

Traffic Impact Study

Delo Boom

Louisville, Colorado

Prepared for:

Live Forward Development

Kimley»Horn

T R A F F I C I M P A C T S T U D Y

Delo Boom

Louisville, Colorado

Prepared for
Live Forward Development
915 S Pearl Street
Denver, Colorado 80209

Prepared by
Kimley-Horn and Associates, Inc.
6200 South Syracuse Way
Suite 300
Greenwood Village, Colorado 80111
(303) 228-2300



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1.0 EXECUTIVE SUMMARY

Delo Boom is proposed to be located on the southeast corner of the Griffith Street and Cannon Street intersection in Louisville, Colorado. The project is proposed to include 36 townhomes, 99 multifamily units, and 4,000 square feet of retail space. It is expected that the project will be completed in the next couple years. Therefore, analysis was conducted for the 2026 short-term buildout horizon as well as the 2045 long-term twenty-year planning horizon.

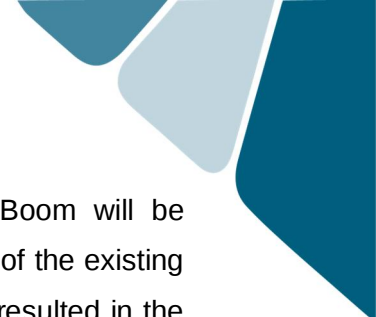
The purpose of this traffic study is to identify project traffic generation characteristics to determine potential project traffic related impacts on the local street system and to develop the necessary mitigation measures required for the identified traffic impacts. The following intersections were incorporated into this traffic study in accordance with the City of Louisville and State of Colorado Department of Transportation (CDOT) standards and requirements:

- Griffith Street and Main Street (Intersection #1)
- Griffith Street and Cannon Street (#2)
- Griffith Street and State Highway 42 (SH-42) (#3)
- Short Street and Cannon Street (#4)
- Short Street and SH-42 (#5)

In addition, the two (2) proposed full movement accesses along Cannon Street and the existing right-in/right-out access along SH-42 to remain were evaluated.

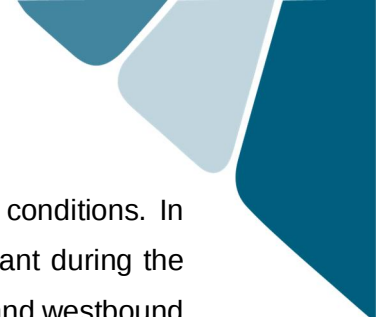
Regional access to Delo Boom will be provided by US-36, Northwest Parkway, and US-287 while primary access to the site will be provided by South Boulder Road and SH-42. Direct access to the site will be provided by two (2) proposed accesses along the east side of Cannon Street with the north access located approximately 200 feet (measured edge to edge) south of Griffith Street and the south access located 375 feet (measured edge to edge) from the north access. Additionally, the existing right-in/right-out access along SH-42 will remain.

Accounting for internal capture, Delo Boom is expected to generate approximately 1,072 weekday daily trips, with 62 of these trips occurring in the morning peak hour and 86 of these trips occurring in the afternoon peak hour.



Based on the analysis presented in this report, Kimley-Horn believes Delo Boom will be successfully incorporated into the existing and future roadway network. Analysis of the existing street network, the proposed project development, and expected traffic volumes resulted in the following conclusions and recommendations:

- The threshold for requiring an access permit along Colorado Department of Transportation (CDOT) roadways occurs when project traffic is anticipated to increase the existing access traffic volumes by more than 20 percent. Based on traffic projections, the addition of project traffic on the west leg of Griffith Street at the intersection of SH-42 is not anticipated to increase existing access traffic volumes by more than 20 percent. The maximum expected increase on the west leg of Griffith Street is six (6) percent (10 project / 166 existing) during the afternoon peak hour. Therefore, a CDOT access permit is not anticipated to be required in association with this project at this intersection. The addition of project traffic on the west leg of Short Street at the intersection with SH-42 is anticipated to increase existing traffic by more than 20 percent. Additionally, the right-in/right-out access along SH-42 is anticipated to increase existing access traffic volumes by more than 20 percent. Therefore, access permits are anticipated to be needed at these locations.
- With completion of the Delo Boom project, two full movement accesses are proposed along the east side of Cannon Street. The north access will be located approximately 200 feet (measured edge to edge) south of Griffith Street, and the south access located 375 feet (measured edge to edge) from the north access. Additionally, the existing right-in/right-out access along SH-42 will remain. It is recommended that R1-1 “STOP” signs be installed on the westbound approaches exiting the development at both driveways along Cannon Street.
- By 2045, SH-42 is anticipated to expand to accommodate two through lanes in each direction as has been identified in the City’s Transportation Master Plan and Future42 plans. Additionally, the Griffith Street and SH-42 (#3) intersection is planned for signalization, and the southbound right turn lane will be absorbed when SH-42 is improved to provide two through lanes in each direction.
- If Future42 is not implemented, the intersection of Griffith Street and SH-42 (#3) is recommended to be converted to a signalized intersection by the 2045 long-term horizon. This



improvement is necessary due to the intersection failing under stop control conditions. In addition, the intersection is expected to meet a four-hour volume signal warrant during the 2045 total conditions. With the implementation of a signal, both the eastbound and westbound lanes should be converted to accommodate a designated left turn lane and a shared lane for through and right turning movements.

- Any onsite or offsite improvements should be incorporated into the Civil Drawings and conform to standards of the City of Louisville and the Manual on Uniform Traffic Control Devices (MUTCD) – 11th Edition, 2023.

2.0 INTRODUCTION

Kimley-Horn has prepared this report to document the results of a Traffic Impact Study for Delo Boom proposed to be located on the southeast corner of the Griffith Street and Cannon Street intersection in Louisville, Colorado. A vicinity map illustrating the Delo Boom development location is shown in **Figure 1**. Delo Boom is proposed to include 36 townhomes, 99 multifamily units, and 4,000 square feet of retail space. A conceptual site plan is attached in **Appendix A**. It is expected that Delo Boom will be completed in the next couple years; therefore, analysis was conducted for the 2026 short-term buildout horizon as well as the 2045 long-term twenty-year planning horizon.

The purpose of this traffic study is to identify project traffic generation characteristics to determine potential project traffic related impacts on the local street system and to develop the necessary mitigation measures required for the identified traffic impacts. The following intersections were incorporated into this traffic study in accordance with the City of Louisville and CDOT standards and requirements:

- Griffith Street and Main Street (Intersection #1)
- Griffith Street and Cannon Street (#2)
- Griffith Street and SH-42 (#3)
- Short Street and Cannon Street (#4)
- Short Street and SH-42 (#5)

In addition, the two (2) proposed full movement accesses along Cannon Street and the existing right-in/right-out access along SH-42 to remain were evaluated.

Regional access to Delo Boom will be provided by US-36, Northwest Parkway, and US-287 while primary access to the site will be provided by South Boulder Road and SH-42. Direct access to the site will be provided by two (2) proposed accesses along the east side of Cannon Street with the north access located approximately 200 feet (measured edge to edge) south of Griffith Street and the south access located 375 feet (measured edge to edge) from the north access. Additionally, the existing right-in/right-out access along SH-42 will remain.

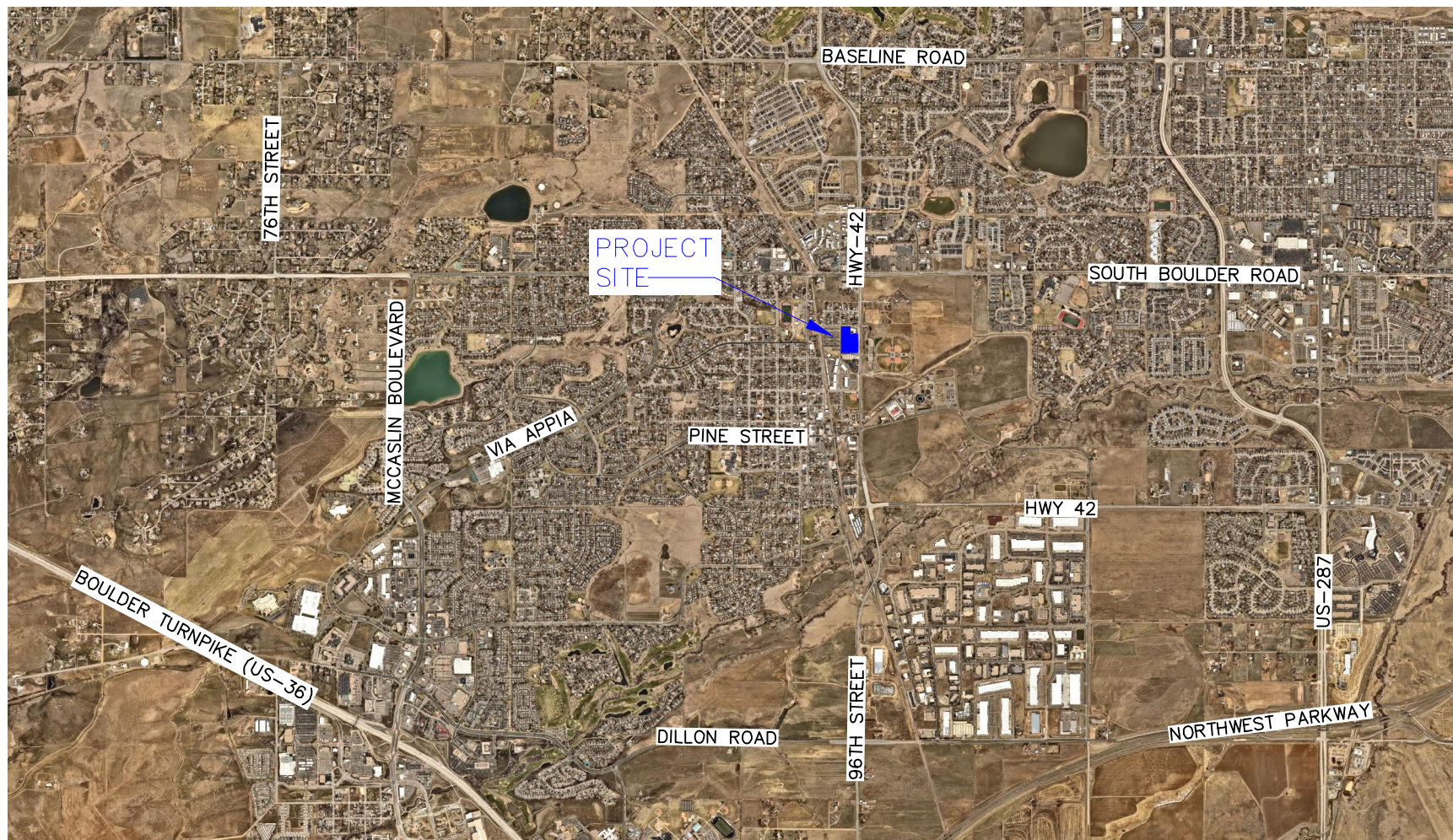


FIGURE 1
DELO BOOM
LOUISVILLE, COLORADO
VICINITY MAP

3.0 EXISTING AND FUTURE CONDITIONS

3.1 Existing Study Area

The existing site is comprised of vacant land and storage for heavy-use equipment. Directly to the south are storage units, directly west are single-family attached homes, and directly east is Louisville Tire & Auto Care. The extended surrounding area comprises mostly of residential housing and public parks. A site aerial is shown below (north is up).



Site Aerial

3.2 Existing Roadway Network

Griffith Street extends east/west with one through lane of travel in each direction with on-street parking permitted. The posted speed limit along Griffith Street is 25 miles per hour.

Main Street provides one through lane in each direction extending northbound and southbound with on-street parking. Main Street has a posted speed limit of 25 miles per hour that decreases to 20 miles per hour during the arrival and dismissal times near Louisville Middle School.

Cannon Street extends in the north/south direction with one through lane in each direction with on-street parking provided. A posted speed limit was not observed nor could be determined from Google Earth Streetview; however, travel speeds of 25 miles per hour could be assumed along Cannon Street based on the adjacent development area and character of the roadway.

SH-42 is a two-lane roadway extending northbound and southbound near the project site. The posted speed limit in the southbound direction is 45 miles per hour while the posted speed limit in the northbound direction is 50 miles per hour. SH-42 is a state highway and is classified as a "Non-Rural Principal Highway (NR-A)".

Short Street extends east/west with one lane in each direction while also providing on-street parking. A posted speed limit was not observed along Short Street but could be assumed to be 25 miles per hour due to the characteristics of the street.

The unsignalized 'T'-intersection of Griffith Street and Main Street (#1) operates with stop control on the westbound approach of Griffith Street. All three legs provide a single lane shared for all movements. An aerial photo of the existing intersection configuration is below (north is up - typical).



Griffith Street & Main Street (#1)

The unsignalized Griffith Street and Cannon Street (#2) intersection operates with stop control on the northbound and southbound approaches of Cannon Street. All four approaches provide a single through lane shared with left and right turning movements. An aerial photo of the existing intersection configuration is below.



Griffith Street & Cannon Street (#2)

The intersection of Griffith Street and SH-42 (#3) is unsignalized and operates with stop control on the eastbound and westbound approaches of Griffith Street. The northbound approach of SH-42 provides a left turn lane and a shared through/right turn lane while the southbound approach of SH-42 provides a left turn lane, a through lane, and a right turn lane. The eastbound approach provides a single lane shared for all movements and the westbound approach provides a shared left turn/through lane and right turn lane. An aerial photo of the existing intersection configuration is below.



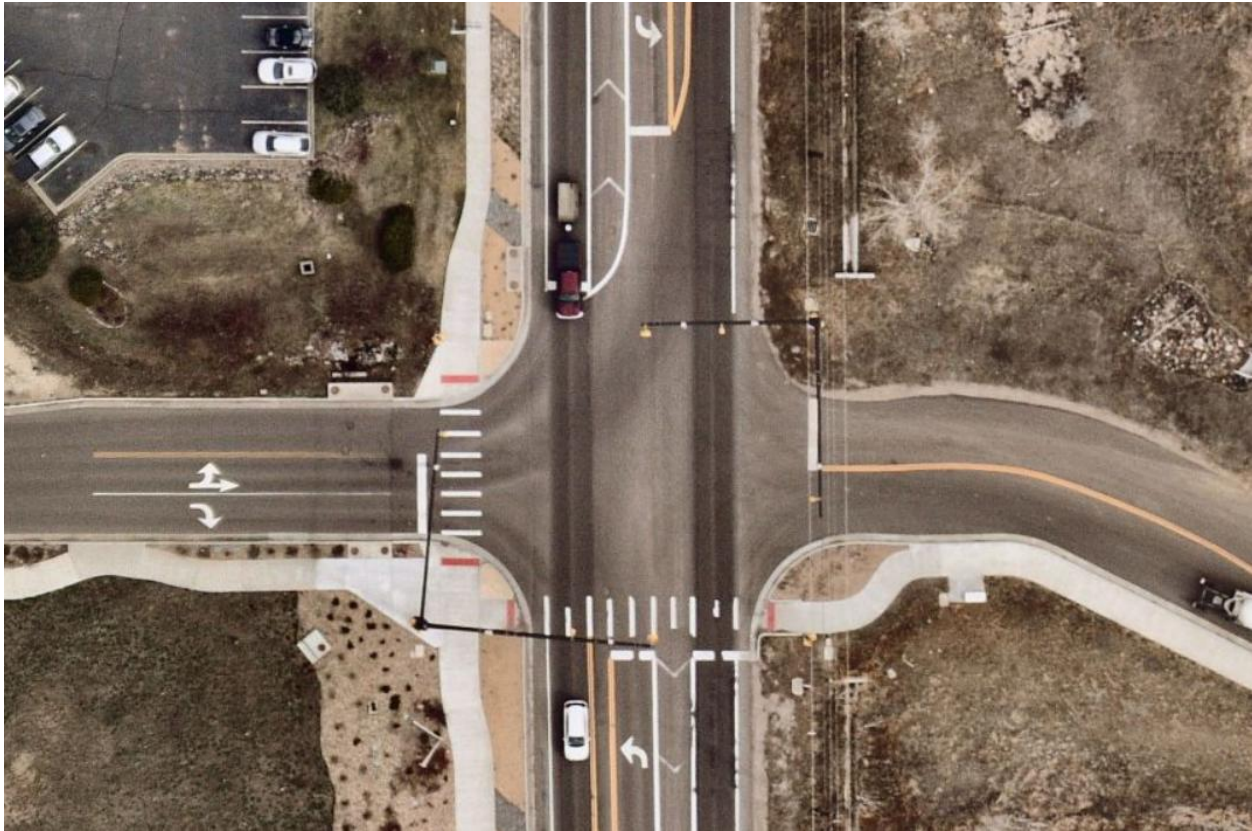
Griffith Street & SH-42 (#3)

The intersection of Short Street and Cannon Street (#4) operates with stop control on the eastbound and westbound approaches of Short Street. All four approaches provide a single lane shared with all movements. An aerial photo of the existing intersection configuration is below.



Short Street & Cannon Street (#4)

The signalized intersection of Short Street and SH-42 (#5) operates with permissive only left turn phasing on the eastbound and westbound approaches of Short Street and protected-permissive left turn phasing on the northbound and southbound approaches of SH-42. The northbound and southbound approaches provide a left turn lane and a shared through/right turn lane. The eastbound Short Street approach provides a shared left turn/through lane and a right turn lane while the westbound approach provides a single lane shared with left turn, through, and right turn movements. An aerial photo of the existing intersection configuration is below.



Short Street & SH-42 (#5)

The intersection lane configuration and control for the study area key intersections are shown in **Figure 2**.

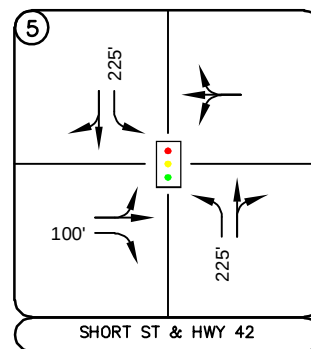
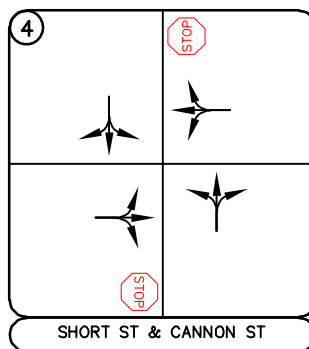
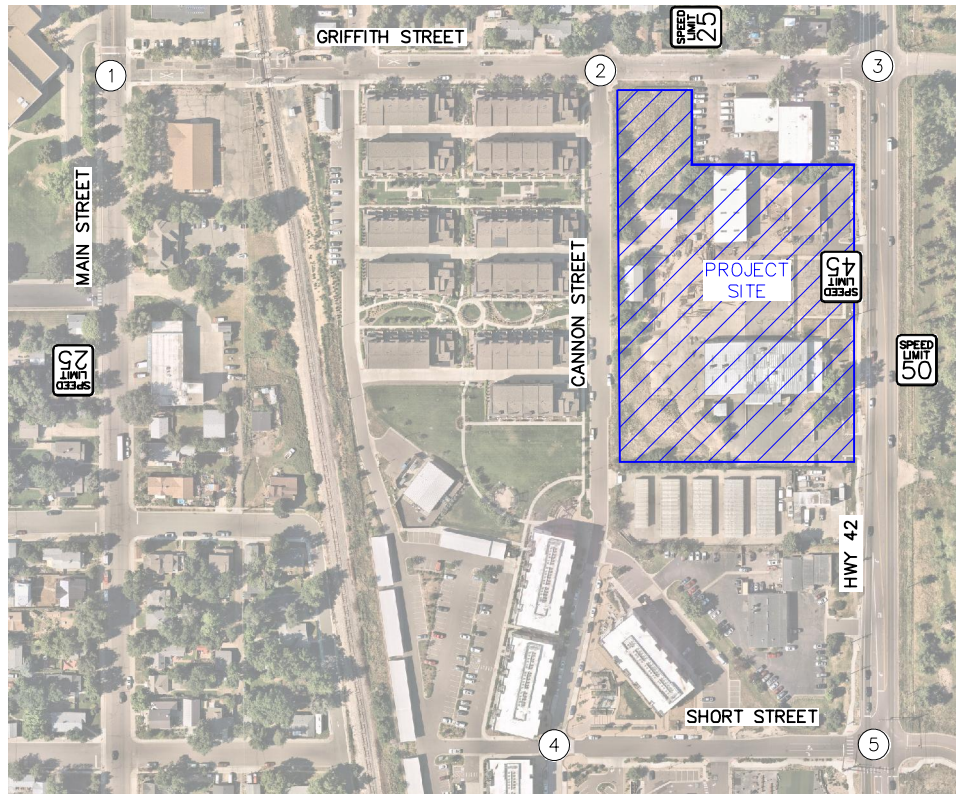
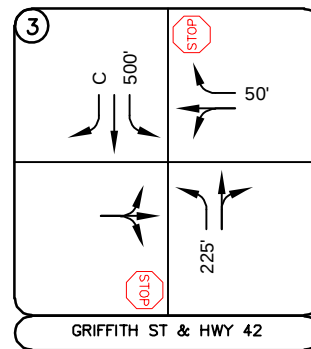
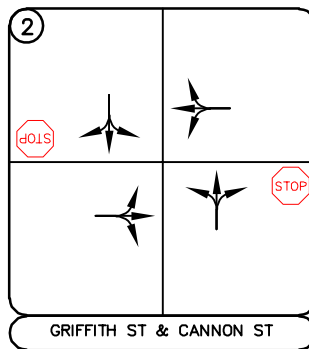
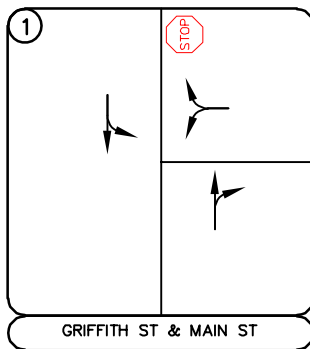
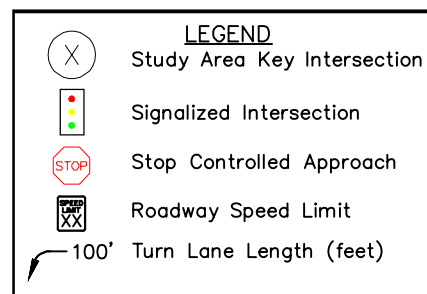


FIGURE 2
DELO BOOM
LOUISVILLE, COLORADO
EXISTING GEOMETRY AND CONTROL



3.3 Existing Traffic Volumes

Existing turning movement counts were conducted at the study intersections on Thursday, January 18, 2024 during the weekday morning and afternoon peak hours with the exception of Griffith Street/Main Street and Griffith Street/SH-42 intersection which were conducted on Tuesday, January 23, 2024. The counts were conducted during the morning and afternoon peak hours of adjacent street traffic in 15-minute intervals from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM on this count date. The existing intersection traffic volumes are shown in **Figure 3** with count sheets provided in **Appendix B**.

3.4 Unspecified Development Traffic Growth

According to information provided on the website for the Colorado Department of Transportation (CDOT), the 20-year growth factor along State Highway 42 in the vicinity of the site is 1.23 which equates to annual growth rate of 1.04 percent. Traffic information from the CDOT Online Transportation Information System (OTIS) website is included in **Appendix C**. This annual growth rate was used to estimate near-term 2026 and long-term 2045 traffic volume projections at the key intersections. Background traffic volumes for 2026 and 2045 are shown in **Figures 4** and **5**, respectively.

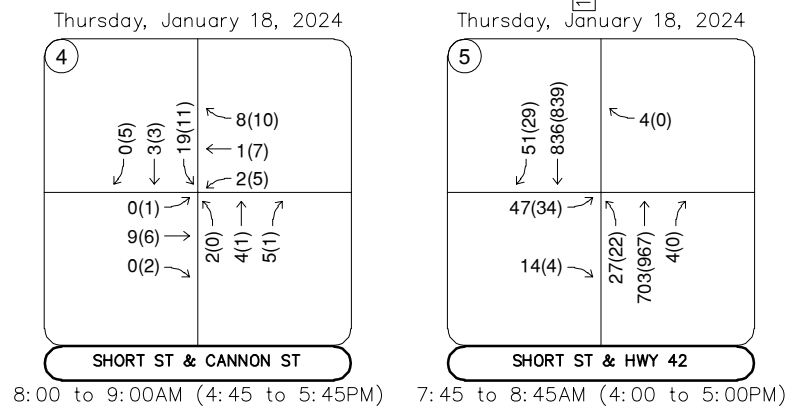
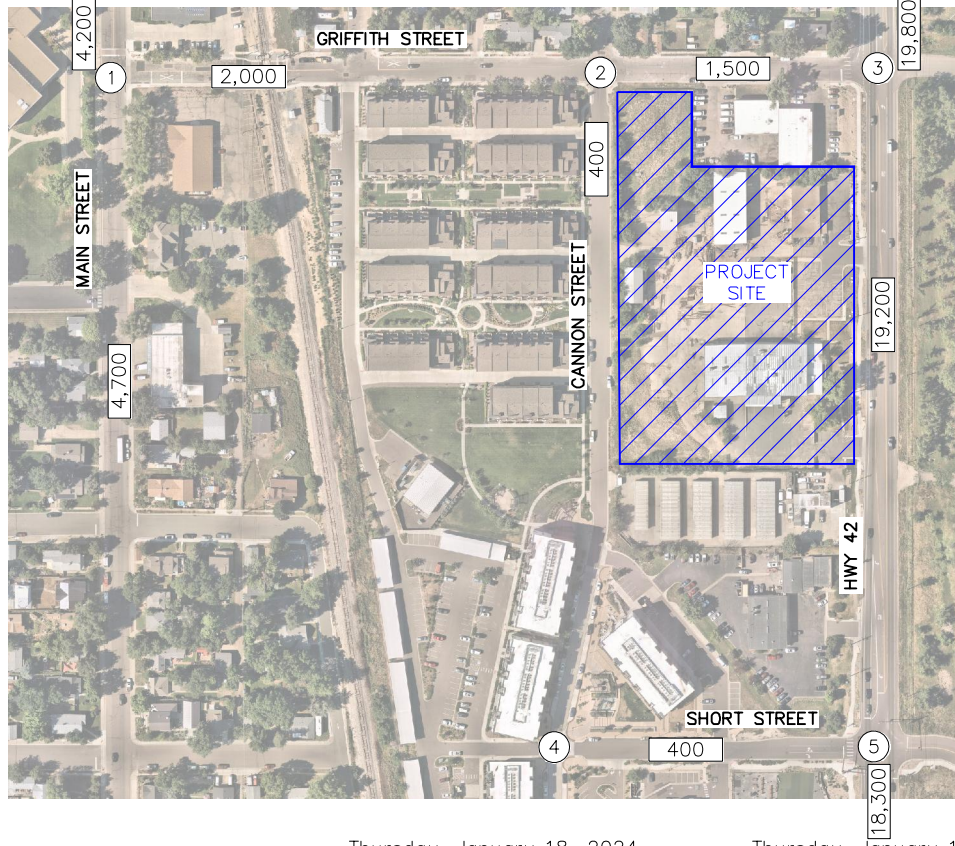
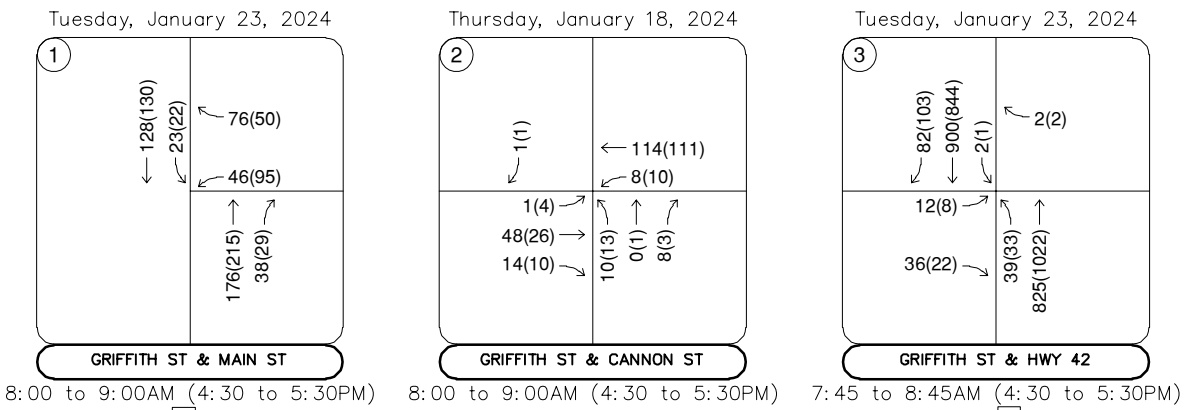


FIGURE 3
DELO BOOM
LOUISVILLE, COLORADO
2024 EXISTING TRAFFIC VOLUMES

LEGEND	
(X)	Study Area Key Intersection
xxx(xxx)	Weekday AM(PM) Peak Hour Traffic Volumes
xx,x00	Estimated Daily Traffic Volume



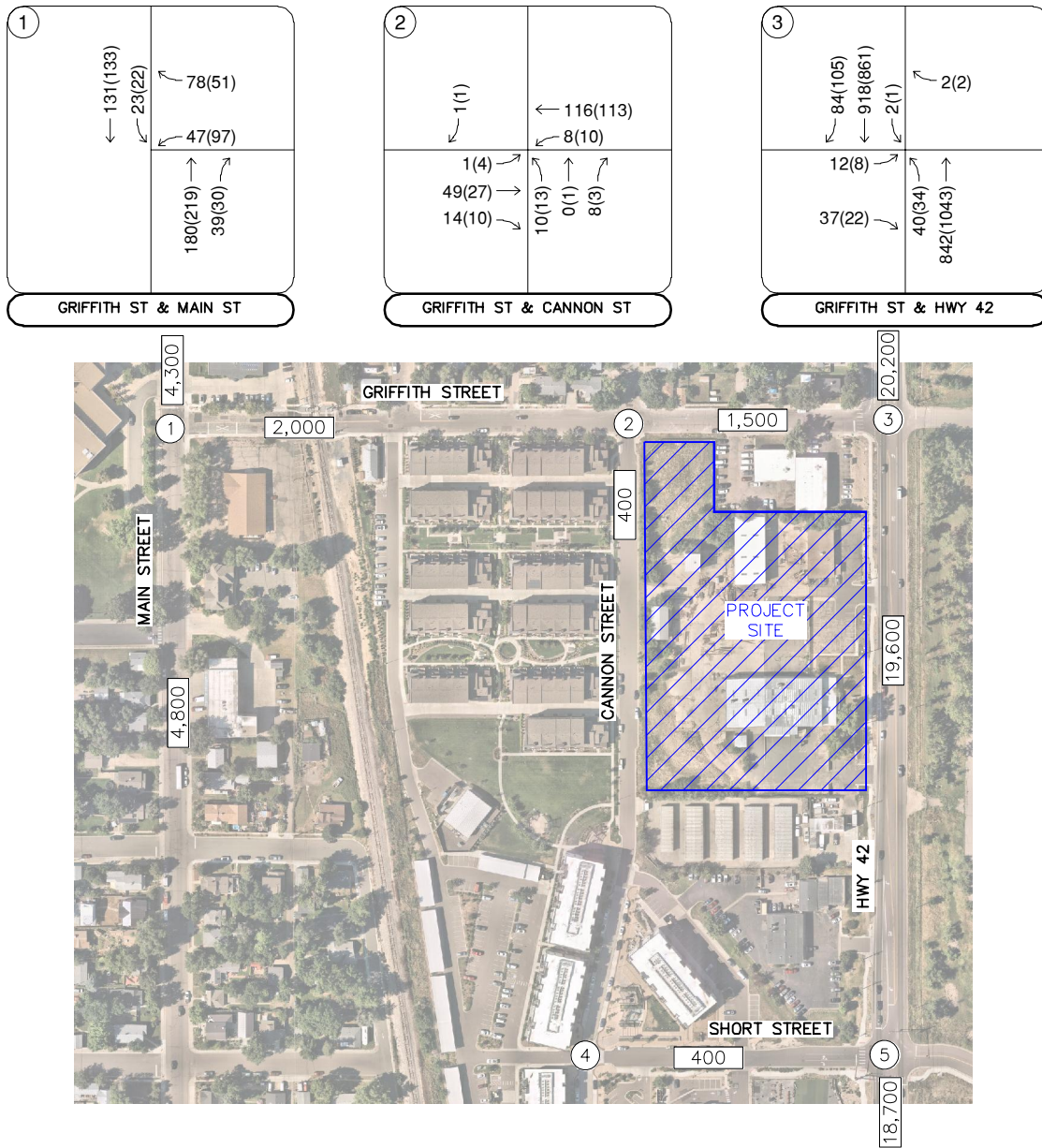


FIGURE 4
DELO BOOM
LOUISVILLE, COLORADO
2026 BACKGROUND TRAFFIC VOLUMES

LEGEND

(X) Study Area Key Intersection

xxx(xxx) Weekday AM(PM)
Peak Hour Traffic Volumes

xx,x00 Estimated Daily Traffic Volume



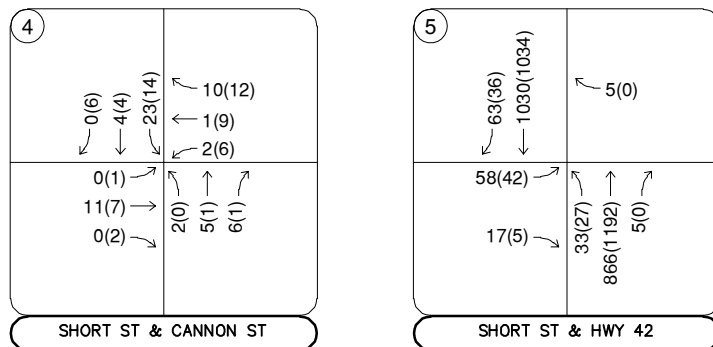
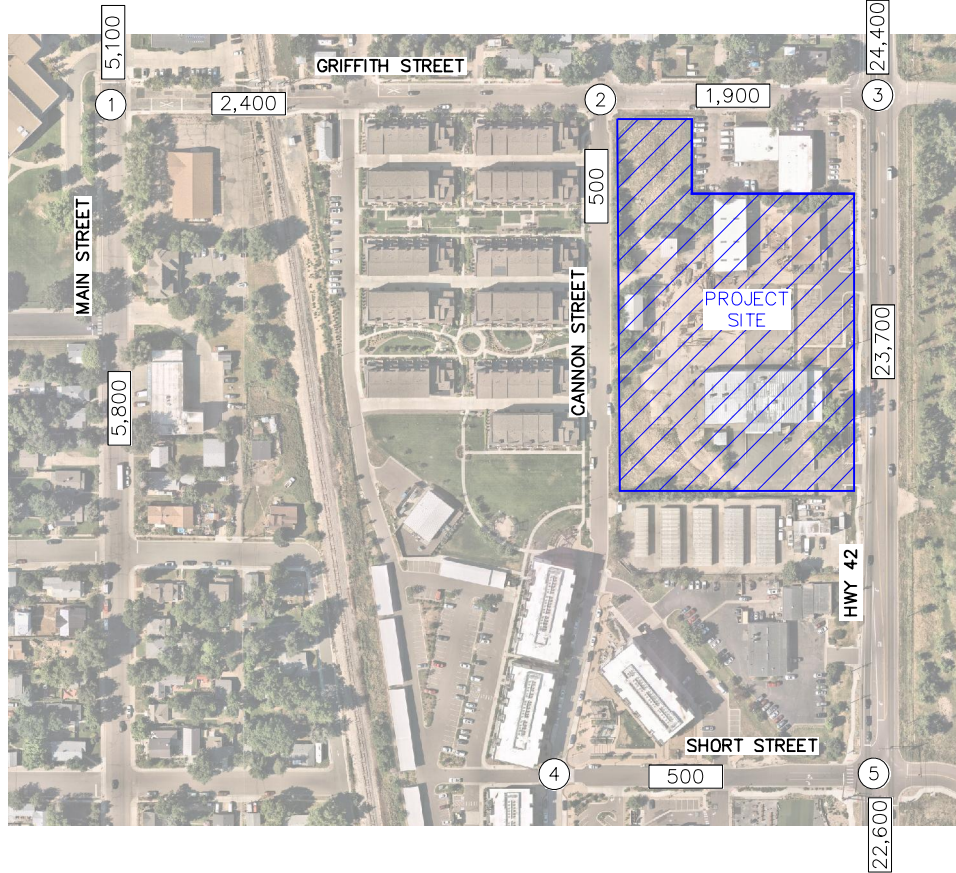
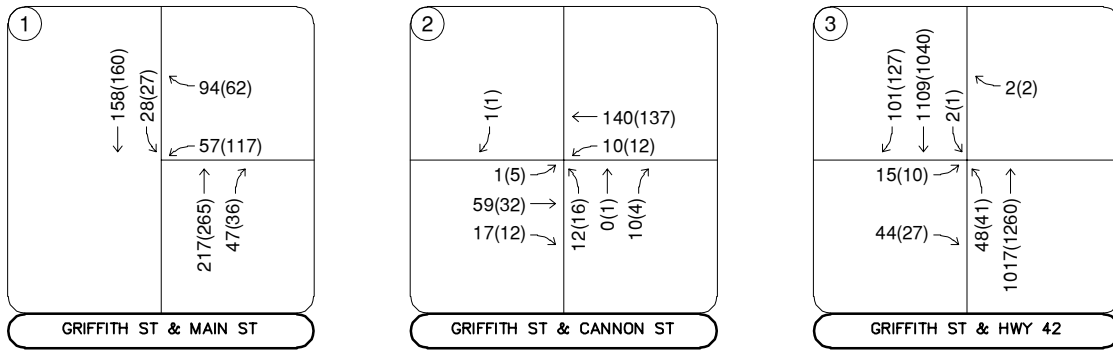


FIGURE 5
DELO BOOM
LOUISVILLE, COLORADO
2045 BACKGROUND TRAFFIC VOLUMES

LEGEND

(X) Study Area Key Intersection

xxx(xxx) Weekday AM(PM)
Peak Hour Traffic Volumes

xx,x00 Estimated Daily Traffic Volume



4.0 PROJECT TRAFFIC CHARACTERISTICS

4.1 Trip Generation

Site-generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land use to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the *Trip Generation Manual*¹ published by the Institute of Transportation Engineers (ITE). ITE has established trip rates in nationwide studies of similar land uses. For this study, Kimley-Horn used the ITE Trip Generation Report average rates that apply to Multifamily Low-Rise Housing (ITE Land Use Code 220) and to Strip Retail <40k (ITE 822) and fitted curve equations that apply to Single Family Attached Housing (ITE 215) for traffic associated with the development. Of note, the number of multifamily units meets the ITE average rate equation line first with the low number of dwelling units (99 DUs), even though the fitted curve equation is recommended to be used based on the *Process for Selecting Average Rate or Equation* chart.

Since the full buildout of the project is proposed to contain residential and a small retail component, internal capture trips are expected to occur on site as well. These internal capture trips are shared trips from vehicles already within the internal street network. These shared trips reduce the number of total external trips and were calculated directly per the ITE procedure.

Accounting for internal capture, Delo Boom is expected to generate approximately 1,072 weekday daily trips, with 62 of these trips occurring in the morning peak hour and 86 of these trips occurring in the afternoon peak hour. Calculations were based on the procedure and information provided in the ITE *Trip Generation Manual, 11th Edition – Volume 1: User's Guide and Handbook*, 2021. **Table 1** summarizes the estimated trip generation for the Delo Boom. The trip generation worksheets are included in **Appendix D**.

¹ Institute of Transportation Engineers, *Trip Generation Manual*, Eleventh Edition, Washington DC, 2021.

Table 1 – Delo Boom Traffic Generation

Land Use and Size	Weekday Vehicle Trips						
	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Single Family Attached (ITE 215) – 36 Dwelling Units	224	4	9	13	11	7	18
Multifamily Low-Rise Housing (ITE 220) – 99 Dwelling Units	668	10	30	40	32	18	50
Strip Retail <40k (ITE 822) – 4,000 Square Feet	218	5	4	9	13	13	26
Total Project Trips	1,110	19	43	62	56	38	96
Total Project Trips with Internal Capture	1,072	19	43	62	51	35	86

4.2 Trip Distribution

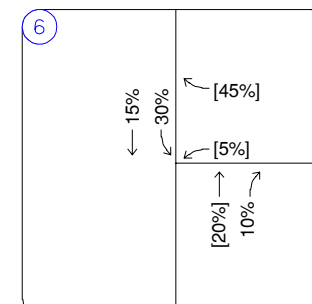
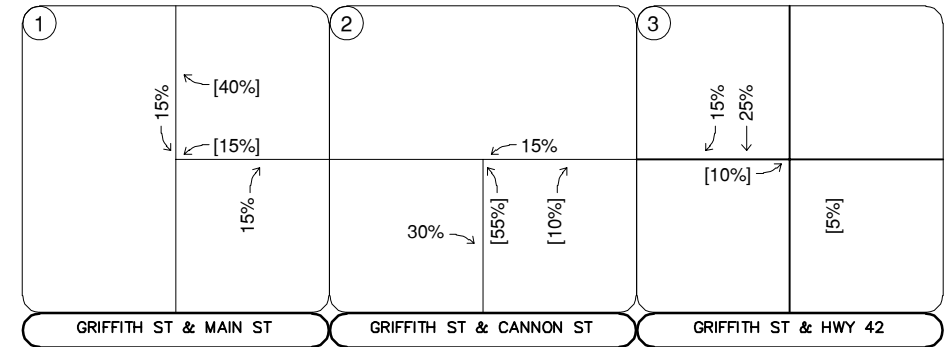
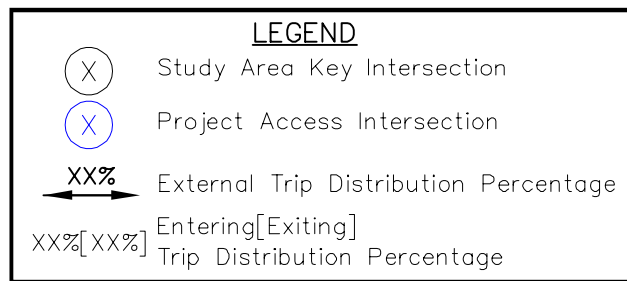
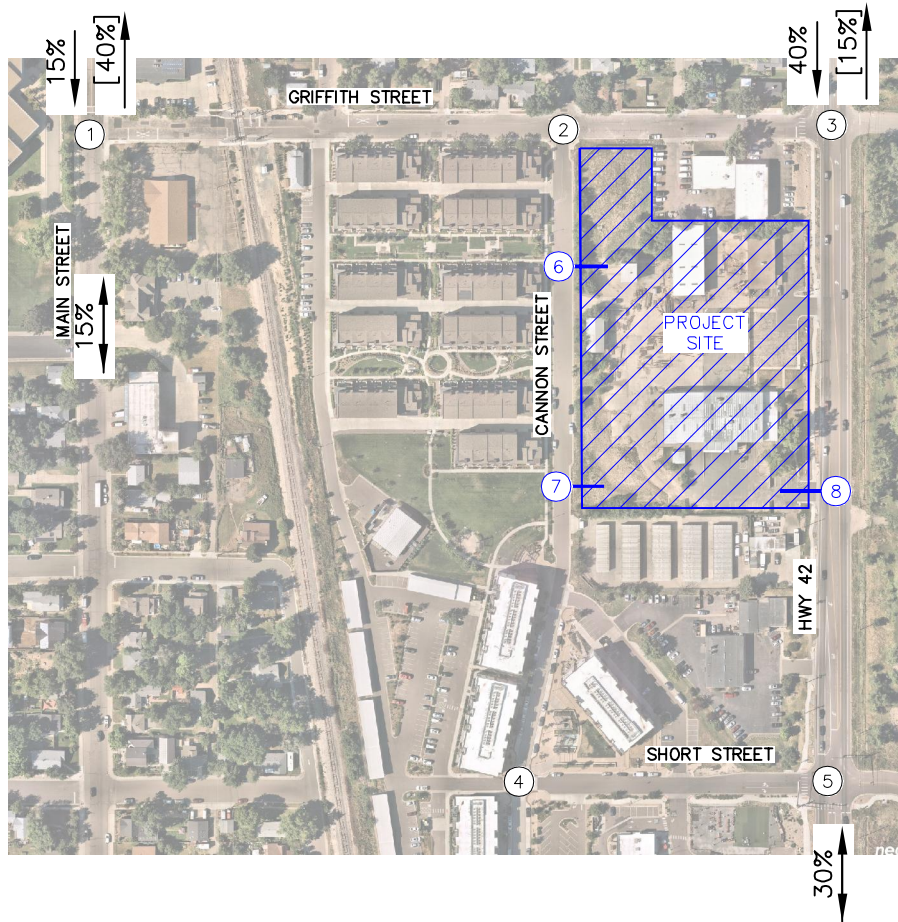
Distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, existing and anticipated surrounding attraction information, and the proposed access system for the project. The directional distribution of traffic is a means to quantify the percentage of site-generated traffic that approaches the site from a given direction and departs the site back to the original source. The project trip distribution for the proposed development is illustrated in **Figure 6** for the residential portion and **Figure 7** for the retail portion for the short-term horizon. However, since a signal is planned for the future at Griffith Street and SH-42, it is likely the residential and retail uses will have a different distribution between the two horizon analysis years. Therefore, **Figure 8** and **Figure 9** illustrate the residential and retail areas, respectively for the long-term horizon.

4.3 Traffic Assignment

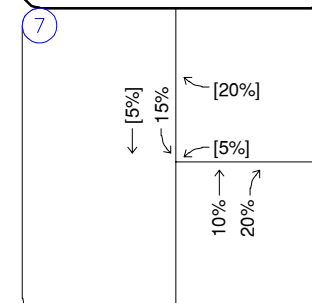
Delo Boom traffic assignment was obtained by applying the project trip distribution to the estimated traffic generation of the development shown in **Table 1**. Traffic assignment is shown in **Figure 10** for the short-term horizon and **Figure 11** for the long-term horizon.

4.4 Total (Background Plus Project) Traffic

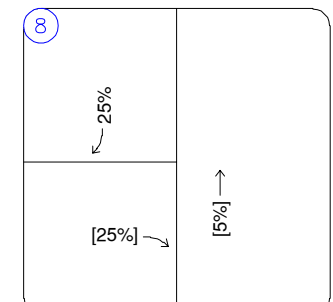
Site traffic volumes were added to the background volumes to represent estimated traffic conditions for the short-term 2026 buildout horizon and long-term 2045 twenty-year planning horizon. These total traffic volumes for the study area are illustrated for the 2026 and 2045 horizon years in **Figures 12** and **13**, respectively.



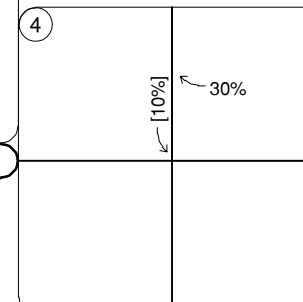
CANNON ST NORTH ACCESS



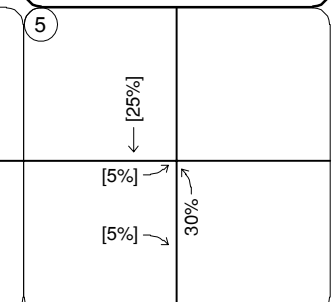
CANNON ST SOUTH ACCESS



HWY 42 ACCESS



SHORT ST & CANNON ST



SHORT ST & HWY 42



FIGURE 6
 DELO BOOM
 LOUISVILLE, COLORADO
 2026 PROJECT TRIP DISTRIBUTION (RESIDENTIAL)

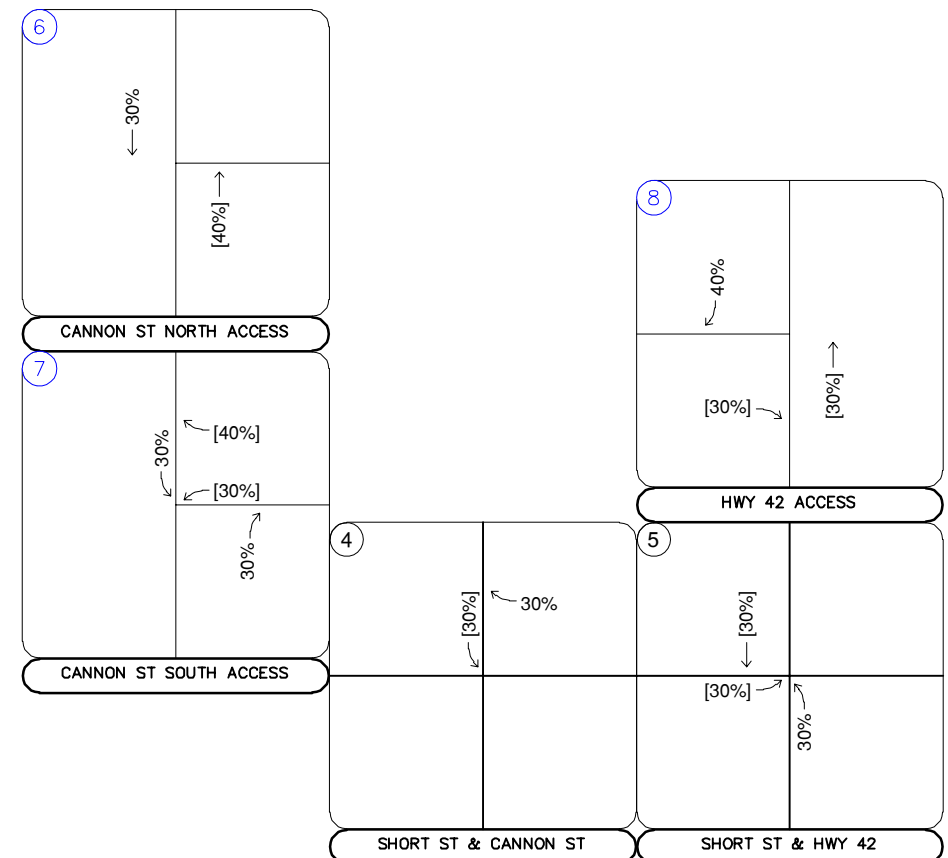
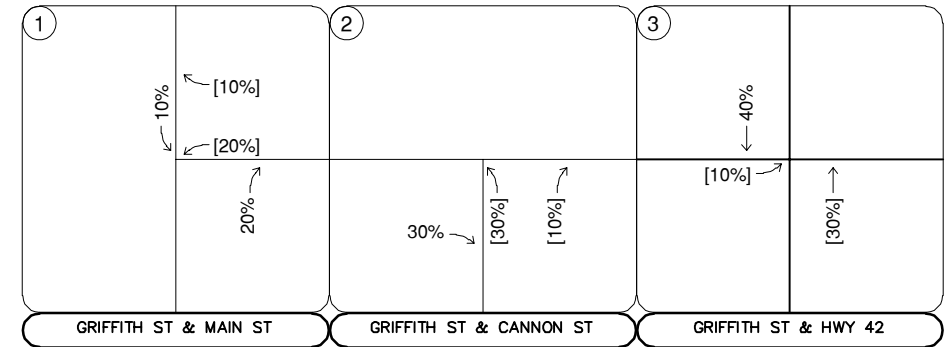
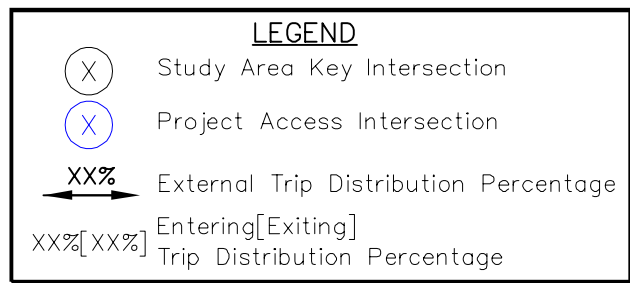
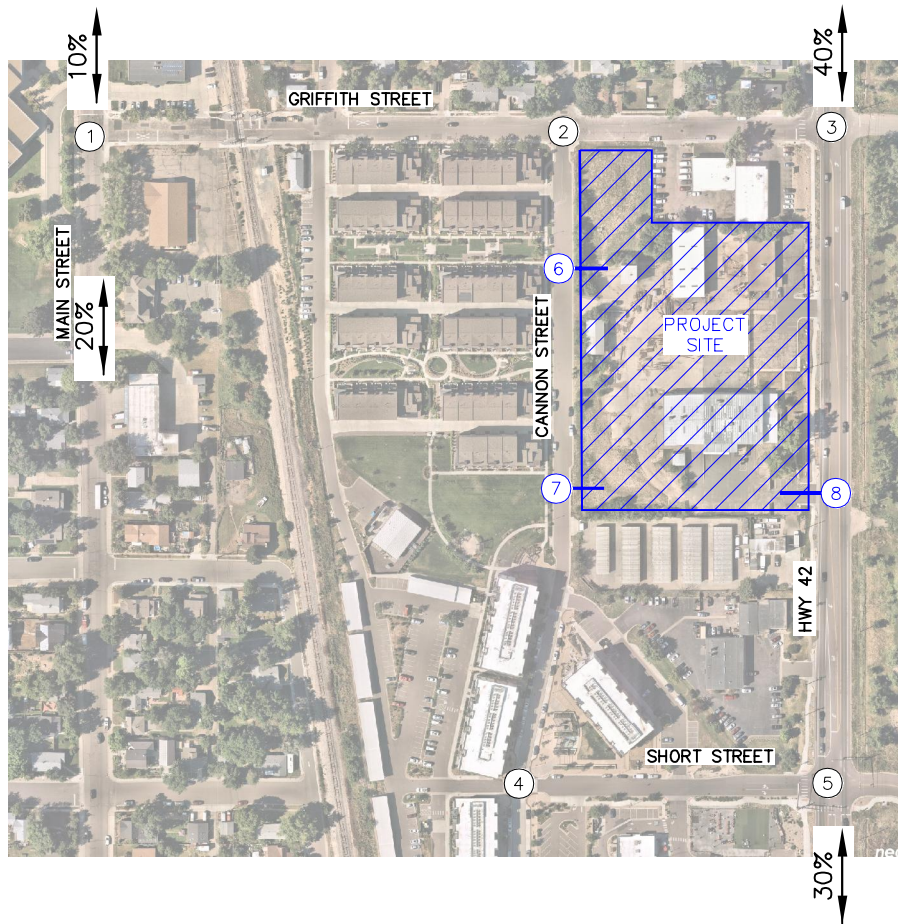
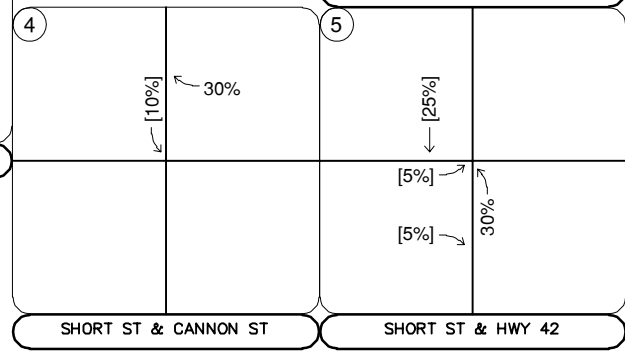
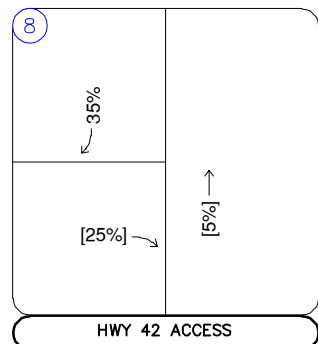
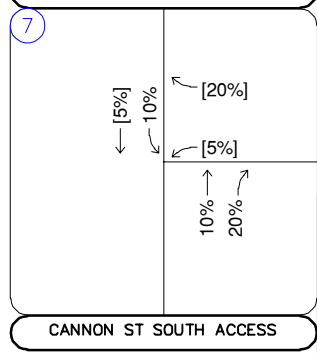
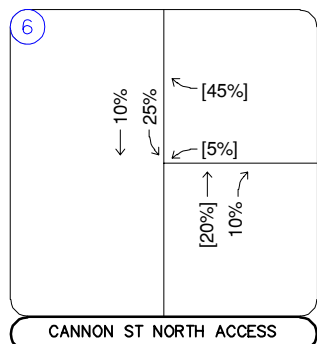
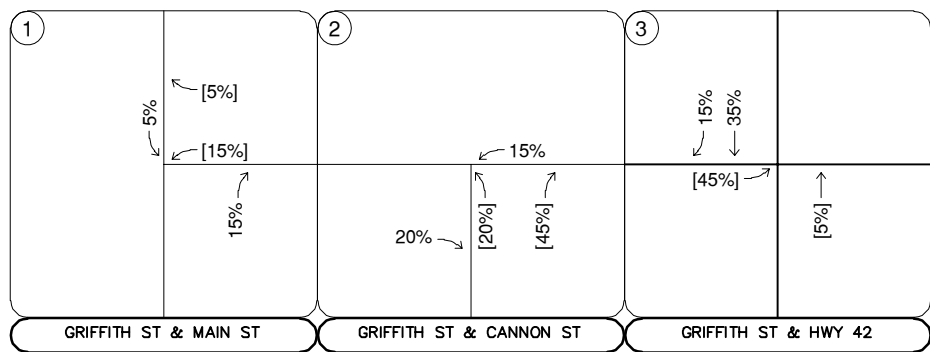
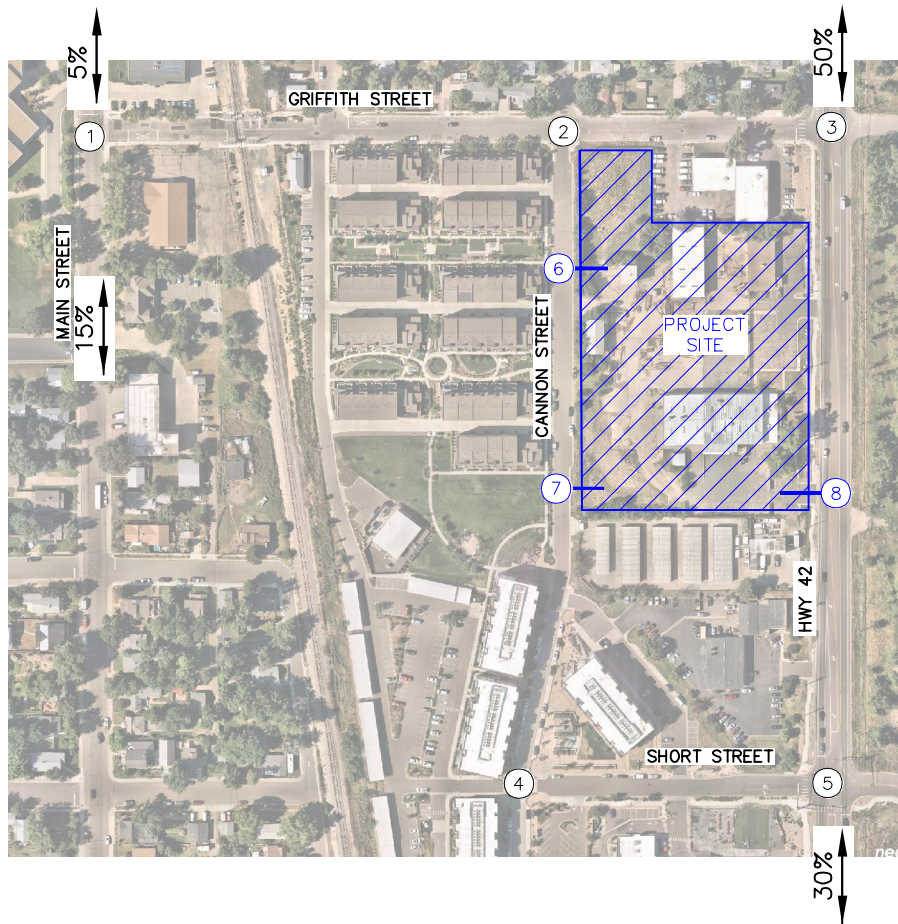


FIGURE 7
 DELO BOOM
 LOUISVILLE, COLORADO
 2026 PROJECT TRIP DISTRIBUTION (RETAIL)





LEGEND

(X) Study Area Key Intersection

(X) Project Access Intersection

XX% External Trip Distribution Percentage

XX%[XX%] Entering[Exiting] Trip Distribution Percentage



FIGURE 8
DELO BOOM
LOUISVILLE, COLORADO
2045 PROJECT TRIP DISTRIBUTION (RESIDENTIAL)

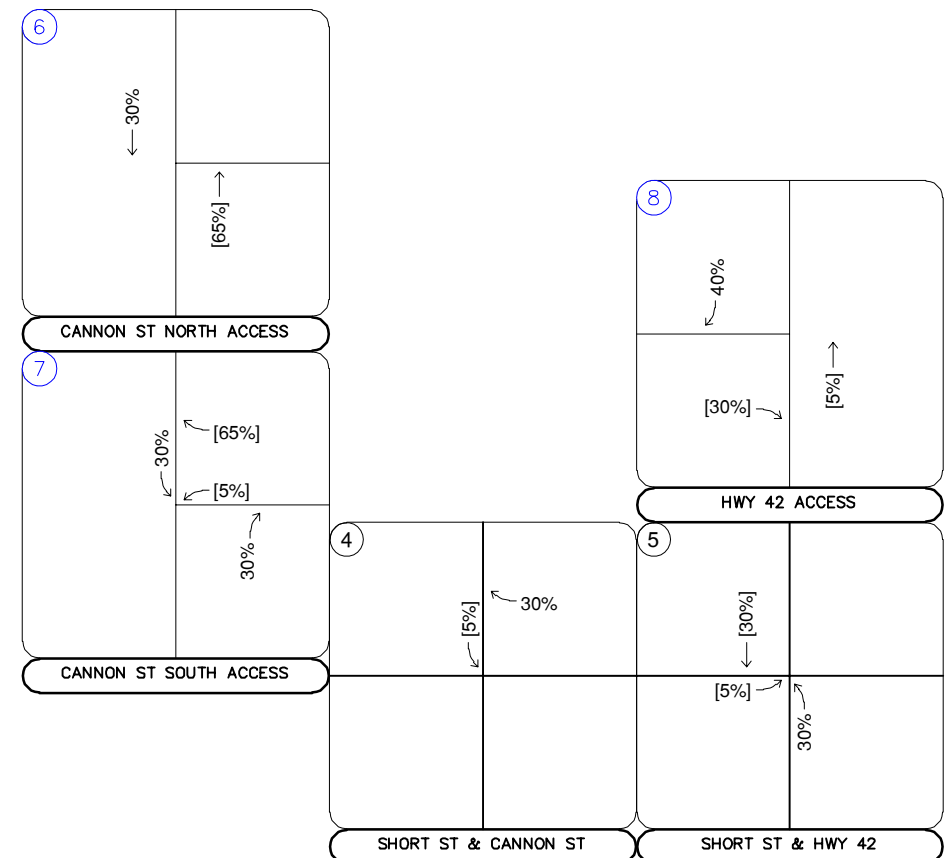
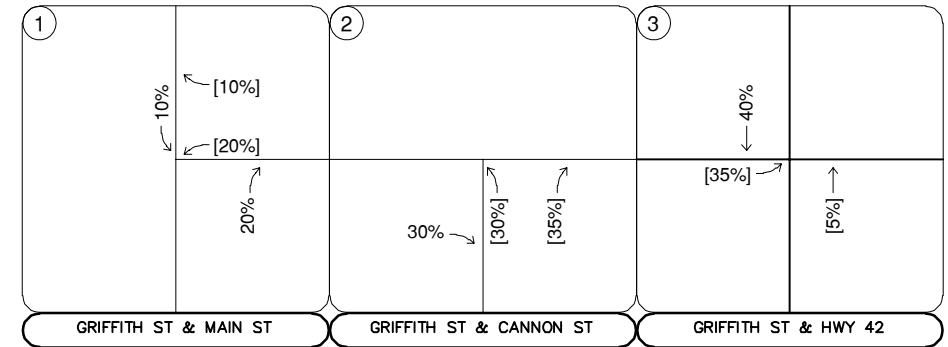
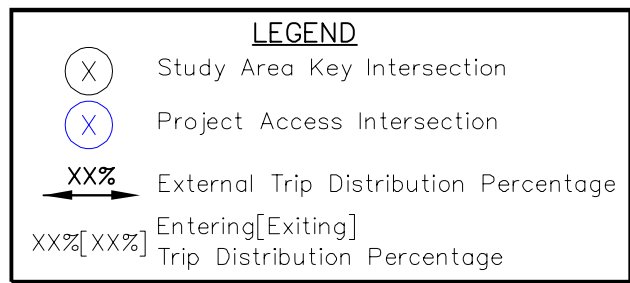
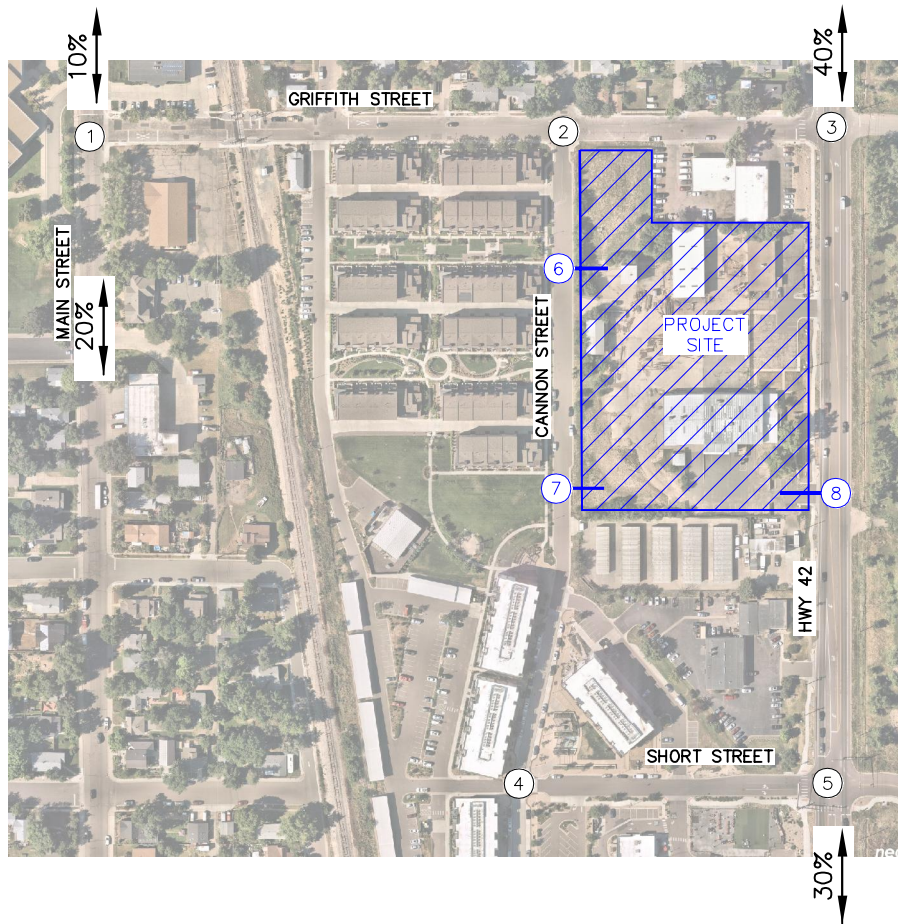
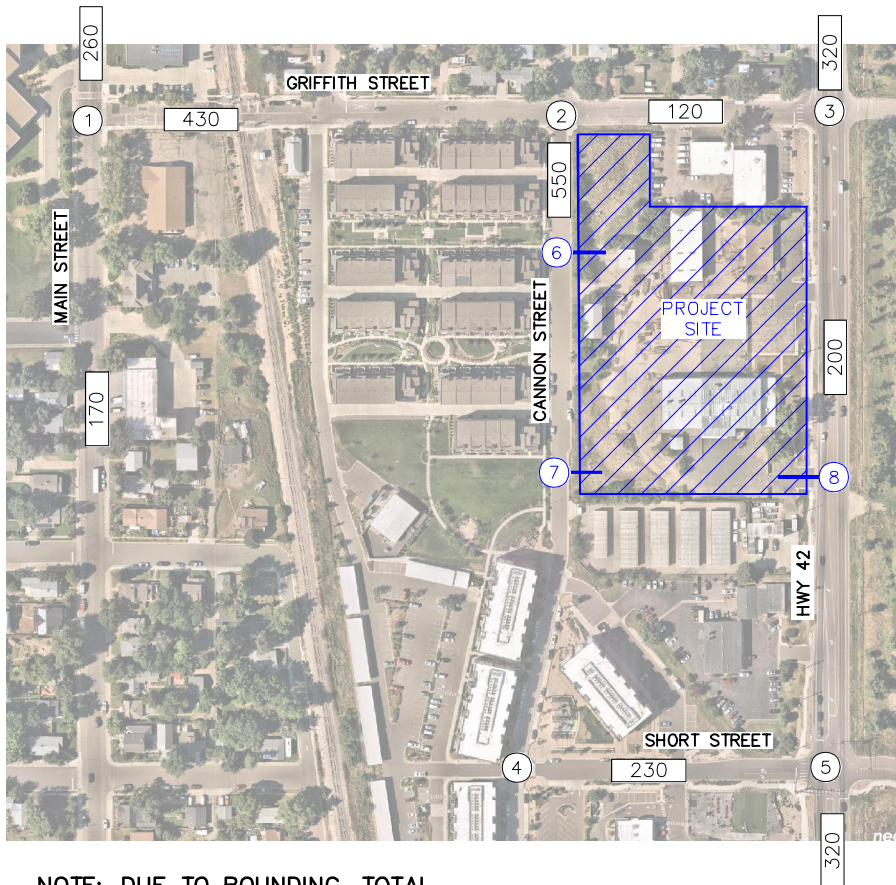


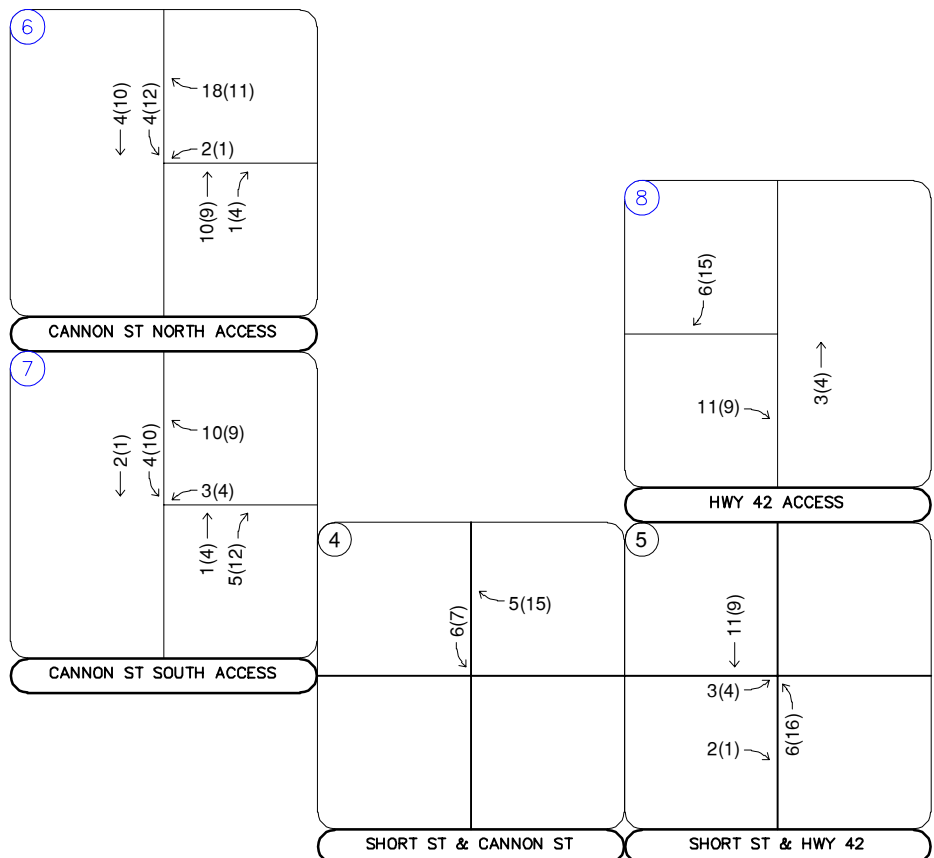
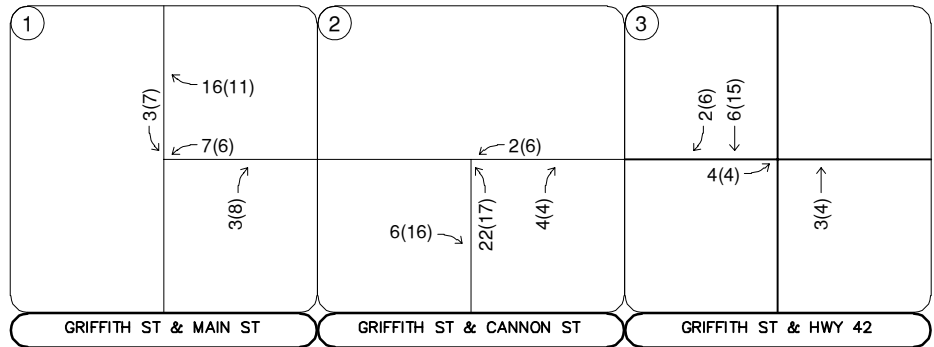
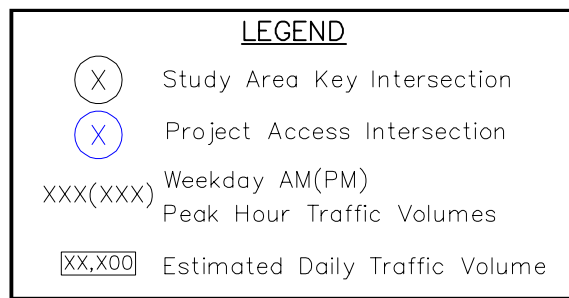
FIGURE 9
 DELO BOOM
 LOUISVILLE, COLORADO
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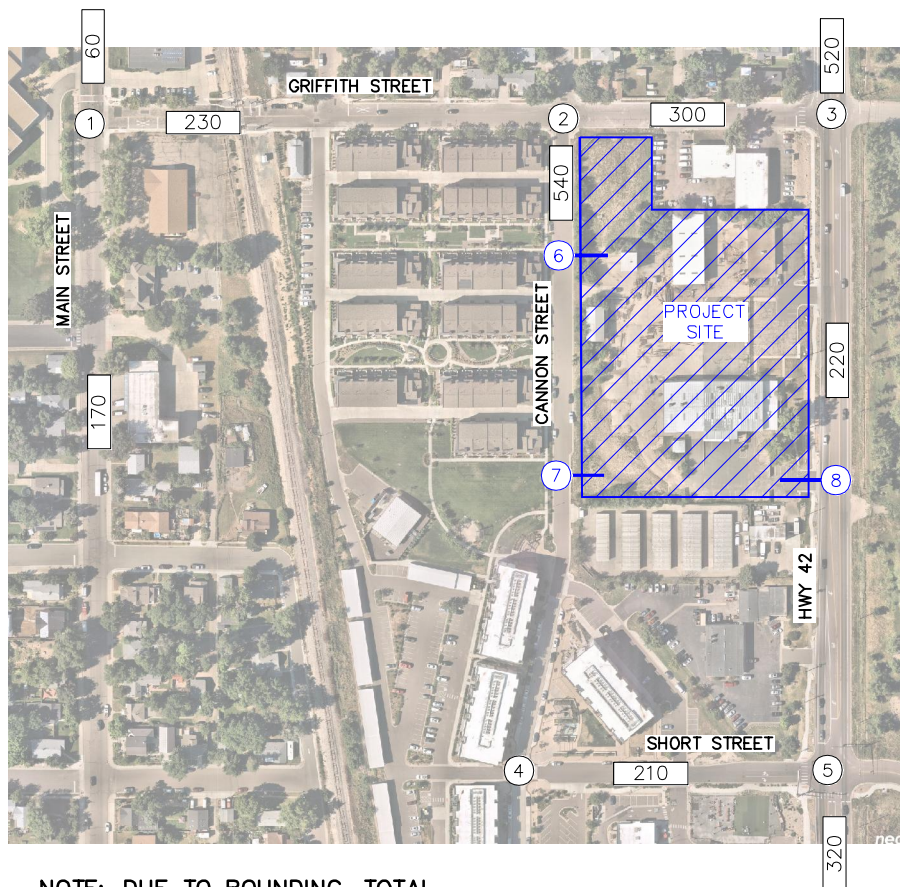


NOTE: DUE TO ROUNDING, TOTAL ASSIGNMENT MAY BE ROUNDED UP



FIGURE 10
DELO BOOM
LOUISVILLE, COLORADO
2026 PROJECT TRAFFIC ASSIGNMENT

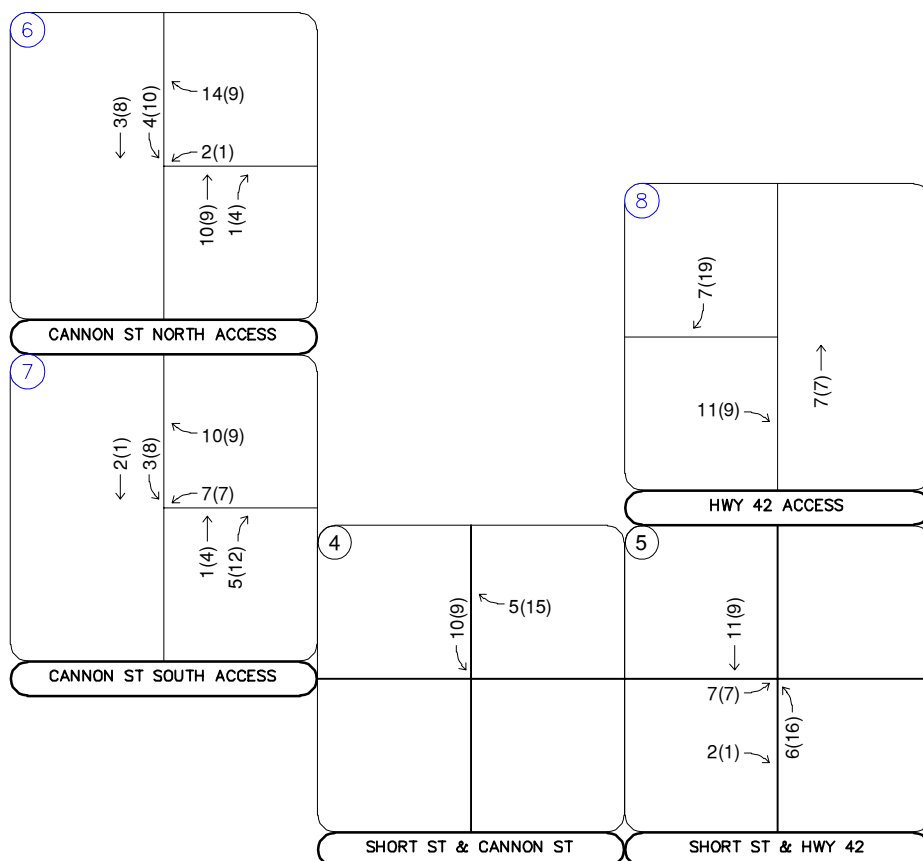
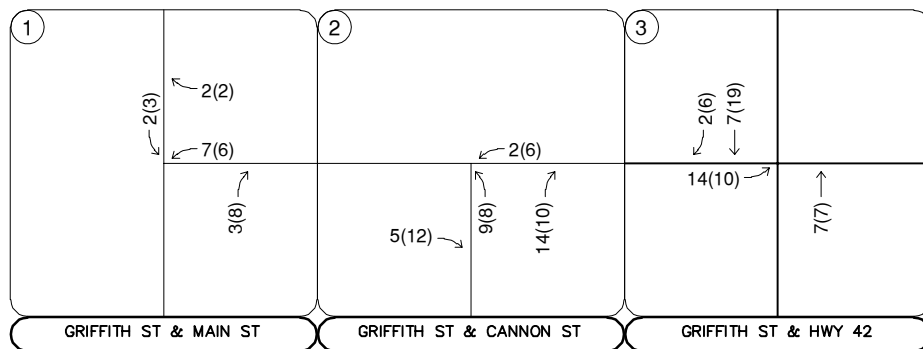
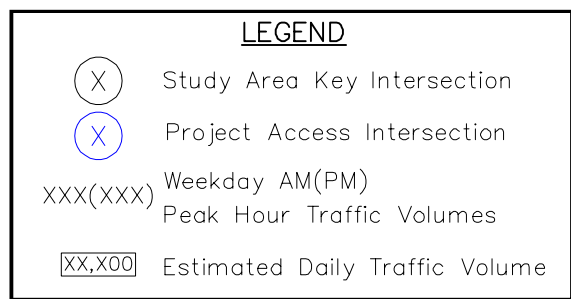


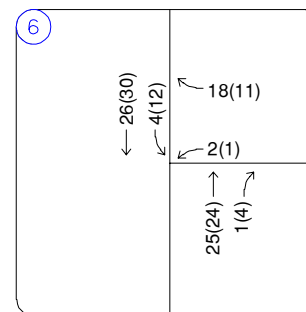
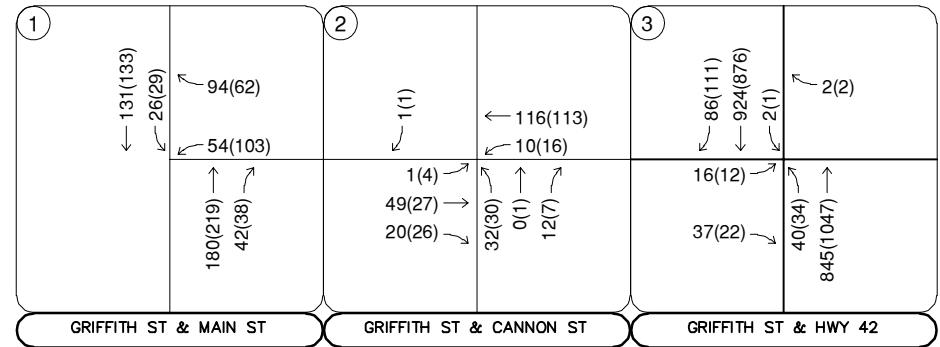
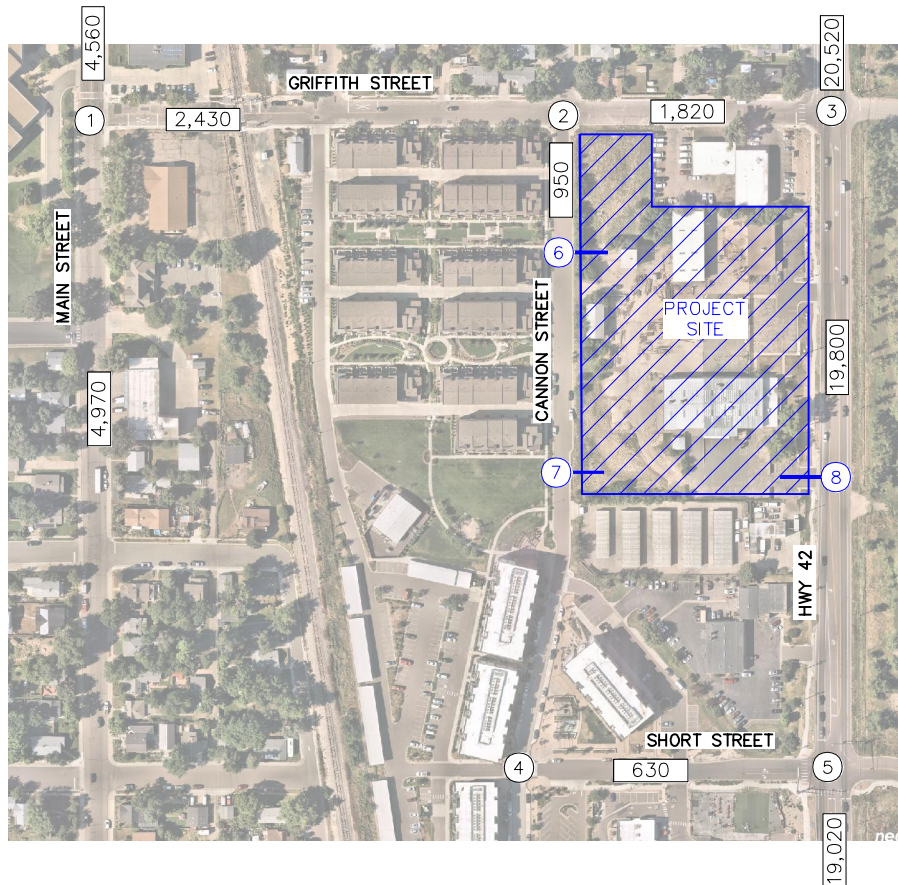


NOTE: DUE TO ROUNDING, TOTAL ASSIGNMENT MAY BE ROUNDED UP

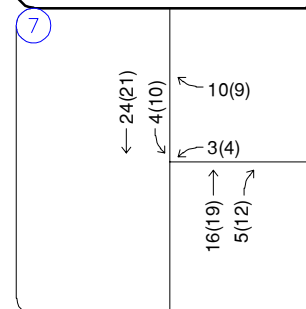


FIGURE 11
DELO BOOM
LOUISVILLE, COLORADO
2045 PROJECT TRAFFIC ASSIGNMENT

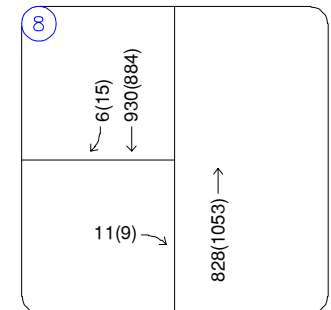




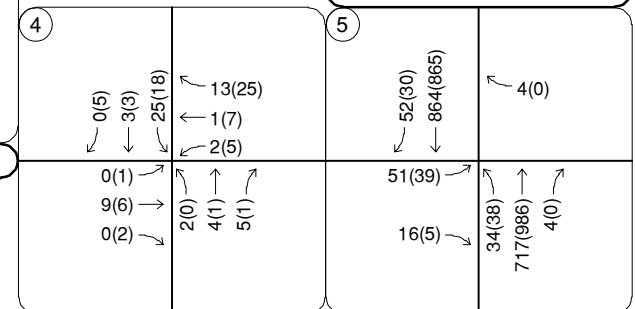
CANNON ST NORTH ACCESS



CANNON ST SOUTH ACCESS



HWY 42 ACCESS



SHORT ST & CANNON ST

SHORT ST & HWY 42

LEGEND



Study Area Key Intersection



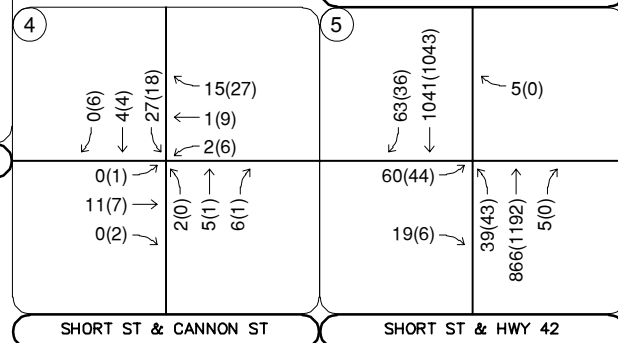
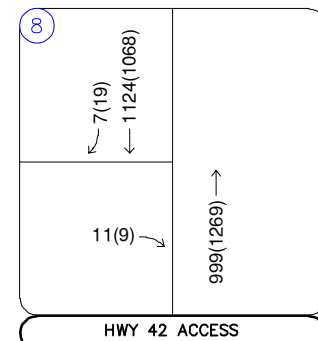
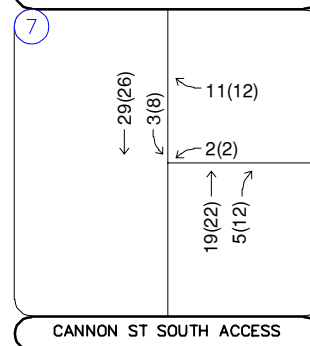
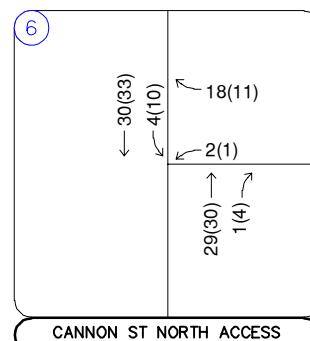
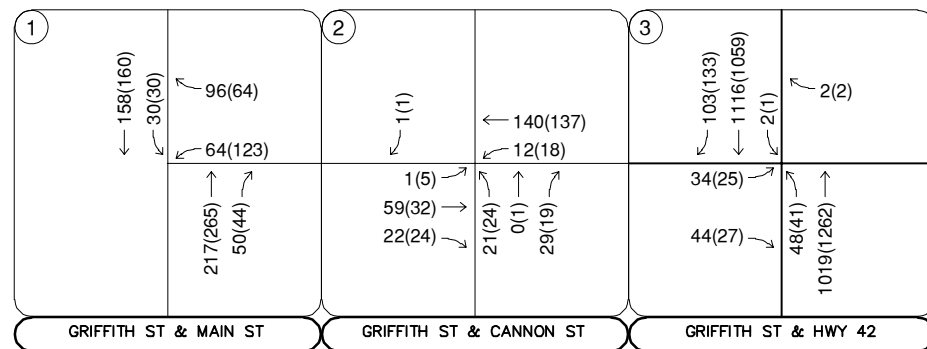
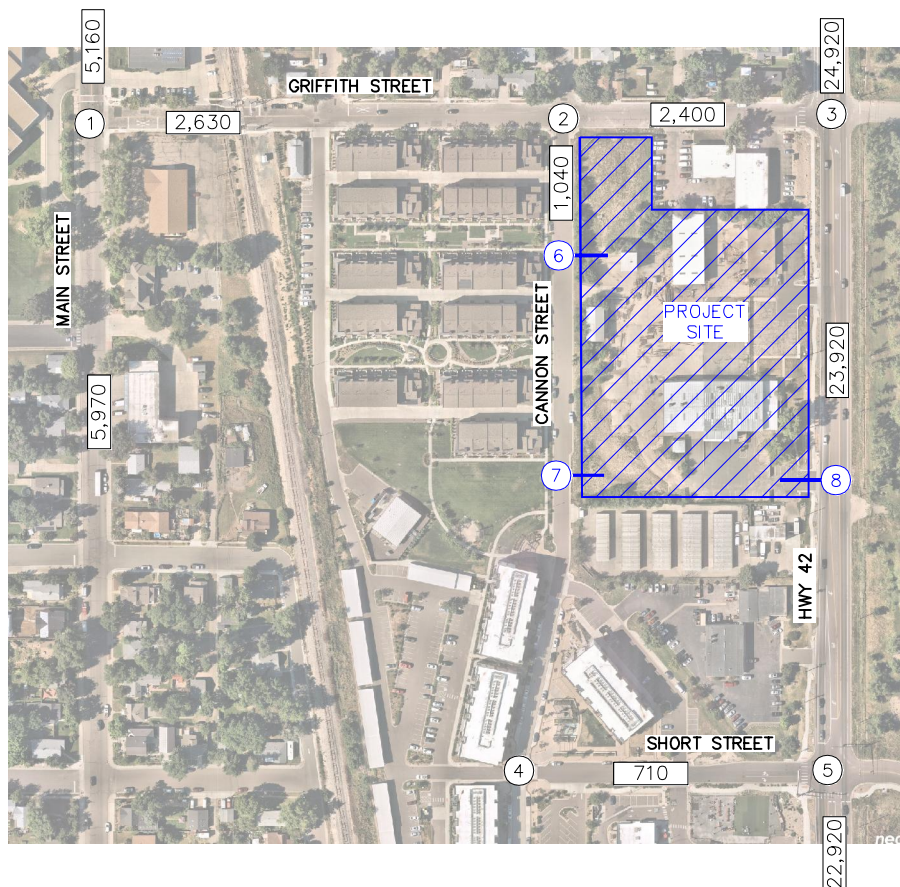
Project Access Intersection

xxx(XXX)
Weekday AM(PM)
Peak Hour Traffic Volumes

xx,x00
Estimated Daily Traffic Volume



FIGURE 12
DELO BOOM
LOUISVILLE, COLORADO
2026 TOTAL TRAFFIC VOLUMES



LEGEND



Study Area Key Intersection



Project Access Intersection

xxx(xxx) Weekday AM(PM)
Peak Hour Traffic Volumes

xx,x00 Estimated Daily Traffic Volume



FIGURE 13
DELO BOOM
LOUISVILLE, COLORADO
2045 TOTAL TRAFFIC VOLUMES

5.0 TRAFFIC OPERATIONS ANALYSIS

Kimley-Horn's analysis of traffic operations in the site vicinity was conducted to determine potential capacity deficiencies in the 2026 and 2045 development horizons at the identified key intersections. The acknowledged source for determining overall capacity is the *Highway Capacity Manual (HCM)*².

5.1 Analysis Methodology

Capacity analysis results are listed in terms of Level of Service (LOS). LOS is a qualitative term describing operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from A (very little delay) to F (long delays and congestion). For intersections and roadways in this study area, standard traffic engineering practice recommends overall intersection LOS D and movement/approach LOS E as the minimum desirable thresholds for acceptable operations. **Table 2** shows the definition of level of service for signalized and unsignalized intersections.

Table 2 – Level of Service Definitions

Level of Service	Signalized Intersection Average Total Delay (sec/veh)	Unsignalized Intersection Average Total Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

Definitions provided from the Highway Capacity Manual, Sixth Edition, Transportation Research Board, 2016.

Study area intersections were analyzed based on average total delay analysis for signalized and unsignalized intersections. Under the unsignalized analysis, the LOS for a two-way stop-controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. LOS for a two-way stop-controlled intersection is not defined for the intersection as a whole. LOS for signalized, roundabout, and all-way stop controlled intersections are defined for each approach and for the overall intersection.

² Transportation Research Board, *Highway Capacity Manual*, Sixth Edition, Washington DC, 2016.

5.2 Key Intersection Operational Analysis

Calculations for the operational level of service at the key intersections for the study area are provided in **Appendix E**. The existing year analysis is based on the lane geometry and intersection control shown in **Figure 3**. Existing peak hour factors were utilized in the analysis. The existing heavy vehicle percentages obtained from the turning movement counts were also used in each horizon year. The signalized intersection analysis utilizes the observed cycle lengths and phasing. Based on increased national attention given to establishing appropriate yellow and all-red clearance intervals to improve intersection safety, these have been calculated and are applied for approaches at the signalized intersections. The increase in yellow (4 seconds) and all red time (2 seconds) sacrifices intersection capacity for improved safety. Synchro traffic analysis software was used to analyze the signalized and unsignalized key intersections for HCM LOS.

Griffith Street and Main Street (#1)

The unsignalized 'T'-intersection of Griffith Street and Main Street (#1) operates with stop control on the westbound approach of Griffith Street. The intersection movements operate acceptably at LOS B or better during both peak hours under existing conditions. With project traffic, all movements are anticipated to continue operating at an acceptable level of service throughout the 2045 horizon. Therefore, no improvements or modifications are anticipated to be needed at this intersection based on the addition of project traffic and this operational level of service analysis. **Table 3** provides the results of the LOS analysis conducted at this intersection.

Table 3 – Griffith Street & Main Street LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2022 Existing				
Westbound Approach	13.4	B	12.6	B
Southbound Left	8.0	A	7.8	A
2026 Background				
Westbound Approach	13.7	B	12.7	B
Southbound Left	8.0	A	7.8	A
2026 Background Plus Project				
Westbound Approach	14.5	B	13.2	B
Southbound Left	8.0	A	7.9	A
2045 Background				
Westbound Approach	16.7	C	14.9	B
Southbound Left	8.2	A	8.0	A
2045 Background Plus Project				
Westbound Approach	17.8	C	15.3	C
Southbound Left	8.2	A	8.0	A

Griffith Street and Cannon Street (#2)

The unsignalized intersection of Griffith Street and Cannon Street (#2) operates with stop control on the northbound and southbound approaches of Cannon Street. Under existing conditions, the intersection movements operate acceptably at LOS B or better during the morning and afternoon peak hours. With the addition of project traffic, all movements are anticipated to continue operating at LOS B or better throughout the 2045 horizon with the existing intersection control and geometry. City staff inquired whether all-way stop control warrant be considered at this intersection. However, the traffic volume threshold to meet all-way stop control warrants is at least 300 vehicles per hour on the major street and 200 vehicles per hour on the minor street for 8 of the same hours in a day. The AM and PM peak hours in this study do not meet these traffic volume thresholds and as such, all-way stop control is not warranted. Therefore, no improvements are recommended. **Table 4** provides the results of the LOS analysis conducted at this intersection.

Table 4 – Griffith Street & Cannon Street LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2022 Existing				
Northbound Approach	10.1	B	9.6	A
Eastbound Left	7.6	A	7.5	A
Westbound Left	7.5	A	7.3	A
Southbound Approach	9.3	A	8.9	A
2026 Background				
Northbound Approach	10.2	B	9.7	A
Eastbound Left	7.6	A	7.5	A
Westbound Left	7.5	A	7.3	A
Southbound Approach	9.3	A	8.9	A
2026 Background Plus Project				
Northbound Approach	11.1	B	10.0	B
Eastbound Left	7.6	A	7.5	A
Westbound Left	7.5	A	7.4	A
Southbound Approach	9.3	A	8.9	A
2045 Background				
Northbound Approach	10.9	B	9.9	A
Eastbound Left	7.7	A	7.6	A
Westbound Left	7.6	A	7.4	A
Southbound Approach	9.6	A	9.0	A
2045 Background Plus Project				
Northbound Approach	10.8	B	9.8	A
Eastbound Left	7.7	A	7.6	A
Westbound Left	7.6	A	7.4	A
Southbound Approach	9.6	A	9.0	A

Griffith Street and SH-42 (#3)

The intersection of Griffith Street and SH-42 (#3) is unsignalized and operates with stop control on the eastbound and westbound approaches of Griffith Street. The intersection movements operate acceptably during both peak hours under existing conditions. With project traffic, all movements are anticipated to continue operating at an acceptable level of service D or better in 2026. Of note, the intersection is predicted to fail in the 2045 long-term horizon with the existing geometry and control. A four-hour volume signal warrant evaluation was provided and included in **Appendix F**, and it was determined that a signal is warranted at this intersection under the long-term 2045 conditions if no reduction is applied to the right turn movements. If all predicted traffic volumes are realized, the intersection fails under stop control and passes a four-hour warrant. Therefore, by 2045, it is recommended that a signal be considered for installation at this intersection to improve operating conditions. In addition, both the westbound and eastbound approaches should be altered to include a designated left turn lane and a shared lane for through and right turning movements to improve safety.

An alternative scenario based on improvements shown in the Future42 study was also evaluated. Excerpts from the Future42 study can be found in **Appendix G**. Consistent with these plans, State Highway 42 would be widened to provide two through lanes in each direction plus a center median space designated for left turn lanes at full movement intersection. The widening would be implemented for the purpose of incorporating transit and not needing additional capacity for passenger vehicles. Additionally, this intersection is planned for signalization with separate left turn lanes on the minor approach in association with Future42. Of note, the southbound right turn lane along SH-42 will be absorbed by the second southbound through lane. Therefore, with two through lanes along SH-42 and signalization by 2045, the movements at the intersection are expected to operate with LOS A during both peak hours. Of note, it is assumed once this intersection is signalized, the vehicles in the surrounding area will likely reroute to this intersection to utilize movements that were more difficult to perform when the intersection operated with stop control on the minor approaches. **Table 5** provides the results of the LOS analysis conducted at this intersection.

Table 5 – Griffith Street & SH-42 LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2022 Existing				
Northbound Left	11.0	B	10.4	B
Eastbound Approach	24.3	C	21.4	C
Westbound Left/Through	0.0	A	0.0	A
Westbound Right	15.7	C	18.4	C
Southbound Left	9.8	A	10.5	B
2026 Background				
Northbound Left	11.1	B	10.5	B
Eastbound Approach	25.1	D	22.0	C
Westbound Left/Through	0.0	A	0.0	A
Westbound Right	15.9	C	18.8	C
Southbound Left	9.8	A	10.6	B
2026 Background Plus Project				
Northbound Left	11.2	B	10.6	B
Eastbound Approach	27.1	D	24.7	C
Westbound Left/Through	0.0	A	0.0	A
Westbound Right	16.0	C	18.9	C
Southbound Left	9.9	A	10.6	B
2045 Background				
Northbound Left	12.8	B	11.8	B
Eastbound Approach	38.0	E	30.2	E
Westbound Left/Through	0.0	A	0.0	A
Westbound Right	19.2	C	23.8	C
Southbound Left	10.7	B	11.8	B
2045 Background Plus Project				
Northbound Left	12.8	B	11.9	B
Eastbound Approach	58.8	F	44.8	E
Westbound Left/Through	0.0	A	0.0	A
Westbound Right	19.2	C	23.8	C
Southbound Left	10.7	B	11.9	B
2045 Background Plus Project #^	5.9	A	5.6	A
2045 Background #*	5.1	A	3.6	A
2045 Background Plus Project #*	5.6	A	4.1	A

= Signalized; ^ = EB and WB designated left, shared through/right; * = Two NB and SB Through Lanes, Separate Minor Left Turn Lanes

Short Street and Cannon Street (#4)

The intersection of Short Street and Cannon Street (#4) operates with stop control on the eastbound and westbound approaches of Short Street. Under existing conditions, the movements at the intersection currently operate with LOS A during both peak hours. With project traffic, all movements are anticipated to continue operating at an acceptable level of service throughout the 2045 horizon. Therefore, no improvements or modifications are anticipated to be needed at this intersection based on the addition of project traffic and this operational level of service analysis. **Table 6** provides the results of the LOS analysis conducted at this intersection.

Table 6 – Short Street & Cannon Street LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2022 Existing				
Northbound Left	7.2	A	0.0	A
Eastbound Approach	9.5	A	9.1	A
Westbound Approach	8.7	A	8.8	A
Southbound Left	7.3	A	7.2	A
2026 Background				
Northbound Left	7.2	A	0.0	A
Eastbound Approach	9.5	A	9.1	A
Westbound Approach	8.7	A	8.8	A
Southbound Left	7.3	A	7.2	A
2026 Background Plus Project				
Northbound Left	7.2	A	0.0	A
Eastbound Approach	9.6	A	9.2	A
Westbound Approach	8.7	A	8.8	A
Southbound Left	7.3	A	7.3	A
2045 Background				
Northbound Left	7.2	A	0.0	A
Eastbound Approach	9.6	A	9.1	A
Westbound Approach	8.7	A	8.9	A
Southbound Left	7.3	A	7.2	A
2045 Background Plus Project				
Northbound Left	7.2	A	0.0	A
Eastbound Approach	9.7	B	9.2	A
Westbound Approach	8.7	A	8.8	A
Southbound Left	7.3	A	7.3	A

Short Street and SH-42 (#5)

The signalized intersection of Short Street and SH-42 (#5) operates with permissive only left turn phasing on the eastbound and westbound approaches of Short Street and protected-permissive left turn phasing on the northbound and southbound approaches of SH-42. The intersection currently operates at LOS A during the morning the afternoon peak hour. With project traffic, the intersection is expected to continue operating at LOS A during both peak hours in 2026. In addition, the intersection is expected to continue operating at LOS B during both peak hours in 2045 without any improvements.

Additionally, and documented previously, SH-42 is planned to be a four-lane roadway with center median space for left turn lanes if and when the Future42 plan is implemented. The Future42 study identifies converting the shared left/through eastbound lane to a separate left turn lane and a shared through/right turn lanes. With these planned improvements, the intersection is expected to operate with LOS A during the peak hours in 2045. **Table 7** provides the results of the LOS analysis conducted at this intersection.

Table 7 – Short Street & SH-42 LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2022 Existing	8.0	A	6.2	A
2026 Background	8.2	A	6.4	A
2026 Background Plus Project	8.7	A	7.0	A
2045 Background	11.6	B	9.9	A
2045 Background Plus Project	12.3	B	9.9	A
2045 Background #	3.8	A	2.6	A
2045 Background Plus Project #	3.9	A	2.7	A

= Two NB and SB Through Lanes, Convert Shared EB Left/Through to Separate Left and Shared Through/Right

Project Accesses

With completion of the Delo Boom project, two full movement accesses are proposed along the east side of Cannon Street. The north access will be located approximately 200 feet (measured edge to edge) south of Griffith Street and the south access located 375 feet (measured edge to edge) from the north access. Additionally, the existing right-in/right-out access along SH-42 will remain. It is recommended that R1-1 “STOP” signs be installed on the westbound approaches exiting the development at both driveways along Cannon Street. **Table 8** provides the results of the level of service for the proposed accesses. As shown in the table, the project access intersections are anticipated to have all movements operating with acceptable LOS C or better during the peak hours in both the buildout year 2026 and the 2045 long term horizons. Of note, by 2045, SH-42 is planned to be a four-lane roadway, and the eastbound right movement is reporting a decrease in delay compared to the 2026 horizon.

Table 8 – Project Access Level of Service Results

Intersection	2026 Total				2045 Total			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Cannon St North Access (#6)								
Westbound Approach	8.6	A	8.5	A	8.6	A	8.6	A
Southbound Left	7.3	A	7.3	A	7.3	A	7.3	A
Cannon St South Access (#7)								
Westbound Approach	8.5	A	8.6	A	8.5	A	8.6	A
Southbound Approach	7.3	A	7.3	A	7.3	A	7.3	A
SH-42 RIRO Access (#8)								
Eastbound Right	18.0	C	17.1	C	22.5	C	21.0	C
Eastbound Right #	-	-	-	-	13.5	B	13.2	B

= Two Northbound and Southbound Through Lanes

5.3 CDOT Access Permit and Auxiliary Turn Lane Warrant Analysis

Of note, to be consistent with the full buildout of the Future42 plans, no additional right turn lanes are anticipated to be added to the SH-42 corridor. Right turn lanes are planned for removal along the SH-42 corridor in association with the Future42 plans to create a more effective multimodal corridor to improve safety. An auxiliary turn lane analysis was conservatively conducted at the project access location to further justify the removal of right turn lanes and to provide information if the Future42 plans are not implemented.

The threshold for requiring an access permit along Colorado Department of Transportation (CDOT) roadways occurs when project traffic is anticipated to increase the existing access traffic volumes by more than 20 percent. Based on traffic projections, the addition of project traffic on the west leg of Griffith Street at the intersection with SH-42 is not anticipated to increase existing access traffic volumes by more than 20 percent. The maximum expected increase on the west leg of Griffith Street is six (6) percent (10 project / 166 existing) during the afternoon peak hour. Therefore, a CDOT access permit is not anticipated to be required in association with this project at this intersection. The addition of project traffic on the west leg of Short Street at the intersection with SH-42 is anticipated to increase existing traffic by more than 20 percent. Therefore, a CDOT access permit is likely required. Additionally, the right-in/right-out access along SH-42 is anticipated to increase existing access traffic volumes by more than 20 percent. Therefore, an access permit is anticipated to be needed at this access also.

Auxiliary turn lanes along CDOT controlled highways are to be implemented based on volume threshold requirements set forth in the State Highway Access Code. Further, turn lane lengths should be designed based on the State Highway Access Code. SH-42 is categorized as a Non-Rural Arterial (NR-A) and has a posted speed limit of 45 miles per hour southbound and 50 miles per hour northbound. According to the State Highway Access Code for category Non-Rural Arterial (NR-A) roadways, the turn lane warrants are as follows:

- A left turn deceleration lane and taper is required for any access with a projected peak hour ingress turning volume greater than 10 vehicles per hour (vph). The taper length will be included within the required deceleration length.
- A right turn deceleration lane and taper is required for any access with a projected peak hour ingress turning volume greater than 25 vph. The taper length will be included within the required deceleration length.
- Right turn acceleration lane and taper is required for any access with a projected peak hour right turning volume greater than 50 vph when the posted speed on the highway is greater than 40 mph. The taper length will be included within the required acceleration length.

Based on the 2026 traffic volume projections, turn lane requirements at the project access intersection along SH-42 are as follows:

- A southbound right turn lane **is not** warranted at the SH-42 Access based on projected 2026 background plus project traffic volumes being 15 southbound right turns during the peak hour and the threshold being 25 vph.
- A southbound acceleration lane along SH-42 from the eastbound right turn **is not** warranted based on projected 2026 background plus project traffic volumes being 11 eastbound right turns during the peak hour and the threshold being 50 vph.

5.4 Vehicle Queuing Analysis

A vehicle queuing analysis was conducted for the study area intersections. The queuing analysis was performed using Synchro presenting the results of the 95th percentile queue lengths. Results are shown in the following **Table 9** with calculations provided within the level of service operational sheets of **Appendix E** for unsignalized intersections and **Appendix H** for signalized intersections.

Table 9 – Turn Lane Queuing Analysis Results

Intersection Turn Lane	Existing Turn Lane Length (feet)	2026 Calculated Queue (feet)	2026 Recommended Length (feet)	2045 Calculated Queue (feet)	2045 Recommended Length (feet)
Griffith St & Cannon St (#2) Northbound Approach	C (60')	25'	C (60')	25'	C (60')
Griffith St & SH-42 (#3) Northbound Left	225'	25'	225'	25'	225'
Westbound Left	50'	25'	50'	25'	50'
Eastbound Left	DNE	-	-	64'	75'
Southbound Left	500'	25'	500'	25'	500'
Southbound Right	C	25'	C	25'	C
Griffith St & SH-42 (#3)* Northbound Left	225'	25'	225'	25'	225'
Westbound Left	50'	25'	50'	25'	50'
Eastbound Left	DNE	-	-	62'	75'
Southbound Left	500'	25'	500'	25'	200'
Southbound Right	C	25'	C	-	DNE
Short St & SH-42 (#5) Eastbound Right	100'	25'	100'	25'	100'
Eastbound Left	DNE	-	DNE	93'	DNE
Northbound Left	225'	25'	225'	25'	225'
Southbound Left	225'	25'	225'	25'	225'
Short St & SH-42 (#5)* Eastbound Right	100'	25'	100'	-	DNE
Eastbound Left	DNE	-	-	92'	100'
Northbound Left	225'	25'	225'	25'	225'
Southbound Left	225'	25'	225'	25'	225'

*Includes improvements based on Future42; C = Continuous Lane; DNE = Does Not Exist; **Blue** Text = Recommendation



All queues are anticipated to remain within the existing or recommended turn lane lengths through 2045. As shown in **Table 9**, the 95th percentile queue is anticipated to be one vehicle between the northbound stop bar at the Griffith Street / Cannon Street (#2) intersection and the existing Maria Lane intersection. Therefore, this queue will be accommodated without blocking the existing Maria Lane intersection. At the intersection of Griffith Street and SH-42 (#3), a 75 foot eastbound left turn lane can be installed. If Future42 plans are implemented, the southbound right turn lane at the Griffith Street and SH-42 (#3) intersection will be absorbed when SH-42 is improved to provide two through lanes in each direction. Additionally, the design plans for Future42 identifies separate eastbound and westbound left turn lanes. The southbound left turn is also planned to be restriped from 500 feet to 200 feet.

5.5 Improvement Summary

Based on the results of the intersection operational and vehicle queuing analysis, the key intersection recommended improvements and control are shown in **Figure 14** for the 2026 horizon and **Figure 15** for the 2045 horizon. **Figure 15** shows two scenarios for each of the intersections on SH-42, the improvements needed with and without the implementation of the recommendations in the Future42 study.

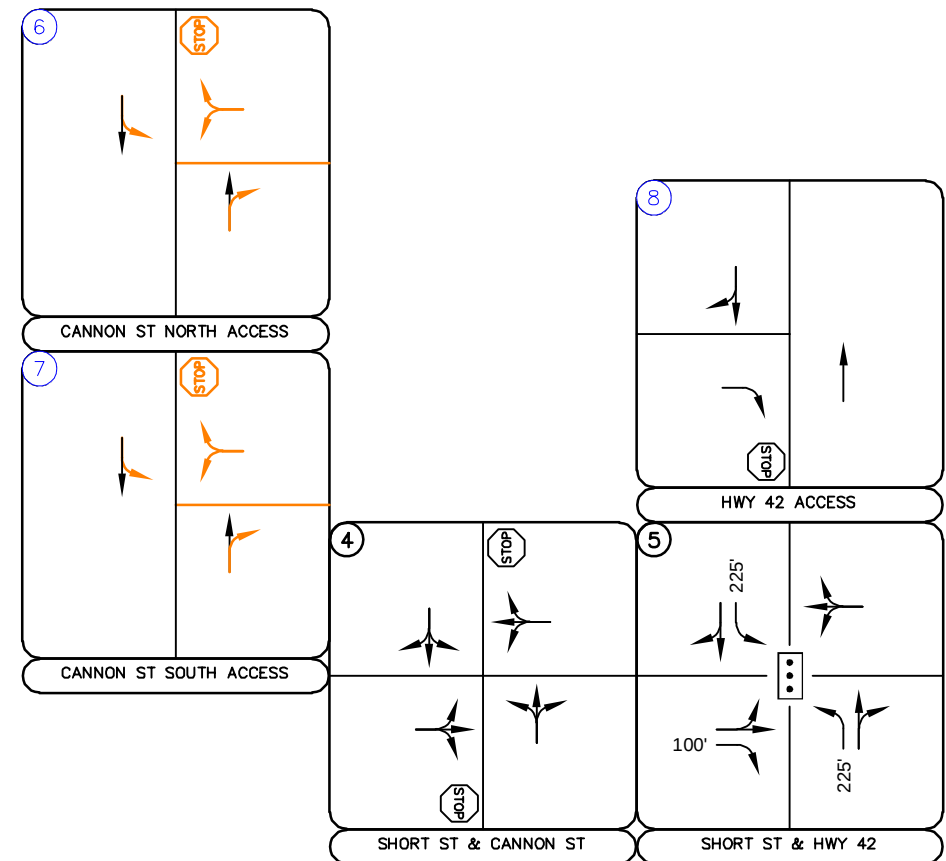
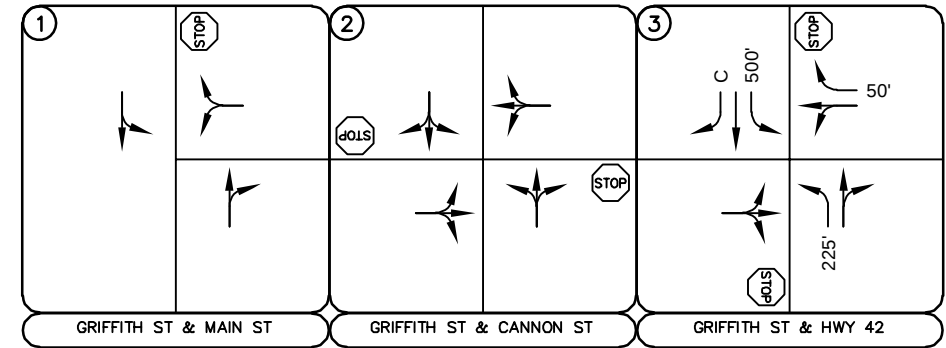
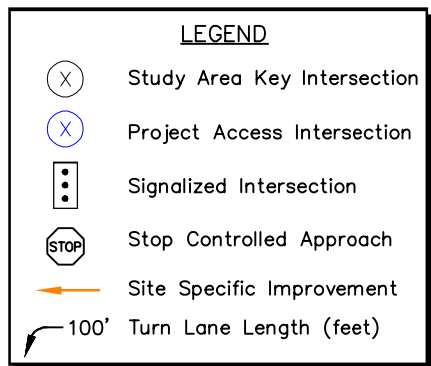
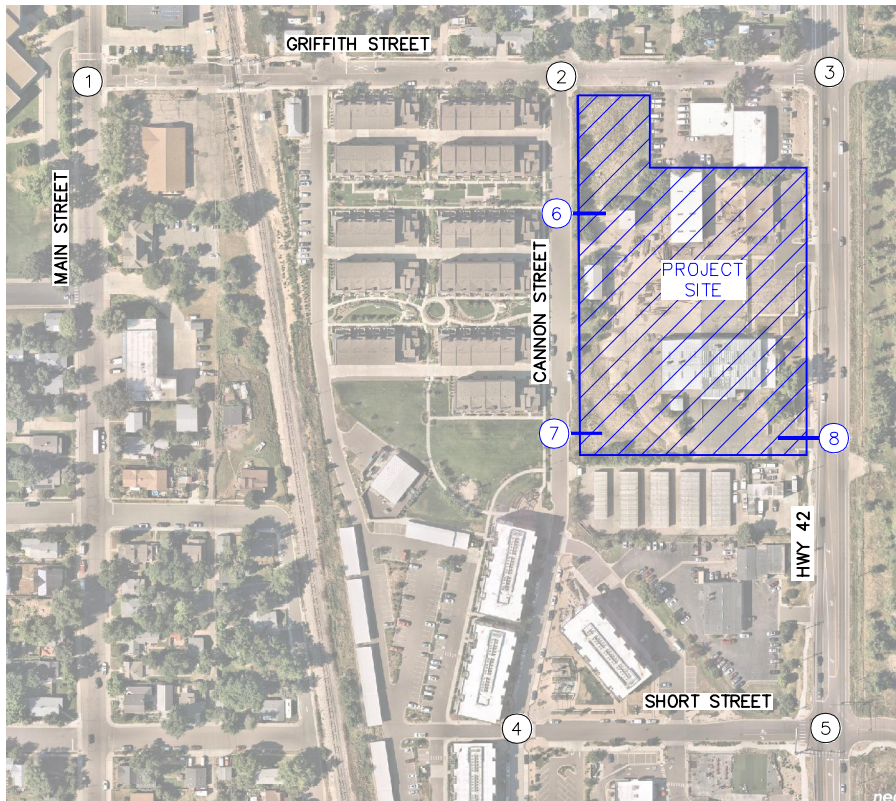


FIGURE 14
DELO BOOM
LOUISVILLE, COLORADO
2026 RECOMMENDED GEOMETRY AND CONTROL

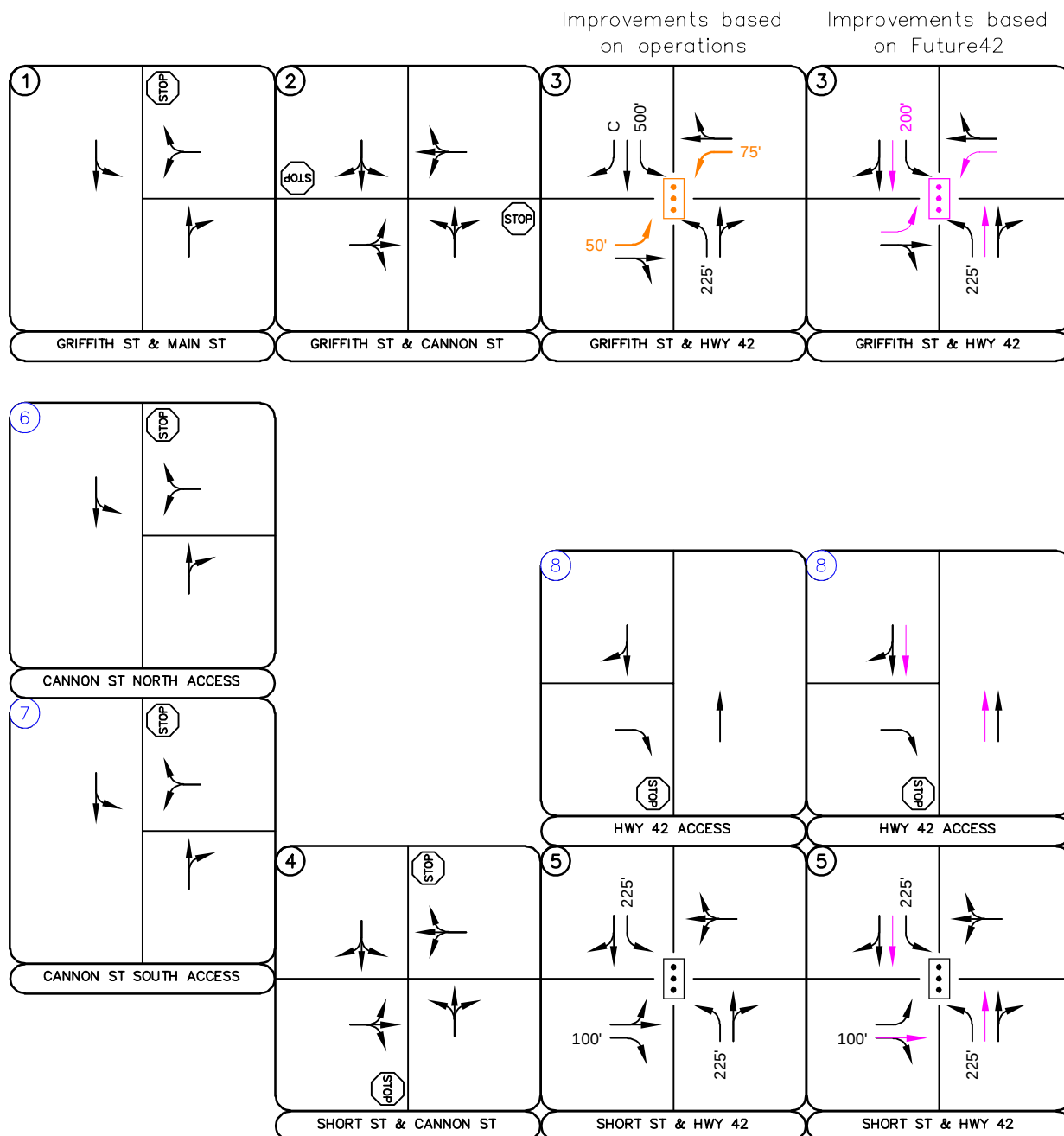
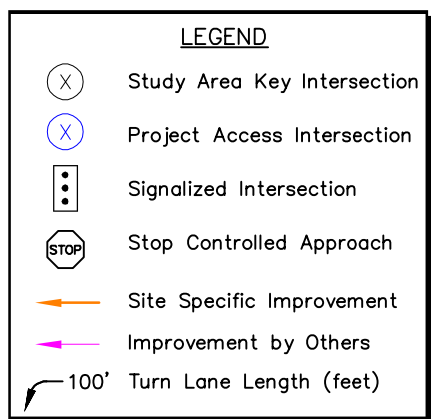
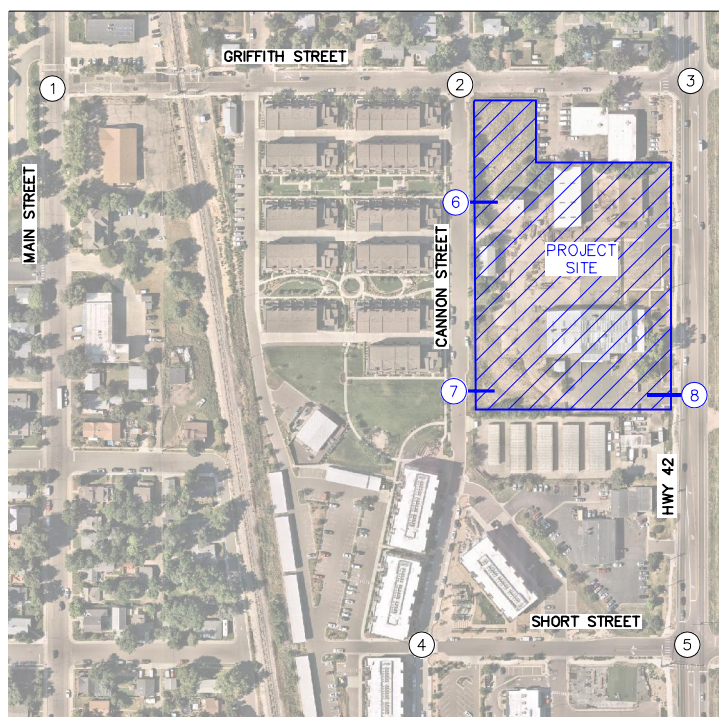


FIGURE 15
DELO BOOM
LOUISVILLE, COLORADO
2045 RECOMMENDED GEOMETRY AND CONTROL

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, Kimley-Horn believes Delo Boom will be successfully incorporated into the existing and future roadway network. Analysis of the existing street network, the proposed project development, and expected traffic volumes resulted in the following conclusions and recommendations:

- The threshold for requiring an access permit along Colorado Department of Transportation (CDOT) roadways occurs when project traffic is anticipated to increase the existing access traffic volumes by more than 20 percent. Based on traffic projections, the addition of project traffic on the west leg of Griffith Street at the intersection of SH-42 is not anticipated to increase existing access traffic volumes by more than 20 percent. The maximum expected increase on the west leg of Griffith Street is six (6) percent (10 project / 166 existing) during the afternoon peak hour. Therefore, a CDOT access permit is not anticipated to be required in association with this project at this intersection. The addition of project traffic on the west leg of Short Street at the intersection with SH-42 is anticipated to increase existing traffic by more than 20 percent. Additionally, the right-in/right-out access along SH-42 is anticipated to increase existing access traffic volumes by more than 20 percent. Therefore, access permits are anticipated to be needed at these locations.
- With completion of the Delo Boom project, two full movement accesses are proposed along the east side of Cannon Street. The north access will be located approximately 200 feet (measured edge to edge) south of Griffith Street, and the south access located 375 feet (measured edge to edge) from the north access. Additionally, the existing right-in/right-out access along SH-42 will remain. It is recommended that R1-1 "STOP" signs be installed on the westbound approaches exiting the development at both driveways along Cannon Street.
- By 2045, SH-42 is anticipated to expand to accommodate two through lanes in each direction as has been identified in the City's Transportation Master Plan and Future42 plans. Additionally, the Griffith Street and SH-42 (#3) intersection is planned for signalization and the southbound right turn lane will be absorbed when SH-42 is improved to provide two through lanes in each direction.

- If Future42 is not implemented, the intersection of Griffith Street and SH-42 (#3) is recommended to be converted to a signalized intersection by the 2045 long-term horizon. This improvement is necessary due to the intersection failing under stop control conditions. In addition, the intersection is expected to meet a four-hour volume signal warrant during the 2045 total conditions. With the implementation of a signal, both the eastbound and westbound lanes should be converted to accommodate a designated left turn lane and a shared lane for through and right turning movements.
- Any onsite or offsite improvements should be incorporated into the Civil Drawings and conform to standards of the City of Louisville and the Manual on Uniform Traffic Control Devices (MUTCD) – 11th Edition, 2023.



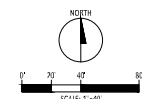
APPENDICES

APPENDIX A

Conceptual Site Plan

LOTS 1 THROUGH 9, BLOCK 1, AND TRACTS A, B, C, D AND E, DELO LOFTS SUBDIVISION
PART OF THE NORTHEAST QUARTER OF SECTION 8, TOWNSHIP 1 SOUTH, RANGE 69 WEST OF THE 6TH P.M.,
CITY OF LOUISVILLE, COUNTY OF BOULDER, STATE OF COLORADO

SITE SUMMARY:
TOWNHOMES: 36 UNITS
APARTMENTS: 99 UNITS
PARKING: 236 SPACES
*INCLUDES 176 SURFACE SPACES (WITH 7 ADA SPACES), 20 PARALLEL SPACES
ALONG CANNON STREET, 20 DRIVEWAY SPACES, & 20 GARAGE SPACES



LEGEND:

	PROPERTY LINE
	EASEMENT
	ADA ROUTE
	CONCRETE
	ASPHALT
	RETAINING WALL
	FENCE
	DOWNSPOUT
	PARKING COUNT



DELO BOOM
CONCEPT DRAWINGS
CITY OF LOUISVILLE, COUNTY OF BOULDER, STATE OF COLORADO

23-45

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CONCEPT SITE PLAN

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SHEET 1 OF 01