TRAFFIC IMPACT STUDY

Avenue South

Loveland, Colorado

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I. INTRODUCTION

McWhinney is planning to develop approximately 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 of US 34), 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 unit amount analyzed in this study reflects 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.

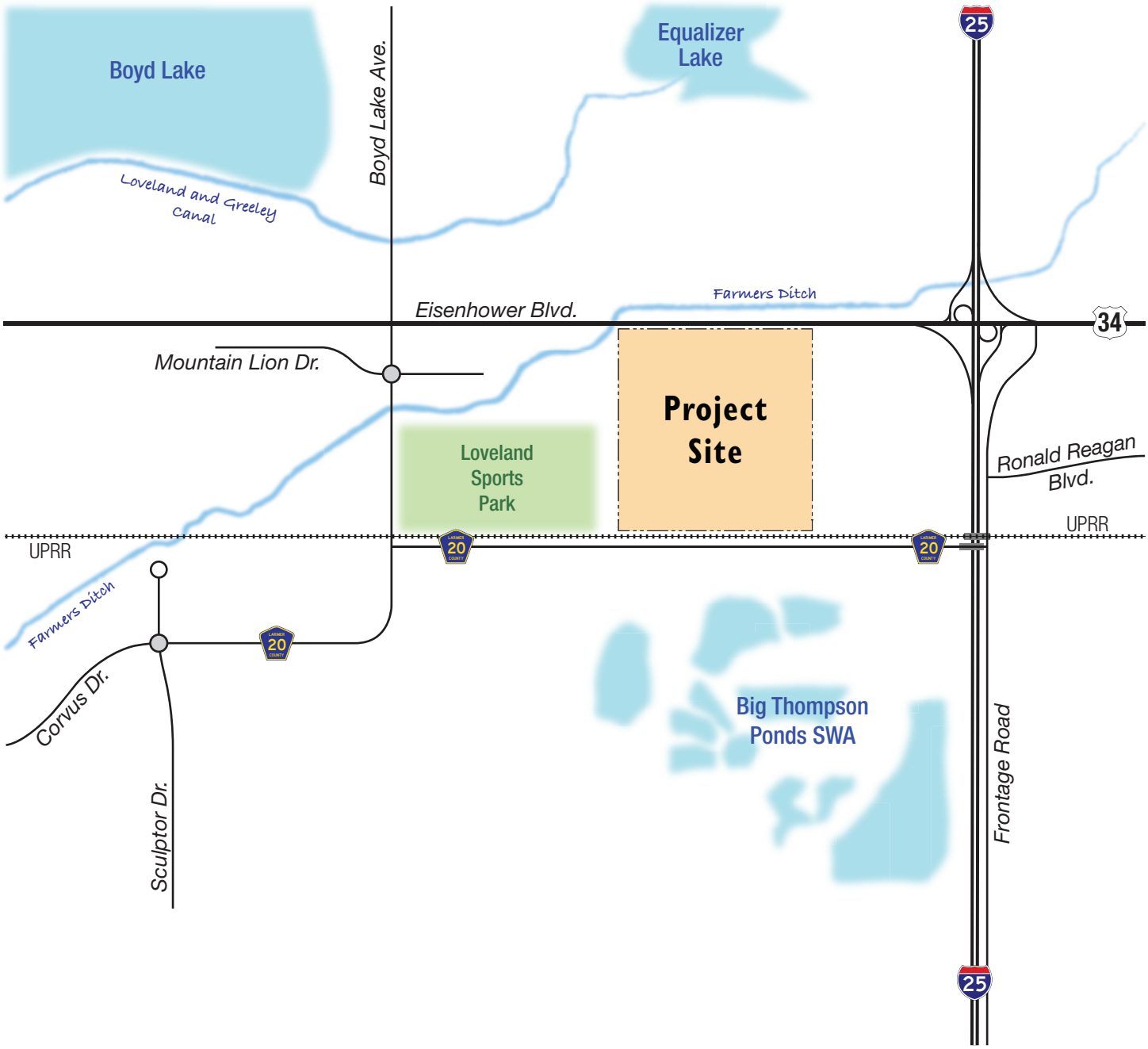
At completion, the site is anticipated to be served by two US 34 signalized full movement vehicular accesses via Rocky Mountain Avenue and Hahns Peak Drive, both of which exist. A Right-in/Right-Out (RIRO) intersection is also planned along US 34 in between these two signals, which is recognized in the 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.

The two future planning horizons being evaluated include:

- **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 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** yet 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 Rocky Mountain Avenue connection across the GWRR to LCR 20E will be in place. Other area network enhancements that are expected include the completion of Sculptor Drive across the GWRR, the extension of Boyd Lake Avenue south to SH 402, and the completion of Kendall Parkway from Boyd Lake Avenue to US 34 (this was recently completed passing under I-25). The full development of the neighboring properties is also assumed. Two of these network enhancements are outside the study area but affect traffic demand with the study area per the NFR travel demand model.

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



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NOTE: Drawing Not to Scale

FIGURE 1
Vicinity Map

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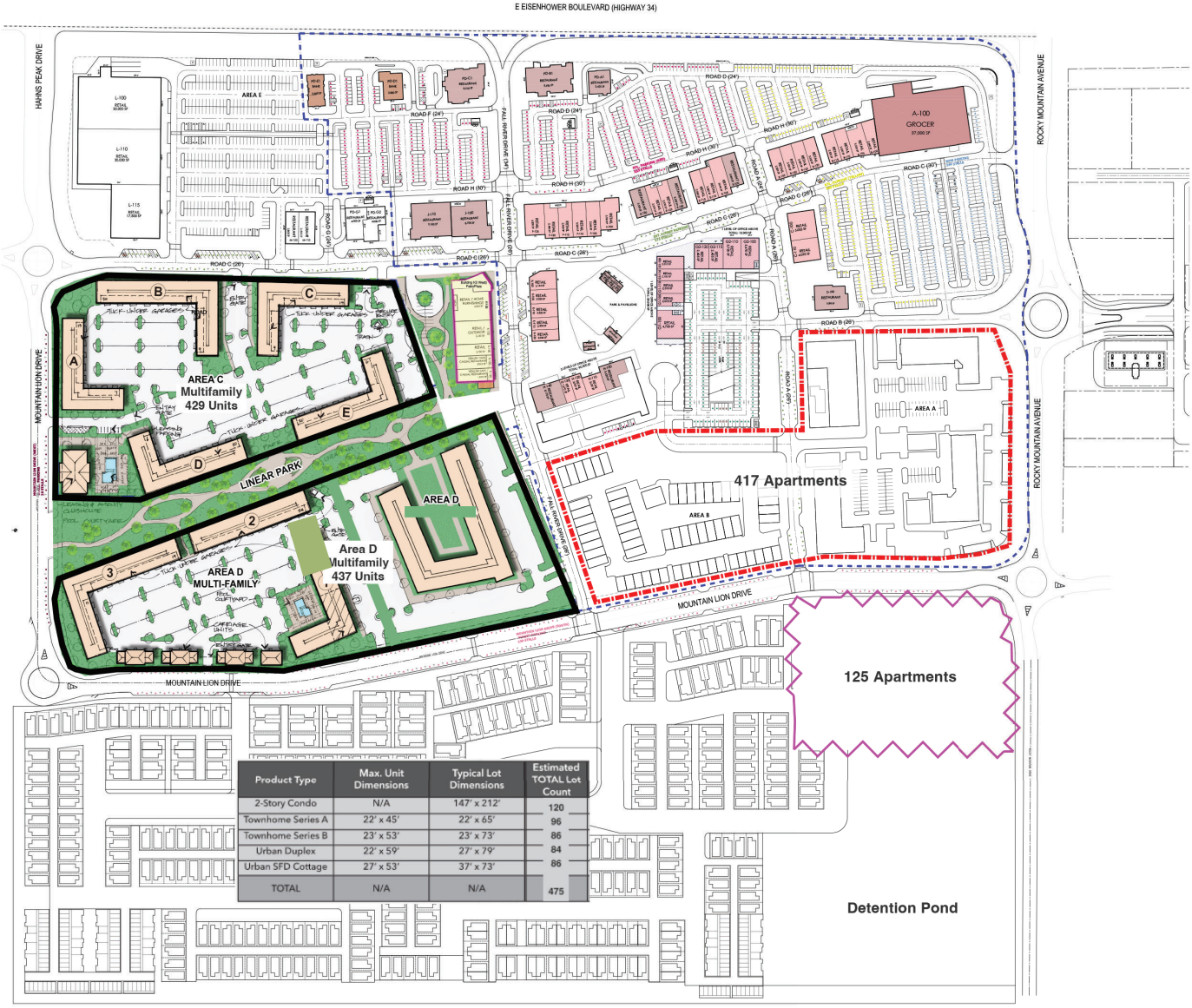

Product Type	Max. Unit Dimensions	Typical Lot Dimensions	Estimated TOTAL Lot Count
2-Story Condo	N/A	147' x 212'	120
Townhome Series A	22' x 45'	22' x 65'	96
Townhome Series B	23' x 53'	23' x 73'	86
Urban Duplex	22' x 59'	27' x 79'	84
Urban SFD Cottage	27' x 53'	37' x 73'	86
TOTAL	N/A	N/A	475

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FIGURE 2
Site Plan

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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 captures the Avenue South frontage and reflects the proposed development plan's access scheme (thereby being consistent with the Access Control Plan).
- **Rocky Mountain Avenue** is a four-lane arterial running north-south from US 34 to Crossroads Boulevard paralleling I-25 to its 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) and the GWRR due to crossing the rail line.
- **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 passing 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 from the west.
- **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 south along the Hahns Peak Drive alignment and east through Avenue South to intersect with the Rocky Mountain Avenue extension.

II.B. Surrounding Land Uses

The surrounding area is partially developed. Chilson-Stroh to the west is underway. Uses include auto dealerships and multi-family residential uses, and various commercial pads along US 34 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 (TMCs) collected as part of the Schmer Farm Traffic Impact Study were extracted for some of the study area intersections, including the US 34/Hahns Peak Drive and the US 34/Rocky Mountain Avenue intersections. These data were collected in February 2024. All Traffic Data/Rekor counted the remainder of the study area intersections in September 2024. Weekday AM peak hour, PM peak hour, and Saturday peak hour TMCs were collected at the study area intersections 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 in the study area. AM demands adjacent to the site are approximately 3,200 vehicles per hour (vph), and the PM demands are just above 3,900 vph (both directions combined). Boyd Lake Avenue serves 900 to 1,200 vph 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 vph during the peak hours. The directionality favors the northbound direction in the AM and the southbound direction in the PM peak hour. Besides east-west though traffic, the US 34/Rocky Mountain Avenue intersection displays a heavy traffic pattern between the east (to/from I-25) and north legs.

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

Weekday PM peak hour tends to be the heaviest of the three peak hours counted. One exception is along Boyd Lake Avenue north of the Loveland Sports Park, likely due to park activity on Saturdays. Other exceptions include Hahns Peak Drive and Rocky Mountain Avenue north of US 34, in which the Saturday peak hour sees the greatest demand, likely due to the retail-oriented traffic served by these roadways.

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 calculate 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 recognized that the southbound left turn movement is heavy at times creating backups to the roundabout at Foxtrail Drive.

US 34/Hahns Peak Drive

This intersection operates acceptably (LOS D or better) as a signalized intersection during all three peak hours. US 34 provides only two through lanes in each direction at this intersection. The city will be constructing a third through lane in both directions in the near future, which could improve its LOS.

US 34/Boyd Lake Avenue

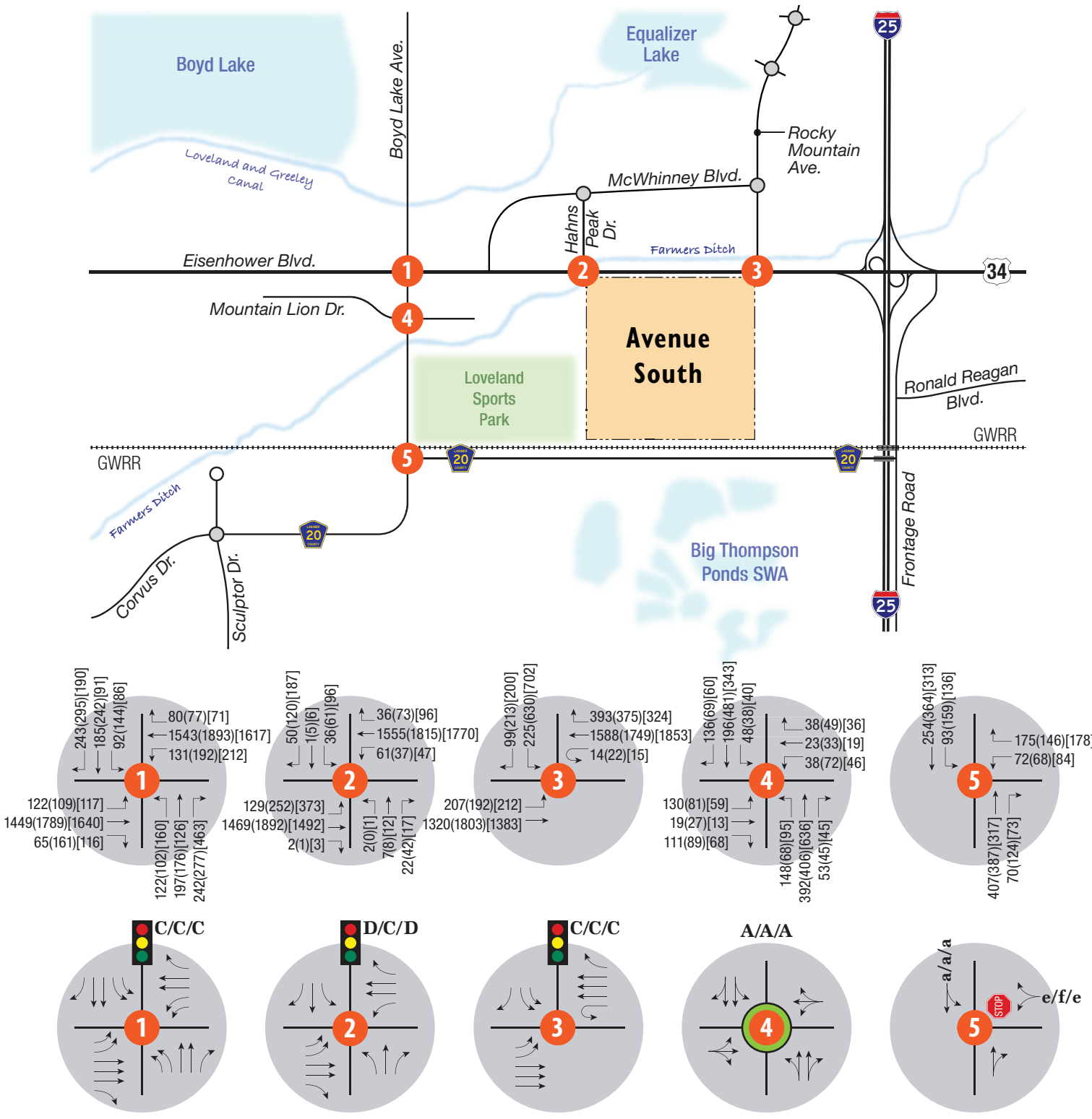
Currently, this intersection operates at an acceptable LOS C during all three peak hours given its current lane geometry. Dual left turn lanes are provided along all four approaches, and three through lanes are provided in the eastbound direction, two in the westbound direction. North-south traffic is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

Boyd Lake Avenue/Mountain Lion Drive

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

Boyd Lake Avenue/ LCR 20E

This unsignalized intersection near the GWRR crossing of Boyd Lake Avenue experiences delay as a side-street stop-controlled intersection. The westbound approach functions at either an LOS E or an LOS F during peak hours.



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
X	=	Study Intersection

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NOTE: Drawing Not to Scale

FIGURE 3
Existing (2023) Traffic Conditions

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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 1 of the project would include TAZs 2, 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.

Avenue South has been laid out with an intentional mix of uses that prioritizes multimodal transportation. Planned facilities will encourage walking and bicycling over the reliance of single-occupancy vehicles. Dedicated bike lanes along collector streets will provide safe and efficient routes for cyclists, while slow-speed interior roads will provide a shared space approach, fostering a pedestrian-friendly environment. Abundant walkways and direct pedestrian connections will be provided throughout the site ensuring safe and convenient access to retail, dining, and services.

A linear park connection from Loveland Sports Park will enhance outdoor mobility, offering scenic off-road pathways that will make walking and biking more inviting. Strategically placed safe street crossings will also improve connectivity between neighborhoods, and no key amenity will be more than a quarter-mile from large residential areas. This will encourage short, active trips on a daily basis. A robust tree canopy will increase user comfort along these routes, making year-round pedestrian and cyclist travel more enjoyable. With a Live-Work-Play design philosophy, Avenue South integrates housing, employment, and recreation within a half-mile radius, reducing the need for car travel while fostering a vibrant, connected community. The thoughtful lay out of the master plan will encourage internal trip making via non-auto uses which collectively support the auto trip reduction estimates applied in this study.

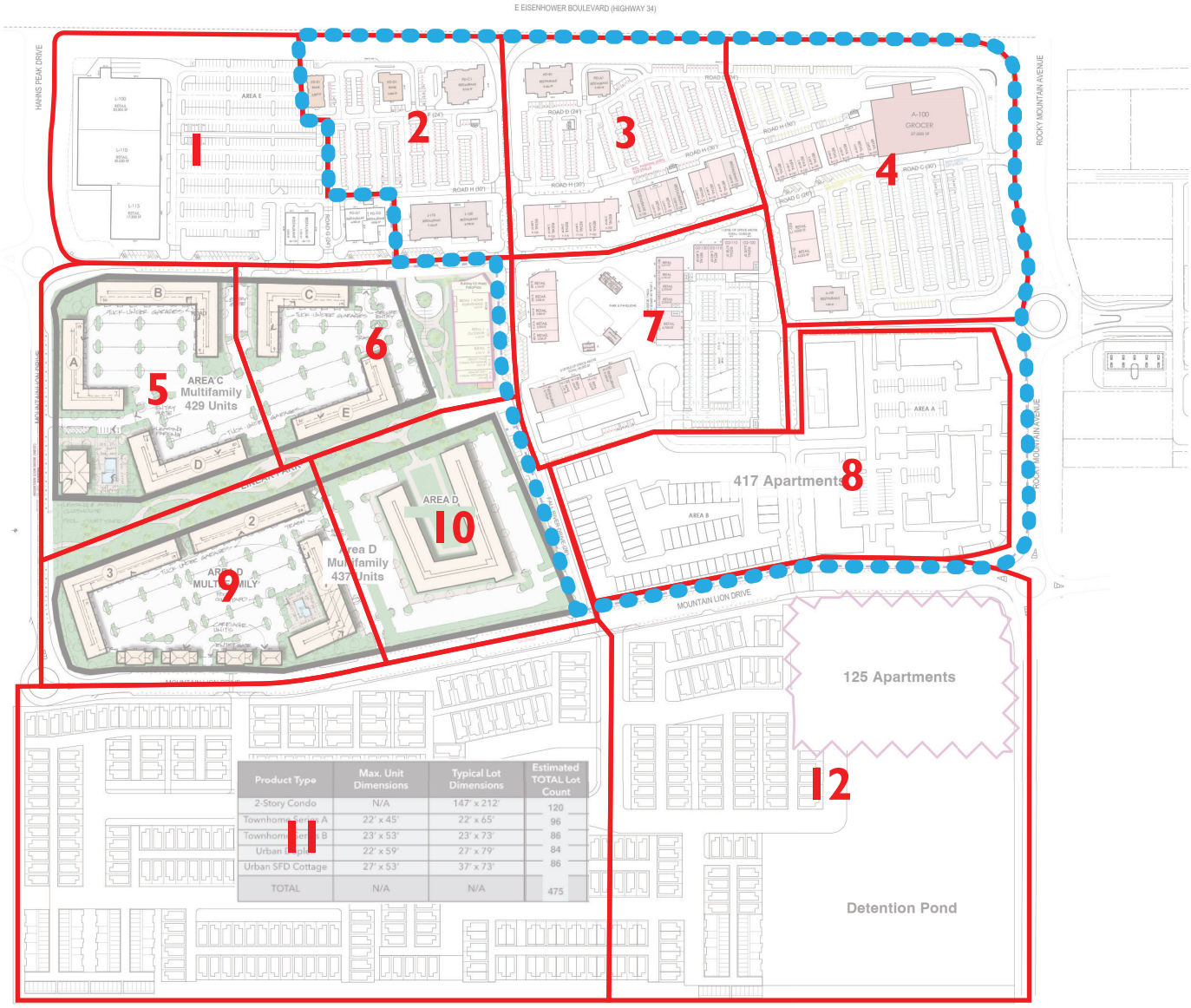
Using procedures outlined in NCHRP 684, trips remaining internal to Avenue South were estimated. This procedure considers the mix of uses and calculates the internal trip activity based on the nature of land uses. **Appendix C** shows the process, and the net effect from applying this procedure yielded 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 and services as a matter of convenience. ITE data provide information for pass-by traffic based on specific uses and time of day peak hour as well as it 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 1** shows the pass-by percentages used in this study.

Table 1. 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

X = TAZ (Traffic Analysis Zone) Boundary

= Short-Term Boundary

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FIGURE 4

Site Plan with TAZ (Traffic Analysis Zones) Overlay

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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, 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 1 development (TAZs 2, 3, 4, 7, and 8) is anticipated to generate 12,955 external new trips per day, with 1056 during the AM peak hour, 824 during the PM peak hour, and 836 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**

*TAZ is included as part of Phase 1 of the development.

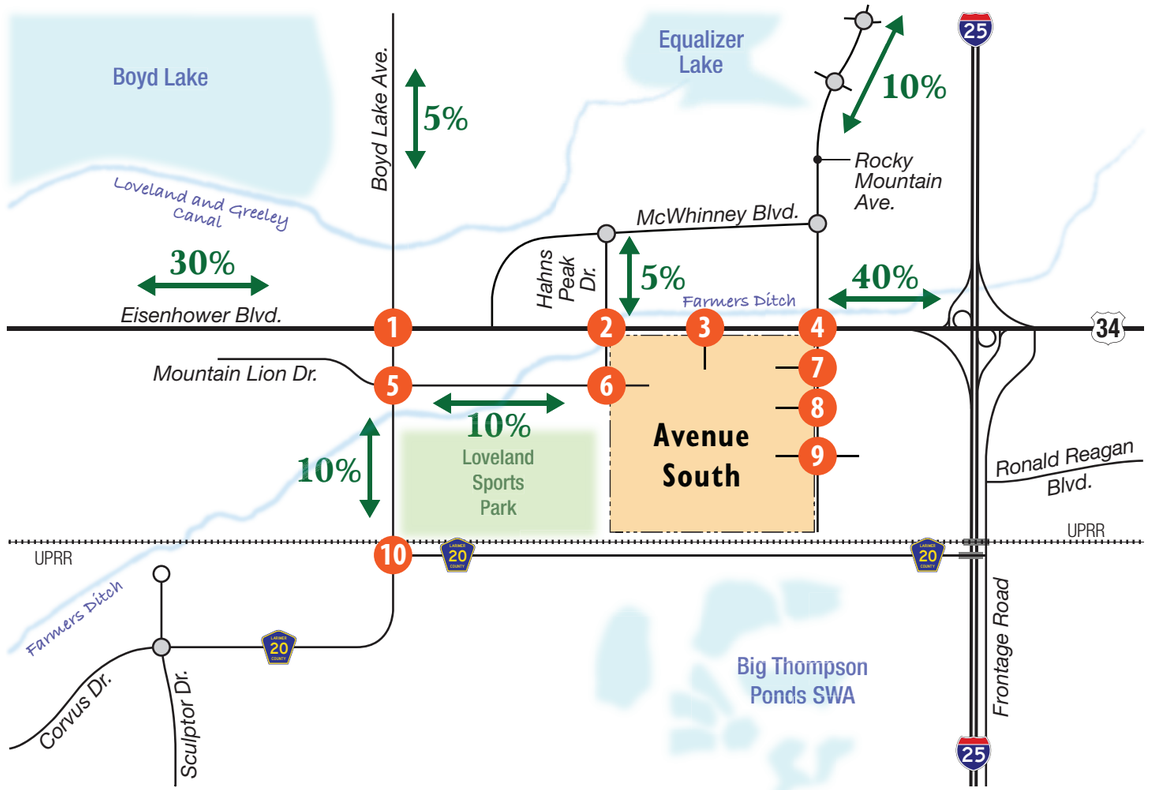
III.D. Trip Distribution and Traffic Assignment

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 Avenue roadway connection to LCR 20E, whereas the long-term does and therefore offers an additional means of routing trips (and therefore adjustments in the distribution percentages).

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 approximately 7 percent of Avenue South traffic that would otherwise use US 34 to/from the west or Mountain Lion Drive.

From **Figure 5**, Phase 1 of the development is estimated to add 290 to 410 vph 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 vph per **Figure 6**.



LEGEND

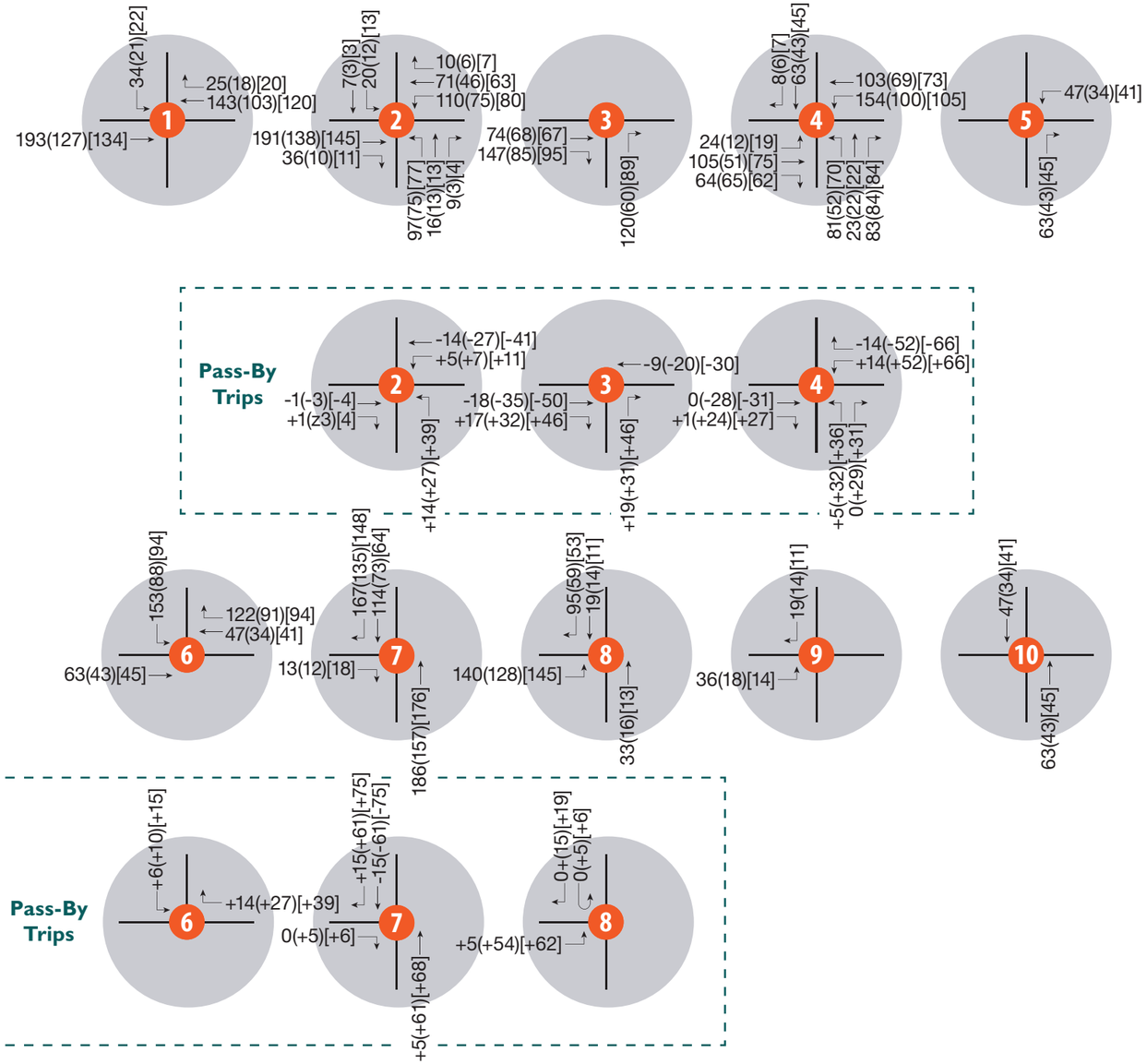
XXX(XXX)[XXX] = AM(PM)[SAT] Peak Hour Traffic Volumes

XX% = Site Trip Distribution

X = Study Intersection

Short-Term Site Generated Traffic

Pass-By Trips



NORTH

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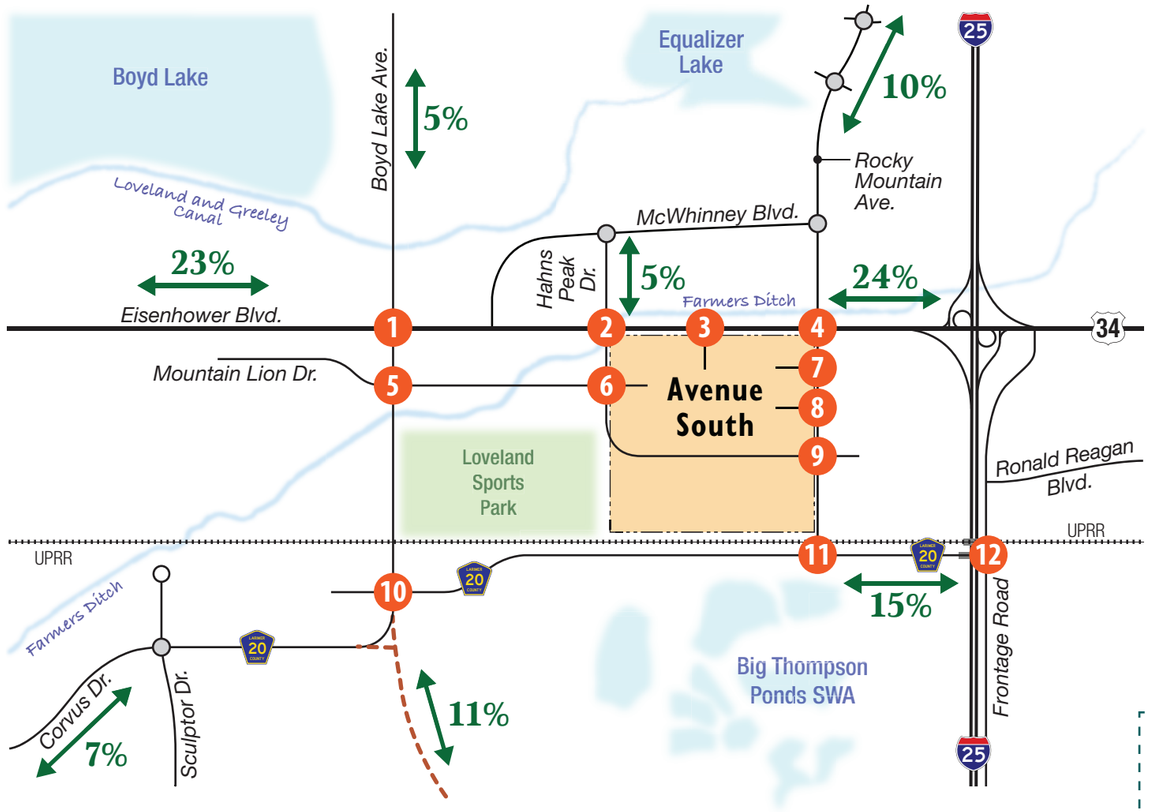
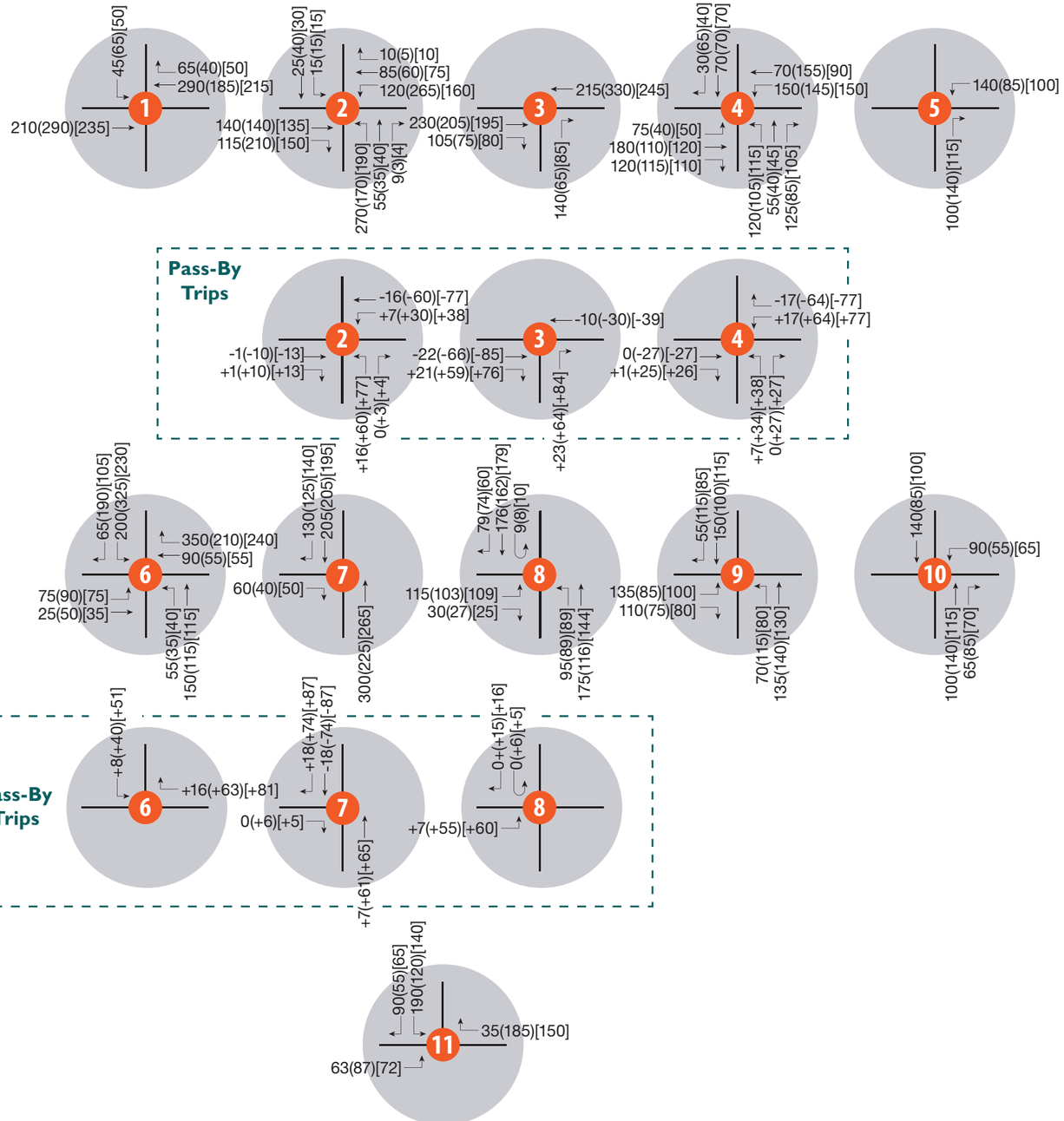
NOTE: Drawing Not to Scale

FIGURE 5

2029 Trip Distribution and Site Generated Traffic Volumes

Centerra Avenue South DEC_24 UPDATE 124281-01 12/19/24





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

NORTH

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. Auxiliary lanes will also be provided at intersections and accesses.
- **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 the Millennium GDP 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. Completed turn lanes adds to its width. 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 a 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 line. This new intersection is planned to be controlled via a roundabout by 2045 possibly being built in conjunction with the Stuart development plan on the west side of Boyd Lake Avenue. 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 west of Rocky Mountain Avenue.

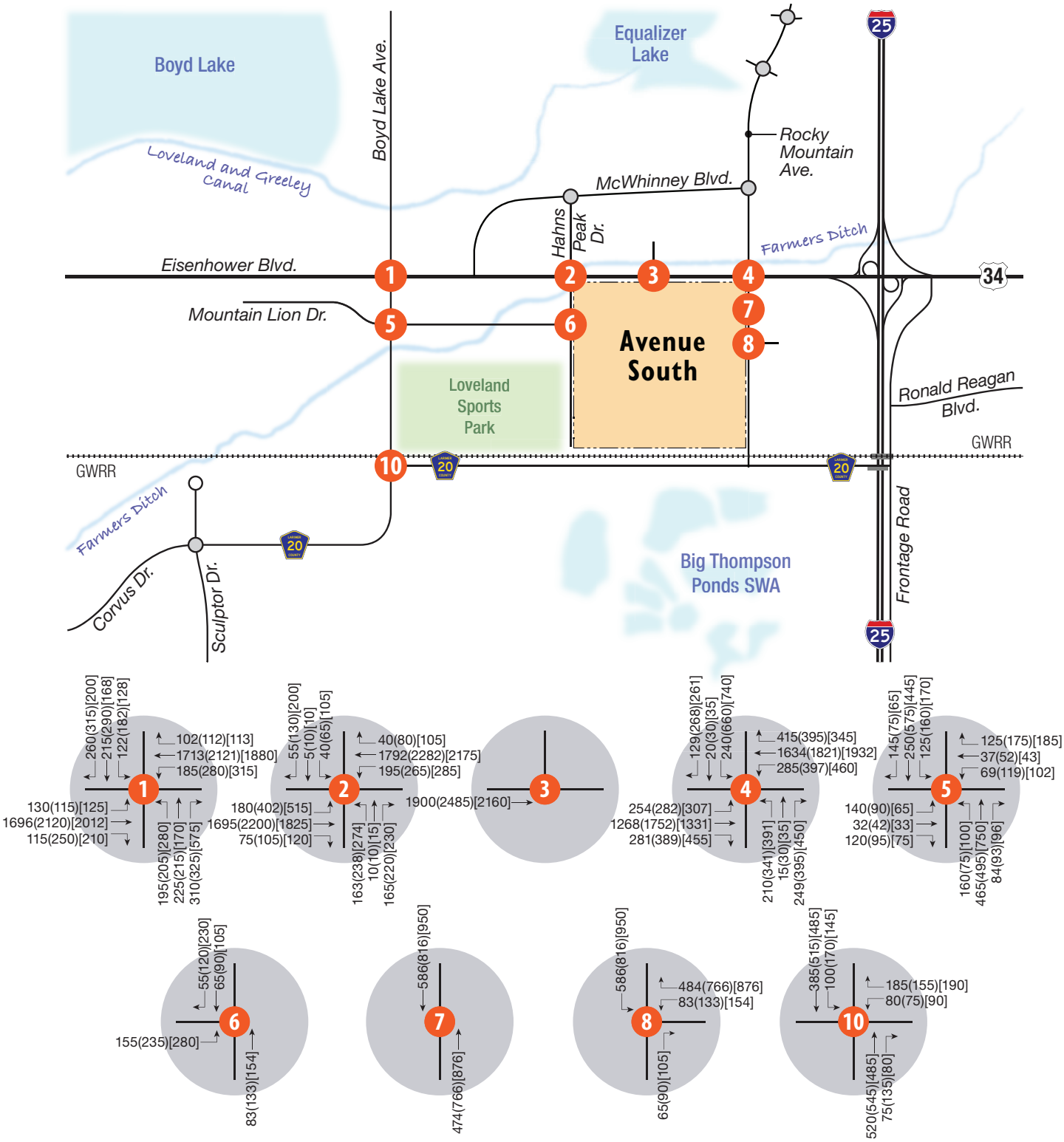
IV.B. Short-Term (2029) Background Traffic Forecasts

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 in part by applying a 1.0 percent annual growth factor to the existing counts. In addition, traffic estimates from the Chilson-Stroh residential and commercial sites (after adjusting for pass-by effects) west of Avenue South have 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 RIRO 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 (including pass-by traffic adjustments) 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 based on their December 2024 traffic impact study prepared by Galloway & Company. 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 13,000 external new trips during a weekday and 15,000 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 for now), serving the new trips as well as Schmer Farm's pass-by trips.

Recently, the eastbound left turn at US 34/Fall River Road serving the Centerra Marketplace north of US 34, was closed. As part of developing future background traffic, these movements were shifted to Hahns Peak and to a lesser degree Rocky Mountain Avenue. These shifts are also captured on **Figure 7**.



LEGEND

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

X = Study Intersection

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NORTH

NOTE: Drawing Not to Scale

FIGURE 7

2029 Background Traffic Volumes

Centerra Avenue South MAR_25 UPDATE 124281-01 3/19/25

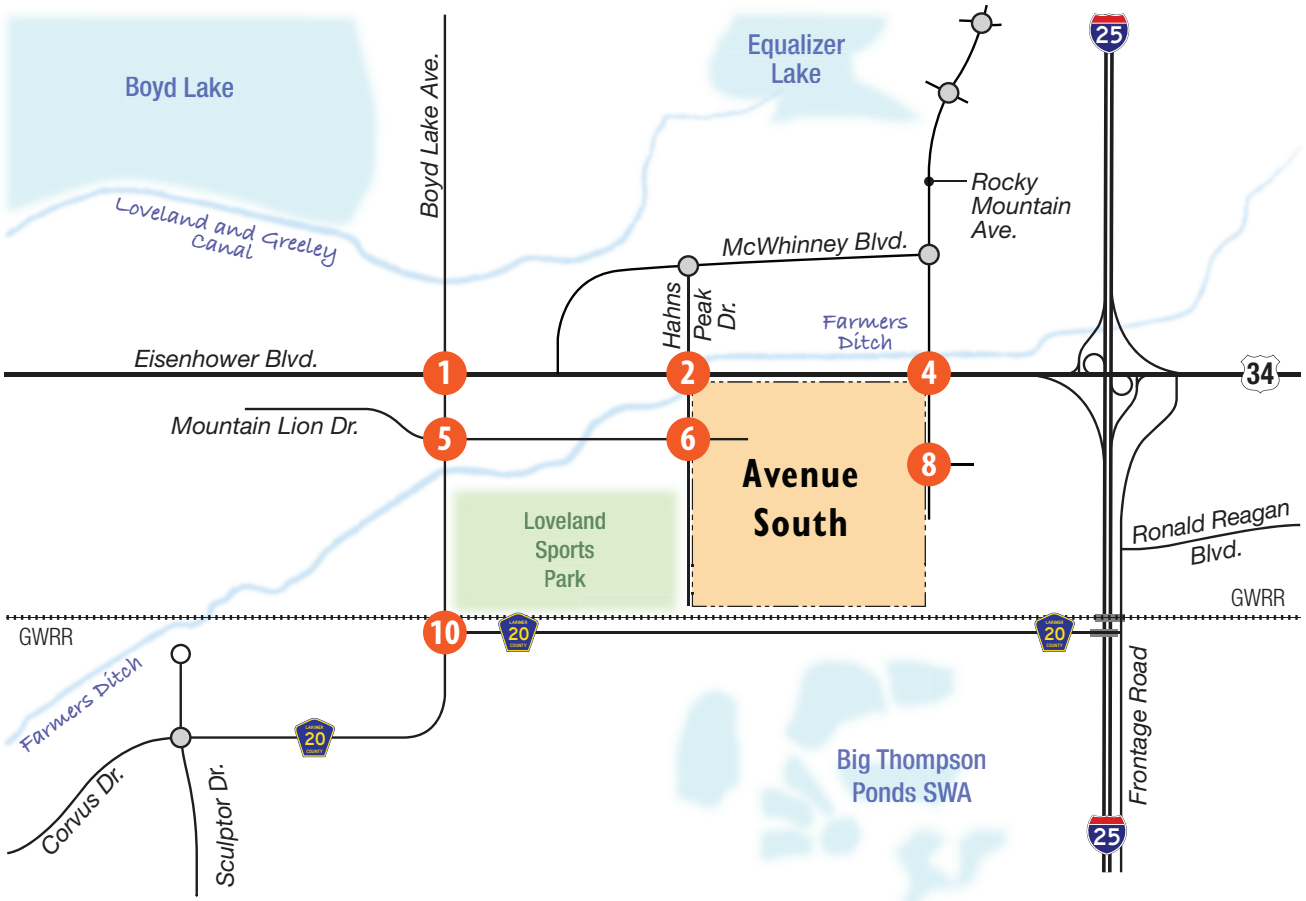
IV.C. Short-Term (2029) Background Traffic Operations

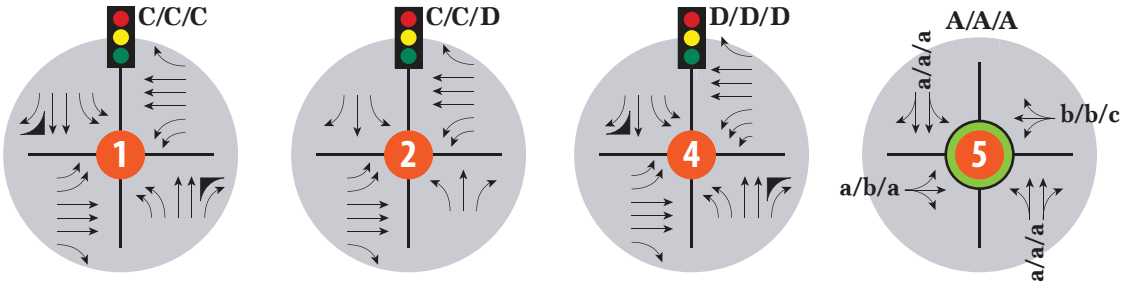
Traffic analysis procedures discussed previously were applied to the background volumes for the short-term planning horizon. Signal timings were optimized for all signalized intersections; longer cycle lengths (that were consistent for each US 34 intersection) were applied to the US 34 intersections given the heavy demands. **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 and are consistent along US 34.

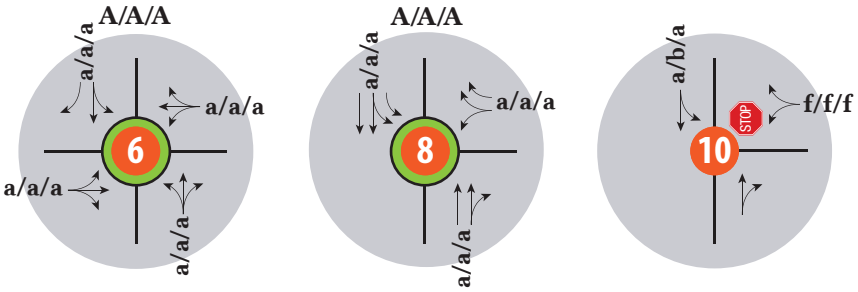
Most intersections are projected to function acceptably (LOS D or better). A few observations include the following:

- **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 weekday PM and Saturday peak hours, and this movement regularly queues (sometimes back to the Foxtrail Drive roundabout), which is anticipated to continue in the 2029 timeframe. For the westbound approach, dual left turn lanes might be adequate, but triple left turn lanes would be ideal since this is a long-term need and constructing the triple lefts in conjunction with other short-term improvements would prevent future construction traffic disruption versus a phased approach in which a third left turn lane would otherwise be added in the future. Two northbound left-turn lanes, two northbound through-lanes should also be provided as well as a northbound free-flow right turn lane. The existing southbound striped-out lane (which is north of US 34) should be converted to a single southbound through lane. If there was adequate right-of-way north of US 34, a second southbound through lane would be desirable.
- **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 no worse than LOS D overall given background traffic and the recent construction.
- **US 34/Boyd Lake Avenue**. This intersection is projected to operate at LOS C in 2029 given background traffic and the existing intersection lane geometry. This accounts for adjustments in signal timing compared to existing conditions.

The Boyd Lake Avenue/Mountain Lion Drive roundabout intersection is projected to continue to function well at LOS A given 2029 background traffic. The Boyd Lake Avenue/LCR 20E intersection, being side-street stop controlled, will experience long delays specifically for drivers along the westbound stop-sign approach. 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 Sign
= Traffic Signal
= Roundabout
= Study Intersection

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NORTH

NOTE: Drawing Not to Scale

FIGURE 8
2029 Background Traffic Conditions

Centerra Avenue South MAR_25 UPDATE 124281-01 3/18/25

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 plus area growth. 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). Trips from an additional 200 homes to be located behind the Schmer Farm development were incorporated as well (which is not anticipated for the 2029 planning horizon). Adjustments and shifts have been estimated to account for the Rocky Mountain Avenue connection to LCR 20E. This connection is not included in the NFR travel demand base model, so Felsburg Holt & Ullevig staff added the connection, ran the model, and used modeling results to compare against the no-connection model run results. This comparison helped inform traffic shift 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.

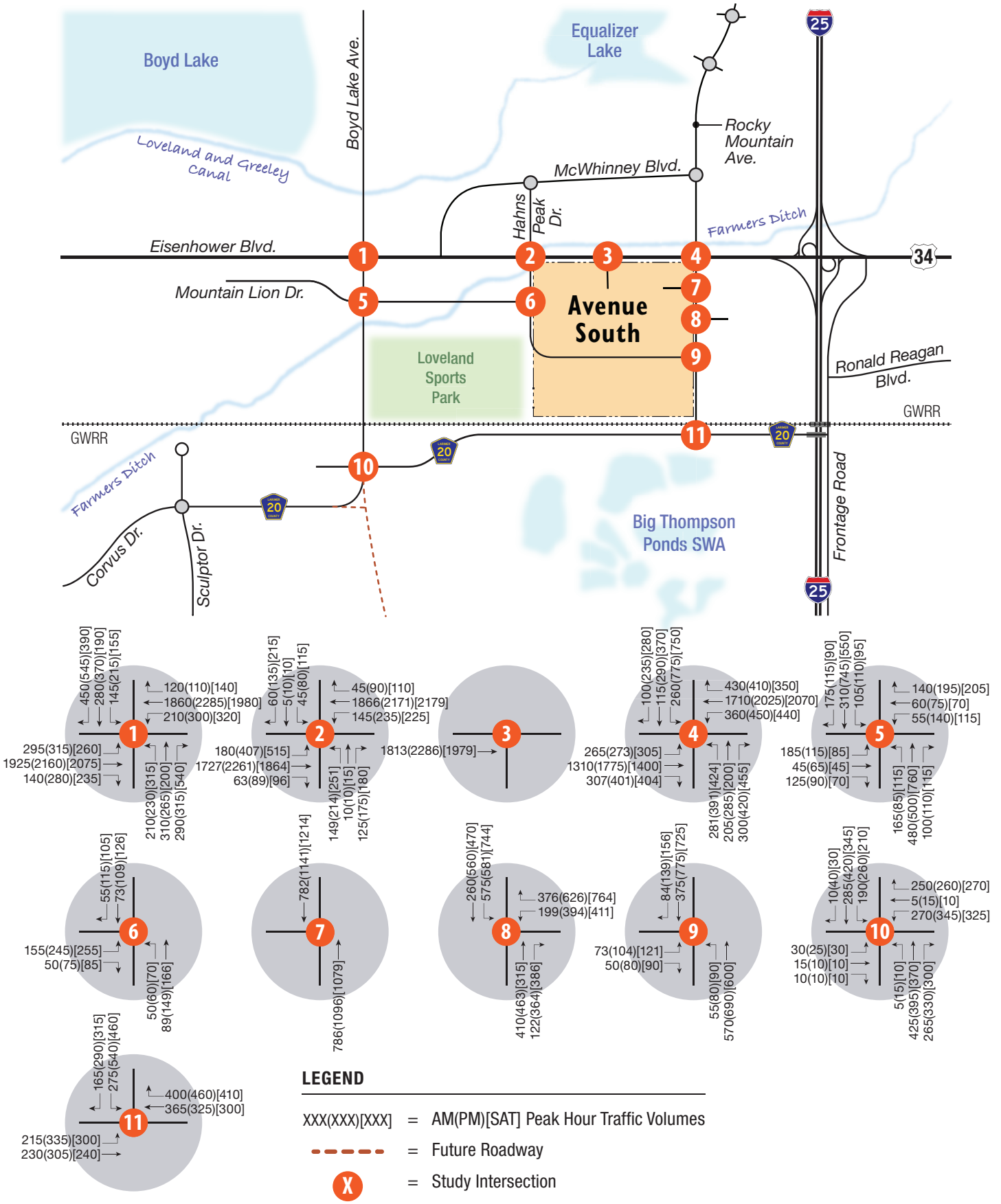
The following further describes the process conducted in development long-term traffic forecasts. Each traffic shift associated with the Rocky Mountain Avenue connection to LCR 20E is described below:

- **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 developments 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. Background movements between the east and south legs also increases 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 in 2045 (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 their (and this study's background traffic) demand along Rocky Mountain Avenue. Either way, 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 and Saturday peak hours, 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 RIRO access onto US 34 to serve the Schmer Farm development.

Recently, the eastbound left turn at US 34/Fall River Road serving the Centerra Marketplace north of US 34, was closed. As part of developing future background traffic, these movements were shifted to Hahns Peak and to a lesser degree Rocky Mountain Avenue. These shifts are also captured on **Figure 9**.



FELSBURG HOLT & ULLEVIG

NORTH

NOTE: Drawing Not to Scale

FIGURE 9
2045 Background Traffic Volumes

Centerra Avenue South MAR_25 UPDATE 124281-01 3/19/25

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 with respect to background traffic. 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 the 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 2045 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 2045 background condition adds a second northbound left turn lane as compared to the 2029 analysis.

US 34/ Boyd Lake Avenue

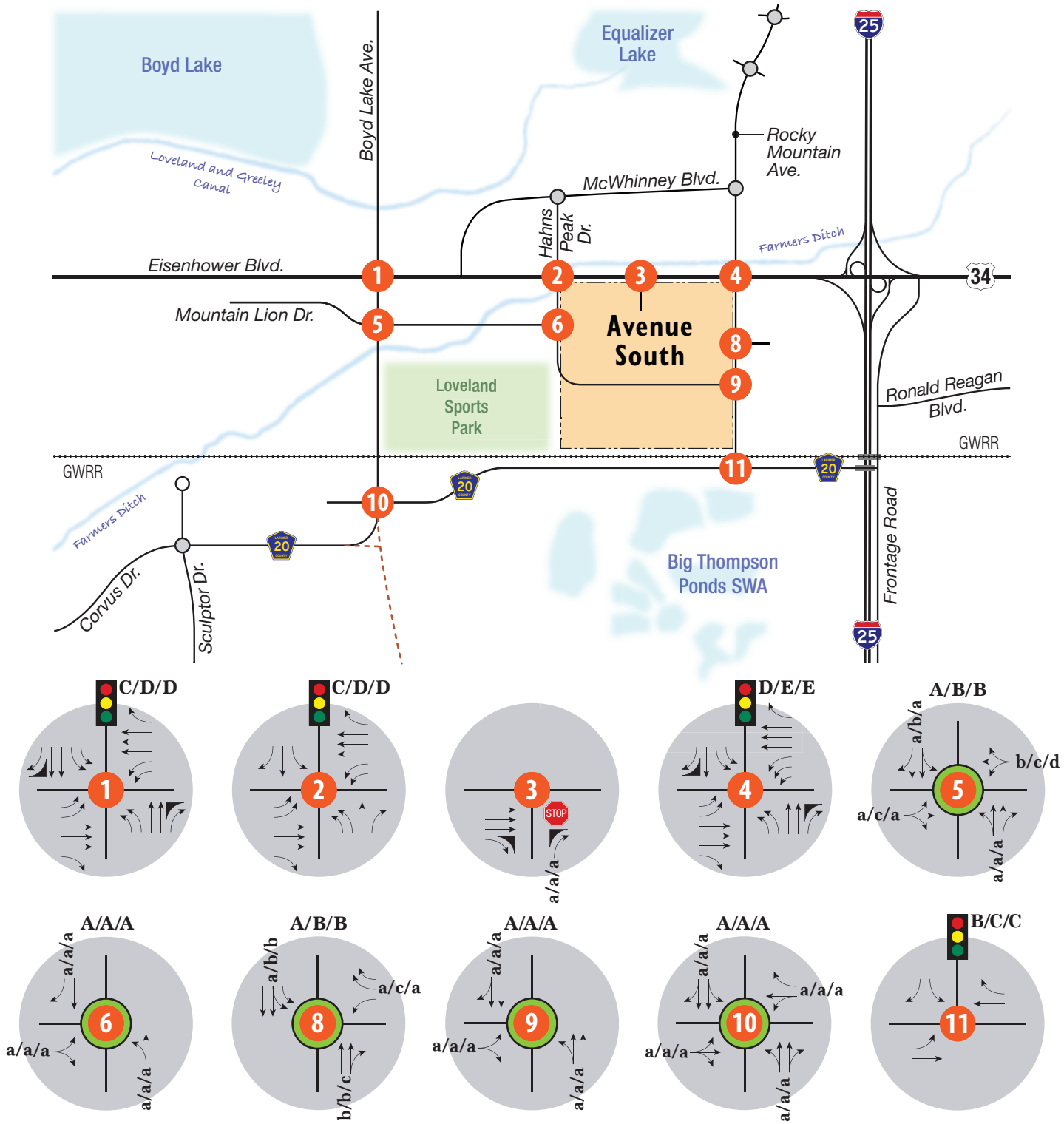
Traffic shifts due to the LCR 20E connection offer some traffic relief in background traffic passing through this intersection. The connection partially offsets the growth effect allowing the intersection to function at LOS D or better during all three analysis hours, given 2045 background traffic.

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 study 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. Given year 2045 background traffic projections, this intersection is projected to operate at LOS A or better during all three peak hours.

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). Other 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. The resulting LOS for this intersection would be LOS C or better given 2045 background traffic.



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
----	=	Future Roadway
STOP	=	Stop Sign
	=	Traffic Signal
	=	Roundabout
X	=	Study Intersection

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NORTH

NOTE: Drawing Not to Scale

FIGURE 10

2045 Background Traffic Conditions

Centerra Avenue South MAR_25 UPDATE 124281-01 3/21/25

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, 5 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 1 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 compared to 2029 background traffic projections, and 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 1), 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 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 incorporating triple left turn lanes westbound to southbound would be appropriate for the short-term. 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. To help ensure reasonable lane utilization, all three lanes (receiving lanes of the triple lefts) should be extended south to the planned roundabout.

An eastbound right turn deceleration lane will also be needed along US 34. With three southbound lanes being needed carrying southbound traffic away from US 34, the eastbound right turn movement should be signal 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 right-of-way 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 which includes westbound triple left turn lanes

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 LOS D with a 95th percentile queue of approximately 300 feet given just one northbound left turn lane. As such, a second northbound left turn is appropriate by 2029 (which will eventually be needed once Avenue South is built out anyway) and was included in this analysis. Also, dual westbound left turn lanes should be constructed down the center of US 34. This will necessitate providing two receiving lanes that extend south of US 34 to the planned Mountain Lion Drive roundabout.

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 or better, given 2029 total traffic conditions.

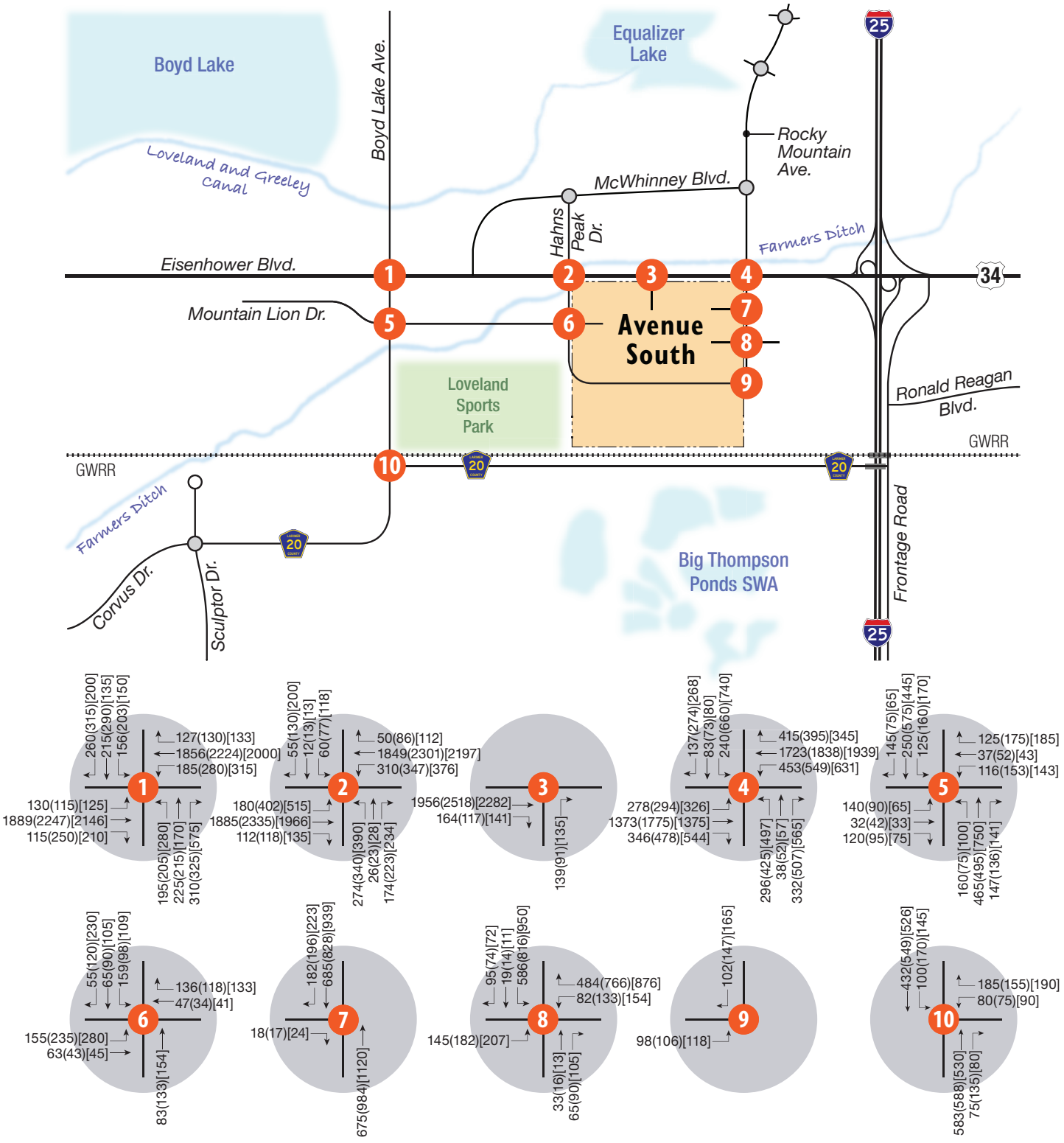
Boyd Lake Avenue/LCR 20E

In 2029, this intersection is anticipated to continue functioning under side-street-stop control. The side street LOS is projected to be 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 given 2029 total projected traffic.

Rocky Mountain Avenue

Ultimate plans include an extension of Rocky Mountain Avenue south of US 34 to LCR 20E as described previously. The connection to LCR 20E is not anticipated to be in place by 2029, however. 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 northern roundabout. Current conceptual plans of the roundabout show three southbound entering lanes and two outbound lanes from Schmer Farm; the LOS for the roundabout given 2029 total traffic conditions is LOS A. A significant southbound left and westbound right turn are projected given the assumption that this would be Schmer Farm's only access and most of their traffic is projected to utilize US 34 via Rocky Mountain Avenue (some of their traffic is also assumed to use Hahns Peak Drive). Should Schmer Farm secure a RIRO onto US 34, the southbound left and westbound right would be reduced. As of the preparation of this study, Schmer Farm was planning to submit an access application to CDOT for a RIRO.

The northbound approach of Rocky Mountain Avenue to US 34 will queue. The 2029 LOS analyses worksheets (**Appendix F**) show a northbound left turn queue that could reach nearly 15 vehicles, which equates to approximately 375 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

X = Study Intersection

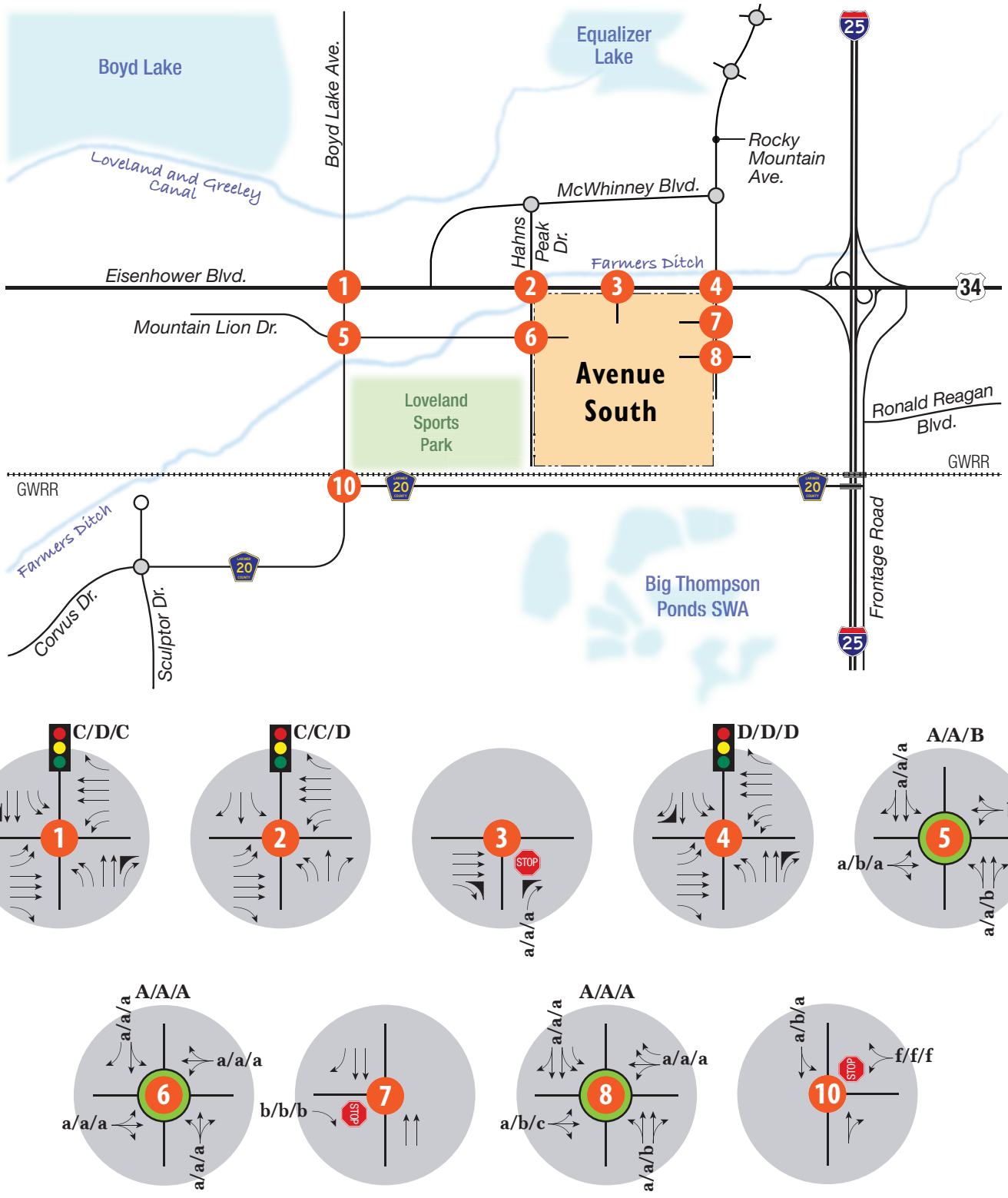
FELSBURG HOLT & ULLEVIG

NORTH

NOTE: Drawing Not to Scale

FIGURE 11
2029 Total Traffic Volumes

Centerra Avenue South MAR_25 UPDATE 124281-01 3/18/25



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

= Roundabout

X = Study Intersection

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NORTH

NOTE: Drawing Not to Scale

FIGURE 12
2029 Total Traffic Conditions

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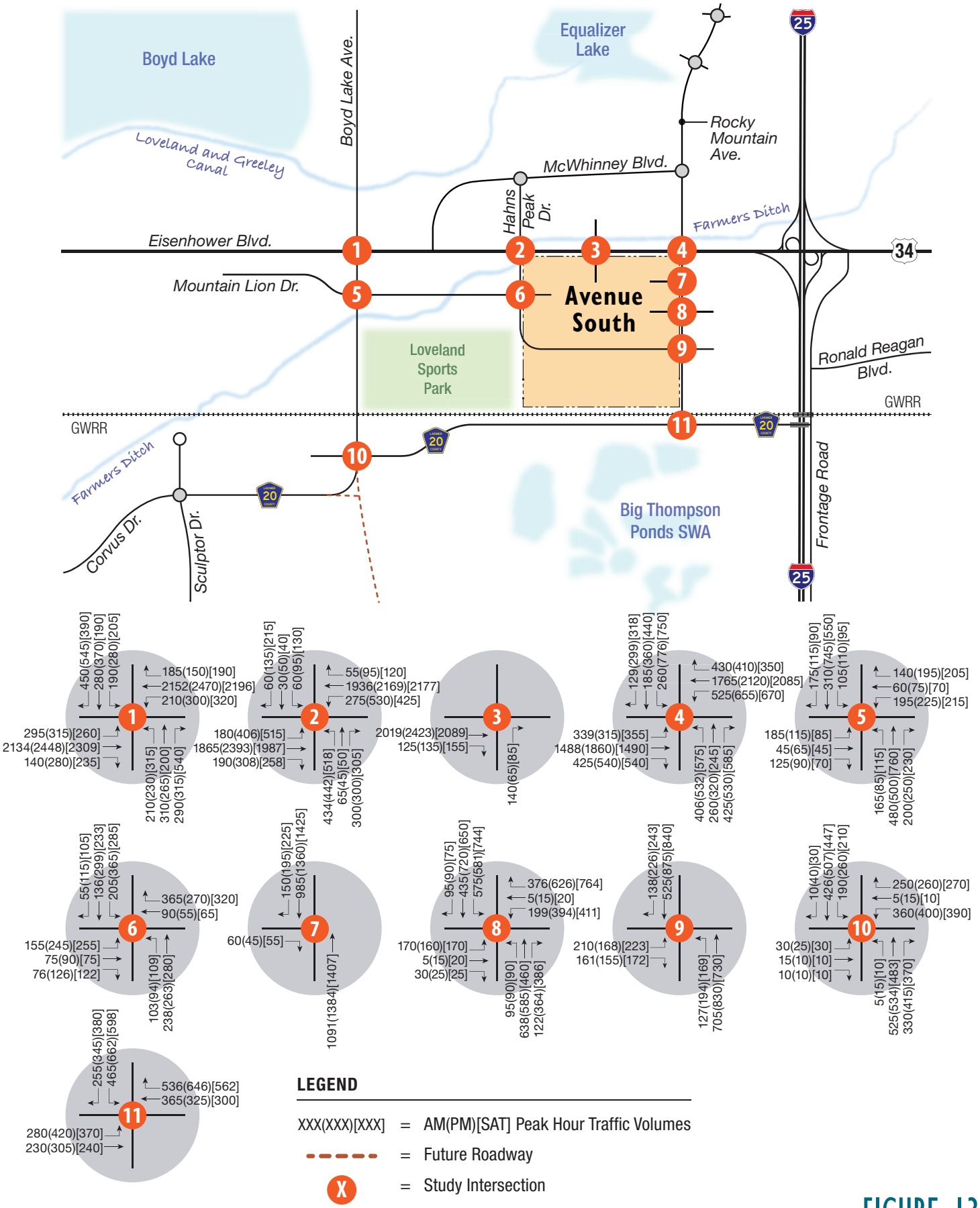
V.C. Long-Term (2045) Total Traffic Volumes

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 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.

A myriad of traffic components that would now 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). From **Figure 13**, Rocky Mountain Avenue is projected to serve about 3060 vph during the Saturday peak hour just south of US 34. As mentioned, Rocky Mountain Avenue will be the only roadway to serve the future Schmer Farm development, but by 2045 these trips will 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 recently approved Millennium General Development Plan amendment. Much of this additional residential development would likely be located on the west side of Avenue South, where Hahns Peak Drive would be best positioned to serve it.

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 1940 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.



LEGEND

XXX(XXX)[XXX]	=	AM(PM)[SAT] Peak Hour Traffic Volumes
	=	Future Roadway
X	=	Study Intersection

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NORTH

NOTE: Drawing Not to Scale

FIGURE 13

2045 Total Traffic Volumes with LCR 20E Connection

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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 measure of decreasing overall delays at the US 34 intersections (and ensuring consistent cycle lengths along US 34). 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 produce 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 operate at LOS E 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 465 feet when controlled via signalization; the eastbound right would end up receiving a significant amount of green time when considering overlap signal phases (Saturday peak hour is the critical time for this queue according to the worksheets provided in **Appendix G**); the site RIRO 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. The northbound 95th percentile queue is estimated to reach 575 (Saturday peak hour period) which is within the available distance to the roundabout.

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 LOS C with a 95th percentile queue that is less than 200 feet if only one southbound lane is provided.

Likely not occurring until beyond year 2045, this intersection has been identified to be grade-separated. 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 on **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 or better during all three peak hours in 2045. No other improvements are proposed.

Boyd Lake Avenue/Mountain Lion Drive

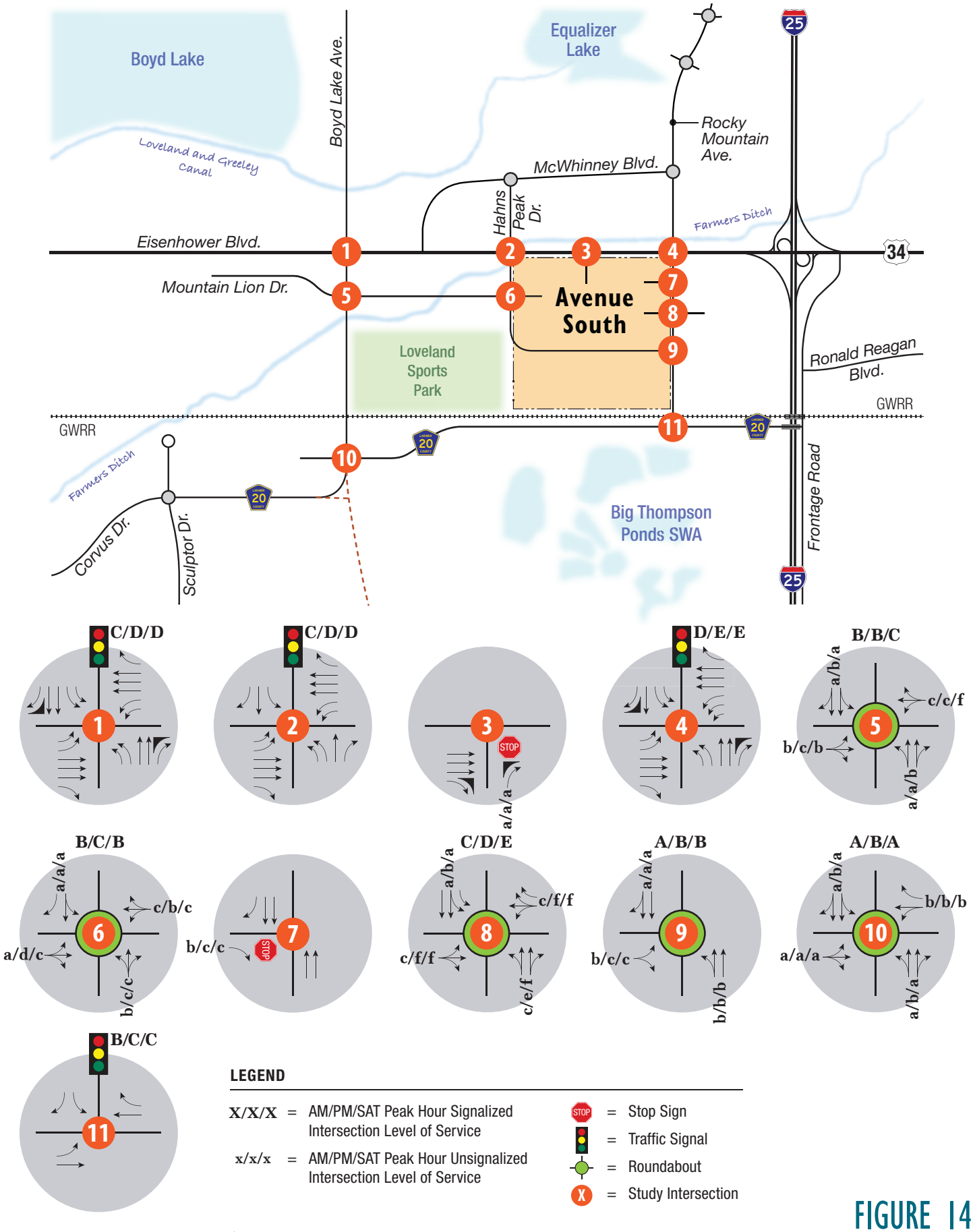
The functionality of this multi-lane roundabout is expected to function at LOS C or better given 2045 total traffic. No improvement recommendations are being proposed.

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. Development of the Stuart parcel would create a west leg. The overall result is 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. This intersection is projected to function at LOS C or better given the above.



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NORTH

NOTE: Drawing Not to Scale

FIGURE 14

Long-Term (with LCR 20E Connection) Total Traffic Conditions

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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 three southbound lanes will be needed to receive triple lefts from US 34, extended to the roundabout. 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. This configuration was assumed in the LOS analyses presented here. 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 intersection will be critical for Schmer Farm. The Rocky Mountain Avenue Connection to LCR 20E will serve a portion of the area's development trips, but there will still be a meaningful amount traveling to/from US 34. The northbound 95th percentile queue from US 34 is projected to 575 for the left turn movement during the PM peak hour and the Saturday peak hour.

The roundabout's functionality will necessitate three entry lanes along the southbound approach and dual lanes along the northbound and westbound approaches. Ideally, the westbound approach coming out of Schmer Farm contains two lanes, one being a right-turn by pass lane. 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 while also providing two continuous lanes southbound without encouraging sideswipe crashes within the roundabout.

A possible modification in Schmer Farm's access scheme that would entail a RI/RO onto US 34, and this would relieve remove 5 to 10 percent of 2045 total traffic projected to use this roundabout, by virtue of reducing the southbound left turn movement 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. Without the RIRO onto US 34, this roundabout is projected to operate at LOS D during the Saturday peak hour with the westbound right turn bypass lane.

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 GDP Amendment Traffic Impact Study. The second roundabout south of US 34 will serve the Mountain Lion Drive intersection, and 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 be needed (warranted via volumes and needed to accommodate auto-rail conflicts) as well as turn lanes.

V.E. Delay Summary

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 LOS and Delay (seconds per vehicle) Results

Intersection	Existing			Short Range BG			Short Range Total			Long Range Background (with LCR 20E)			Long Range Total (With LCR 20E)		
	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 (25.7)	C (26.6)	C(28.1)	C (24.1)	D(35.6)	C (30.0)	C (30.3)	D (37.8)	D (49.6)	C (30.5)	D (44.4)	D (39.5)
2. US 34 / Hahns Peak Drive	D (38.2)	C (34.0)	D (41.6)	C (28.2)	C (34.4)	D (53.7)	C (27.1)	C (31.6)	D (41.5)	C (20.2)	D (40.5)	D (36.2)	C (26.7)	D (41.2)	D (43.2)
4. US 34 / Rocky Mountain Avenue	C (22.8)	C (31.1)	C (22.3)	D (42.9)	D (45.0)	D (38.5)	D (49.4)	D (46.3)	D (54.6)	D (53.1)	E (68.5)	E (75.7)	D (52.8)	E (75.0)	E (74.6)
5. Boyd Lake Avenue / Mountain Lion Drive	A (5.7)	A (5.8)	A (5.9)	A (7.5)	A (8.7)	A (9.9)	A (8.4)	A (9.5)	B (11.2)	A (8.6)	B (11.3)	B (12.1)	B (11.5)	B (13.9)	C (19.1)
6. Mountain Lion Drive / Hahns Peak Drive	–	–	–	A (3.7)	A (4.3)	A (4.7)	A (5.0)	A (5.3)	A (5.9)	A (4.1)	A (5.1)	A (5.4)	B (10.8)	C (17.0)	B (14.7)
7. Rocky Mountain Avenue / RIRO Access	–	–	–	–	–	–	B (11.9)	B (12.9)	B (14.1)	–	–	–	C (16.8)	C (22.0)	C (24.9)
8. Rocky Mountain Avenue / Schmer Access Roundabout	–	–	–	A (4.8)	A (6.3)	A (7.1)	A (5.7)	A (7.9)	A (9.5)	A (7.9)	B (13.0)	B (13.0)	B (12.7)	C (21.9)	D (27.1)

Intersection	Existing			Short Range BG			Short Range Total			Long Range Background (with LCR 20E)			Long Range Total (With LCR 20E)		
	AM	PM	SAT	AM	PM	SAT	AM	PM	SAT	AM	PM	SAT	AM	PM	SAT
9. Rocky Mountain Avenue / Mountain Lion Roundabout	–	–	–	–	–	–	–	–	–	A (5.2)	A (8.2)	A (8.0)	A (9.1)	B (12.8)	B (12.8)
10. Boyd Lake Avenue / LCR 20E	E (45.1)	F (73.5)	E (41)	F (73.7)	F (247.7)	F (175.8)	F (120.5)	F (337)	F (248.8)	A (7.0)	A (8.4)	A (7.5)	A (8.7)	B (10.6)	A (9.2)
11. Rocky Mountain Avenue / LCR 20E	–	–	–	–	–	–	–	–	–	B (18.6)	C (28.2)	C (23.0)	B (16.9)	C (32.2)	C (26.2)

In addition to the LOS results, intersection approach queuing results have also been determined using 2045 total traffic projections, and these are shown in **Table 4**. These results can be used to help inform design of lane lengths in the area

Table 4. Projected 2045 95th Percentile Intersection Queues

Intersection Number	Intersection Name	Approach	Movement	2040 95th Percentile Queues		
				AM	PM	SAT
1	Boyd Lake Avenue & US 34 (Signalized)	Eastbound	Left	225	325	250
			Through	725	1075	1000
			Right	100	100	175
		Westbound	Left	150	225	200
			Through	175	750	575
			Right	25	25	75
		Northbound	Left	200	250	300
			Through	250	250	200
			Right	0	0	0
		Southbound	Left	175	300	200
			Through	225	325	175
			Right	0	0	0
2	Hahns Peak Drive & US 34 (Signalized)	Eastbound	Left	150	300	425
			Through	575	1050	725
			Right	150	225	200
		Westbound	Left	225	475	375
			Through	175	225	325
			Right	25	25	25
		Northbound	Left	350	475	525
			Through	100	75	100
			Right	400	400	425
		Southbound	Left	125	200	275
			Through	50	100	75
			Right	75	200	300

Intersection Number	Intersection Name	Approach	Movement	2040 95th Percentile Queues		
				AM	PM	SAT
4	Rocky Mountain Avenue & US 34 (Signalized)	Eastbound	Left	250	200	300
			Through	675	950	800
			Right	225	400	475
		Westbound	Left	225	175	250
			Through	800	1100	1100
			Right	275	175	225
		Northbound	Left	325	575	575
			Through	175	325	225
			Right	0	0	0
		Southbound	Left	225	775	550
			Through	250	825	1150
			Right	0	0	0
5	Boyd Lake Avenue & Mountain Lion Drive (Roundabout)	Eastbound	Left/Through/Right	100	100	50
		Westbound	Left/Through/Right	150	225	425
		Northbound	Left/Through	100	75	125
			Through/right	75	75	100
		Southbound	Left/Through	50	150	75
			Through/right	50	150	75
6	Hahns Peak Drive & US 34 (Roundabout)	Eastbound	Left/Through/Right	50	250	175
		Westbound	Left/Through/Right	175	100	150
		Northbound	Left/Through/Right	100	150	150
		Southbound	Left/Through	50	125	100
			Right	25	25	25
7	Rocky Mountain Avenue & Ave south RIRO Access (TWSC)	Eastbound	Right	25	25	0
8	Rocky Mountain Avenue & Road B Schmer/Avenue South Access (Roundabout)	Eastbound	Left/Through/Right	75	125	200
		Westbound	Left/Through/Right	50	150	150
		Northbound	Through/Left	175	325	375
			Through/Right	175	350	400
		Southbound	Left	75	150	175
			Through/Left	75	150	175
			Through/right	75	150	175

Intersection Number	Intersection Name	Approach	Movement	2040 95th Percentile Queues		
				AM	PM	SAT
9	Rocky Mountain Avenue & Mountain Lion Drive (Roundabout)	Eastbound	Left/Through/Right	100	100	150
		Northbound	Through/Left	225	450	325
			Through	25	25	25
		Southbound	Through	50	100	100
			Through/Right	50	100	100
10	Boyd Lake Avenue & LCR 20E (Roundabout)	Eastbound	Left/through/Right	25	25	25
		Westbound	Through/Left	100	100	100
			Right	50	75	75
		Northbound	Through/Left	75	100	75
			Through/Right	75	100	75
		Southbound	Through/Left	50	100	75
			Through/Right	50	100	75
11	Rocky Mountain Avenue & LCR 20E (Signalized)	Eastbound	Left	175	425	400
			Through	100	200	125
		Westbound	Through	250	400	225
			Right	325	575	400
		Southbound	Left	275	650	425
			Right	300	475	350

The longest queues are associated with through-traffic along US 34. The side-street approaches to US 34 see the greatest queues along northbound Hahns Peak Drive (left turn movement) and along southbound Rocky Mountain Avenue (left turn and through movement due to it being only one lane).

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 vph, 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 backup 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 ACCOMMODATIONS

This chapter addresses the multimodal considerations relative to the Avenue South development including connections to surrounding destinations. As previously described, Avenue South is a thoughtfully designed live-work-play mixed-use development that prioritizes multimodal transportation, encouraging walking and bicycling. A host of features support his including:

- Dedicated bike lanes
- Slow-speed interior roads supporting a shared space approach
- Abundant walkways and direct pedestrian connections throughout the site
- A linear park connection to/from Loveland Sports Park
- Strategically placed roadway crossings
- Key amenities being within one quarter-mile of the larger residential areas
- Robust tree canopies along select routes to increase user comfort

VII.A. Importance of Multimodal Considerations

Multimodal accommodation could be critical in light of the heavy traffic projections. Also, 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.

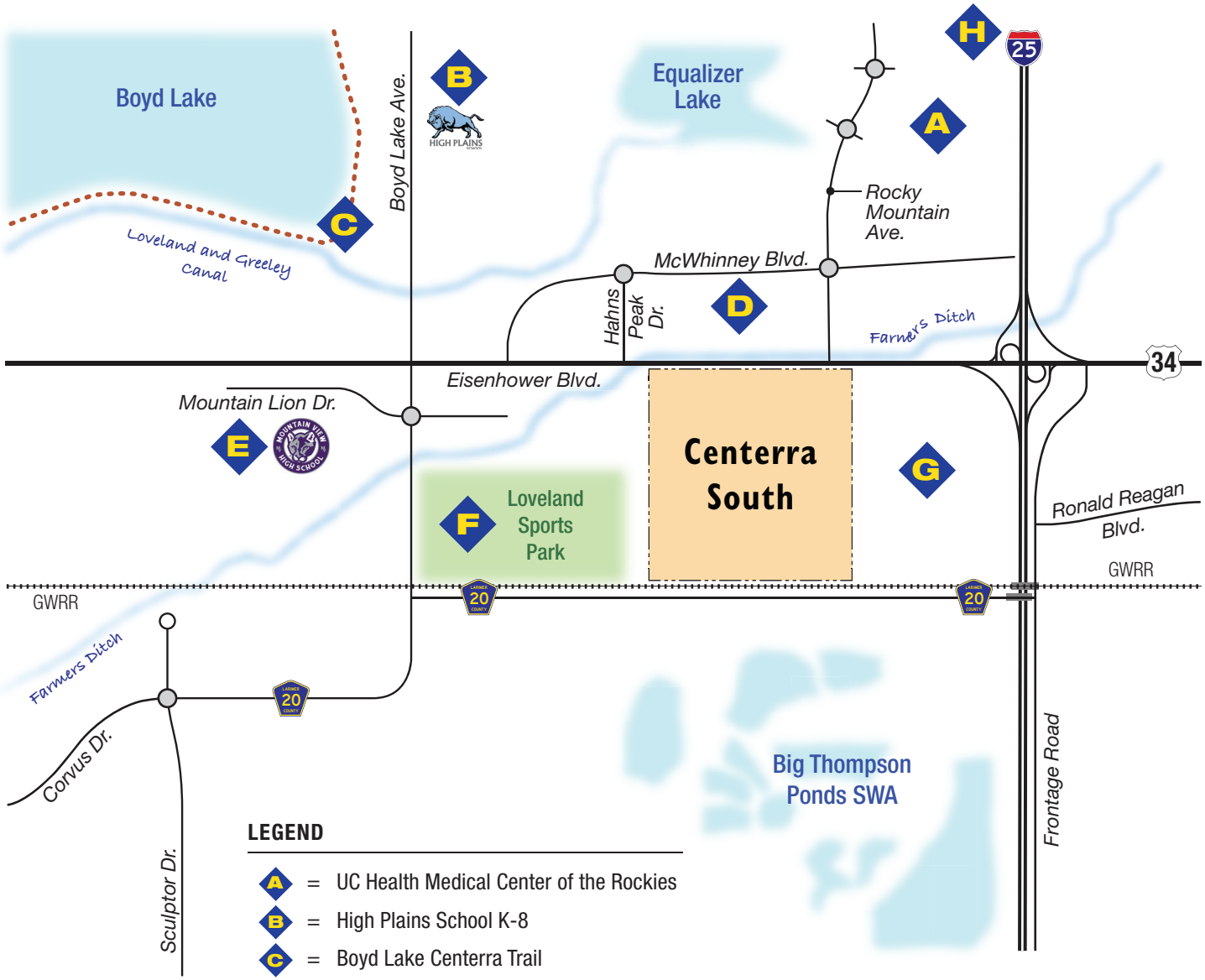
Because greenhouse gas emissions have also become a greater concern, providing safe and comfortable biking and walking connections will contribute to people using sustainable modes of transportation instead of single-occupant vehicles. Improved biking and walking connections to/from system transit stops 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)
- Centerra-Loveland Mobility Hub located about 1.5 miles north and east of Avenue South

Figure 15 shows these attractors in comparison to the Avenue South site. Trail accommodations are all shown on this figure, rather are shown on subsequent figures.



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NOTE: Drawing Not to Scale

NORTH

FIGURE 15

Nearby Multi-Modal Attractors

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VII.C. Multimodal Improvement Ideas/Considerations

Figure 16 depicts a vision for multimodal service within the study area, and **Figure 17** shows more specifics within the master plan 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.

Figure 16 also shows 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 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 previously.

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. Some consideration has been made relative to a grade-separated pedestrian crossing of US 34, but initial engineering assessment found that the Farmer's Ditch on the north side of US 34 would be an obstacle. Establishing footprint "landing" areas on both sides of US 34 would be impactful. The applicant is also concerned that a pedestrian bridge would be minimally used in favor of users' impression of crossing at-grade being a quicker option. At this point, a grade-separated pedestrian crossing of US 34 is not part of the master planning.
- 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.
- A pedestrian connection to the Loveland Sports Park at the southwest corner of the study area (being planned as part of the Avenue South development as a Linear Park).

- 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.

Another key aspect to encourage use of alternative modes pertains to providing information to travelers. Once new development is occupied, employers and residential associations should continually provide information and/or pass-on information prepared by others with respect to informing travelers of the alternatives modes and the ease of using them.

Alternative mode accommodation also entail street crossing accommodations. **Figure 17** shows where key crossings are planned. These include:

- Crossing Mountain Lion Drive (actually Hahns Peak extended south) at the west end of the linear park. This is planned to be a push-button rectangular rapid flashing beacon (RRFB).
- Crossing the east-west segment of Mountain Lion Drive, two RRFBs are proposed which will be spaced between the east side of the master plan, Fall River Road, and Rocky Mountain Avenue.
- Crossing Rocky Mountain Avenue to the Schmer Farm development, the roundabout intersections will be designed to accommodate pedestrian crossings. In addition, a possible location for a High-intensity Activated crosswalk (HAWK) signal has been identified through applicant/city meetings.

The possible location is between the first two roundabout intersections; the exit of each roundabout would be located approximately 270 feet from the crossing. Concerns about queues forming have been raised, and using the 2045 total traffic projections shown in this study, the 95th percentile queue in either direction would be approximately 100 feet during peak hours.

Pedestrian usage of the possible HAWK signal has been loosely estimated using ITE Trip Generation Manual data in generated pedestrian trips associated with Avenue South and Schmer Farm. It is also realized that Avenue South's site design is intended to encourage non-auto trips, which further adds to pedestrian usage crossing Rocky Mountain Avenue. In combining these considerations and applying professional judgement, between 100 and 200 pedestrians could cross Rocky Mountain Avenue during the PM peak hour. The crosswalks at the roundabouts will serve most of this demand, but potentially 25 to 75 pedestrians might use a HAWK signal between the roundabouts if one is provided, once the area is completely built out. Based on criteria shown in the Manual of Uniform Traffic Control Devices (MUTCD), this level of usage would suggest a HAWK signal could be considered when assessing its need with respect to the entire width of Rocky Mountain Avenue. However, if a center median refuge area is provided for pedestrians and the MUTCD criteria is applied to each direction of Rocky Mountain Avenue separately, the criteria suggests a HAWK signal is not necessarily a consideration. In the short-term, a HAWK signal is definitely not needed, so to preserve options it might make sense to simply install underground conduit for possible future signalization so as to preclude the need to cut into the road IF a HAWK signal is ever installed in the future.

Connectivity to the Centerra Loveland Transit Hub is provided via bike lanes and detached sidewalks along Rocky Mountain Avenue. These exist along much of Rocky Mountain Avenue. Improvements to 29th Street will eventually extend these accommodations to the hub from Rocky Mountain Avenue. Also, the development's density may lend itself to COLT transit service that could also play a role in delivering development residents and employees to the hub.

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

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NOTE: Drawing Not to Scale

NORTH

FIGURE 16
Area Multi-Modal Vision

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Legend

- Phase 1 Extents
- Pedestrian Circulation
- HAWK Crossing
- Rapid Flashing Beacon

HAWK Crossing

Rapid Flashing Beacon

NORTH

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NOTE: Drawing Not to Scale

FIGURE 17

Avenue South
Pedestrian Circulation Diagram

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VIII. IMPROVEMENTS SUMMARY

The preceding analysis and improvements have been assembled into **Table 5** to summarize the various roadway, intersection, and multimodal improvements associated with the Avenue South plan. Its layout is consistent with that illustrated in LCUASS, and the intent is to succinctly itemize improvements and identify the applicant's participation in implementing the improvements.

Table 5. Recommended Improvements Summary

Improvement Description and Locations	Responsible Party		
	Applicant Committed	Background Committed	Master Planned
Year 2029 (Short Range)			
US 34/Hahns Peak Dr Intersection Expansion	Applicant to participate with City 3rd lane project to complete improvements on SE corner of intersection		
Addition of third EB US 34 through lane			CDOT/City to complete
Addition of EB accel/decel lane along Avenue South frontage	Applicant committed; to be incorporated with CDOT/City general lane widening project		
Construction of Rocky Mountain Avenue south of US 34 as major arterial	Applicant participation with Schmer	Schmer to participate	
US 34/Rocky Mountain Avenue Intersection Expansion including westbound tripled left turns	Applicant participation with Schmer	Schmer to participate	
Construction of Rocky Mountain Avenue Roundabouts	Applicant participation with Schmer	Schmer to participate	
Construction of Roundabout at Hahns Peak and Mountain Lion	Applicant to complete		
Improvement of US 34/ Rocky Mountain Ave. intersection and signal to incorporate south leg plus lane additions (including WB triple lefts)	Applicant and Schmer to participate with City 3rd lane project to complete intersection improvements	Schmer to participate	

Improvement Description and Locations	Responsible Party		
	Applicant Committed	Background Committed	Master Planned
Construction of Mountain Lion Dr from Hahns Peak to Rock Mountain Ave. as a minor arterial	Applicant to complete		
Construct sidewalks along all construct roads	Applicant to complete		
Construct bike lanes along internal public streets	Applicant to complete		
Construct internal walkways	Applicant to complete		
Install crosswalks at all intersections	Applicant to complete	Schmer to participate where cost sharing occurs	
Install bicycle racks at several locations around retail and office uses and within the parking structure	Applicant to complete		
Provide Showers and locker rooms facilities to encourage bicycling to work	Applicant to participate		
Year 2045(Long Range)			
Extension of Rocky Mountain Avenue across GWRR to LCR 20E	Applicant to participate	Schmer to participate	City to lead and applicant to provide cost share in improvement
Construction of Roundabout at Boyd Lake Avenue and LCR 20E, including LCR 20E realignments	Applicant to participate	Schmer to participate	City to lead and applicant to provide cost share in improvement
Widening of LCR 20E east of Rocky Mountain Avenue connection	Applicant to participate	Schmer to participate	City to lead and applicant to provide cost share in improvement
Widening of Boyd Lake Ave from Mountain Lion Dr to 5th Street			Future city project. No known funding at this time
Extension of Boyd Lake Avenue south to SH 402			Future city project. No known funding at this time.

Improvement Description and Locations	Responsible Party		
	Applicant Committed	Background Committed	Master Planned
Construct regional trail along US 34	Applicant to participate for segment along frontage		Future project. No known funding at this time.
Construct regional trail along Big Thompson River and provide trail connection to Avenue South			Future project. No known funding at this time.
Construct regional trail along GWRR			Future project. No known funding at this time.
Establish COLT service through Avenue South once density level warrants			Future project. No known funding at this time. Will be dependent upon COLT planning
Install rectangular rapid flashing beacons (RRFB) at key pedestrian crossings onto Mountain Lion Drive and Rock Mountain Avenue. Assess need for HAWK signal across Rocky Mountain Avenue in future.	Applicant to complete		City coordination on appropriateness of treatment

Also, the city has requested an understanding of the relative impact of Avenue South on the US 34/Hahns Peak Drive and US 34/Rocky Mountain Avenue intersections. In comparing Avenue South traffic against the total projected traffic, the following observations are made from the projections shown in this report:

At US 34/Hahns Peak Drive, Avenue South trips as a percentage of the total traffic projected to pass through the intersection is 2045 ranges from 13 to 16 percent (depending on the specific peak hour). At US 34/Rocky Mountain Avenue, Avenue South trips make up 11 to 15 percent of the total traffic.

IX. 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 are signalized with US 34. A RIRO 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. Long-term 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 1 of the development, assumed to be in place in the short-term timeframe, will generate approximately 13,000 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 1 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 also incorporate three receiving lanes in the southbound direction of Rocky Mountain Avenue that extend to the first roundabout.
- 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 (as was analyzed in this study).
- 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 right turn accel/decel lane along the site's frontage of US 34. This would serve the US 34 intersections with Hahns Peak Drive, the site's RIRO across from Fall River Road, 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 (which is not yet a given).
- 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 sine it provides an alternative route for other trips in the area, mostly to/from destinations north of US 34.

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, three along its wet side. 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 may be completed 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 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 along LCR 20E.
  - 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 multimodal 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