0.15	0.44	0.44	0.22	0.03	0.00	0.25	0.07	0.00
Sat Flow, veh/h	3456	5106	1585	5023	5106	1585	3456	3554	1585	3456	1870	1585
Grp Volume(v), veh/h	315	1598	707	685	2212	375	707	60	0	804	87	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1674	1702	1585	1728	1777	1585	1728	1870	1585
Q Serve(g_s), s	13.0	39.5	43.9	19.5	61.5	13.7	29.0	2.4	0.0	33.0	6.6	0.0
Cycle Q Clear(g_c), s	13.0	39.5	43.9	19.5	61.5	13.7	29.0	2.4	0.0	33.0	6.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	362	2049	988	745	2271	1101	768	112		864	130	
V/C Ratio(X)	0.87	0.78	0.72	0.92	0.97	0.34	0.92	0.54		0.93	0.67	
Avail Cap(c_a), veh/h	417	2049	988	745	2271	1101	989	147		1025	130	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	63.9	37.8	18.5	60.9	39.4	8.8	55.1	69.2	0.0	53.1	65.8	0.0
Incr Delay (d2), s/veh	14.6	3.0	4.4	16.3	13.7	0.8	10.1	1.5	0.0	12.1	10.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	10.7	23.8	23.6	14.5	36.9	8.5	19.8	2.0	0.0	22.3	6.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	78.6	40.8	23.0	77.2	53.1	9.7	65.2	70.7	0.0	65.3	76.1	0.0
LnGrp LOS	E	D	C	E	D	A	E	E		E	E	
Approach Vol, veh/h	2620			3272			767			891		
Approach Delay, s/veh	40.5			53.2			65.6			66.3		
Approach LOS	D			D			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	26.0	65.2	36.7	17.1	19.7	71.5	42.3	11.6				
Change Period (Y+Rc), s	4.5	7.0	4.5	7.0	4.5	7.0	6.0	* 7				
Max Green Setting (Gmax), s	21.5	51.0	41.5	8.0	17.5	55.0	43.0	* 6				
Max Q Clear Time (g_c+I1), s	21.5	45.9	31.0	8.6	15.0	63.5	35.0	4.4				
Green Ext Time (p_c), s	0.0	2.9	1.2	0.0	0.2	0.0	1.3	0.0				

Intersection Summary

HCM 6th Ctrl Delay	51.6
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection

Int Delay, s/veh 0.1

Movement EBL EBR NBL NBT SBT SBRLane Configurations 

Traffic Vol, veh/h 0 25 0 1280 1045 240

Future Vol, veh/h 0 25 0 1280 1045 240

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length - 0 0 - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 92 92 92 92 92 92

Heavy Vehicles, % 2 2 2 2 2 2

Mvmt Flow 0 27 0 1391 1136 261

Major/Minor Minor2 Major1 Major2

Conflicting Flow All - 699 1397 0 - 0

Stage 1 - - - - - -

Stage 2 - - - - - -

Critical Hdwy - 6.94 4.14 - - -

Critical Hdwy Stg 1 - - - - - -

Critical Hdwy Stg 2 - - - - - -

Follow-up Hdwy - 3.32 2.22 - - -

Pot Cap-1 Maneuver 0 382 485 - - -

Stage 1 0 - - - - -

Stage 2 0 - - - - -

Platoon blocked, % - - - - - -

Mov Cap-1 Maneuver - 382 485 - - -

Mov Cap-2 Maneuver - - - - - -

Stage 1 - - - - - -

Stage 2 - - - - - -

Approach EB NB SB

HCM Control Delay, s 15.1 0 0

HCM LOS C

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 485 - 382 - -

HCM Lane V/C Ratio - - 0.071 - -

HCM Control Delay (s) 0 - 15.1 - -

HCM Lane LOS A - C - -

HCM 95th %tile Q(veh) 0 - 0.2 - -

Intersection						
Int Delay, s/veh	45.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	90	190	530	80	145	525
Future Vol, veh/h	90	190	530	80	145	525
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	98	207	576	87	158	571
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1507	620	0	0	663	0
Stage 1	620	-	-	-	-	-
Stage 2	887	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	133	488	-	-	926	-
Stage 1	536	-	-	-	-	-
Stage 2	402	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	100	488	-	-	926	-
Mov Cap-2 Maneuver	100	-	-	-	-	-
Stage 1	536	-	-	-	-	-
Stage 2	302	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	248.8	0		2.1		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	217	926	-	
HCM Lane V/C Ratio	-	-	1.403	0.17	-	
HCM Control Delay (s)	-	-	248.8	9.7	0	
HCM Lane LOS	-	-	F	A	A	
HCM 95th %tile Q(veh)	-	-	17.5	0.6	-	

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion Dr SAT (Site Folder: General)]**

Saturday Mid Day
Site Category: Short Term Total
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] ft				
South: Boyd Lake Ave														
3	L2	100	3.0	109	3.0	0.541	10.6	LOS B	4.2	106.9	0.60	0.59	0.77	32.0
8	T1	750	3.0	815	3.0	0.541	10.3	LOS B	4.2	106.9	0.59	0.58	0.75	32.2
18	R2	165	3.0	179	3.0	0.541	10.1	LOS B	4.0	103.5	0.58	0.56	0.72	31.6
Approach		1015	3.0	1103	3.0	0.541	10.3	LOS B	4.2	106.9	0.59	0.58	0.75	32.1
East: Mountain Lion Dr														
1	L2	165	3.0	179	3.0	0.763	27.3	LOS D	6.5	166.0	0.85	1.19	1.99	25.5
6	T1	55	3.0	60	3.0	0.763	27.3	LOS D	6.5	166.0	0.85	1.19	1.99	25.5
16	R2	185	3.0	201	3.0	0.763	27.3	LOS D	6.5	166.0	0.85	1.19	1.99	24.9
Approach		405	3.0	440	3.0	0.763	27.3	LOS D	6.5	166.0	0.85	1.19	1.99	25.2
North: Boyd Lake Ave														
7	L2	170	3.0	185	3.0	0.377	8.0	LOS A	1.8	45.5	0.53	0.46	0.53	32.4
4	T1	445	3.0	484	3.0	0.377	7.7	LOS A	1.8	45.5	0.52	0.45	0.52	33.3
14	R2	65	3.0	71	3.0	0.377	7.6	LOS A	1.8	44.9	0.51	0.44	0.51	32.8
Approach		680	3.0	739	3.0	0.377	7.8	LOS A	1.8	45.5	0.52	0.45	0.52	33.0
West: Mountain Lion Dr														
5	L2	65	3.0	71	3.0	0.306	9.4	LOS A	1.2	30.6	0.64	0.66	0.69	32.1
2	T1	45	3.0	49	3.0	0.306	9.4	LOS A	1.2	30.6	0.64	0.66	0.69	32.0
12	R2	75	3.0	82	3.0	0.306	9.4	LOS A	1.2	30.6	0.64	0.66	0.69	31.2
Approach		185	3.0	201	3.0	0.306	9.4	LOS A	1.2	30.6	0.64	0.66	0.69	31.7
All Vehicles		2285	3.0	2484	3.0	0.763	12.5	LOS B	6.5	166.0	0.62	0.65	0.90	30.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 6 [Hahns Peak & Mtn Lion Dr SAT (Site Folder: General)]**

Saturday Mid Day
Site Category: Short Term Total
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
East: Road B														
6	T1	35	3.0	38	3.0	0.145	5.1	LOS A	0.6	16.1	0.45	0.34	0.45	35.1
16	R2	95	3.0	103	3.0	0.145	5.1	LOS A	0.6	16.1	0.45	0.34	0.45	34.1
Approach		130	3.0	141	3.0	0.145	5.1	LOS A	0.6	16.1	0.45	0.34	0.45	34.4
North: Hahn's Peak														
7	L2	30	3.0	33	3.0	0.131	3.9	LOS A	0.6	15.5	0.15	0.05	0.15	35.2
14	R2	125	3.0	136	3.0	0.131	3.9	LOS A	0.6	15.5	0.15	0.05	0.15	34.1
Approach		155	3.0	168	3.0	0.131	3.9	LOS A	0.6	15.5	0.15	0.05	0.15	34.3
West: Road B														
5	L2	280	3.0	304	3.0	0.264	5.1	LOS A	1.4	36.5	0.16	0.05	0.16	32.7
2	T1	35	3.0	38	3.0	0.264	5.1	LOS A	1.4	36.5	0.16	0.05	0.16	32.7
Approach		315	3.0	342	3.0	0.264	5.1	LOS A	1.4	36.5	0.16	0.05	0.16	32.7
All Vehicles		600	3.0	652	3.0	0.264	4.8	LOS A	1.4	36.5	0.22	0.11	0.22	33.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 8 [Rocky Mountain & Road B SAT (Site Folder: General)]**

Saturday Mid Day
Site Category: Short Term Total
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] ft				
South: Rocky Mountain Avenue														
3	L2	5	3.0	5	3.0	0.067	9.9	LOS A	0.2	5.3	0.72	0.72	0.72	32.4
8	T1	15	3.0	16	3.0	0.067	9.9	LOS A	0.2	5.3	0.72	0.72	0.72	32.3
18	R2	5	3.0	5	3.0	0.067	9.9	LOS A	0.2	5.3	0.72	0.72	0.72	31.4
Approach		25	3.0	27	3.0	0.067	9.9	LOS A	0.2	5.3	0.72	0.72	0.72	32.1
East: RoadName														
1	L2	5	3.0	5	3.0	0.011	3.6	LOS A	0.0	1.0	0.35	0.20	0.35	34.6
6	T1	5	3.0	5	3.0	0.011	3.6	LOS A	0.0	1.0	0.35	0.20	0.35	34.5
16	R2	1030	3.0	1120	3.0	1.030	54.9	LOS F	64.2	1643.3	1.00	2.27	3.97	19.3
Approach		1040	3.0	1130	3.0	1.030	54.4	LOS F	64.2	1643.3	0.99	2.25	3.93	19.4
North: Rocky Mountain Ave														
7u	U	25	3.0	27	3.0	0.864	20.7	LOS C	17.4	445.4	0.38	0.11	0.38	27.3
7	L2	1055	3.0	1147	3.0	0.864	20.7	LOS C	17.4	445.4	0.38	0.11	0.38	26.8
4	T1	10	3.0	11	3.0	0.067	3.3	LOS A	0.3	6.6	0.07	0.02	0.07	36.1
14	R2	70	3.0	76	3.0	0.067	3.3	LOS A	0.3	6.6	0.07	0.02	0.07	34.9
Approach		1160	3.0	1261	3.0	0.864	19.5	LOS C	17.4	445.4	0.36	0.10	0.36	27.2
West: Road B														
5	L2	205	3.0	223	3.0	0.458	15.8	LOS C	2.1	52.9	0.77	0.87	1.15	28.4
2	T1	5	3.0	5	3.0	0.026	8.8	LOS A	0.1	2.1	0.68	0.67	0.68	33.2
12	R2	5	3.0	5	3.0	0.026	8.8	LOS A	0.1	2.1	0.68	0.67	0.68	32.2
Approach		215	3.0	234	3.0	0.458	15.5	LOS C	2.1	52.9	0.76	0.87	1.13	28.5
All Vehicles		2440	3.0	2652	3.0	1.030	33.9	LOS D	64.2	1643.3	0.67	1.09	1.95	23.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX G. 2045 FUTURE TOTAL TRAFFIC LEVEL OF SERVICE WORKSHEETS

Timings
1: Boyd Lake Ave & US 34

AM Peak Hour
2045 Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	295	2184	145	210	2187	183	215	310	290	192	280	450
Future Volume (vph)	295	2184	145	210	2187	183	215	310	290	192	280	450
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	20.0		9.5	20.0	
Total Split (s)	13.5	45.9	11.6	11.5	43.9	11.0	11.6	21.6		11.0	21.0	
Total Split (%)	15.0%	51.0%	12.9%	12.8%	48.8%	12.2%	12.9%	24.0%		12.2%	23.3%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	9.0	41.4	53.0	7.0	39.4	50.4	7.1	17.1	90.0	6.5	16.5	90.0
Actuated g/C Ratio	0.10	0.46	0.59	0.08	0.44	0.56	0.08	0.19	1.00	0.07	0.18	1.00
v/c Ratio	0.94	1.01	0.16	0.85	1.07	0.22	0.87	0.50	0.20	0.85	0.47	0.31
Control Delay	76.7	47.6	4.2	70.3	66.3	6.6	71.8	35.6	0.3	71.2	35.6	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.7	47.6	4.2	70.3	66.3	6.6	71.8	35.6	0.3	71.2	35.6	0.5
LOS	E	D	A	E	E	A	E	D	A	E	D	A
Approach Delay		48.5			62.4			32.6			25.9	
Approach LOS		D			E			C			C	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 48.8

Intersection LOS: D

Intersection Capacity Utilization 79.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34

			
Ø1	Ø2 (R)	Ø3	Ø4
11 s	21.6 s	11.5 s	45.9 s
			
Ø5	Ø6 (R)	Ø7	Ø8
11.6 s	21 s	13.5 s	43.9 s

HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

AM Peak Hour

2045 Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	295	2184	145	210	2187	183	215	310	290	192	280	450
Future Volume (veh/h)	295	2184	145	210	2187	183	215	310	290	192	280	450
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	321	2374	158	228	2377	199	234	337	0	209	304	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	346	2349	854	269	2235	808	273	675		250	652	
Arrive On Green	0.10	0.46	0.46	0.08	0.44	0.44	0.08	0.19	0.00	0.07	0.18	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	321	2374	158	228	2377	199	234	337	0	209	304	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	8.3	41.4	4.6	5.9	39.4	6.3	6.0	7.6	0.0	5.4	6.9	0.0
Cycle Q Clear(g_c), s	8.3	41.4	4.6	5.9	39.4	6.3	6.0	7.6	0.0	5.4	6.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	346	2349	854	269	2235	808	273	675		250	652	
V/C Ratio(X)	0.93	1.01	0.18	0.85	1.06	0.25	0.86	0.50		0.84	0.47	
Avail Cap(c_a), veh/h	346	2349	854	269	2235	808	273	675		250	652	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	40.2	24.3	10.6	41.0	25.3	12.4	41.0	32.6	0.0	41.2	32.8	0.0
Incr Delay (d2), s/veh	30.8	21.2	0.1	8.4	32.4	0.1	22.9	2.6	0.0	21.4	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.6	27.6	2.8	4.3	27.2	3.5	6.1	6.3	0.0	5.4	5.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.0	45.5	10.7	49.4	57.7	12.4	63.9	35.2	0.0	62.6	35.2	0.0
LnGrp LOS	E	F	B	D	F	B	E	D		E	D	
Approach Vol, veh/h	2853			2804			571			513		
Approach Delay, s/veh	46.5			53.8			47.0			46.4		
Approach LOS	D			D			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.0	21.6	11.5	45.9	11.6	21.0	13.5	43.9				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	6.5	17.1	7.0	41.4	7.1	16.5	9.0	39.4				
Max Q Clear Time (g_c+I1), s	7.4	9.6	7.9	43.4	8.0	8.9	10.3	41.4				
Green Ext Time (p_c), s	0.0	1.2	0.0	0.0	0.0	1.1	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 49.6

HCM 6th LOS D

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Timings

2: Hahns Peak Dr & US 34

AM Peak Hour

2045 Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	1968	137	274	2040	54	365	64	302	62	29	60
Future Volume (vph)	140	1968	137	274	2040	54	365	64	302	62	29	60
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8	1		4	5
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	1	4	4	5
Switch Phase												
Minimum Initial (s)	5.0	25.0	25.0	5.0	25.0	25.0	25.0	25.0	5.0	25.0	25.0	5.0
Minimum Split (s)	9.5	32.0	32.0	9.5	32.0	32.0	32.0	32.0	9.5	32.0	32.0	9.5
Total Split (s)	10.2	54.0	54.0	14.0	57.8	57.8	32.0	32.0	14.0	32.0	32.0	10.2
Total Split (%)	10.2%	54.0%	54.0%	14.0%	57.8%	57.8%	32.0%	32.0%	14.0%	32.0%	32.0%	10.2%
Yellow Time (s)	3.5	5.0	5.0	3.5	5.0	5.0	5.0	5.0	3.5	5.0	5.0	3.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	7.0	7.0	4.5	7.0	7.0	7.0	7.0	4.5	7.0	7.0	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag			Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes			Yes			Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	Min	Min	None	Min	Min	None
Act Effect Green (s)	5.7	47.0	47.0	9.5	50.8	50.8	25.0	25.0	41.5	25.0	25.0	37.7
Actuated g/C Ratio	0.06	0.47	0.47	0.10	0.51	0.51	0.25	0.25	0.42	0.25	0.25	0.38
v/c Ratio	0.88	1.00	0.19	0.91	0.96	0.08	0.60	0.15	0.48	0.23	0.07	0.12
Control Delay	86.9	46.7	7.0	78.1	35.3	1.5	37.4	30.4	21.1	32.1	29.2	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.9	46.7	7.0	78.1	35.3	1.5	37.4	30.4	21.1	32.1	29.2	10.5
LOS	F	D	A	E	D	A	D	C	C	C	C	B
Approach Delay		47.0			39.0			30.1			22.9	
Approach LOS		D			D			C			C	

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 40.8

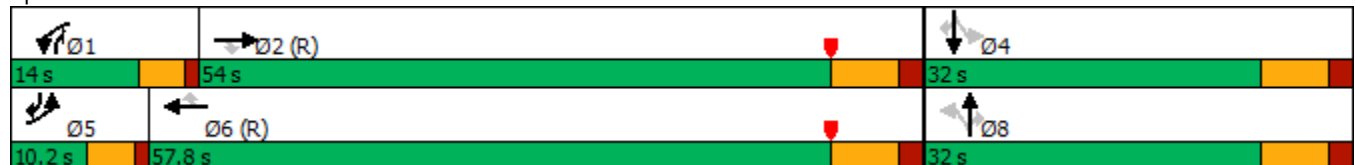
Intersection LOS: D

Intersection Capacity Utilization 93.0%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Hahns Peak Dr & US 34



HCM 6th Signalized Intersection Summary

2: Hahns Peak Dr & US 34

AM Peak Hour
2045 Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	1968	137	274	2040	54	365	64	302	62	29	60
Future Volume (veh/h)	140	1968	137	274	2040	54	365	64	302	62	29	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	171	2400	149	298	2488	66	397	70	328	76	32	73
Peak Hour Factor	0.82	0.82	0.92	0.92	0.82	0.82	0.92	0.92	0.92	0.82	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	197	2400	745	328	2594	805	777	468	547	290	468	487
Arrive On Green	0.06	0.47	0.47	0.09	0.51	0.51	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	2672	1870	1585	987	1870	1585
Grp Volume(v), veh/h	171	2400	149	298	2488	66	397	70	328	76	32	73
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1336	1870	1585	987	1870	1585
Q Serve(g_s), s	4.9	47.0	5.5	8.5	46.8	2.1	13.3	2.9	17.1	6.5	1.3	3.3
Cycle Q Clear(g_c), s	4.9	47.0	5.5	8.5	46.8	2.1	14.6	2.9	17.1	9.4	1.3	3.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	197	2400	745	328	2594	805	777	468	547	290	468	487
V/C Ratio(X)	0.87	1.00	0.20	0.91	0.96	0.08	0.51	0.15	0.60	0.26	0.07	0.15
Avail Cap(c_a), veh/h	197	2400	745	328	2594	805	777	468	547	290	468	487
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.28	0.28	0.28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.8	26.5	15.5	44.8	23.6	12.6	34.2	29.2	27.0	32.9	28.6	25.2
Incr Delay (d2), s/veh	11.2	9.7	0.2	27.1	10.4	0.2	0.2	0.1	1.3	0.2	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.7	23.9	3.2	8.5	27.2	1.4	7.7	2.4	10.7	2.8	1.1	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.0	36.2	15.7	71.9	34.0	12.8	34.4	29.3	28.3	33.1	28.6	25.2
LnGrp LOS	E	F	B	E	C	B	C	C	C	C	C	C
Approach Vol, veh/h	2720			2852			795			181		
Approach Delay, s/veh	36.5			37.5			31.5			29.1		
Approach LOS	D			D			C			C		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	14.0	54.0		32.0	10.2	57.8		32.0				
Change Period (Y+Rc), s	4.5	7.0		7.0	4.5	7.0		7.0				
Max Green Setting (Gmax), s	9.5	47.0		25.0	5.7	50.8		25.0				
Max Q Clear Time (g_c+I1), s	10.5	49.0		11.4	6.9	48.8		19.1				
Green Ext Time (p_c), s	0.0	0.0		0.2	0.0	1.7		0.5				

Intersection Summary

HCM 6th Ctrl Delay 36.1
HCM 6th LOS D

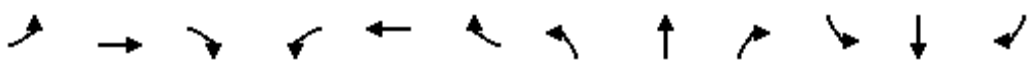
Notes

User approved pedestrian interval to be less than phase max green.

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑↑	↗		↑↑↑↑		↗
Traffic Vol, veh/h	2131	126	0	217	0	141
Future Vol, veh/h	2131	126	0	217	0	141
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Free	-	Free	-	Free
Storage Length	-	250	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2316	137	0	236	0	153
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-
Pot Cap-1 Maneuver	-	0	0	-	0	0
Stage 1	-	0	0	-	0	0
Stage 2	-	0	0	-	0	0
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		0	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	WBT			
Capacity (veh/h)	-	-	-			
HCM Lane V/C Ratio	-	-	-			
HCM Control Delay (s)	0	-	-			
HCM Lane LOS	A	-	-			
HCM 95th %tile Q(veh)	-	-	-			

Timings 4: US 34 & Rocky Mountain Ave

AM Peak Hour
2045 Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	329	1528	478	526	1793	430	475	260	425	260	185	134
Future Volume (vph)	329	1528	478	526	1793	430	475	260	425	260	185	134
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	1	6	7	5	2	3	7	4		3	8	
Permitted Phases			6			2			Free			Free
Detector Phase	1	6	7	5	2	3	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	25.0	5.0	5.0	25.0	5.0	5.0	18.0		5.0	20.0	
Minimum Split (s)	9.5	32.0	9.5	10.0	35.0	24.0	9.5	25.0		24.0	27.0	
Total Split (s)	19.0	46.0	32.0	29.0	56.0	32.0	32.0	28.0		32.0	28.0	
Total Split (%)	14.1%	34.1%	23.7%	21.5%	41.5%	23.7%	23.7%	20.7%		23.7%	20.7%	
Yellow Time (s)	3.5	5.0	3.5	3.5	5.0	4.0	3.5	5.0		4.0	5.0	
All-Red Time (s)	1.0	2.0	1.0	1.0	2.0	2.0	1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	7.0	4.5	4.5	7.0	6.0	4.5	7.0		6.0	7.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	Min	None	None	C-Min	None	None	Min		None	Min	
Act Effect Green (s)	16.4	46.6	78.9	19.8	50.0	72.6	25.3	28.5	135.0	15.7	20.4	135.0
Actuated g/C Ratio	0.12	0.35	0.58	0.15	0.37	0.54	0.19	0.21	1.00	0.12	0.15	1.00
v/c Ratio	0.86	0.95	0.54	0.78	1.04	0.53	0.80	0.38	0.29	0.71	0.72	0.09
Control Delay	78.2	55.5	15.9	63.5	72.3	19.1	62.6	47.6	0.5	67.3	69.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.2	55.5	15.9	63.5	72.3	19.1	62.6	47.6	0.5	67.3	69.6	0.1
LOS	E	E	B	E	E	B	E	D	A	E	E	A
Approach Delay		50.6			62.3			36.5			52.5	
Approach LOS		D			E			D			D	

Intersection Summary

Cycle Length: 135

Actuated Cycle Length: 135

Offset: 0 (0%), Referenced to phase 2:WBT, Start of Yellow

Natural Cycle: 115

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 53.1

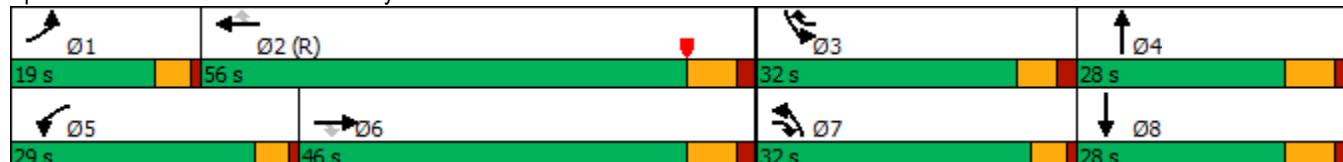
Intersection LOS: D

Intersection Capacity Utilization 93.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 4: US 34 & Rocky Mountain Ave



HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

AM Peak Hour
2045 Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	329	1528	478	526	1793	430	475	260	425	260	185	134
Future Volume (veh/h)	329	1528	478	526	1793	430	475	260	425	260	185	134
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	358	1661	520	572	1949	467	516	283	0	283	201	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	371	1942	870	666	2071	799	582	736		340	277	
Arrive On Green	0.11	0.38	0.38	0.13	0.41	0.41	0.17	0.21	0.00	0.10	0.15	0.00
Sat Flow, veh/h	3456	5106	1585	5023	5106	1585	3456	3554	1585	3456	1870	1585
Grp Volume(v), veh/h	358	1661	520	572	1949	467	516	283	0	283	201	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1674	1702	1585	1728	1777	1585	1728	1870	1585
Q Serve(g_s), s	13.9	40.3	29.7	15.0	49.5	28.0	19.7	9.3	0.0	10.9	13.8	0.0
Cycle Q Clear(g_c), s	13.9	40.3	29.7	15.0	49.5	28.0	19.7	9.3	0.0	10.9	13.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	371	1942	870	666	2071	799	582	736		340	277	
V/C Ratio(X)	0.96	0.86	0.60	0.86	0.94	0.58	0.89	0.38		0.83	0.73	
Avail Cap(c_a), veh/h	371	1942	870	912	2071	799	704	736		666	291	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	60.0	38.4	20.5	57.3	38.6	23.5	54.9	46.1	0.0	59.8	54.9	0.0
Incr Delay (d2), s/veh	37.3	3.8	0.8	4.8	10.1	3.1	11.4	0.1	0.0	2.0	7.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	12.7	24.2	16.5	10.9	30.1	16.6	14.6	7.5	0.0	8.5	11.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	97.3	42.2	21.2	62.1	48.6	26.7	66.3	46.2	0.0	61.8	61.9	0.0
LnGrp LOS	F	D	C	E	D	C	E	D		E	E	
Approach Vol, veh/h	2539			2988			799			484		
Approach Delay, s/veh	45.7			47.8			59.2			61.8		
Approach LOS	D			D			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.0	61.8	19.3	34.9	22.4	58.3	27.2	27.0				
Change Period (Y+Rc), s	4.5	7.0	6.0	7.0	4.5	7.0	4.5	7.0				
Max Green Setting (Gmax), s	14.5	49.0	26.0	21.0	24.5	39.0	27.5	21.0				
Max Q Clear Time (g_c+I1), s	15.9	51.5	12.9	11.3	17.0	42.3	21.7	15.8				
Green Ext Time (p_c), s	0.0	0.0	0.4	0.5	0.9	0.0	1.0	0.2				

Intersection Summary

HCM 6th Ctrl Delay	49.3
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

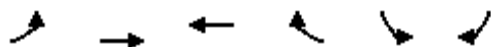
User approved ignoring U-Turning movement.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↗↗	↗↗	↗
Traffic Vol, veh/h	0	59	0	1160	1022	150
Future Vol, veh/h	0	59	0	1160	1022	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	64	0	1261	1111	163
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	556	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	475	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	475	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	13.8	0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT EBLn1		SBT	SBR		
Capacity (veh/h)	- 475		-	-		
HCM Lane V/C Ratio	- 0.135		-	-		
HCM Control Delay (s)	- 13.8		-	-		
HCM Lane LOS	- B		-	-		
HCM 95th %tile Q(veh)	- 0.5		-	-		

Timings
11: LCR 20E & Rocky Mountain Avenue

AM Peak Hour
2045 Total



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	278	230	365	551	480	254
Future Volume (vph)	278	230	365	551	480	254
Turn Type	pm+pt	NA	NA	pm+ov	Prot	pm+ov
Protected Phases	7	4	8	6	6	7
Permitted Phases	4			8		6
Detector Phase	7	4	8	6	6	7
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	9.5
Total Split (s)	9.6	32.1	22.5	22.9	22.9	9.6
Total Split (%)	17.5%	58.4%	40.9%	41.6%	41.6%	17.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Recall Mode	None	None	None	C-Max	C-Max	None
Act Effect Green (s)	25.2	25.2	15.6	40.9	20.8	30.4
Actuated g/C Ratio	0.46	0.46	0.28	0.74	0.38	0.55
v/c Ratio	0.93	0.29	0.75	0.49	0.78	0.28
Control Delay	51.2	9.8	27.4	3.7	27.8	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.2	9.8	27.4	3.7	27.8	2.9
LOS	D	A	C	A	C	A
Approach Delay		32.5	13.1		19.2	
Approach LOS		C	B		B	

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 19.7

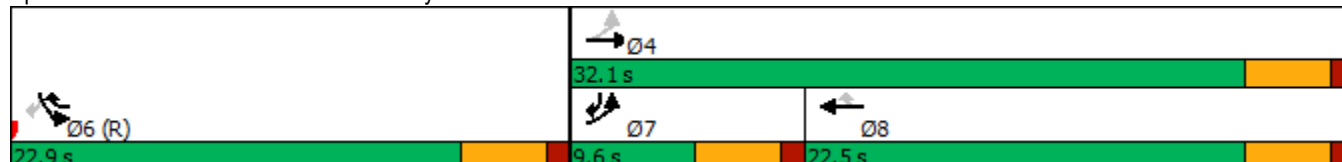
Intersection LOS: B

Intersection Capacity Utilization 72.5%

ICU Level of Service C

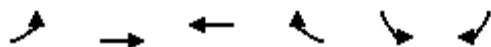
Analysis Period (min) 15

Splits and Phases: 11: LCR 20E & Rocky Mountain Avenue



HCM 6th Signalized Intersection Summary 11: LCR 20E & Rocky Mountain Avenue

AM Peak Hour
2045 Total



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	278	230	365	551	480	254
Future Volume (veh/h)	278	230	365	551	480	254
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	302	250	397	599	522	276
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	345	852	525	1049	678	751
Arrive On Green	0.09	0.46	0.28	0.28	0.38	0.38
Sat Flow, veh/h	1781	1870	1870	1585	1781	1585
Grp Volume(v), veh/h	302	250	397	599	522	276
Grp Sat Flow(s),veh/h/ln	1781	1870	1870	1585	1781	1585
Q Serve(g_s), s	5.1	4.6	10.7	11.3	14.1	6.1
Cycle Q Clear(g_c), s	5.1	4.6	10.7	11.3	14.1	6.1
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	345	852	525	1049	678	751
V/C Ratio(X)	0.87	0.29	0.76	0.57	0.77	0.37
Avail Cap(c_a), veh/h	345	939	612	1122	678	751
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.2	9.4	18.1	5.1	14.9	9.2
Incr Delay (d2), s/veh	21.2	0.2	4.6	0.6	8.2	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	7.6	2.9	8.3	12.1	10.6	11.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	37.4	9.6	22.6	5.7	23.1	10.6
LnGrp LOS	D	A	C	A	C	B
Approach Vol, veh/h		552	996		798	
Approach Delay, s/veh		24.8	12.4		18.8	
Approach LOS		C	B		B	
Timer - Assigned Phs			4		6	7
Phs Duration (G+Y+Rc), s			29.6		25.4	9.6
Change Period (Y+Rc), s			4.5		4.5	4.5
Max Green Setting (Gmax), s			27.6		18.4	5.1
Max Q Clear Time (g_c+I1), s			6.6		16.1	7.1
Green Ext Time (p_c), s			1.4		0.8	0.0
Intersection Summary						
HCM 6th Ctrl Delay			17.5			
HCM 6th LOS			B			

MOVEMENT SUMMARY

 **Site: 8 [Rocky Mountain & Road B AM (Site Folder: General)]**

AM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] ft				
South: Rocky Mountain Ave														
3	L2	95	3.0	103	3.0	0.729	24.0	LOS C	6.4	162.7	0.84	1.14	1.82	27.0
8	T1	585	3.0	636	3.0	0.729	23.1	LOS C	6.6	169.0	0.84	1.14	1.81	27.3
18	R2	175	3.0	190	3.0	0.729	22.0	LOS C	6.6	169.0	0.83	1.14	1.81	27.1
Approach		855	3.0	929	3.0	0.729	23.0	LOS C	6.6	169.0	0.84	1.14	1.81	27.2
East: Road B														
1	L2	130	3.0	141	3.0	0.240	8.9	LOS A	0.9	21.9	0.64	0.64	0.64	31.0
6	T1	5	3.0	5	3.0	0.240	8.9	LOS A	0.9	21.9	0.64	0.64	0.64	30.9
16	R2	445	3.0	484	3.0	0.298	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	37.2
Approach		580	3.0	630	3.0	0.298	2.2	LOS A	0.9	21.9	0.15	0.15	0.15	35.5
North: Rocky Mountain Ave														
7u	U	5	3.0	5	3.0	0.569	10.3	LOS B	4.3	111.2	0.57	0.49	0.65	31.1
7	L2	575	3.0	625	3.0	0.569	10.3	LOS B	4.3	111.2	0.57	0.49	0.65	30.4
4	T1	435	3.0	473	3.0	0.557	10.6	LOS B	4.2	107.6	0.58	0.51	0.67	32.5
14	R2	95	3.0	103	3.0	0.557	10.6	LOS B	4.2	107.6	0.58	0.51	0.67	31.5
Approach		1110	3.0	1207	3.0	0.569	10.4	LOS B	4.3	111.2	0.57	0.50	0.66	31.3
West: RoadName														
5	L2	170	3.0	185	3.0	0.257	12.6	LOS B	0.9	22.7	0.74	0.75	0.79	29.8
2	T1	5	3.0	5	3.0	0.257	11.7	LOS B	0.9	22.6	0.72	0.74	0.77	30.4
12	R2	30	3.0	33	3.0	0.257	11.7	LOS B	0.9	22.6	0.72	0.74	0.77	29.5
Approach		205	3.0	223	3.0	0.257	12.4	LOS B	0.9	22.7	0.74	0.75	0.78	29.8
All Vehicles		2750	3.0	2989	3.0	0.729	12.7	LOS B	6.6	169.0	0.58	0.64	0.92	30.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 9 [Rocky Mountain & Mtn Lion AM (Site Folder: General)]**

AM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Rocky Mountain Avenue														
3	L2	140	3.0	152	3.0	0.636	11.3	LOS B	4.7	120.1	0.54	0.38	0.54	31.7
8	T1	705	3.0	766	3.0	0.636	9.9	LOS A	4.7	120.1	0.49	0.34	0.49	32.4
Approach		845	3.0	918	3.0	0.636	10.1	LOS B	4.7	120.1	0.50	0.34	0.50	32.2
North: Rocky Mountain Ave														
4	T1	525	3.0	571	3.0	0.276	5.6	LOS A	1.3	32.6	0.32	0.20	0.32	34.9
14	R2	70	3.0	76	3.0	0.276	5.5	LOS A	1.2	31.9	0.31	0.19	0.31	33.8
Approach		595	3.0	647	3.0	0.276	5.6	LOS A	1.3	32.6	0.32	0.20	0.32	34.8
West: Mountain Lion Dr														
5	L2	155	3.0	168	3.0	0.429	9.6	LOS A	2.3	58.7	0.63	0.69	0.80	31.7
12	R2	175	3.0	190	3.0	0.429	9.6	LOS A	2.3	58.7	0.63	0.69	0.80	30.8
Approach		330	3.0	359	3.0	0.429	9.6	LOS A	2.3	58.7	0.63	0.69	0.80	31.2
All Vehicles		1770	3.0	1924	3.0	0.636	8.5	LOS A	4.7	120.1	0.46	0.36	0.50	32.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 6 [Hahns Peak & Mtn Lion AM (Site Folder: General)]**

AM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Moutain Lion Dr														
3	L2	120	3.0	130	3.0	0.424	10.3	LOS B	2.4	61.5	0.68	0.74	0.84	31.6
8	T1	170	3.0	185	3.0	0.424	10.3	LOS B	2.4	61.5	0.68	0.74	0.84	31.6
18	R2	5	3.0	5	3.0	0.424	10.3	LOS B	2.4	61.5	0.68	0.74	0.84	30.7
Approach		295	3.0	321	3.0	0.424	10.3	LOS B	2.4	61.5	0.68	0.74	0.84	31.6
East: RoadName														
1	L2	5	3.0	5	3.0	0.620	14.6	LOS B	5.9	152.1	0.78	0.98	1.30	30.6
6	T1	90	3.0	98	3.0	0.620	14.6	LOS B	5.9	152.1	0.78	0.98	1.30	30.5
16	R2	365	3.0	397	3.0	0.620	14.6	LOS B	5.9	152.1	0.78	0.98	1.30	29.7
Approach		460	3.0	500	3.0	0.620	14.6	LOS B	5.9	152.1	0.78	0.98	1.30	29.9
North: Hahns Peak														
7	L2	205	3.0	223	3.0	0.285	6.0	LOS A	1.3	34.1	0.41	0.30	0.41	32.8
4	T1	85	3.0	92	3.0	0.285	6.0	LOS A	1.3	34.1	0.41	0.30	0.41	32.8
14	R2	105	3.0	114	3.0	0.103	4.1	LOS A	0.4	10.5	0.35	0.23	0.35	34.3
Approach		395	3.0	429	3.0	0.285	5.5	LOS A	1.3	34.1	0.40	0.28	0.40	33.2
West: Moutain Lion Dr														
5	L2	155	3.0	168	3.0	0.364	7.7	LOS A	1.9	48.2	0.55	0.46	0.55	32.6
2	T1	140	3.0	152	3.0	0.364	7.7	LOS A	1.9	48.2	0.55	0.46	0.55	32.5
12	R2	25	3.0	27	3.0	0.364	7.7	LOS A	1.9	48.2	0.55	0.46	0.55	31.6
Approach		320	3.0	348	3.0	0.364	7.7	LOS A	1.9	48.2	0.55	0.46	0.55	32.5
All Vehicles		1470	3.0	1598	3.0	0.620	9.8	LOS A	5.9	152.1	0.61	0.63	0.80	31.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 10 [Boyd Lake Ave & LCR 20 AM (Site Folder: General)]**

AM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Ave														
3	L2	5	3.0	5	3.0	0.441	8.4	LOS A	2.3	59.6	0.50	0.40	0.50	33.5
8	T1	530	3.0	576	3.0	0.441	8.3	LOS A	2.3	59.6	0.50	0.40	0.50	33.5
18	R2	330	3.0	359	3.0	0.441	8.0	LOS A	2.3	58.8	0.48	0.38	0.48	32.5
Approach		865	3.0	940	3.0	0.441	8.2	LOS A	2.3	59.6	0.49	0.39	0.49	33.1
East: LCR 20 E														
1	L2	360	3.0	391	3.0	0.493	11.2	LOS B	3.0	77.9	0.67	0.78	0.98	30.0
6	T1	5	3.0	5	3.0	0.493	11.2	LOS B	3.0	77.9	0.67	0.78	0.98	29.9
16	R2	250	3.0	272	3.0	0.371	9.6	LOS A	1.7	44.1	0.63	0.67	0.73	31.7
Approach		615	3.0	668	3.0	0.493	10.6	LOS B	3.0	77.9	0.66	0.74	0.88	30.6
North: Boyd Lake Ave														
7	L2	190	3.0	207	3.0	0.367	8.2	LOS A	1.7	42.9	0.55	0.51	0.55	32.0
4	T1	430	3.0	467	3.0	0.367	7.8	LOS A	1.7	42.9	0.54	0.49	0.54	33.3
14	R2	10	3.0	11	3.0	0.367	7.7	LOS A	1.7	42.4	0.53	0.48	0.53	32.8
Approach		630	3.0	685	3.0	0.367	7.9	LOS A	1.7	42.9	0.54	0.49	0.54	32.9
West: LCR 20 E														
5	L2	30	3.0	33	3.0	0.110	8.0	LOS A	0.4	9.3	0.63	0.63	0.63	32.3
2	T1	15	3.0	16	3.0	0.110	8.0	LOS A	0.4	9.3	0.63	0.63	0.63	32.2
12	R2	10	3.0	11	3.0	0.110	8.0	LOS A	0.4	9.3	0.63	0.63	0.63	31.3
Approach		55	3.0	60	3.0	0.110	8.0	LOS A	0.4	9.3	0.63	0.63	0.63	32.1
All Vehicles		2165	3.0	2353	3.0	0.493	8.8	LOS A	3.0	77.9	0.56	0.52	0.62	32.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion AM (Site Folder: General)]**

AM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Avenue														
3	L2	165	3.0	179	3.0	0.479	9.8	LOS A	3.0	76.5	0.60	0.59	0.72	31.9
8	T1	485	3.0	527	3.0	0.479	9.5	LOS A	3.0	76.5	0.59	0.57	0.69	32.4
18	R2	200	3.0	217	3.0	0.479	9.2	LOS A	2.9	74.2	0.58	0.55	0.67	32.0
Approach		850	3.0	924	3.0	0.479	9.5	LOS A	3.0	76.5	0.59	0.57	0.69	32.2
East: Mountain Lion Dr														
1	L2	195	3.0	212	3.0	0.689	21.1	LOS C	5.3	135.5	0.81	1.07	1.66	27.3
6	T1	60	3.0	65	3.0	0.689	21.1	LOS C	5.3	135.5	0.81	1.07	1.66	27.3
16	R2	140	3.0	152	3.0	0.689	21.1	LOS C	5.3	135.5	0.81	1.07	1.66	26.7
Approach		395	3.0	429	3.0	0.689	21.1	LOS C	5.3	135.5	0.81	1.07	1.66	27.1
North: Boyd Lake Ave														
7	L2	105	3.0	114	3.0	0.364	8.5	LOS A	1.6	41.5	0.58	0.55	0.58	32.5
4	T1	315	3.0	342	3.0	0.364	8.2	LOS A	1.6	41.5	0.57	0.54	0.57	32.9
14	R2	175	3.0	190	3.0	0.364	7.9	LOS A	1.6	41.1	0.56	0.52	0.56	32.6
Approach		595	3.0	647	3.0	0.364	8.2	LOS A	1.6	41.5	0.57	0.54	0.57	32.8
West: Mountain Lion Dr														
5	L2	185	3.0	201	3.0	0.503	11.8	LOS B	3.1	79.0	0.69	0.81	1.04	30.6
2	T1	45	3.0	49	3.0	0.503	11.8	LOS B	3.1	79.0	0.69	0.81	1.04	30.6
12	R2	125	3.0	136	3.0	0.503	11.8	LOS B	3.1	79.0	0.69	0.81	1.04	29.8
Approach		355	3.0	386	3.0	0.503	11.8	LOS B	3.1	79.0	0.69	0.81	1.04	30.3
All Vehicles		2195	3.0	2386	3.0	0.689	11.6	LOS B	5.3	135.5	0.64	0.69	0.89	31.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Timings
1: Boyd Lake Ave & US 34

PM Peak Hour
2045 Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	315	2513	290	300	2540	151	240	265	315	278	370	545
Future Volume (vph)	315	2513	290	300	2540	151	240	265	315	278	370	545
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5		9.5	22.5	
Total Split (s)	19.0	79.9	16.2	18.1	79.0	17.2	16.2	24.8		17.2	25.8	
Total Split (%)	13.6%	57.1%	11.6%	12.9%	56.4%	12.3%	11.6%	17.7%		12.3%	18.4%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	14.5	75.4	91.6	13.6	74.5	91.7	11.7	20.3	140.0	12.7	21.3	140.0
Actuated g/C Ratio	0.10	0.54	0.65	0.10	0.53	0.66	0.08	0.14	1.00	0.09	0.15	1.00
v/c Ratio	0.96	1.00	0.30	0.98	1.02	0.16	0.91	0.56	0.22	0.97	0.75	0.37
Control Delay	101.2	48.8	9.5	106.6	55.3	6.6	98.0	60.4	0.3	106.9	66.3	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	101.2	48.8	9.5	106.6	55.3	6.6	98.0	60.4	0.3	106.9	66.3	0.7
LOS	F	D	A	F	E	A	F	E	A	F	E	A
Approach Delay		50.5			58.0			48.4			45.8	
Approach LOS		D			E			D			D	

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 52.3

Intersection LOS: D

Intersection Capacity Utilization 90.1%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34

			
Ø1	Ø2 (R)	Ø3	Ø4
17.2 s	24.8 s	18.1 s	79.9 s
			
Ø5	Ø6 (R)	Ø7	Ø8
16.2 s	25.8 s	19 s	79 s

HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

PM Peak Hour

2045 Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	315	2513	290	300	2540	151	240	265	315	278	370	545
Future Volume (veh/h)	315	2513	290	300	2540	151	240	265	315	278	370	545
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	342	2732	315	326	2761	164	261	288	0	302	402	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	358	2750	986	336	2717	987	289	515		313	541	
Arrive On Green	0.10	0.54	0.54	0.10	0.53	0.53	0.08	0.14	0.00	0.09	0.15	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	342	2732	315	326	2761	164	261	288	0	302	402	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	13.8	74.3	13.1	13.2	74.5	6.1	10.5	10.6	0.0	12.2	15.1	0.0
Cycle Q Clear(g_c), s	13.8	74.3	13.1	13.2	74.5	6.1	10.5	10.6	0.0	12.2	15.1	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	358	2750	986	336	2717	987	289	515		313	541	
V/C Ratio(X)	0.96	0.99	0.32	0.97	1.02	0.17	0.90	0.56		0.96	0.74	
Avail Cap(c_a), veh/h	358	2750	986	336	2717	987	289	515		313	541	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.37	0.37	0.37	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	62.4	32.1	12.5	63.0	32.8	11.1	63.6	55.7	0.0	63.4	56.7	0.0
Incr Delay (d2), s/veh	36.0	15.6	0.2	23.0	14.8	0.0	29.5	4.3	0.0	40.9	9.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	12.4	42.9	8.2	9.5	39.7	3.6	9.8	8.8	0.0	11.5	12.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	98.4	47.7	12.7	86.0	47.6	11.1	93.1	60.0	0.0	104.3	65.7	0.0
LnGrp LOS	F	D	B	F	F	B	F	E		F	E	
Approach Vol, veh/h	3389			3251			549			704		
Approach Delay, s/veh	49.5			49.6			75.8			82.3		
Approach LOS	D			D			E			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.2	24.8	18.1	79.9	16.2	25.8	19.0	79.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	12.7	20.3	13.6	75.4	11.7	21.3	14.5	74.5				
Max Q Clear Time (g_c+I1), s	14.2	12.6	15.2	76.3	12.5	17.1	15.8	76.5				
Green Ext Time (p_c), s	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 54.3

HCM 6th LOS D

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Timings

2: Hahns Peak Dr & US 34

PM Peak Hour

2045 Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	2532	234	529	2348	96	333	45	298	95	51	135
Future Volume (vph)	270	2532	234	529	2348	96	333	45	298	95	51	135
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8	1		4	5
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	1	4	4	5
Switch Phase												
Minimum Initial (s)	5.0	25.0	25.0	5.0	25.0	25.0	13.0	13.0	5.0	13.0	13.0	5.0
Minimum Split (s)	9.5	32.0	32.0	9.5	32.0	32.0	20.0	20.0	9.5	20.0	20.0	9.5
Total Split (s)	20.0	95.0	95.0	32.0	107.0	107.0	23.0	23.0	32.0	23.0	23.0	20.0
Total Split (%)	13.3%	63.3%	63.3%	21.3%	71.3%	71.3%	15.3%	15.3%	21.3%	15.3%	15.3%	13.3%
Yellow Time (s)	3.5	5.0	5.0	3.5	5.0	5.0	5.0	5.0	3.5	5.0	5.0	3.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	7.0	7.0	4.5	7.0	7.0	7.0	7.0	4.5	7.0	7.0	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag			Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes			Yes			Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	Min	Min	None	Min	Min	None
Act Effect Green (s)	15.5	88.6	88.6	26.9	100.0	100.0	16.0	16.0	49.9	16.0	16.0	38.5
Actuated g/C Ratio	0.10	0.59	0.59	0.18	0.67	0.67	0.11	0.11	0.33	0.11	0.11	0.26
v/c Ratio	0.93	1.03	0.26	0.94	0.84	0.11	1.31	0.25	0.59	0.81	0.28	0.37
Control Delay	98.9	54.5	9.8	83.9	22.2	2.9	211.5	65.0	42.8	101.9	65.8	30.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	98.9	54.5	9.8	83.9	22.2	2.9	211.5	65.0	42.8	101.9	65.8	30.6
LOS	F	D	A	F	C	A	F	E	D	F	E	C
Approach Delay		55.4			31.6			127.4			61.0	
Approach LOS		E			C			F			E	

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.31

Intersection Signal Delay: 51.8

Intersection LOS: D

Intersection Capacity Utilization 95.6%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Hahns Peak Dr & US 34



HCM 6th Signalized Intersection Summary 2: Hahns Peak Dr & US 34

PM Peak Hour
2045 Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	  		 	  		 			 	 	
Traffic Volume (veh/h)	270	2532	234	529	2348	96	333	45	298	95	51	135
Future Volume (veh/h)	270	2532	234	529	2348	96	333	45	298	95	51	135
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	329	3088	254	575	2863	117	362	49	324	116	55	165
Peak Hour Factor	0.82	0.82	0.92	0.92	0.82	0.82	0.92	0.92	0.92	0.82	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	357	3021	938	617	3404	1057	304	200	452	131	200	333
Arrive On Green	0.10	0.59	0.59	0.18	0.67	0.67	0.11	0.11	0.11	0.11	0.11	0.11
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	2617	1870	1585	1009	1870	1585
Grp Volume(v), veh/h	329	3088	254	575	2863	117	362	49	324	116	55	165
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1308	1870	1585	1009	1870	1585
Q Serve(g_s), s	14.2	88.7	11.7	24.6	63.8	4.0	11.9	3.6	16.0	12.4	4.1	13.8
Cycle Q Clear(g_c), s	14.2	88.7	11.7	24.6	63.8	4.0	16.0	3.6	16.0	16.0	4.1	13.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	357	3021	938	617	3404	1057	304	200	452	131	200	333
V/C Ratio(X)	0.92	1.02	0.27	0.93	0.84	0.11	1.19	0.25	0.72	0.88	0.28	0.50
Avail Cap(c_a), veh/h	357	3021	938	634	3404	1057	304	200	452	131	200	333
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.28	0.28	0.28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	66.6	30.6	14.9	60.7	19.0	9.0	70.9	61.5	48.2	70.5	61.7	52.2
Incr Delay (d2), s/veh	11.0	15.1	0.2	20.2	2.7	0.2	113.3	0.2	4.7	44.1	0.3	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.1	45.5	6.1	18.3	32.9	2.6	17.1	3.1	17.1	10.2	3.5	9.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	77.7	45.7	15.1	80.9	21.7	9.2	184.2	61.7	52.9	114.6	61.9	52.7
LnGrp LOS	E	F	B	F	C	A	F	E	D	F	E	D
Approach Vol, veh/h	3671			3555			735			336		
Approach Delay, s/veh	46.5			30.8			118.1			75.6		
Approach LOS	D			C			F			E		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	31.3	95.7		23.0	20.0	107.0		23.0				
Change Period (Y+Rc), s	4.5	7.0		7.0	4.5	7.0		7.0				
Max Green Setting (Gmax), s	27.5	88.0		16.0	15.5	100.0		16.0				
Max Q Clear Time (g_c+I1), s	26.6	90.7		18.0	16.2	65.8		18.0				
Green Ext Time (p_c), s	0.2	0.0		0.0	0.0	16.7		0.0				

Intersection Summary

HCM 6th Ctrl Delay 47.3
HCM 6th LOS D

Notes

User approved pedestrian interval to be less than phase max green.

Intersection												
Int Delay, s/veh	0											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↑	↱		↑↑↑	↱			↱			↱
Traffic Vol, veh/h	0	2562	133	0	328	0	0	0	63	0	0	0
Future Vol, veh/h	0	2562	133	0	328	0	0	0	63	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Free	-	-	Free	-	-	Free	-	-	None
Storage Length	250	-	250	-	-	0	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2785	145	0	357	0	0	0	68	0	0	0

Major/Minor	Major1		Major2		Minor1		Minor2	
Conflicting Flow All	357	0	-	-	-	0	-	-
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-
Pot Cap-1 Maneuver	790	-	0	0	-	0	0	0
Stage 1	-	-	0	0	-	0	0	0
Stage 2	-	-	0	0	-	0	0	0
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	790	-	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	-	790	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	0	-	-	0
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	-	0	-	-	-

Timings
4: US 34 & Rocky Mountain Ave

PM Peak Hour
2045 Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	262	1908	615	657	2173	410	641	322	530	400	359	314
Future Volume (vph)	262	1908	615	657	2173	410	641	322	530	400	359	314
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	1	6	7	5	2	3	7	4		3	8	
Permitted Phases			6			2			Free			Free
Detector Phase	1	6	7	5	2	3	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	25.0	5.0	5.0	25.0	5.0	5.0	13.0		5.0	5.0	
Minimum Split (s)	20.0	32.0	9.5	10.0	35.0	24.0	9.5	20.0		24.0	24.0	
Total Split (s)	22.0	60.0	30.0	28.0	66.0	31.0	30.0	26.0		31.0	27.0	
Total Split (%)	15.2%	41.4%	20.7%	19.3%	45.5%	21.4%	20.7%	17.9%		21.4%	18.6%	
Yellow Time (s)	3.5	5.0	3.5	3.5	5.0	4.0	3.5	5.0		4.0	4.0	
All-Red Time (s)	1.0	2.0	1.0	1.0	2.0	2.0	1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	7.0	4.5	4.5	7.0	6.0	4.5	7.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	C-Min	None	None	C-Min	None	None	Min		None	None	
Act Effect Green (s)	15.5	53.6	86.1	22.9	61.0	90.0	25.5	22.0	145.0	22.0	21.0	145.0
Actuated g/C Ratio	0.11	0.37	0.59	0.16	0.42	0.62	0.18	0.15	1.00	0.15	0.14	1.00
v/c Ratio	0.78	1.10	0.68	0.91	1.10	0.44	1.16	0.65	0.36	0.84	1.45	0.22
Control Delay	77.8	97.9	21.2	75.8	94.1	13.6	139.3	65.0	0.6	74.2	264.4	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.8	97.9	21.2	75.8	94.1	13.6	139.3	65.0	0.6	74.2	264.4	0.3
LOS	E	F	C	E	F	B	F	E	A	E	F	A
Approach Delay		79.1			80.2			74.1			116.2	
Approach LOS		E			F			E			F	

Intersection Summary

Cycle Length: 145
 Actuated Cycle Length: 145
 Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.45
 Intersection Signal Delay: 83.3
 Intersection Capacity Utilization 105.0%
 Analysis Period (min) 15

Intersection LOS: F
 ICU Level of Service G

Splits and Phases: 4: US 34 & Rocky Mountain Ave

			
Ø1	Ø2 (R)	Ø3	Ø4
22 s	66 s	31 s	26 s
			
Ø5	Ø6 (R)	Ø7	Ø8
28 s	60 s	30 s	27 s

HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

PM Peak Hour
2045 Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	262	1908	615	657	2173	410	641	322	530	400	359	314
Future Volume (veh/h)	262	1908	615	657	2173	410	641	322	530	400	359	314
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	285	2074	668	714	2362	446	697	350	0	435	390	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	333	1949	884	782	2252	922	608	603		486	271	
Arrive On Green	0.10	0.38	0.38	0.16	0.44	0.44	0.18	0.17	0.00	0.14	0.14	0.00
Sat Flow, veh/h	3456	5106	1585	5023	5106	1585	3456	3554	1585	3456	1870	1585
Grp Volume(v), veh/h	285	2074	668	714	2362	446	697	350	0	435	390	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1674	1702	1585	1728	1777	1585	1728	1870	1585
Q Serve(g_s), s	11.8	55.4	46.7	20.3	63.9	23.7	25.5	13.2	0.0	17.9	21.0	0.0
Cycle Q Clear(g_c), s	11.8	55.4	46.7	20.3	63.9	23.7	25.5	13.2	0.0	17.9	21.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	333	1949	884	782	2252	922	608	603		486	271	
V/C Ratio(X)	0.85	1.06	0.76	0.91	1.05	0.48	1.15	0.58		0.89	1.44	
Avail Cap(c_a), veh/h	417	1949	884	814	2252	922	608	603		596	271	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	64.5	44.8	24.5	60.2	40.5	17.6	59.8	55.5	0.0	61.2	62.0	0.0
Incr Delay (d2), s/veh	11.3	39.9	6.0	13.8	33.3	1.8	84.2	0.9	0.0	12.5	217.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.7	41.2	25.8	14.7	44.4	14.1	27.1	10.0	0.0	13.6	40.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	75.8	84.7	30.5	74.0	73.9	19.5	144.0	56.4	0.0	73.7	279.7	0.0
LnGrp LOS	E	F	C	E	F	B	F	E		E	F	
Approach Vol, veh/h	3027				3522				1047			
Approach Delay, s/veh	71.9				67.0				114.7			
Approach LOS	E				E				F			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.5	71.0	26.4	31.6	27.1	62.4	30.0	28.0				
Change Period (Y+Rc), s	4.5	7.0	6.0	7.0	4.5	7.0	4.5	* 7				
Max Green Setting (Gmax), s	17.5	59.0	25.0	19.0	23.5	53.0	25.5	* 21				
Max Q Clear Time (g_c+I1), s	13.8	65.9	19.9	15.2	22.3	57.4	27.5	23.0				
Green Ext Time (p_c), s	0.2	0.0	0.5	0.4	0.3	0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 84.9
HCM 6th LOS F

Notes

User approved pedestrian interval to be less than phase max green.

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↗↗	↗↗	↗
Traffic Vol, veh/h	0	46	0	1493	1344	197
Future Vol, veh/h	0	46	0	1493	1344	197
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	50	0	1623	1461	214
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	731	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	364	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	364	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	16.5	0		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBT EBLn1		SBT	SBR		
Capacity (veh/h)	- 364		-	-		
HCM Lane V/C Ratio	- 0.137		-	-		
HCM Control Delay (s)	- 16.5		-	-		
HCM Lane LOS	- C		-	-		
HCM 95th %tile Q(veh)	- 0.5		-	-		

Timings

11:

PM Peak Hour

2045 Total

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	422	305	325	666	682	346
Future Volume (vph)	422	305	325	666	682	346
Turn Type	pm+pt	NA	NA	pm+ov	Prot	pm+ov
Protected Phases	7	4	8	6	6	7
Permitted Phases	4			8		6
Detector Phase	7	4	8	6	6	7
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	9.5
Total Split (s)	23.3	45.9	22.6	44.1	44.1	23.3
Total Split (%)	25.9%	51.0%	25.1%	49.0%	49.0%	25.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Recall Mode	None	None	None	C-Max	C-Max	None
Act Effect Green (s)	41.4	41.4	18.1	62.2	39.6	62.9
Actuated g/C Ratio	0.46	0.46	0.20	0.69	0.44	0.70
v/c Ratio	1.02	0.39	0.94	0.64	0.95	0.33
Control Delay	71.6	17.7	71.7	9.7	38.4	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.6	17.7	71.7	9.7	38.4	8.0
LOS	E	B	E	A	D	A
Approach Delay		49.0	30.0		28.1	
Approach LOS		D	C		C	

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 34.3

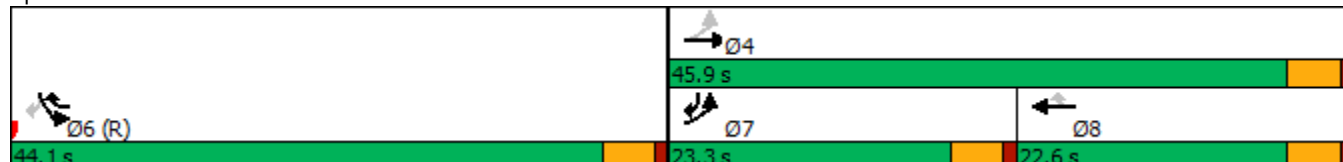
Intersection LOS: C

Intersection Capacity Utilization 89.5%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 11:



HCM 6th Signalized Intersection Summary

PM Peak Hour

11:

2045 Total

							
Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations							
Traffic Volume (veh/h)	422	305	325	666	682	346	
Future Volume (veh/h)	422	305	325	666	682	346	
Initial Q (Qb), veh	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	
Work Zone On Approach		No	No		No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	
Adj Flow Rate, veh/h	459	332	353	724	741	376	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	2	2	2	2	2	2	
Cap, veh/h	468	860	376	1016	784	1029	
Arrive On Green	0.21	0.46	0.20	0.20	0.44	0.44	
Sat Flow, veh/h	1781	1870	1870	1585	1781	1585	
Grp Volume(v), veh/h	459	332	353	724	741	376	
Grp Sat Flow(s),veh/h/ln	1781	1870	1870	1585	1781	1585	
Q Serve(g_s), s	18.2	10.5	16.7	18.1	35.9	9.8	
Cycle Q Clear(g_c), s	18.2	10.5	16.7	18.1	35.9	9.8	
Prop In Lane	1.00			1.00	1.00	1.00	
Lane Grp Cap(c), veh/h	468	860	376	1016	784	1029	
V/C Ratio(X)	0.98	0.39	0.94	0.71	0.95	0.37	
Avail Cap(c_a), veh/h	468	860	376	1016	784	1029	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.76	0.76	
Uniform Delay (d), s/veh	22.8	16.0	35.4	9.0	24.2	7.3	
Incr Delay (d2), s/veh	36.6	0.3	31.1	2.4	17.6	0.8	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(95%),veh/ln	17.6	7.8	16.0	23.4	24.0	18.0	
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	59.4	16.2	66.5	11.4	41.8	8.0	
LnGrp LOS	E	B	E	B	D	A	
Approach Vol, veh/h		791	1077		1117		
Approach Delay, s/veh		41.3	29.5		30.4		
Approach LOS		D	C		C		
Timer - Assigned Phs				4	6	7	8
Phs Duration (G+Y+Rc), s				45.9	44.1	23.3	22.6
Change Period (Y+Rc), s				4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s				41.4	39.6	18.8	18.1
Max Q Clear Time (g_c+I1), s				12.5	37.9	20.2	20.1
Green Ext Time (p_c), s				2.1	0.9	0.0	0.0
Intersection Summary							
HCM 6th Ctrl Delay			33.0				
HCM 6th LOS			C				

MOVEMENT SUMMARY

 **Site: 8 [Rocky Mountain & Road B PM (Site Folder: General)]**

PM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Rocky Mountain Avenue														
3	L2	90	3.0	98	3.0	0.900	44.7	LOS E	12.0	306.0	0.93	1.56	3.03	21.7
8	T1	585	3.0	636	3.0	0.900	43.5	LOS E	12.7	325.0	0.93	1.57	3.05	22.0
18	R2	290	3.0	315	3.0	0.900	41.4	LOS E	12.7	325.0	0.93	1.59	3.07	22.0
Approach		965	3.0	1049	3.0	0.900	43.0	LOS E	12.7	325.0	0.93	1.57	3.06	21.9
East: Road B														
1	L2	285	3.0	310	3.0	0.531	15.0	LOS B	3.0	76.8	0.74	0.88	1.21	28.8
6	T1	15	3.0	16	3.0	0.531	15.0	LOS B	3.0	76.8	0.74	0.88	1.21	28.7
16	R2	735	3.0	799	3.0	0.491	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	37.1
Approach		1035	3.0	1125	3.0	0.531	4.5	LOS A	3.0	76.8	0.21	0.26	0.35	34.1
North: Rocky Mountain Ave														
7u	U	15	3.0	16	3.0	0.830	24.8	LOS C	16.2	414.3	0.93	1.44	2.24	26.1
7	L2	655	3.0	712	3.0	0.830	24.8	LOS C	16.2	414.3	0.93	1.44	2.24	25.6
4	T1	720	3.0	783	3.0	0.926	34.8	LOS D	27.8	711.9	1.00	1.85	3.13	24.1
14	R2	90	3.0	98	3.0	0.926	34.8	LOS D	27.8	711.9	1.00	1.85	3.13	23.6
Approach		1480	3.0	1609	3.0	0.926	30.2	LOS D	27.8	711.9	0.97	1.67	2.72	24.8
West: RoadName														
5	L2	160	3.0	174	3.0	0.423	26.5	LOS D	1.5	39.2	0.88	0.97	1.26	25.3
2	T1	15	3.0	16	3.0	0.423	24.1	LOS C	1.5	39.2	0.87	0.96	1.24	26.2
12	R2	25	3.0	27	3.0	0.423	24.1	LOS C	1.5	39.2	0.87	0.96	1.24	25.6
Approach		200	3.0	217	3.0	0.423	26.1	LOS D	1.5	39.2	0.88	0.97	1.25	25.4
All Vehicles		3680	3.0	4000	3.0	0.926	26.1	LOS D	27.8	711.9	0.74	1.21	2.06	25.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 9 [Rocky Mountain & Mtn Lion PM (Site Folder: General)]**

PM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Rocky Mountain Avenue														
3	L2	215	3.0	234	3.0	0.742	14.3	LOS B	7.5	192.7	0.56	0.33	0.56	30.3
8	T1	830	3.0	902	3.0	0.742	12.1	LOS B	7.5	192.7	0.49	0.28	0.49	31.3
Approach		1045	3.0	1136	3.0	0.742	12.5	LOS B	7.5	192.7	0.51	0.29	0.51	31.1
North: Rocky Mountain Ave														
4	T1	875	3.0	951	3.0	0.495	9.0	LOS A	2.8	72.4	0.51	0.39	0.51	33.2
14	R2	115	3.0	125	3.0	0.495	8.8	LOS A	2.8	71.4	0.50	0.38	0.50	32.3
Approach		990	3.0	1076	3.0	0.495	9.0	LOS A	2.8	72.4	0.51	0.39	0.51	33.1
West: Mountain Lion Dr														
5	L2	95	3.0	103	3.0	0.489	14.1	LOS B	2.5	65.2	0.73	0.85	1.12	30.0
12	R2	175	3.0	190	3.0	0.489	14.1	LOS B	2.5	65.2	0.73	0.85	1.12	29.2
Approach		270	3.0	293	3.0	0.489	14.1	LOS B	2.5	65.2	0.73	0.85	1.12	29.5
All Vehicles		2305	3.0	2505	3.0	0.742	11.2	LOS B	7.5	192.7	0.53	0.40	0.58	31.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 6 [Hahns Peak & Mtn Lion PM (Site Folder: General)]**

PM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Mountain Lion Dr														
3	L2	115	3.0	125	3.0	0.448	12.0	LOS B	2.6	65.9	0.72	0.81	0.98	30.9
8	T1	155	3.0	168	3.0	0.448	12.0	LOS B	2.6	65.9	0.72	0.81	0.98	30.8
18	R2	5	3.0	5	3.0	0.448	12.0	LOS B	2.6	65.9	0.72	0.81	0.98	30.0
Approach		275	3.0	299	3.0	0.448	12.0	LOS B	2.6	65.9	0.72	0.81	0.98	30.8
East: RoadName														
1	L2	5	3.0	5	3.0	0.482	11.7	LOS B	3.1	80.0	0.72	0.81	0.99	31.8
6	T1	55	3.0	60	3.0	0.482	11.7	LOS B	3.1	80.0	0.72	0.81	0.99	31.8
16	R2	270	3.0	293	3.0	0.482	11.7	LOS B	3.1	80.0	0.72	0.81	0.99	30.9
Approach		330	3.0	359	3.0	0.482	11.7	LOS B	3.1	80.0	0.72	0.81	0.99	31.1
North: Hahns Peak														
7	L2	365	3.0	397	3.0	0.556	9.7	LOS A	3.7	95.1	0.53	0.38	0.53	31.4
4	T1	225	3.0	245	3.0	0.556	9.7	LOS A	3.7	95.1	0.53	0.38	0.53	31.3
14	R2	115	3.0	125	3.0	0.108	4.0	LOS A	0.4	11.1	0.32	0.19	0.32	34.4
Approach		705	3.0	766	3.0	0.556	8.8	LOS A	3.7	95.1	0.49	0.35	0.49	31.8
West: Mountain Lion Dr														
5	L2	245	3.0	266	3.0	0.474	12.3	LOS B	2.9	73.8	0.73	0.83	1.03	29.8
2	T1	1	3.0	1	3.0	0.474	12.3	LOS B	2.9	73.8	0.73	0.83	1.03	29.8
12	R2	50	3.0	54	3.0	0.474	12.3	LOS B	2.9	73.8	0.73	0.83	1.03	29.0
Approach		296	3.0	322	3.0	0.474	12.3	LOS B	2.9	73.8	0.73	0.83	1.03	29.7
All Vehicles		1606	3.0	1746	3.0	0.556	10.6	LOS B	3.7	95.1	0.62	0.61	0.78	31.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 10 [Boyd Lake Ave & LCR 20 PM (Site Folder: General)]**

PM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Ave														
3	L2	15	3.0	16	3.0	0.528	10.4	LOS B	3.9	99.7	0.60	0.60	0.77	32.5
8	T1	545	3.0	592	3.0	0.528	10.3	LOS B	3.9	99.7	0.60	0.59	0.76	32.5
18	R2	415	3.0	451	3.0	0.528	9.9	LOS A	3.8	96.8	0.58	0.56	0.72	31.6
Approach		975	3.0	1060	3.0	0.528	10.2	LOS B	3.9	99.7	0.59	0.58	0.74	32.1
East: LCR 20 E														
1	L2	400	3.0	435	3.0	0.550	12.7	LOS B	3.8	98.1	0.71	0.86	1.14	29.3
6	T1	15	3.0	16	3.0	0.417	10.6	LOS B	2.1	54.9	0.66	0.73	0.86	32.2
16	R2	260	3.0	283	3.0	0.417	10.6	LOS B	2.1	54.9	0.66	0.73	0.86	31.2
Approach		675	3.0	734	3.0	0.550	11.9	LOS B	3.8	98.1	0.69	0.81	1.02	30.1
North: Boyd Lake Ave														
7	L2	260	3.0	283	3.0	0.504	11.1	LOS B	3.4	87.6	0.66	0.75	0.92	30.7
4	T1	515	3.0	560	3.0	0.504	10.6	LOS B	3.4	87.6	0.64	0.73	0.89	32.0
14	R2	40	3.0	43	3.0	0.504	10.4	LOS B	3.4	87.3	0.64	0.72	0.88	31.6
Approach		815	3.0	886	3.0	0.504	10.7	LOS B	3.4	87.6	0.65	0.74	0.90	31.6
West: LCR 20 E														
5	L2	25	3.0	27	3.0	0.109	9.5	LOS A	0.3	8.9	0.70	0.70	0.70	31.6
2	T1	10	3.0	11	3.0	0.109	9.5	LOS A	0.3	8.9	0.70	0.70	0.70	31.5
12	R2	10	3.0	11	3.0	0.109	9.5	LOS A	0.3	8.9	0.70	0.70	0.70	30.7
Approach		45	3.0	49	3.0	0.109	9.5	LOS A	0.3	8.9	0.70	0.70	0.70	31.4
All Vehicles		2510	3.0	2728	3.0	0.550	10.8	LOS B	3.9	99.7	0.64	0.69	0.87	31.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion PM (Site Folder: General)]**

PM Peak Hour
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] ft				
South: Boyd Lake Ave														
3	L2	85	3.0	92	3.0	0.455	9.0	LOS A	2.4	60.9	0.55	0.48	0.56	32.7
8	T1	510	3.0	554	3.0	0.455	8.9	LOS A	2.4	60.9	0.55	0.47	0.55	32.9
18	R2	250	3.0	272	3.0	0.455	8.6	LOS A	2.3	59.6	0.53	0.45	0.53	32.3
Approach		845	3.0	918	3.0	0.455	8.8	LOS A	2.4	60.9	0.54	0.46	0.55	32.7
East: Mountain Lion Dr														
1	L2	225	3.0	245	3.0	0.767	23.8	LOS C	8.0	205.8	0.86	1.22	1.98	26.5
6	T1	75	3.0	82	3.0	0.767	23.8	LOS C	8.0	205.8	0.86	1.22	1.98	26.5
16	R2	195	3.0	212	3.0	0.767	23.8	LOS C	8.0	205.8	0.86	1.22	1.98	25.9
Approach		495	3.0	538	3.0	0.767	23.8	LOS C	8.0	205.8	0.86	1.22	1.98	26.3
North: Boyd Lake Ave														
7	L2	110	3.0	120	3.0	0.580	12.5	LOS B	5.0	128.8	0.69	0.82	1.07	31.1
4	T1	755	3.0	821	3.0	0.580	12.1	LOS B	5.1	129.5	0.68	0.80	1.05	31.5
14	R2	115	3.0	125	3.0	0.580	11.7	LOS B	5.1	129.5	0.67	0.79	1.03	30.9
Approach		980	3.0	1065	3.0	0.580	12.1	LOS B	5.1	129.5	0.68	0.80	1.05	31.4
West: Mountain Lion Dr														
5	L2	115	3.0	125	3.0	0.601	20.8	LOS C	3.3	84.5	0.81	0.99	1.46	27.5
2	T1	65	3.0	71	3.0	0.601	20.8	LOS C	3.3	84.5	0.81	0.99	1.46	27.5
12	R2	90	3.0	98	3.0	0.601	20.8	LOS C	3.3	84.5	0.81	0.99	1.46	26.8
Approach		270	3.0	293	3.0	0.601	20.8	LOS C	3.3	84.5	0.81	0.99	1.46	27.3
All Vehicles		2590	3.0	2815	3.0	0.767	14.2	LOS B	8.0	205.8	0.68	0.79	1.11	30.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Timings
1: Boyd Lake Ave & US 34

Saturday Mid Day
2045 Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	2369	250	320	2266	189	330	200	540	206	190	390
Future Volume (vph)	260	2369	250	320	2266	189	330	200	540	206	190	390
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8			Free			Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5	9.5	9.5	22.5	9.5	9.5	22.5		9.5	22.5	
Total Split (s)	16.2	70.0	18.4	18.0	71.8	15.8	18.4	26.2		15.8	23.6	
Total Split (%)	12.5%	53.8%	14.2%	13.8%	55.2%	12.2%	14.2%	20.2%		12.2%	18.2%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effect Green (s)	11.7	65.5	83.9	13.5	67.3	82.9	13.9	21.9	130.0	11.1	19.1	130.0
Actuated g/C Ratio	0.09	0.50	0.65	0.10	0.52	0.64	0.11	0.17	1.00	0.09	0.15	1.00
v/c Ratio	0.92	1.01	0.26	0.98	0.94	0.19	0.98	0.36	0.37	0.76	0.40	0.27
Control Delay	92.7	51.3	6.2	100.2	37.5	4.0	99.5	50.0	0.7	75.6	52.8	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	92.7	51.3	6.2	100.2	37.5	4.0	99.5	50.0	0.7	75.6	52.8	0.4
LOS	F	D	A	F	D	A	F	D	A	E	D	A
Approach Delay		51.1			42.5			40.4			32.8	
Approach LOS		D			D			D			C	

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 44.5

Intersection LOS: D

Intersection Capacity Utilization 84.6%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Boyd Lake Ave & US 34

			
Ø1	Ø2 (R)	Ø3	Ø4
15.8 s	26.2 s	18 s	70 s
			
Ø5	Ø6 (R)	Ø7	Ø8
18.4 s	23.6 s	16.2 s	71.8 s

HCM 6th Signalized Intersection Summary

1: Boyd Lake Ave & US 34

Saturday Mid Day

2045 Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	2369	250	320	2266	189	330	200	540	206	190	390
Future Volume (veh/h)	260	2369	250	320	2266	189	330	200	540	206	190	390
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	283	2575	272	348	2463	205	359	217	0	224	207	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	311	2573	968	359	2643	947	369	619		276	522	
Arrive On Green	0.09	0.50	0.50	0.10	0.52	0.52	0.11	0.17	0.00	0.08	0.15	0.00
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	283	2575	272	348	2463	205	359	217	0	224	207	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	10.6	65.5	10.5	13.0	58.4	7.8	13.5	7.0	0.0	8.3	6.9	0.0
Cycle Q Clear(g_c), s	10.6	65.5	10.5	13.0	58.4	7.8	13.5	7.0	0.0	8.3	6.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	311	2573	968	359	2643	947	369	619		276	522	
V/C Ratio(X)	0.91	1.00	0.28	0.97	0.93	0.22	0.97	0.35		0.81	0.40	
Avail Cap(c_a), veh/h	311	2573	968	359	2643	947	369	619		300	522	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.18	0.18	0.18	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	58.6	32.3	11.9	58.0	29.2	12.1	57.9	47.2	0.0	58.9	50.2	0.0
Incr Delay (d2), s/veh	29.2	18.0	0.2	13.7	1.4	0.0	39.2	1.6	0.0	14.5	2.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.9	39.3	6.7	8.1	26.7	3.9	12.5	5.8	0.0	7.5	5.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	87.8	50.2	12.0	71.8	30.6	12.1	97.0	48.8	0.0	73.4	52.5	0.0
LnGrp LOS	F	F	B	E	C	B	F	D		E	D	
Approach Vol, veh/h	3130			3016			576			431		
Approach Delay, s/veh	50.3			34.1			78.9			63.4		
Approach LOS	D			C			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.9	27.1	18.0	70.0	18.4	23.6	16.2	71.8				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	11.3	21.7	13.5	65.5	13.9	19.1	11.7	67.3				
Max Q Clear Time (g_c+I1), s	10.3	9.0	15.0	67.5	15.5	8.9	12.6	60.4				
Green Ext Time (p_c), s	0.1	1.0	0.0	0.0	0.0	0.8	0.0	6.5				

Intersection Summary

HCM 6th Ctrl Delay 46.6

HCM 6th LOS D

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Timings
2: Hahns Peak Dr & US 34

Saturday Mid Day
2045 Total

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	395	2133	172	424	2373	118	392	51	307	129	39	215
Future Volume (vph)	395	2133	172	424	2373	118	392	51	307	129	39	215
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	pm+ov	Perm	NA	pm+ov
Protected Phases	5	2		1	6			8	1		4	5
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	8	8	1	4	4	5
Switch Phase												
Minimum Initial (s)	5.0	25.0	25.0	5.0	25.0	25.0	25.0	25.0	5.0	25.0	25.0	5.0
Minimum Split (s)	9.5	32.0	32.0	9.5	32.0	32.0	32.0	32.0	9.5	32.0	32.0	9.5
Total Split (s)	26.0	92.2	92.2	25.8	92.0	92.0	32.0	32.0	25.8	32.0	32.0	26.0
Total Split (%)	17.3%	61.5%	61.5%	17.2%	61.3%	61.3%	21.3%	21.3%	17.2%	21.3%	21.3%	17.3%
Yellow Time (s)	3.5	5.0	5.0	3.5	5.0	5.0	5.0	5.0	3.5	5.0	5.0	3.5
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	7.0	7.0	4.5	7.0	7.0	7.0	7.0	4.5	7.0	7.0	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag			Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes			Yes			Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	Min	Min	None	Min	Min	None
Act Effect Green (s)	21.5	85.3	85.3	21.2	85.0	85.0	25.0	25.0	53.2	25.0	25.0	53.5
Actuated g/C Ratio	0.14	0.57	0.57	0.14	0.57	0.57	0.17	0.17	0.35	0.17	0.17	0.36
v/c Ratio	0.98	0.90	0.20	0.95	1.00	0.15	0.97	0.18	0.58	0.70	0.14	0.45
Control Delay	99.0	34.0	10.9	93.2	50.1	7.0	97.5	55.5	40.3	76.8	54.7	35.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	99.0	34.0	10.9	93.2	50.1	7.0	97.5	55.5	40.3	76.8	54.7	35.6
LOS	F	C	B	F	D	A	F	E	D	E	D	D
Approach Delay		42.3			54.0			71.2			51.3	
Approach LOS		D			D			E			D	

Intersection Summary

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 50.8

Intersection LOS: D

Intersection Capacity Utilization 96.5%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Hahns Peak Dr & US 34



HCM 6th Signalized Intersection Summary

2: Hahns Peak Dr & US 34

Saturday Mid Day
2045 Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	395	2133	172	424	2373	118	392	51	307	129	39	215
Future Volume (veh/h)	395	2133	172	424	2373	118	392	51	307	129	39	215
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	482	2601	187	461	2894	144	426	55	334	157	42	262
Peak Hour Factor	0.82	0.82	0.92	0.92	0.82	0.82	0.92	0.92	0.92	0.82	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	495	2900	900	491	2893	898	487	312	489	189	312	491
Arrive On Green	0.14	0.57	0.57	0.14	0.57	0.57	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	3456	5106	1585	3456	5106	1585	2648	1870	1585	995	1870	1585
Grp Volume(v), veh/h	482	2601	187	461	2894	144	426	55	334	157	42	262
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1728	1702	1585	1324	1870	1585	995	1870	1585
Q Serve(g_s), s	20.8	67.3	8.7	19.8	85.0	6.5	22.1	3.8	25.0	21.2	2.9	20.5
Cycle Q Clear(g_c), s	20.8	67.3	8.7	19.8	85.0	6.5	25.0	3.8	25.0	25.0	2.9	20.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	495	2900	900	491	2893	898	487	312	489	189	312	491
V/C Ratio(X)	0.97	0.90	0.21	0.94	1.00	0.16	0.88	0.18	0.68	0.83	0.13	0.53
Avail Cap(c_a), veh/h	495	2900	900	491	2893	898	487	312	489	189	312	491
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.36	0.36	0.36	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.0	28.5	15.9	63.7	32.5	15.5	64.9	53.7	45.4	65.5	53.3	42.8
Incr Delay (d2), s/veh	18.1	1.9	0.2	25.9	16.8	0.4	15.7	0.1	3.2	24.6	0.1	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.6	32.3	5.0	15.8	48.4	4.5	14.3	3.3	16.9	11.8	2.5	12.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	82.1	30.4	16.1	89.6	49.3	15.9	80.5	53.8	48.6	90.1	53.4	43.4
LnGrp LOS	F	C	B	F	F	B	F	D	D	F	D	D
Approach Vol, veh/h	3270			3499			815			461		
Approach Delay, s/veh	37.2			53.2			65.7			60.2		
Approach LOS	D			D			E			E		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	25.8	92.2		32.0	26.0	92.0		32.0				
Change Period (Y+Rc), s	4.5	7.0		7.0	4.5	7.0		7.0				
Max Green Setting (Gmax), s	21.3	85.2		25.0	21.5	85.0		25.0				
Max Q Clear Time (g_c+I1), s	21.8	69.3		27.0	22.8	87.0		27.0				
Green Ext Time (p_c), s	0.0	9.6		0.0	0.0	0.0		0.0				

Intersection Summary

HCM 6th Ctrl Delay 48.4
HCM 6th LOS D

Notes

User approved pedestrian interval to be less than phase max green.

Intersection												
Int Delay, s/veh	0											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↑	↱		↑↑↑	↱			↱			↱
Traffic Vol, veh/h	0	2235	155	0	244	0	0	0	84	0	0	0
Future Vol, veh/h	0	2235	155	0	244	0	0	0	84	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Free	-	-	Free	-	-	Free	-	-	None
Storage Length	250	-	250	-	-	0	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2429	168	0	265	0	0	0	91	0	0	0
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	265	0	-	-	-	0	-	-	-	-	-	133
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	872	-	0	0	-	0	0	0	0	0	0	758
Stage 1	-	-	0	0	-	0	0	0	0	0	0	-
Stage 2	-	-	0	0	-	0	0	0	0	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	872	-	-	-	-	-	-	-	-	-	-	758
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0			0			0		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBL	WBT	SBLn1						
Capacity (veh/h)	-	872	-	-	-	-						
HCM Lane V/C Ratio	-	-	-	-	-	-						
HCM Control Delay (s)	0	0	-	-	0							
HCM Lane LOS	A	A	-	-	A							
HCM 95th %tile Q(veh)	-	0	-	-	-	-						

Timings
4: US 34 & Rocky Mountain Ave

Saturday Mid Day
2045 Total

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	308	1552	627	669	2145	350	702	246	586	750	442	328
Future Volume (vph)	308	1552	627	669	2145	350	702	246	586	750	442	328
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	Free	Prot	NA	Free
Protected Phases	5	2	3	1	6	7	3	8		7	4	
Permitted Phases			2			6			Free			Free
Detector Phase	5	2	3	1	6	7	3	8		7	4	
Switch Phase												
Minimum Initial (s)	5.0	25.0	5.0	5.0	25.0	5.0	5.0	5.0		5.0	25.0	
Minimum Split (s)	10.0	35.0	10.0	10.0	32.0	24.0	10.0	24.0		24.0	32.0	
Total Split (s)	16.0	54.0	29.0	28.0	66.0	39.0	29.0	24.0		39.0	34.0	
Total Split (%)	11.0%	37.2%	20.0%	19.3%	45.5%	26.9%	20.0%	16.6%		26.9%	23.4%	
Yellow Time (s)	3.5	5.0	3.5	3.5	5.0	4.0	3.5	4.0		4.0	5.0	
All-Red Time (s)	1.0	2.0	1.0	1.0	2.0	2.0	1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	7.0	4.5	4.5	7.0	6.0	4.5	6.0		6.0	7.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	C-Min	None	None	C-Min	None	None	None		None	Min	
Act Effect Green (s)	11.5	47.5	79.0	23.0	59.0	99.0	24.5	18.0	145.0	33.0	27.0	145.0
Actuated g/C Ratio	0.08	0.33	0.54	0.16	0.41	0.68	0.17	0.12	1.00	0.23	0.19	1.00
v/c Ratio	1.23	1.01	0.74	0.92	1.13	0.35	1.32	0.61	0.40	1.04	1.39	0.23
Control Delay	184.9	73.4	25.1	77.1	103.9	8.7	199.6	66.7	0.8	97.5	233.9	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	184.9	73.4	25.1	77.1	103.9	8.7	199.6	66.7	0.8	97.5	233.9	0.3
LOS	F	E	C	E	F	A	F	E	A	F	F	A
Approach Delay		75.1			87.7			102.3			116.1	
Approach LOS		E			F			F			F	

Intersection Summary

Cycle Length: 145

Actuated Cycle Length: 145

Offset: 80 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.39

Intersection Signal Delay: 91.6

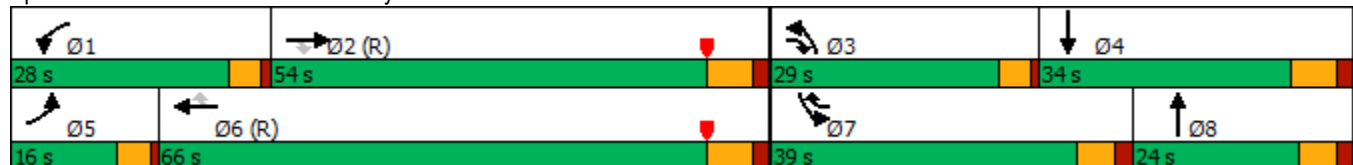
Intersection LOS: F

Intersection Capacity Utilization 112.7%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 4: US 34 & Rocky Mountain Ave



HCM 6th Signalized Intersection Summary

4: US 34 & Rocky Mountain Ave

Saturday Mid Day
2045 Total

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	308	1552	627	669	2145	350	702	246	586	750	442	328
Future Volume (veh/h)	308	1552	627	669	2145	350	702	246	586	750	442	328
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	335	1687	682	727	2332	380	763	267	0	815	480	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
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	274	1677	788	793	2078	1006	584	417		786	348	
Arrive On Green	0.08	0.33	0.33	0.16	0.41	0.41	0.17	0.12	0.00	0.23	0.19	0.00
Sat Flow, veh/h	3456	5106	1585	5023	5106	1585	3456	3554	1585	3456	1870	1585
Grp Volume(v), veh/h	335	1687	682	727	2332	380	763	267	0	815	480	0
Grp Sat Flow(s),veh/h/ln	1728	1702	1585	1674	1702	1585	1728	1777	1585	1728	1870	1585
Q Serve(g_s), s	11.5	47.6	47.6	20.7	59.0	16.7	24.5	10.4	0.0	33.0	27.0	0.0
Cycle Q Clear(g_c), s	11.5	47.6	47.6	20.7	59.0	16.7	24.5	10.4	0.0	33.0	27.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	274	1677	788	793	2078	1006	584	417		786	348	
V/C Ratio(X)	1.22	1.01	0.87	0.92	1.12	0.38	1.31	0.64		1.04	1.38	
Avail Cap(c_a), veh/h	274	1677	788	814	2078	1006	584	441		786	348	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	66.8	48.7	32.1	60.1	43.0	12.7	60.2	61.1	0.0	56.0	59.0	0.0
Incr Delay (d2), s/veh	128.2	23.4	12.2	14.5	62.1	1.1	150.1	2.1	0.0	41.8	187.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	16.2	31.9	31.4	15.0	50.3	10.3	34.7	8.4	0.0	26.6	46.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	195.0	72.1	44.3	74.7	105.1	13.8	210.4	63.2	0.0	97.8	246.3	0.0
LnGrp LOS	F	F	D	E	F	B	F	E		F	F	
Approach Vol, veh/h	2704				3439				1030			
Approach Delay, s/veh	80.3				88.6				172.2			
Approach LOS	F				F				F			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	27.4	54.6	29.0	34.0	16.0	66.0	39.0	24.0				
Change Period (Y+Rc), s	4.5	7.0	4.5	7.0	4.5	7.0	6.0	* 7				
Max Green Setting (Gmax), s	23.5	47.0	24.5	27.0	11.5	59.0	33.0	* 18				
Max Q Clear Time (g_c+I1), s	22.7	49.6	26.5	29.0	13.5	61.0	35.0	12.4				
Green Ext Time (p_c), s	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.5				

Intersection Summary

HCM 6th Ctrl Delay	106.0
HCM 6th LOS	F

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection

Int Delay, s/veh 0.3

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations

Traffic Vol, veh/h 0 57 0 1533 1410 225

Future Vol, veh/h 0 57 0 1533 1410 225

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length - 0 - - - 150

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 92 92 92 92 92 92

Heavy Vehicles, % 2 2 2 2 2 2

Mvmt Flow 0 62 0 1666 1533 245

Major/Minor Minor2 Major1 Major2

Conflicting Flow All - 767 - 0 - 0

Stage 1 - - - - - -

Stage 2 - - - - - -

Critical Hdwy - 6.94 - - - -

Critical Hdwy Stg 1 - - - - - -

Critical Hdwy Stg 2 - - - - - -

Follow-up Hdwy - 3.32 - - - -

Pot Cap-1 Maneuver 0 345 0 - - -

Stage 1 0 - 0 - - -

Stage 2 0 - 0 - - -

Platoon blocked, % - - - - - -

Mov Cap-1 Maneuver - 345 - - - -

Mov Cap-2 Maneuver - - - - - -

Stage 1 - - - - - -

Stage 2 - - - - - -

Approach EB NB SB

HCM Control Delay, s 17.7 0 0

HCM LOS C

Minor Lane/Major Mvmt NBT EBLn1 SBT SBR

Capacity (veh/h) - 345 - -

HCM Lane V/C Ratio - 0.18 - -

HCM Control Delay (s) - 17.7 - -

HCM Lane LOS - C - -

HCM 95th %tile Q(veh) - 0.6 - -

Timings

11:

Saturday Mid Day

2045 Total

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	372	240	300	582	618	382
Future Volume (vph)	372	240	300	582	618	382
Turn Type	pm+pt	NA	NA	pm+ov	Prot	pm+ov
Protected Phases	7	4	8	6	6	7
Permitted Phases	4			8		6
Detector Phase	7	4	8	6	6	7
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	9.5
Total Split (s)	16.4	39.0	22.6	36.0	36.0	16.4
Total Split (%)	21.9%	52.0%	30.1%	48.0%	48.0%	21.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Recall Mode	None	None	None	C-Max	C-Max	None
Act Effect Green (s)	32.9	32.9	16.5	54.1	33.1	49.5
Actuated g/C Ratio	0.44	0.44	0.22	0.72	0.44	0.66
v/c Ratio	1.03	0.32	0.80	0.54	0.86	0.37
Control Delay	72.9	14.6	43.1	5.9	33.4	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.9	14.6	43.1	5.9	33.4	4.3
LOS	E	B	D	A	C	A
Approach Delay		50.0	18.5		22.3	
Approach LOS		D	B		C	

Intersection Summary

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 27.8

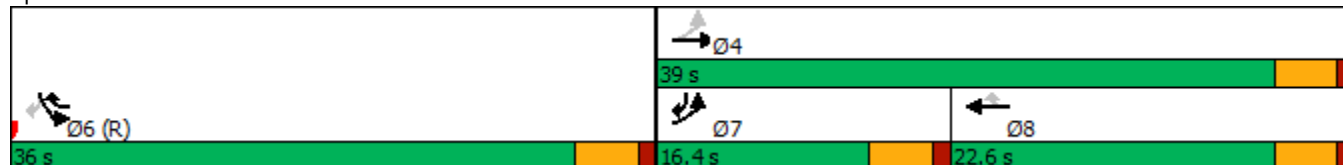
Intersection LOS: C

Intersection Capacity Utilization 81.9%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 11:

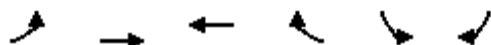


HCM 6th Signalized Intersection Summary

Saturday Mid Day

11:

2045 Total



Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations							
Traffic Volume (veh/h)	372	240	300	582	618	382	
Future Volume (veh/h)	372	240	300	582	618	382	
Initial Q (Qb), veh	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	
Work Zone On Approach		No	No		No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	
Adj Flow Rate, veh/h	404	261	326	633	672	415	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	2	2	2	2	2	2	
Cap, veh/h	464	860	451	1048	748	917	
Arrive On Green	0.16	0.46	0.24	0.24	0.42	0.42	
Sat Flow, veh/h	1781	1870	1870	1585	1781	1585	
Grp Volume(v), veh/h	404	261	326	633	672	415	
Grp Sat Flow(s),veh/h/ln	1781	1870	1870	1585	1781	1585	
Q Serve(g_s), s	11.9	6.6	12.0	16.9	26.4	11.2	
Cycle Q Clear(g_c), s	11.9	6.6	12.0	16.9	26.4	11.2	
Prop In Lane	1.00			1.00	1.00	1.00	
Lane Grp Cap(c), veh/h	464	860	451	1048	748	917	
V/C Ratio(X)	0.87	0.30	0.72	0.60	0.90	0.45	
Avail Cap(c_a), veh/h	464	860	451	1048	748	917	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.78	0.78	
Uniform Delay (d), s/veh	18.6	12.7	26.1	7.2	20.3	9.0	
Incr Delay (d2), s/veh	16.2	0.2	5.6	1.0	12.9	1.3	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(95%),veh/ln	11.1	4.6	9.8	17.2	17.7	17.7	
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	34.9	12.9	31.7	8.1	33.2	10.3	
LnGrp LOS	C	B	C	A	C	B	
Approach Vol, veh/h		665	959	1087			
Approach Delay, s/veh		26.2	16.2	24.4			
Approach LOS		C	B	C			
Timer - Assigned Phs				4	6	7	8
Phs Duration (G+Y+Rc), s				39.0	36.0	16.4	22.6
Change Period (Y+Rc), s				4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s				34.5	31.5	11.9	18.1
Max Q Clear Time (g_c+I1), s				8.6	28.4	13.9	18.9
Green Ext Time (p_c), s				1.5	1.4	0.0	0.0
Intersection Summary							
HCM 6th Ctrl Delay			22.0				
HCM 6th LOS			C				

MOVEMENT SUMMARY

 **Site: 8 [Rocky Mountain & Road B SAT (Site Folder: General)]**

Saturday Mid Day
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist ft				
South: Rocky Mountain Avenue														
3	L2	90	3.0	98	3.0	0.956	62.3	LOS F	13.1	335.7	0.96	1.74	3.73	18.6
8	T1	460	3.0	500	3.0	0.956	60.8	LOS F	14.1	361.5	0.96	1.75	3.76	18.8
18	R2	300	3.0	326	3.0	0.956	57.6	LOS F	14.1	361.5	0.96	1.78	3.83	18.9
Approach		850	3.0	924	3.0	0.956	59.8	LOS F	14.1	361.5	0.96	1.76	3.78	18.8
East: Road B														
1	L2	285	3.0	310	3.0	0.562	14.6	LOS B	3.6	92.3	0.74	0.90	1.25	29.2
6	T1	20	3.0	22	3.0	0.562	14.6	LOS B	3.6	92.3	0.74	0.90	1.25	29.1
16	R2	890	3.0	967	3.0	0.562	0.8	LOS A	3.6	92.3	0.04	0.05	0.07	36.4
Approach		1195	3.0	1299	3.0	0.562	4.5	LOS A	3.6	92.3	0.22	0.27	0.37	34.2
North: Rocky Mountain Ave														
7u	U	15	3.0	16	3.0	0.970	43.2	LOS E	34.9	894.6	1.00	2.08	3.71	21.6
7	L2	830	3.0	902	3.0	0.970	43.2	LOS E	34.9	894.6	1.00	2.08	3.71	21.3
4	T1	650	3.0	707	3.0	0.903	33.2	LOS D	23.2	595.2	1.00	1.74	2.89	24.5
14	R2	75	3.0	82	3.0	0.903	33.2	LOS D	23.2	595.2	1.00	1.74	2.89	24.0
Approach		1570	3.0	1707	3.0	0.970	38.6	LOS E	34.9	894.6	1.00	1.92	3.33	22.6
West: RoadName														
5	L2	170	3.0	185	3.0	0.505	33.6	LOS D	1.9	48.4	0.91	1.03	1.41	23.5
2	T1	20	3.0	22	3.0	0.505	30.4	LOS D	1.9	48.4	0.90	1.02	1.40	24.5
12	R2	25	3.0	27	3.0	0.505	30.4	LOS D	1.9	48.4	0.90	1.02	1.40	23.9
Approach		215	3.0	234	3.0	0.505	32.9	LOS D	1.9	48.4	0.90	1.03	1.41	23.6
All Vehicles		3830	3.0	4163	3.0	0.970	32.3	LOS D	34.9	894.6	0.74	1.32	2.40	24.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 9 [Rocky Mountain & Mtn Lion SAT (Site Folder: General)]**

Saturday Mid Day
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Rocky Mountain Avenue														
3	L2	190	3.0	207	3.0	0.679	12.4	LOS B	5.6	142.9	0.56	0.37	0.56	31.1
8	T1	730	3.0	793	3.0	0.679	10.6	LOS B	5.6	142.9	0.50	0.32	0.50	31.9
Approach		920	3.0	1000	3.0	0.679	11.0	LOS B	5.6	142.9	0.51	0.33	0.51	31.8
North: Rocky Mountain Ave														
4	T1	840	3.0	913	3.0	0.466	8.4	LOS A	2.6	66.9	0.47	0.34	0.47	33.5
14	R2	115	3.0	125	3.0	0.466	8.2	LOS A	2.6	65.8	0.46	0.33	0.46	32.5
Approach		955	3.0	1038	3.0	0.466	8.3	LOS A	2.6	66.9	0.47	0.34	0.47	33.4
West: Mountain Lion Dr														
5	L2	135	3.0	147	3.0	0.570	16.1	LOS C	3.5	88.6	0.76	0.92	1.30	29.2
12	R2	190	3.0	207	3.0	0.570	16.1	LOS C	3.5	88.6	0.76	0.92	1.30	28.4
Approach		325	3.0	353	3.0	0.570	16.1	LOS C	3.5	88.6	0.76	0.92	1.30	28.7
All Vehicles		2200	3.0	2391	3.0	0.679	10.6	LOS B	5.6	142.9	0.53	0.42	0.61	31.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 6 [Hahns Peak & Mtn Lion SAT (Site Folder: General)]**

Saturday Mid Day
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Mountain Lion Dr														
3	L2	130	3.0	141	3.0	0.528	15.4	LOS C	3.3	83.9	0.78	0.91	1.21	29.5
8	T1	155	3.0	168	3.0	0.528	15.4	LOS C	3.3	83.9	0.78	0.91	1.21	29.4
18	R2	1	3.0	1	3.0	0.528	15.4	LOS C	3.3	83.9	0.78	0.91	1.21	28.7
Approach		286	3.0	311	3.0	0.528	15.4	LOS C	3.3	83.9	0.78	0.91	1.21	29.4
East: RoadName														
1	L2	1	3.0	1	3.0	0.580	14.5	LOS B	4.6	117.6	0.78	0.94	1.26	30.6
6	T1	65	3.0	71	3.0	0.580	14.5	LOS B	4.6	117.6	0.78	0.94	1.26	30.6
16	R2	320	3.0	348	3.0	0.580	14.5	LOS B	4.6	117.6	0.78	0.94	1.26	29.8
Approach		386	3.0	420	3.0	0.580	14.5	LOS B	4.6	117.6	0.78	0.94	1.26	29.9
North: Hahns Peak														
7	L2	285	3.0	310	3.0	0.414	7.5	LOS A	2.3	57.7	0.46	0.33	0.46	32.2
4	T1	145	3.0	158	3.0	0.414	7.5	LOS A	2.3	57.7	0.46	0.33	0.46	32.2
14	R2	105	3.0	114	3.0	0.101	4.1	LOS A	0.4	10.3	0.33	0.21	0.33	34.4
Approach		535	3.0	582	3.0	0.414	6.8	LOS A	2.3	57.7	0.43	0.31	0.43	32.6
West: Mountain Lion Dr														
5	L2	255	3.0	277	3.0	0.624	14.5	LOS B	6.1	156.7	0.78	0.98	1.30	29.6
2	T1	180	3.0	196	3.0	0.624	14.5	LOS B	6.1	156.7	0.78	0.98	1.30	29.5
12	R2	35	3.0	38	3.0	0.624	14.5	LOS B	6.1	156.7	0.78	0.98	1.30	28.8
Approach		470	3.0	511	3.0	0.624	14.5	LOS B	6.1	156.7	0.78	0.98	1.30	29.5
All Vehicles		1677	3.0	1823	3.0	0.624	12.2	LOS B	6.1	156.7	0.67	0.75	1.00	30.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 10 [Boyd Lake Ave & LCR 20 SAT (Site Folder: General)]**

Saturday Mid Day
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Ave														
3	L2	10	3.0	11	3.0	0.456	8.8	LOS A	2.4	62.0	0.53	0.43	0.53	33.3
8	T1	500	3.0	543	3.0	0.456	8.7	LOS A	2.4	62.0	0.52	0.42	0.52	33.3
18	R2	370	3.0	402	3.0	0.456	8.3	LOS A	2.4	61.2	0.50	0.40	0.50	32.3
Approach		880	3.0	957	3.0	0.456	8.5	LOS A	2.4	62.0	0.51	0.41	0.51	32.9
East: LCR 20 E														
1	L2	390	3.0	424	3.0	0.514	11.5	LOS B	3.4	86.7	0.68	0.80	1.02	29.8
6	T1	10	3.0	11	3.0	0.405	10.0	LOS B	2.1	52.5	0.64	0.69	0.79	32.5
16	R2	270	3.0	293	3.0	0.405	10.0	LOS B	2.1	52.5	0.64	0.69	0.79	31.5
Approach		670	3.0	728	3.0	0.514	10.9	LOS B	3.4	86.7	0.66	0.76	0.92	30.5
North: Boyd Lake Ave														
7	L2	210	3.0	228	3.0	0.424	9.4	LOS A	2.3	58.0	0.60	0.62	0.70	31.5
4	T1	460	3.0	500	3.0	0.424	9.0	LOS A	2.3	58.0	0.59	0.59	0.67	32.7
14	R2	30	3.0	33	3.0	0.424	8.8	LOS A	2.2	56.5	0.58	0.58	0.66	32.3
Approach		700	3.0	761	3.0	0.424	9.1	LOS A	2.3	58.0	0.59	0.60	0.68	32.3
West: LCR 20 E														
5	L2	30	3.0	33	3.0	0.108	8.6	LOS A	0.4	9.0	0.66	0.66	0.66	31.9
2	T1	10	3.0	11	3.0	0.108	8.6	LOS A	0.4	9.0	0.66	0.66	0.66	31.8
12	R2	10	3.0	11	3.0	0.108	8.6	LOS A	0.4	9.0	0.66	0.66	0.66	31.0
Approach		50	3.0	54	3.0	0.108	8.6	LOS A	0.4	9.0	0.66	0.66	0.66	31.7
All Vehicles		2300	3.0	2500	3.0	0.514	9.4	LOS A	3.4	86.7	0.58	0.58	0.69	31.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 5 [Boyd Lake Ave & Mountain Lion SAT (Site Folder: General)]**

Saturday Mid Day
Site Category: Long Term Background
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: Boyd Lake Avenue														
3	L2	115	3.0	125	3.0	0.566	10.7	LOS B	4.4	112.6	0.58	0.51	0.68	31.9
8	T1	775	3.0	842	3.0	0.566	10.5	LOS B	4.4	112.6	0.57	0.49	0.66	32.2
18	R2	230	3.0	250	3.0	0.566	10.2	LOS B	4.1	105.6	0.56	0.47	0.63	31.6
Approach		1120	3.0	1217	3.0	0.566	10.4	LOS B	4.4	112.6	0.57	0.49	0.65	32.0
East: Mountain Lion Dr														
1	L2	215	3.0	234	3.0	0.977	60.5	LOS F	16.8	429.8	0.97	1.90	4.18	18.6
6	T1	70	3.0	76	3.0	0.977	60.5	LOS F	16.8	429.8	0.97	1.90	4.18	18.6
16	R2	205	3.0	223	3.0	0.977	60.5	LOS F	16.8	429.8	0.97	1.90	4.18	18.3
Approach		490	3.0	533	3.0	0.977	60.5	LOS F	16.8	429.8	0.97	1.90	4.18	18.5
North: Boyd Lake Ave														
7	L2	95	3.0	103	3.0	0.450	9.8	LOS A	2.6	66.8	0.61	0.64	0.75	32.2
4	T1	565	3.0	614	3.0	0.450	9.4	LOS A	2.6	66.8	0.60	0.62	0.73	32.6
14	R2	90	3.0	98	3.0	0.450	9.2	LOS A	2.6	65.5	0.59	0.61	0.71	32.1
Approach		750	3.0	815	3.0	0.450	9.4	LOS A	2.6	66.8	0.60	0.62	0.73	32.5
West: Mountain Lion Dr														
5	L2	85	3.0	92	3.0	0.363	11.2	LOS B	1.5	39.5	0.68	0.74	0.86	31.1
2	T1	45	3.0	49	3.0	0.363	11.2	LOS B	1.5	39.5	0.68	0.74	0.86	31.1
12	R2	70	3.0	76	3.0	0.363	11.2	LOS B	1.5	39.5	0.68	0.74	0.86	30.3
Approach		200	3.0	217	3.0	0.363	11.2	LOS B	1.5	39.5	0.68	0.74	0.86	30.8
All Vehicles		2560	3.0	2783	3.0	0.977	19.8	LOS C	16.8	429.8	0.66	0.82	1.37	28.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX H. SCOPING PACKAGE

Attachment A Transportation Impact Study Base Assumptions

Project Information				
Project Name Avenue South				
Project Location South side of US 34, between Rock Mtn Ave and Hahn's Peak Dr				
TIS Assumptions				
Type of Study	Full: X		Intermediate:	
Study Area Boundaries	North: US 34		South: LCR 20E	
	East: Rocky Mountain Ave		West: Boyd Lake Ave	
Study Years	Short Range: 2029		Long Range: 2045	
Future Traffic Growth Rate	Based on	NFR Model	1.0%/Yr	See Text
Study Intersections	1. All access drives		5.	
	2. See Attached Figs.		6.	
	3.		7.	
	4.		8.	
Time Period for Study	AM: 7:00-9:00	PM: 4:00-6:00	Sat Noon: Noon-2 PM	
Trip Generation Rates	ITE Equations.			
Trip Adjustment Factors	Passby: Varies; see text		Captive Market: 20% See Text	
Overall Trip Distribution	SEE ATTACHED SKETCH			
Mode Split Assumptions	None			
Committed Roadway Improvements	Improvements at US 34/Hahn's Peak drive intersection, planned widening of US 34 to 6 lanes. RMA Connection to LCR20E to be included for Long-term; funding not yet determined.			
Other Traffic Studies	Journey Homes, Chilson-Stroh Commercial, Latest Schmer study. The recent Millennium GDP Amendment study set's stage here as well.			
Areas Requiring Special Study	Connection to LCR 20E, multi-modal network and accommodation within and around site to inform design, see text. Summary will include comprehensive improvement list. Units have been added to match GDP Amendment request. (3367 total DU's)			

Date: November 15th, 2024Traffic Engineer: Chris Fasching (Fasching Consulting)

Local Entity Engineer: _____ 11.21.2024

Approved with
minor corrections
shown

Avenue South Traffic Impact Study Assumptions/Parameters

Key Scope Items

The current site plan is attached. The study will address key intersections along:

1. US 34
2. Rocky Mountain Avenue
3. Hahn's Peak Drive
4. Mountain Lion Drive
5. Boyd Lake Avenue
6. LCR 20E

The attached figures identify the specific intersections. A separate study, the master Millennium GDP amendment study (being prepared concurrently), will set the stage for this more detailed study.

Weekday AM, PM, and mid-day Saturday peak hours will be analyzed. A short-term and long-term planning horizon will be assessed. The long-term analysis will entail conducting analyses for one network scenario in which Rocky Mountain Avenue connects to LCR 20E. The city appears poised to pursue this option to enhance the area's network and it will therefore be treated as "given" in the Long-term analysis (not the short-term analysis). This will entail reassigning some of the Schmer traffic as well. Funding for this improvement is not yet identified.

McWhinney has \$8M committed to this connection in the Master MFA agreement

The Schmer study shows recently collected peak hour turning movements at some of the study area intersections to be analyzed in this study. That study does not analyze any Boyd Lake Avenue intersections, so we'll supplement the recently collected Schmer data with fresh weekday AM, PM, and Saturday mid-day peak hour turning movement counts at the three Boyd Lake Avenue intersections (US 34, Mountain Lion Drive, and LCR 20E).

Trip Distribution has been estimated based on the NFR model. It will be varied for short-term and for the long-term scenario in light of the Rocky Mountain Avenue connection to LCR 20E. Please see the attached figures illustrating the distribution percentages for each planning horizon/network scenario.

Trip Generation has been detailed such that the entire site has been divided into 12 zones (map attached atop an older site plan) in which the land use and trip-making for each is tabulated in the attached table. The plan does not yet identify all users, but specific uses were analyzed where identified; shopping center use has been used by default where they are not specifically known. Also, residential units have been added to the plan to match a recent GDP amendment request contains a grand total of 3367 units reflecting the recent entitlement request. A sensitivity analysis will also be conducted in which a lesser more likely number of units occur to gauge relative differences in traffic projections.

An analysis has been conducted relative to the pass-by adjustments and the internal trip-making reductions. Pass-by percentages have been researched with ITE and they have been itemized by specific retail use and by the specific peak hour of analysis. The following pass-by percentages will be applied to development uses:

- Grocery:
 - 0% AM peak hour
 - 24% PM peak hour
 - 19% Saturday peak hour

- Bank:
 - 29% AM peak hour
 - 35% PM peak hour
 - 38% Saturday peak hour
- Fast food restaurant:
 - 50% AM peak hour
 - 55% PM peak hour
 - 55% Saturday peak hour
- High Turnover Sit-down Restaurant:
 - 0% AM peak hour
 - 43% PM peak hour
 - 43% Saturday peak hour
- Other retail:
 - 0% AM peak hour
 - 29% PM peak hour
 - 29% Saturday peak hour

These trips will not be eliminated, rather they will be reflected in the analysis as a diversion of background traffic from/to US 34 into/out of the site. Also, the above percentages will be applied to the trip total after the internal trips are removed (see next paragraph).

Internal trip-making has also been estimated using procedures outlined in NCHRP 684. This process considers the mix of uses within an area and assesses potential internal trip activity based on the nature of land use trips being productions and attractions in their nature. A separate table is shown here that shows the bottom-line results by land use type. Also, tables are included that show each step of the process. The net effect relative to the total generation of Avenue South results in approximately 20 percent on a daily basis (less for AM peak hour, more for the PM Saturday peak hours), suggesting that there will ultimately be a good mix of production and attraction uses. Many of these trips are likely to be conducted via foot, so these trips will be eliminated from the traffic assignment. Each TAZ will be associated with internal trip reductions to avoid assigning these trips external to the master plan.

Other adjustments could also be considered such as trip interaction between Avenue South and the neighboring developments, namely Schmer and Chilson-Stroh. To remain conservative, these adjustments will not be considered, rather all new trips external to the immediate area are to be assigned per the trip distribution assumptions presented here.

From the attached trip generation table, the net effect of Avenue South results in 32,400 new external trips per day.

Background Traffic Derivation

A series of assumptions will be applied in developing background traffic. The following illustrate the key assumptions:

- Existing traffic counts will be increased by 1.0 percent per year, based on the MNFR model and recent discussions with city staff.
- Trips from the Chilson-Stroh residential development as well as the Chilson-Stroh commercial pad sites will be added in. Chilson Stroh is located west of Avenue South; Mountain Lion Drive will align

through the center of this development. We'll assess how much of this development is complete; it may be partially captured in the recent traffic counts that the Schmer study collected.

- Trips from the Schmer master plan as we currently understand it, will be added in as well. Schmer is estimated to ultimately contain 172,000 square feet of commercial development, plus a service station and a car wash. Their study shows a net external trip generation of 14,000 after pass-by and internal trip adjustments. That study considered options for US 34 access which impacts the projected numbers; the Avenue South TIS will make use of Schmer's traffic assignment assuming that a right-in/right-out access is NOT provided onto US 34 for their development and that some traffic (left turn movements) from the existing uses at the I-25/US 34 interchange will make use of Rocky Mountain Avenue. The Schmer study did not specifically analyze scenarios with a connection to LCR 20E, but the study recommended pursuing it. The Avenue South TIS will reassign a portion of their traffic given the long-term connection to LCR 20E.

Given the long-term network scenario in which Rocky Mountain Avenue connects to LCR 20E, adjustments to background traffic will be made to account for:

- Deviations in traffic routing for Schmer traffic
- Deviation in traffic routing for Chilson-Stroh traffic
- Shifts in sub-regional traffic brought about by this connection. This will include incorporating additional through traffic along Rocky Mountain Avenue that would cut through the area south of US 34. A select link analysis of this connection was previously performed using the NFR travel demand model (with this connection coded in) to assess the level of additional background traffic that could potentially cut through the Avenue South/Schmer area via Rocky Mountain Avenue; the results will be used in this new study. The 1 percent annual growth rate will be integrated appropriately. Recent work in support of the Millennium GPD Amendment traffic work will inform this.

All study area intersections will see adjustments in long-term background traffic for Rocky Mountain Avenue connecting to LCR 20E. There will be two scenarios of traffic projections including:

- Short-term that only analyzes the first phases of the development (year 2028 timeframe)
- Long-term WITH a connection to LCR 20E (also 2045 timeframe)

The Schmer study appears to incorporate an additional 200 residential units on acreage south and/or east of their site. We'll incorporate trips from 200 units into the background traffic for long-term scenarios.

Other Analyses Considerations

Additional units have been added to Areas C and D so that the total unit count for the master plan is consistent with a current **GPD** amendment request.

3367

Accommodation for all modes of travel will be considered. Displays will be prepared that show trails and sidewalks through the development. Beyond the master plan boundaries, pedestrian and bicycle routes to/from relative schools will be assessed as they related to future residents of Avenue South. We will coordinate with the school district in understanding the relevant schools for Avenue South.

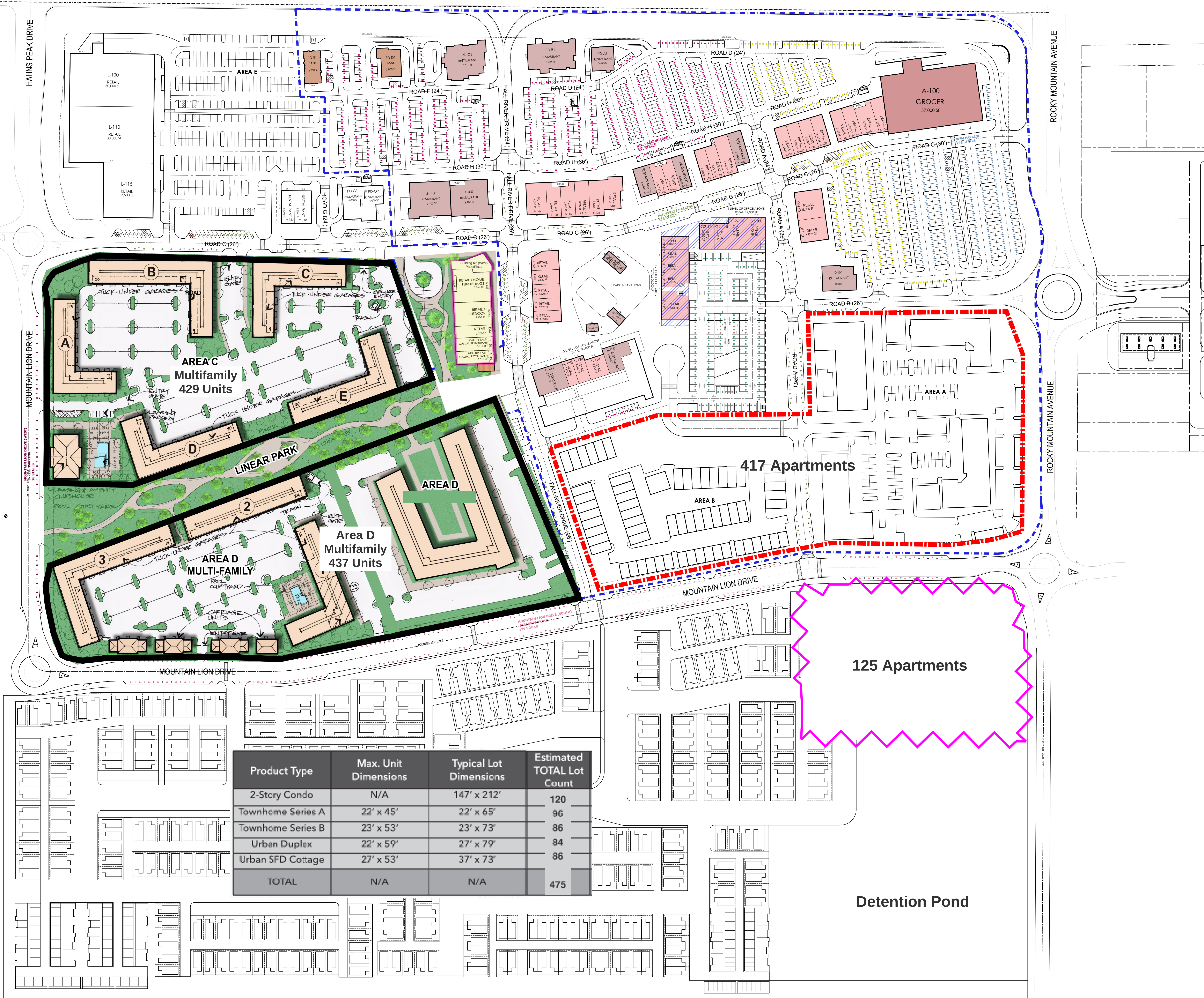
Roadway classifications for planned public roads within and along side the site will be assessed based on daily traffic loading.

Planned improvements at the US 34/ Hahn's Peak Drive intersection will be researched. It is likely that the planned improvements will need to be increased in support of Avenue South.

The internal intersection located south of US 34 at the Fall River Drive right-in/right-out will be assessed with recommendations to help prevent queuing back onto US 34.

Multi-modal planning will be incorporated. This effort will require additional discussion with city staff, but the intent is to consider legitimate options for travel within the development and to/from other nearby destinations. While not a detailed plan, the effort would identify guidelines to inform design and amenities in accommodating and encouraging modes of travel other than the automobile. Surrounding areas east and west of Avenue South will be included as will the developed area across US 34 with respect to known attractions. Transit (regional accommodation and possible local shuttles), pedestrians, bicycles, scooters, and other micro transit modes will be considered including the potential of connecting this development to the Centerra Mobility hub. This aspect will consider recent Green House Gas emission reduction goals established by the state, as appropriate.

The report's summary and conclusions sections will include a comprehensive list of improvements and upgrades and an indication as to the timing of improvements, tied to development phasing and to gradual regional growth. Those that are specific to satisfying LCUASS will be flagged. These will include widenings, turn lane additions, new intersections, signal adjustments and other improvements.



Product Type	Max. Unit Dimensions	Typical Lot Dimensions	Estimated TOTAL Lot Count
2-Story Condo	N/A	147' x 212'	120
Townhome Series A	22' x 45'	22' x 65'	96
Townhome Series B	23' x 53'	23' x 73'	86
Urban Duplex	22' x 59'	27' x 79'	84
Urban SFD Cottage	27' x 53'	37' x 73'	86
TOTAL	N/A	N/A	475

BUILDING A A-100 MARKET SUBTOTAL	37,000 SF 37,000 SF	BUILDING H H-100 RESTAURANT H-110 RETAIL H-120 RETAIL H-130 RETAIL H-140 RESTAURANT H-200 OFFICE (L2-L4) SUBTOTAL	3,600 SF 2,600 SF 2,000 SF 1,700 SF 5,200 SF 90,000 SF 105,100 SF
BUILDING B B-100 RETAIL B-105 RETAIL B-110 RETAIL B-115 RETAIL B-120 RETAIL B-125 RETAIL B-130 RETAIL B-135 RETAIL SUBTOTAL	2,500 SF 3,300 SF 2,500 SF 2,500 SF 2,500 SF 2,500 SF 2,500 SF 2,500 SF 20,800 SF	BUILDING J J-100 RESTAURANT J-110 RESTAURANT SUBTOTAL	8,700 SF 9,100 SF 17,800 SF
BUILDING C C-100 RETAIL C-110 RETAIL SUBTOTAL	5,000 SF 4,000 SF 9,000 SF	BUILDING K K-100 RETAIL K-105 RETAIL K-110 RETAIL K-115 RETAIL K-120 RETAIL SUBTOTAL	3,100 SF 2,500 SF 2,500 SF 2,200 SF 2,000 SF 12,300 SF
BUILDING D D-100 RESTAURANT SUBTOTAL	5,200 SF 5,200 SF	BUILDING K2 (West) K-125 RETAIL K-130 RETAIL K-140 RETAIL K-150 RESTAURANT K-160 RESTAURANT SUBTOTAL	6,850 SF 5,400 SF 2,700 SF 3,015 SF 3,015 SF 20,980 SF
BUILDING E E-100 RESTAURANT E-105 RETAIL E-110 RETAIL E-115 RETAIL E-120 RESTAURANT E-125 RETAIL E-130 RETAIL E-135 RESTAURANT SUBTOTAL	3,100 SF 3,600 SF 2,400 SF 2,400 SF 2,500 SF 2,400 SF 2,400 SF 3,100 SF 21,900 SF	BUILDING PADS PD-A1 RESTAURANT PD-B1 RESTAURANT PD-C1 RESTAURANT PD-D1 RETAIL PD-E1 RETAIL SUBTOTAL	3,400 SF 8,600 SF 8,500 SF 3,800 SF 3,500 SF 27,800 SF
BUILDING F F-100 RETAIL F-105 RETAIL F-110 RETAIL F-115 RETAIL F-120 RETAIL F-125 RETAIL SUBTOTAL	3,700 SF 3,200 SF 3,200 SF 3,000 SF 3,000 SF 4,200 SF 20,300 SF	PAVILIONS PV-10 PV-15 PV-20 PV-40 PV-50 SUBTOTAL	500 SF 500 SF 500 SF 600 SF 1,000 SF 3,100 SF
BUILDING G1 G1-100 RETAIL G1-105 RETAIL G1-110 RETAIL G1-115 RETAIL G1-120 RETAIL G1-200 OFFICE (L2) SUBTOTAL	4,700 SF 2,000 SF 2,300 SF 2,100 SF 2,300 SF 20,000 SF 33,400 SF	RETAIL OFFICE MARKET RESTAURANT PAVILIONS TOTAL	129,550 SF 122,000 SF 37,000 SF 67,030 SF 3,100 SF 358,680 SF
BUILDING G2 G2-100 RETAIL G2-110 RETAIL G2-115 RETAIL G2-120 RETAIL G2-200 OFFICE (L2) SUBTOTAL	3,500 SF 3,700 SF 2,400 SF 2,400 SF 12,000 SF 24,000 SF	PHASE 1 PARKING SURFACE PARKING PARKING GARAGE L1 - GRADE L2 - ROOF SUBTOTAL	1,048 187 189 376
		PARKING PROVIDED RATIO/1,000 SF	1,424 STALLS 4.22

AUTOMOBILE PARKING SUMMARY		
WHOLE FOODS MARKET	246	STALLS
RETAIL	802	STALLS
YELLOW	269	STALLS
RED	533	STALLS
PARKING DECK	376	STALLS
INTERIOR ROADS	173	STALLS
MOUNTAIN LION DR. WEST	28	STALLS
MOUNTAIN LION DR. SOUTH	139	STALLS
TOTAL	1,767	STALLS



LEGEND

X = Traffic Analysis Zone (TAZ)

Note: For TAZ's only. Underlying site plan is obsolete.

Table 1										
Preliminary Centerra South Total Internal Trips-Ends										
Land Use	Daily	AM Peak			PM Peak			Sat Mid Day		
		In	Out	Total	In	Out	Total	In	Out	Total
Office	555	31	19	50	27	34	61	30	7	37
Retail	2655	25	25	50	215	266	481	290	312	602
Restaurant	3035	130	48	178	215	214	429	242	335	577
Entertainment	0									
Residential	2285	21	117	138	188	131	319	245	153	398
Hotel	0									
Other	0									

Table 2													
KSF/DU Per Taz													
TAZ	1	2	3	4	5	6	7	8	9	10	11	12	Total
Office	0	0	0	0	0	0	110	0	0	0	0	0	110
Retail	78	0	33	67	0	0	32	0	0	0	0	0	210
Restaurant	14	26	21	17		0	9	0	0	0	0	0	88
Entertainment	0	0	0	0	0	0	0	0	0	0	0	0	0
Residential	0	0	0	0	945.5556	472.7778		417	767.6667	164	238	362	3367
Hotel	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	7	0	0	0	0	0	0	0	0	0	0	7

Table 3												
Percentage of Land Use Per TAZ												
	1	2	3	4	5	6	7	8	9	10	11	12
Office	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%
Retail	37%	0%	16%	32%	0%	0%	15%	0%	0%	0%	0%	0%
Restaurant	16%	30%	24%	20%	0%	0%	10%	0%	0%	0%	0%	0%
Entertainment												
Residential	0%	0%	0%	0%	28%	14%	0%	12%	23%	5%	7%	11%
Hotel												
Other	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Pass-By Percentages				
Land Use	Daily	AM	PM	Sat
820 Shopping Center	29%	0%	29%	29%
932 High Turnover Restaurant	17%	0%	43%	43%
934 Fast Food w Drive thru	17%	50%	55%	55%
850 Grocery	24%	0%	24%	19%
912 Drive in Bank	31%	29%	35%	38%

Avenue South Trip Generation Estimates														
TAZ	Land Use	ITE Code	Unit	Quantity	Daily	AM Peak			PM Peak			Sat Mid day		
						In	Out	Total	In	Out	Total	In	Out	Total
1	Shopping Center	820	KSF	77.5	2868	40	25	65	126	137	264	177	164	341
	Internal Trips				-981	-9	-9	-18	-79	-98	-178	-107	-115	-222
	Passby Trips				-547	0	0	0	-12	-12	-25	-17	-17	-34
	High-Turnover Restaurant	932	KSF	14.3	1533	75	62	137	79	50	129	82	78	160
	Internal Trips				-496	-21	-8	-29	-35	-35	-70	-40	-55	-94
	Passby Trips				-176	0	0	0	-13	-13	-26	-14	-14	-28
	Net New External Trips				2201	85	69	154	66	29	95	81	41	122
2	High-Turnover Restaurant	932	KSF	26.31	2820	138	113	252	145	93	238	150	144	294
	Internal Trips				-912	-39	-14	-53	-65	-64	-129	-73	-101	-173
	Passby Trips				-324	0	0	0	-23	-23	-47	-26	-26	-52
	Drive In Bank	912	KSF	7.3	702	40	30	70	74	73	147	94	90	184
	Internal Trips				0	0	0	0	0	0	0	0	0	0
	Passby Trips				-217	-10	-10	-20	-26	-26	-51	-35	-35	-70
	Net New External Trips				2070	129	119	248	105	52	158	110	73	183
3	Shopping Center	820	KSF	33.48	1239	17	11	28	55	59	114	77	71	147
	Internal Trips				-424	-4	-4	-8	-34	-42	-77	-46	-50	-96
	Passby Trips				-236	0	0	0	-5	-5	-11	-7	-7	-15
	High-Turnover Restaurant	932	KSF	17.366	1862	91	75	166	96	61	157	99	95	194
	Internal Trips				-602	-26	-10	-35	-43	-42	-85	-48	-66	-114
	Passby Trips				-214	0	0	0	-15	-15	-31	-17	-17	-34
	Fast Food With Drive Through	934	KSF	3.425	1601	78	75	153	59	54	113	97	93	189
	Internal Trips				-119	-5	-2	-7	-8	-8	-17	-9	-13	-23
Passby Trips				-252	-36	-36	-73	-26	-26	-53	-46	-46	-92	
Net New External Trips				2855	115	108	224	77	34	111	98	59	157	
4	Shopping Center	820	KSF	29.83	1104	16	10	25	49	53	101	68	63	131
	Internal Trips				-377	-4	-4	-7	-31	-38	-68	-41	-44	-86
	Passby Trips				-211	0	0	0	-5	-5	-10	-7	-7	-13
	High-Turnover Restaurant	932	KSF	17.366	1862	91	75	166	96	61	157	99	95	194
	Internal Trips				-602	-26	-10	-35	-43	-42	-85	-48	-66	-114
	Passby Trips				-214	0	0	0	-15	-15	-31	-17	-17	-34
	Grocery	850	KSF	37	3472	62	44	106	166	165	331	187	187	374
	Internal Trips				-468	-4	-4	-9	-38	-47	-85	-51	-55	-106
Passby Trips				-721	0	0	0	-30	-30	-59	-25	-25	-51	
Net New External Trips				3844	135	111	246	150	102	252	165	130	295	
5	Multi-Family Housing (Low-Rise)	220	Dwelling Units	945.5555556	6136	76	240	316	269	158	427	194	194	388
	Internal Trips				-642	-6	-33	-39	-53	-37	-90	-69	-43	-112
	Passby Trips				0	0	0	0	0	0	0	0	0	0
	Net New External Trips				5495	70	207	277	216	121	338	125	151	276
6	Multi-Family Housing (Low-Rise)	220	Dwelling Units	472.7777778	3106	41	129	169	141	83	224	97	97	194
	Internal Trips				-321	-3	-16	-19	-26	-18	-45	-34	-21	-56
	Passby Trips				0	0	0	0	0	0	0	0	0	0
	Net New External Trips				2785	38	112	150	115	64	179	63	75	138
7	Shopping Center	820	KSF	32	1184	17	10	27	52	57	109	73	68	141
	Internal Trips				-405	-4	-4	-8	-33	-41	-73	-44	-48	-92
	Passby Trips				-226	0	0	0	-5	-5	-10	-7	-7	-14
	High-Turnover Restaurant	932	KSF	8.8	943	46	38	84	49	31	80	50	48	98
	Internal Trips				-305	-13	-5	-18	-22	-22	-43	-24	-34	-58
	Passby Trips				-109	0	0	0	-8	-8	-16	-9	-9	-17
	Office	710	KSF	110	1192	147	20	167	27	131	158	31	27	58
	Internal Trips				-555	-31	-19	-50	-27	-34	-61	-30	-7	-37
Passby Trips				0	0	0	0	0	0	0	0	0	0	
Net New External Trips				1721	162	41	203	33	110	143	41	39	79	
8	Multi-Family Housing (Low-Rise)	220	Dwelling Units	417	2748	37	116	152	126	74	200	85	85	171
	Internal Trips				-283	-3	-14	-17	-23	-16	-40	-30	-19	-49
	Passby Trips				0	0	0	0	0	0	0	0	0	0
	Net New External Trips				2465	34	101	135	103	58	160	55	67	122
9	Multi-Family Housing (Low-Rise)	220	Dwelling Units	767.6666667	4996	63	198	261	221	130	351	157	157	315
	Internal Trips				-521	-5	-27	-31	-43	-30	-73	-56	-35	-91
	Passby Trips				0	0	0	0	0	0	0	0	0	0
	Net New External Trips				4475	58	172	229	178	100	278	102	122	224
10	Senior Adult Housing - Multifamily	252	Dwelling Units	164	499	11	21	32	23	18	41	28	23	52
	Internal Trips				-111	-1	-6	-7	-9	-6	-16	-12	-7	-19
	Passby Trips				0	0	0	0	0	0	0	0	0	0
	Net New External Trips				387	10	15	25	14	12	26	16	16	33
11	Single-Family Atatched Housing	215	Dweling Units	195	1435	24	72	96	67	46	113	55	60	115
	Single-Family Detatched Housing	210	Dwelling Units	43	464	9	26	35	28	17	45	25	21	47
	Internal Trips				-162	-1	-8	-10	-13	-9	-23	-17	-11	-28
	Passby Trips				0	0	0	0	0	0	0	0	0	0
	Net New External Trips				1738	31	89	121	82	54	135	63	71	134
12	Single-Family Atatched Housing	215	Dweling Units	194	1428	24	71	95	66	46	112	55	60	115
	Single-Family Detatched Housing	210	Dwelling Units	43	464	9	26	35	28	17	45	25	21	47
	Multi-Family Housing (Low-Rise)	220	Dwelling Units	125	877	15	47	62	47	27	74	26	26	51
	Internal Trips				-384	-2	-20	-22	-32	-22	-55	-5	-13	-19
	Passby Trips				0	0	0	0	0	0	0	0	0	0
Net New External Trips				2385	45	125	169	109	68	177	101	94	194	
Total					43660	1151	1485	2637	2042	1615	3657	2007	1942	3951
	Internal Trips				-8668	-207	-216	-423	-657	-653	-1310	-786	-804	-1590
	Passby Trips				-3448	-47	-47	-93	-185	-185	-369	-228	-228	-456
	Net New External Trips				32421	912	1270	2182	1247	804	2051	1018	936	1956

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Avenue South			Organization:	Felsburg Holt & Ullevig
Project Location:	Loveland, CO			Performed By:	Yory Moncada
Scenario Description:	Buildout			Date:	10/21/2024
Analysis Year:	2045			Checked By:	
Analysis Period:	AM Street Peak Hour			Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office	710	46,500	SF	167	147	20
Retail	820	77,280	SF	251	152	99
Restaurant	932	87,580	SF	958	521	437
Cinema/Entertainment				0		
Residential	220,221	1,544	DUs	1,252	306	946
Hotel	310	750	Rooms	0		
All Other Land Uses ²				70	40	30
				2,698	1,166	1,532

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant	1.00			1.00		
Cinema/Entertainment	1.00			1.00		
Residential	1.00			1.00		
Hotel	1.00			1.00		
All Other Land Uses ²	1.00			1.00		

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	13	0	0	0
Retail	6		13	0	6	0
Restaurant	21	12		0	15	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	9	104	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	2,698	1,166	1,532
Internal Capture Percentage	15%	18%	14%
External Vehicle-Trips ⁵	2,280	957	1,323
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	21%	95%
Retail	18%	25%
Restaurant	25%	11%
Cinema/Entertainment	N/A	N/A
Residential	7%	12%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.
⁶ Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Avenue South
Analysis Period:	AM Street Peak Hour

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	147	147	1.00	20	20
Retail	1.00	152	152	1.00	99	99
Restaurant	1.00	521	521	1.00	437	437
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	306	306	1.00	946	946
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	13	0	0	0
Retail	29		13	0	14	0
Restaurant	135	61		0	17	13
Cinema/Entertainment	0	0	0		0	0
Residential	19	9	189	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		49	120	0	0	0
Retail	6		261	0	6	0
Restaurant	21	12		0	15	0
Cinema/Entertainment	0	0	0		0	0
Residential	4	26	104	0		0
Hotel	4	6	31	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	31	116	147	116	0	0
Retail	27	125	152	125	0	0
Restaurant	130	391	521	391	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	21	285	306	285	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	40	40	40	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	19	1	20	1	0	0
Retail	25	74	99	74	0	0
Restaurant	48	389	437	389	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	117	829	946	829	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	30	30	30	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Avenue South			Organization:	Felsburg Holt & Ullevig
Project Location:	Loveland, CO			Performed By:	Yory Moncada
Scenario Description:	Buildout			Date:	10/21/2024
Analysis Year:	2045			Checked By:	
Analysis Period:	PM Street Peak Hour			Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office	710	66,000	SF	158	27	131
Retail	820	50,125	SF	919	448	471
Restaurant	932	66,075	SF	874	523	351
Cinema/Entertainment				0		
Residential	220,221	1,047	DUs	1,632	1,016	616
Hotel	310	620	Rooms	0		
All Other Land Uses ²				147	74	73
				3,730	2,088	1,642

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant	1.00			1.00		
Cinema/Entertainment	1.00			1.00		
Residential	1.00			1.00		
Hotel	1.00			1.00		
All Other Land Uses ²	1.00			1.00		

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		26	5	0	3	0
Retail	7		137	0	122	0
Restaurant	7	144		0	63	0
Cinema/Entertainment	0	0	0		0	0
Residential	13	45	73	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	3,730	2,088	1,642
Internal Capture Percentage	35%	31%	39%
External Vehicle-Trips ⁵	2,440	1,443	997
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	100%	26%
Retail	48%	56%
Restaurant	41%	61%
Cinema/Entertainment	N/A	N/A
Residential	19%	21%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.
⁶ Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Avenue South
Analysis Period:	PM Street Peak Hour

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	27	27	1.00	131	131
Retail	1.00	448	448	1.00	471	471
Restaurant	1.00	523	523	1.00	351	351
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	1016	1016	1.00	616	616
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		26	5	0	3	0
Retail	9		137	19	122	24
Restaurant	11	144		28	63	25
Cinema/Entertainment	0	0	0		0	0
Residential	25	259	129	0		18
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		36	10	0	41	0
Retail	8		152	0	467	0
Restaurant	8	224		0	163	0
Cinema/Entertainment	2	18	16		41	0
Residential	15	45	73	0		0
Hotel	0	9	26	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	27	0	27	0	0	0
Retail	215	233	448	233	0	0
Restaurant	215	308	523	308	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	188	828	1016	828	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	74	74	74	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	34	97	131	97	0	0
Retail	266	205	471	205	0	0
Restaurant	214	137	351	137	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	131	485	616	485	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	73	73	73	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Avenue South			Organization:	Felsburg Holt & Ullevig
Project Location:	Loveland, CO			Performed By:	Yory Moncada
Scenario Description:	Buildout			Date:	10/21/2024
Analysis Year:	2045			Checked By:	
Analysis Period:	Saturday Mid-Day			Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office	710	66,000	SF	58	31	27
Retail	820	50,125	SF	1,134	582	552
Restaurant	932	66,075	SF	1,131	577	554
Cinema/Entertainment				0		
Residential	220,221	1,047	DUs	1,493	748	745
Hotel	310	620	Rooms	0		
All Other Land Uses ²				184	94	90
				4,000	2,032	1,968

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.00			1.00		
Retail	1.00			1.00		
Restaurant	1.00			1.00		
Cinema/Entertainment	1.00			1.00		
Residential	1.00			1.00		
Hotel	1.00			1.00		
All Other Land Uses ²	1.00			1.00		

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	1	0	1	0
Retail	8		160	0	144	0
Restaurant	8	227		0	100	0
Cinema/Entertainment	0	0	0		0	0
Residential	14	58	81	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	4,000	2,032	1,968
Internal Capture Percentage	40%	40%	41%
External Vehicle-Trips ⁵	2,386	1,225	1,161
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	97%	26%
Retail	50%	57%
Restaurant	42%	60%
Cinema/Entertainment	N/A	N/A
Residential	33%	21%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.
⁶ Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Avenue South
Analysis Period:	Saturday Mid-Day

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	31	31	1.00	27	27
Retail	1.00	582	582	1.00	552	552
Restaurant	1.00	577	577	1.00	554	554
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	748	748	1.00	745	745
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	1	0	1	0
Retail	11		160	22	144	28
Restaurant	17	227		44	100	39
Cinema/Entertainment	0	0	0		0	0
Residential	30	313	156	0		22
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		47	12	0	30	0
Retail	10		167	0	344	0
Restaurant	9	291		0	120	0
Cinema/Entertainment	2	23	17		30	0
Residential	18	58	81	0		0
Hotel	0	12	29	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	30	1	31	1	0	0
Retail	290	292	582	292	0	0
Restaurant	242	335	577	335	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	245	503	748	503	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	94	94	94	0	0

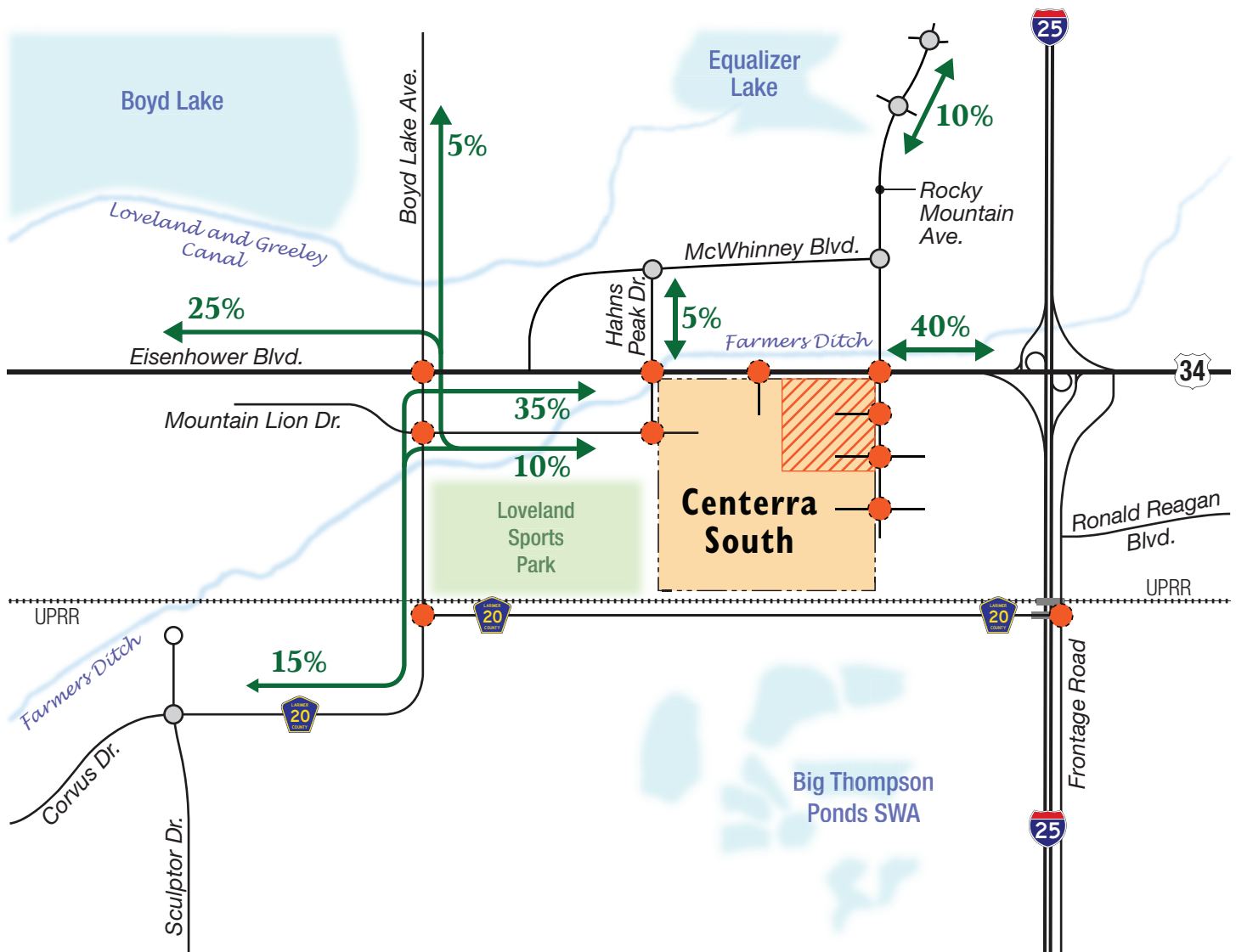
Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	7	20	27	20	0	0
Retail	312	240	552	240	0	0
Restaurant	335	219	554	219	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	153	592	745	592	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	90	90	90	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

²Person-Trips

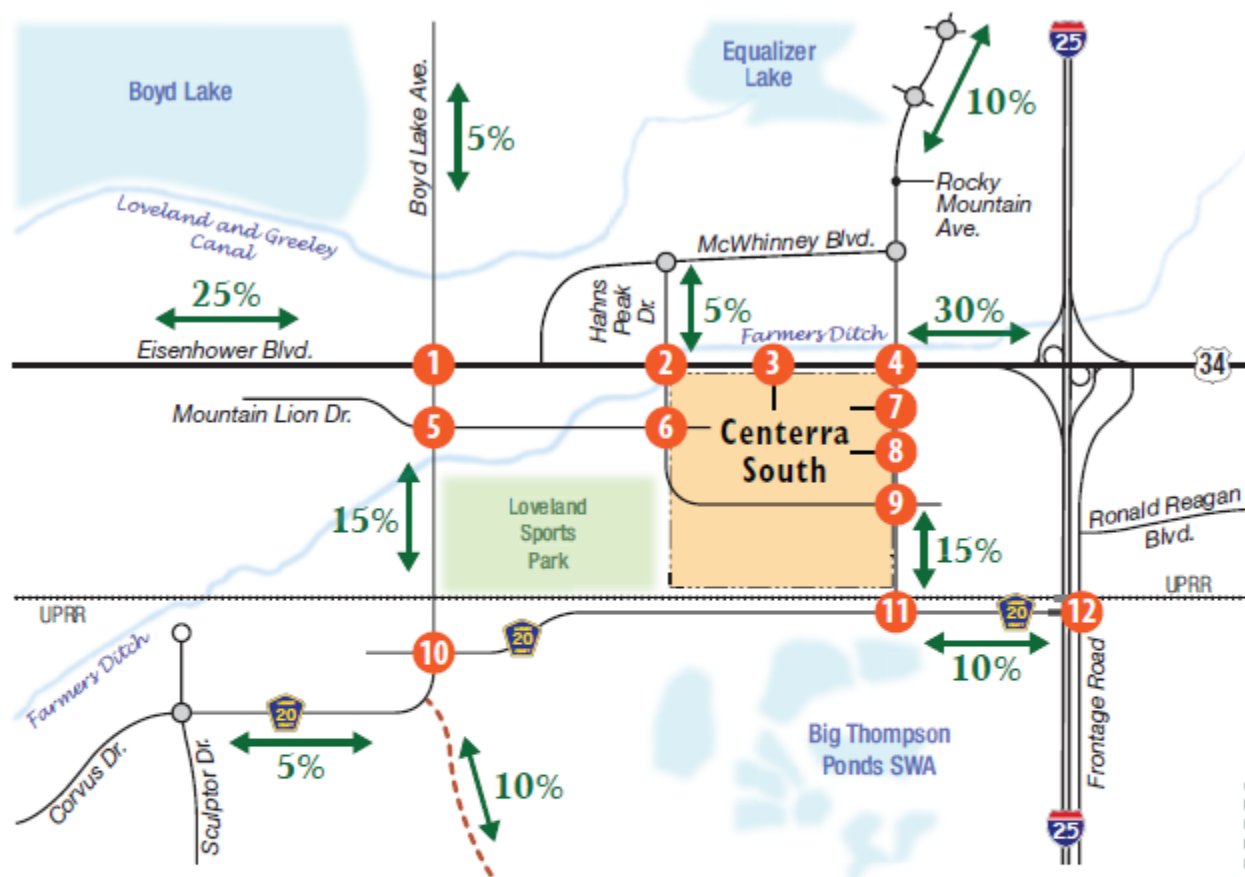
³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.



LEGEND

- = Site Trip Distribution
- = Approximate Area for Phase 1 and 2
- = Intersections to be Analyzed



LEGEND

xxx(xxx) = AM(PM) Peak Hour Traffic Volumes

XX% = Site Trip Distribution

--- = Future Roadway

X = Study Intersection

Long-Term Trip Distribution
Includes Connection to LCR 20E