



Town of Johnstown

LAND USE APPLICATION REFERRAL

DATE: January 11, 2022

JRC: Planning Public Works Town Engineer Fire Traffic
 Water Engineer Water Attorney Town Attorney Other: _____

Initial Submittal only – contact the planner for additional information

EXTERNAL AGENCIES:

Mead Milliken Berthoud Loveland Greeley Windsor
 Larimer Co Weld Co Aims CC CDOT CoPW TRPR
 Weld RE-5J TSD LTWD NoCoWC BT Conserv. _____

UTILITIES: TDS Xcel PVREA United Power

FROM: Kim Meyer, Director of Planning & Development
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Applicant: Buc-cee's LTD
Project: Buc-cee's Final Subdivision
Submittal #: 2 – PICP's only
Location: WCR 48 and Interstate 25
Reply by: ***Wednesday, January 28, 2022***

This application is submitted for professional review and recommendation. Any comments or recommendations relevant to this request are appreciated.

If additional documentation is needed to complete a review, please email me at the address above.

NO Comments.

Comments:

All previous comments on the PICP's have been adequately addressed with this submittal.

By: _____ Date: 01/26/2022
Charles M. Buck, PE, PTOE Felsburg Holt & Ullevig

The Community That Cares

johnstown.colorado.gov

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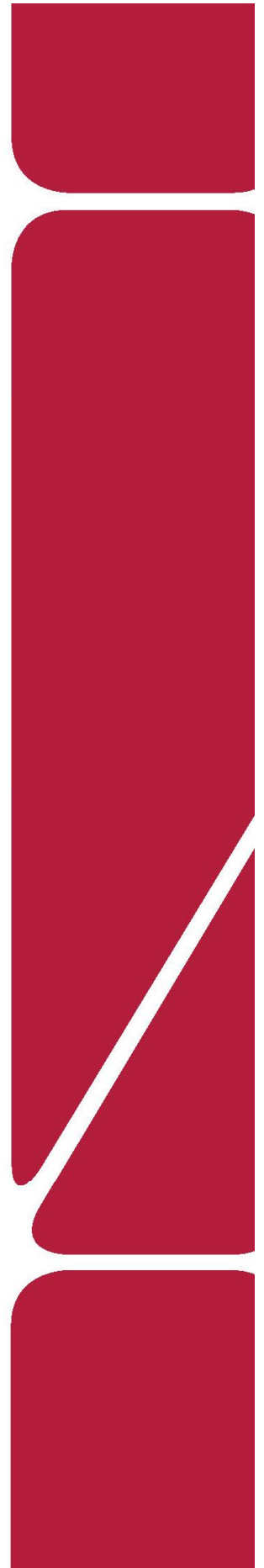


Traffic Impact Study

Travel Center Johnstown Johnstown, Colorado

Prepared for:
Buc-ee's, LTD.

Kimley»»Horn



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

Travel Center Johnstown

Johnstown, Colorado

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November 2021

REVISED & ACCEPTED JANUARY 2022



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1.0 EXECUTIVE SUMMARY

Travel Center Johnstown is a retail project proposed to be located in the southwest quadrant of the Interstate 25 (I-25) and Weld County Road 48 (WCR-48)/State Highway 60 (SH-60) interchange in Johnstown, Colorado. The project is located within the northeast quadrant of the Welty Ridge development area approved as part of the Outline Development Plan (ODP) process. The proposed travel center is anticipated to include an approximate 74,000 square foot convenience market and a gas station containing 120 total fueling positions with 116 fueling positions dedicated to passenger vehicles and four (4) fueling positions dedicated to diesel fuel trucks. The project is anticipated to be completed within the next several years; therefore, analysis was conducted for the 2023 short-term horizon as well as the 2040 long-term horizon.

The purpose of this study is to identify project traffic generation characteristics and project traffic related impacts on the local street system to develop improvements required for the identified impacts. The following intersections were incorporated into this traffic study in accordance with Town of Johnstown, Weld County, and Colorado Department of Transportation (CDOT) standards and requirements:

- WCR-48 and Commerce Drive
- WCR-48 and Gateway Circle
- WCR-48 and Gateway Drive
- WCR-48 and I-25 Southbound Ramps
- WCR-48 and I-25 Northbound Ramps
- WCR-48 and East I-25 Frontage Road

Regional access to the Travel Center Johnstown project will be provided by I-25. Primary access to the project will be provided by WCR-48 while direct access to the project is proposed from a public street access on the east side of the future extension of Commerce Drive and from a private access aligning with Gateway Circle along the south side of WCR-48.

Distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, existing and anticipated surrounding demographic 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.

Travel Center Johnstown is anticipated to generate a total of approximately 23,084 daily weekday trips with 1,220 of these trips occurring during the morning peak hour and 1,692 trips occurring during the afternoon peak hour.

Based on the analysis presented in this report, Kimley-Horn believes the proposed Travel Center Johnstown project 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 recommendations:

2023 Recommendations

- Direct access to the project is proposed from a public street access on the east side of the future extension of Commerce Drive and from a private access aligning with Gateway Circle along the south side of WCR-48. As part of this project or if not sooner as part of the Welty Ridge development, Commerce Drive will be extended south of WCR-48. As additional portions of Welty Ridge develop, the public access intersection along Commerce Drive will provide four legs and stop control with installation of R1-1 “STOP” signs is recommended along the eastbound and westbound approaches. Designated left turn lanes with 150 feet of length are recommended at all four approaches of the public street access with Commerce Drive.
- An I-25 and State Highway 60 / Weld County Road 48 Interchange Type Selection Report was prepared for CDOT Region 4 in December 2019. Based on this study, CDOT is currently in design stages of implementing a diverging diamond interchange (DDI) at the WCR-48 and I-25 interchange and is expected to be completed by 2023. With construction of this DDI, the E I-25 Frontage Road will be removed and essentially be served with a future south leg at the SH-60 and High Plains Boulevard intersection. Coinciding with the implementation of the diverging diamond interchange at I-25, two eastbound and westbound through lanes are proposed along WCR-48 extending through the project limits from Commerce Drive to I-25.
- As the future south leg is provided at the WCR-48 and Commerce Drive intersection, it is recommended that the northbound and southbound approaches provide a designated left turn lane and a shared through/right turn lane. A left turn lane and two through lanes are

proposed on the eastbound approach of this intersection while the westbound approach includes a left turn lane, one through lane, and a dropped right turn lane.

- A two-lane roundabout is proposed as part of this project at the intersection of WCR-48 and Gateway Circle. The eastbound and westbound approaches of the roundabout include two lanes while the northbound and southbound approaches include a single lane. However, the northbound approach of the proposed roundabout includes dual right turn lanes with the outside lane being a combination acceleration to deceleration lane with the I-25 Southbound Ramp to the east. The south leg of this intersection will provide full movement access to the proposed development.
- The intersection of WCR-48 and Gateway Drive is proposed to be restricted to right-in/right-out movements in association with this project and the future improvements associated with the interchange at WCR-48 and I-25. The approved Welty Ridge Outline Development Plan (ODP) identified a future south leg allowing full turning movements at the WCR-48 and Gateway Drive intersection. The current proposal is to amend the future south leg at the WCR-48 and Gateway Drive intersection and provide a south leg with full movement access at the WCR-48 and Gateway Circle intersection. This shift in full movement access to the west will provide additional spacing from the WCR-48 and I-25 interchange. An R3-2 “No Left Turn” sign should be placed under the stop sign on the southbound approach of the WCR-48 and Gateway Drive intersection while a R6-1R “One-Way” sign should be placed within the future raised median along WCR-48 due to this intersection being restricted to right-turn movements.

2040 Recommendations

- The intersection of WCR-48 and Commerce Drive is recommended to be restricted to three-quarter turning movements due to the proximity to the intersection of WCR-48 and Gateway Circle intersection. As remaining land within Welty Ridge is developed, a new Commerce Drive is proposed on the section line to the west of the existing Commerce Drive, and the future realigned intersection of WCR-48 and Commerce Drive should be signalized. There will be two public accesses to the Welty Ridge development from WCR-48: one a three-quarter access at the existing Commerce Drive intersection and the other will be a signalized access at the new Commerce Drive intersection. It is anticipated that a signal will be warranted at the new intersection of WCR-48 and Commerce Drive based on projected

2040 background volumes. Two eastbound and westbound through lanes with one northbound and southbound through lane are recommended to be provided at this new intersection alignment. In addition, separate left turn lanes on all four approaches and a separate northbound right turn lane are recommended at this intersection.

- At the proposed WCR-48 and Gateway Drive roundabout, an additional westbound through lane is identified for to provide the ultimate cross-section for WCR-48. The westbound approach will provide a separate left turn lane, a shared through/left, and a shared through/right turn lane entering the roundabout.

General Recommendations

- Any on-site and off-site signing and striping improvements should be incorporated into the Civil Drawings and conform to Town of Johnstown, Weld County, and CDOT standards as well as the Manual on Uniform Traffic Control Devices – 2009 Edition (MUTCD).

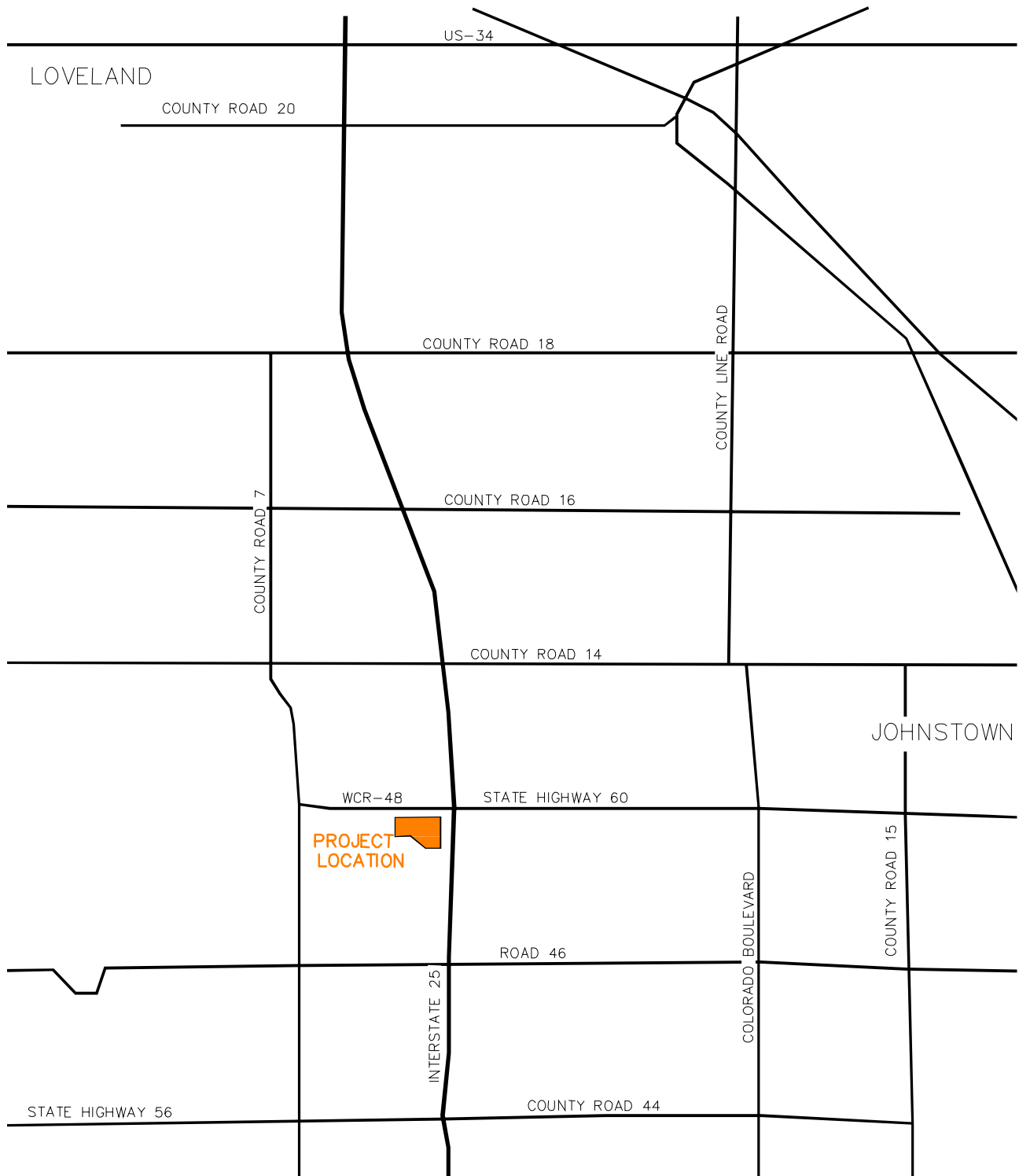
2.0 INTRODUCTION

Kimley-Horn has prepared this report to document the results of a traffic impact study of future traffic conditions associated with the proposed Travel Center Johnstown project to be located in the southwest quadrant of the I-25 and WCR-48/SH-60 interchange in Johnstown, Colorado. A vicinity map illustrating the project location with respect to the surrounding area is shown in **Figure 1**. The proposed travel center is anticipated to include an approximate 74,000 square foot convenience market and a gas station containing 120 total fueling positions with 116 fueling positions dedicated to passenger vehicles and four (4) fueling positions dedicated to diesel fuel trucks. A site plan for the proposed development is provided in **Appendix H**. The project is anticipated to be completed within the next several years; therefore, analysis was conducted for the 2023 short-term horizon as well as the 2040 long-term horizon.

The purpose of this study is to identify project traffic generation characteristics and project traffic related impacts on the local street system to develop improvements required for the identified impacts. The following intersections were incorporated into this traffic study in accordance with Town of Johnstown, Weld County, CDOT standards and requirements:

- WCR-48 and Commerce Drive
- WCR-48 and Gateway Circle
- WCR-48 and Gateway Drive
- WCR-48 and I-25 Southbound Ramps
- WCR-48 and I-25 Northbound Ramps
- WCR-48 and East I-25 Frontage Road

Regional access to the Travel Center Johnstown project will be provided by Interstate 25. Primary access to the project will be provided by WCR-48 while direct access to the project is proposed from a public street access on the east side of the future extension of Commerce Drive and from a private access aligning with Gateway Circle along the south side of WCR-48.



TRAVEL CENTER JOHNSTOWN
JOHNSTOWN, COLORADO
VICINITY MAP

FIGURE 1

3.0 EXISTING CONDITIONS

3.1 Existing Study Area

The existing project site consists vacant land with industrial uses directly north of the site. I-25 is located directly east of the site while the Town of Johnstown is in the extended area to the east. The surrounding area primarily consists of vacant land. Single family residences are located in the extended area to the east on both sides of SH-60. The land uses and roadway network surrounding the site are shown in the aerial on **Figure 2**.

3.2 Existing Roadway Network

WCR-48 and SH-60 share the same east-west alignment with WCR-48 being on the west side of I-25 and SH-60 being on the east side of I-25. WCR-48 and SH-60 extend eastbound and westbound with one through lane of travel in each direction. WCR-48 has a posted speed limit of 35 miles per hour while SH-60 provides a speed limit of 55 miles per hour.

WCR-48 and Commerce Drive operates as an unsignalized intersection with stop control on the southbound approach of Commerce Drive. The eastbound approach of this intersection consists of a shared left turn/through lane while the westbound approach consists of a shared through/right turn lane. The southbound approach provides a shared lane for left-turn and right-turn movements.

WCR-48 and Gateway Circle operates as an unsignalized intersection with stop control on the southbound approach of Gateway Circle. The eastbound approach of this intersection consists of a shared left turn/through lane while the westbound approach provides one through lane and a right turn lane. The southbound approach provides a shared lane for left-turn and right-turn movements.

WCR-48 and Gateway Drive operates as an unsignalized intersection with stop control on the southbound approach of Gateway Drive. The eastbound approach of this intersection consists of a shared left turn/through lane while the westbound approach consists of one through lane and a right turn lane. The southbound approach provides a shared lane for left-turn and right-turn movements.

The WCR-48/SH-60 and I-25 Southbound Ramp intersection is signalized. All three entering approaches of this intersection contains a single lane for shared movements. The south leg of this intersection is the entrance ramp to I-25 which provides one-way travel southbound.

The WCR-48/SH-60 and I-25 Northbound Ramp intersection is signalized with all three entering approaches of this intersection containing a single lane for shared movements. The north leg of this intersection is the entrance ramp to I-25 which provides one-way travel northbound.

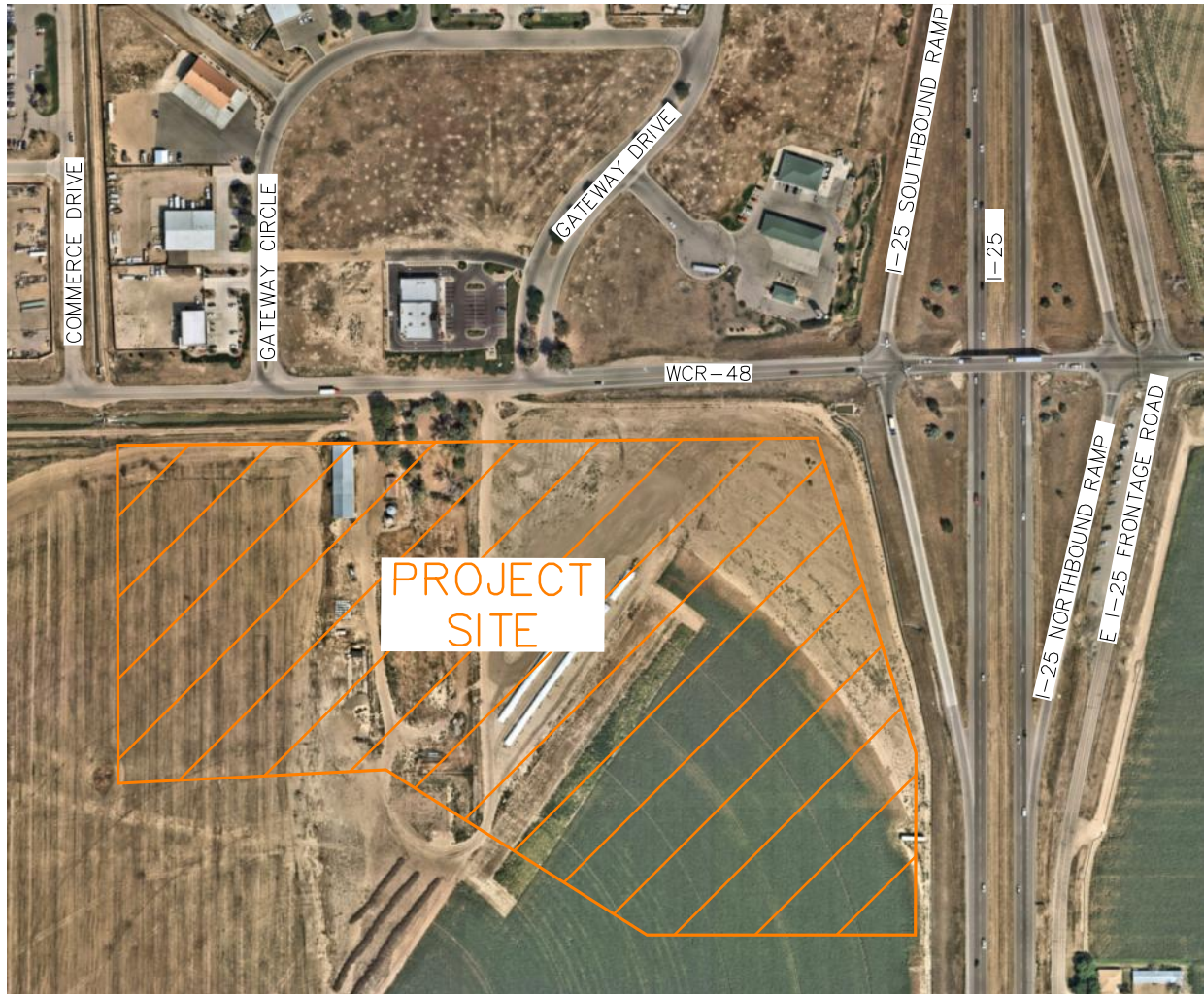
SH-60 and E Interstate 25 Frontage Road operates as a signalized intersection while sharing a controller with the SH-60 and I-25 Northbound Ramp intersection. All four approaches of this intersection provide a single shared lane for all movements. The existing intersection lane configurations and control for the study area key intersections are shown in **Figure 3**.

3.3 Existing Traffic Volumes

Existing peak hour turning movement counts were conducted at the key intersections on Thursday, October 29, 2020. The counts were conducted in 15-minute intervals during the morning and afternoon peak hours of adjacent street traffic from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM on this count date. Existing turning movement counts are shown in **Figure 4** with count sheets provided in **Appendix A**.

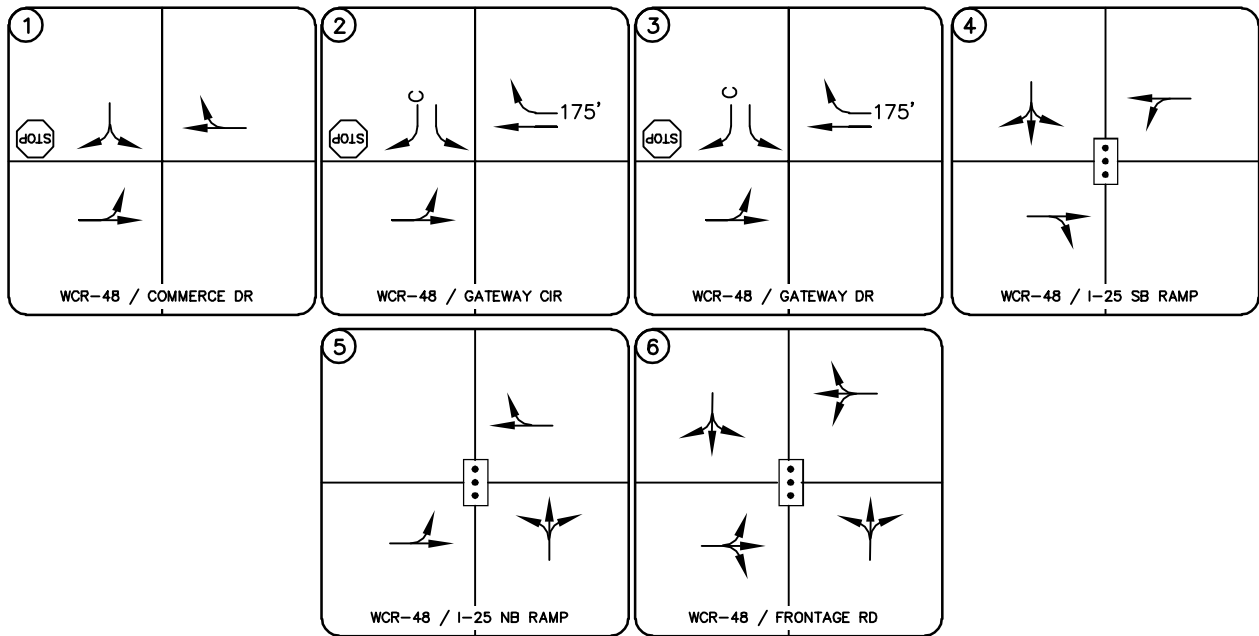
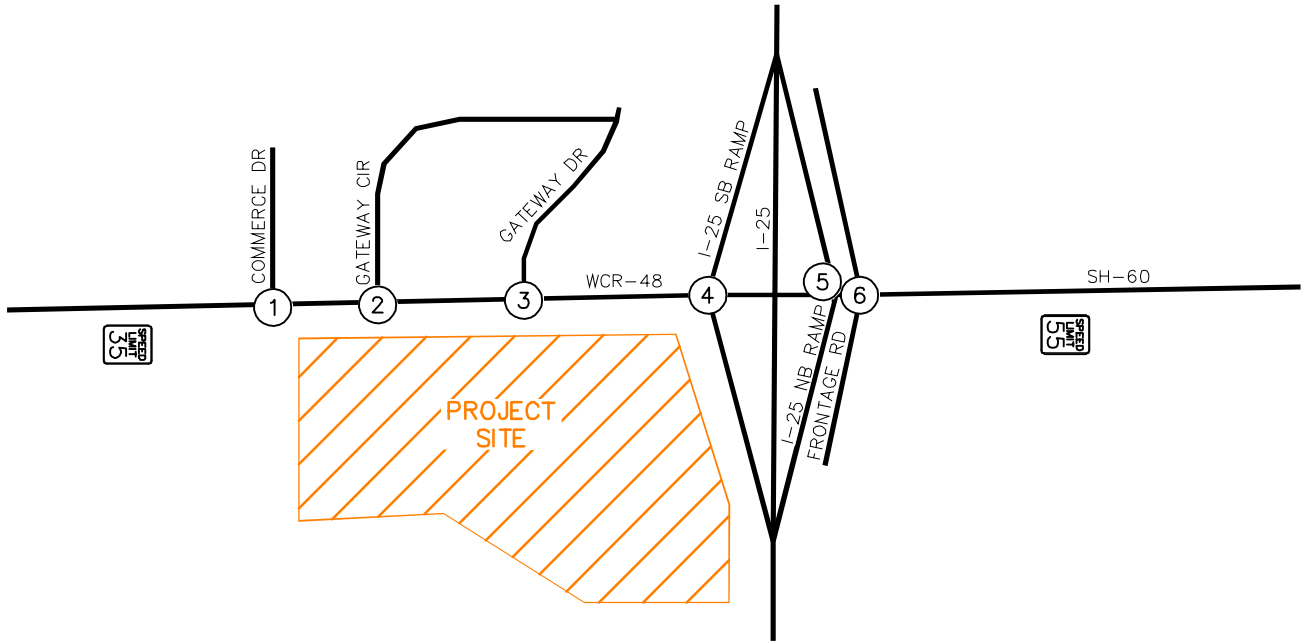
3.4 Adjusted Existing Traffic Volumes

The collected turning movement counts were conducted during the COVID-19 pandemic and were therefore compared to previous through volumes conducted in 2019 provided by the CDOT Online Transportation Information System (OTIS) to determine if a traffic volume adjustment was necessary to obtain normal condition traffic volumes. Based on the count comparison for the daily through volumes, existing peak hour counts adjusted to daily volumes based on the CDOT published Design Hourly Volume (DHV) percentage of 11 percent were less than the 2019 counts and projected 2020 volumes (2019 counts grown for one year). Therefore, it was determined that existing counts needed to be increased by approximately 26 percent to identify the normal conditions to account for COVID-19. Existing adjusted turning movement counts are shown in **Figure 5** with the comparison counts and the count adjustment calculations provided in **Appendix A**.



TRAVEL CENTER JOHNSTOWN
JOHNSTOWN, COLORADO
SITE AREA

FIGURE 2

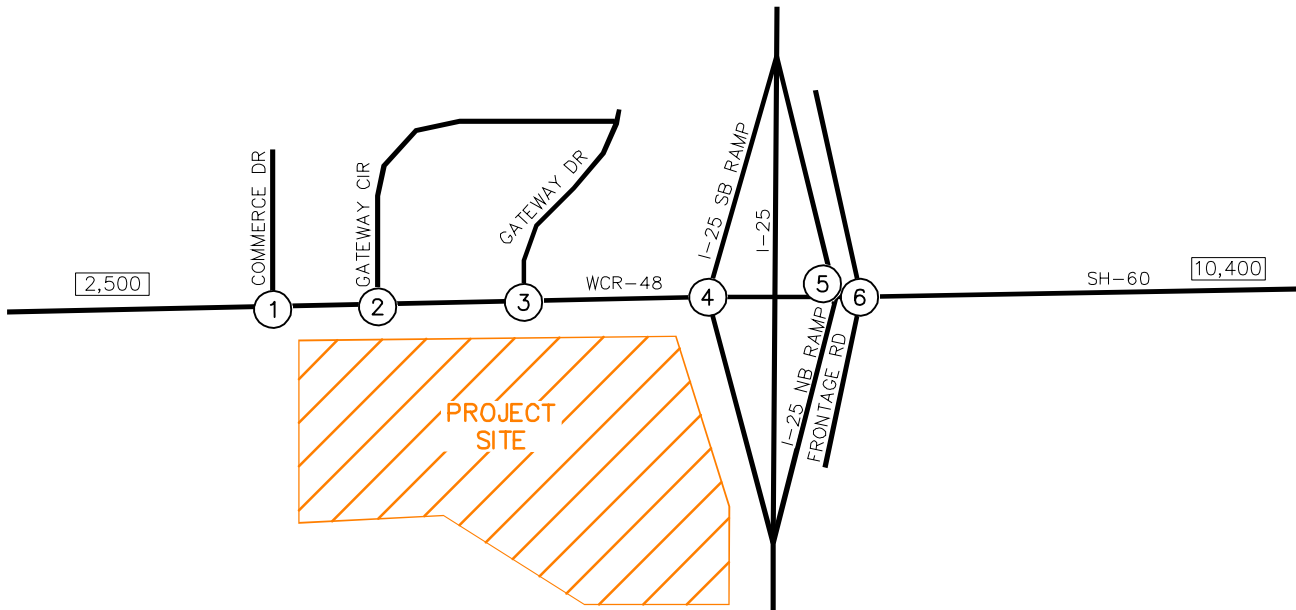


LEGEND

- (X) Study Area Key Intersection
- [Signalized Symbol] Signalized Intersection
- [STOP Sign] Stop Controlled Approach
- [Speed Limit Sign XX] Roadway Speed Limit
- [Turn Lane Arrow] 100' Turn Lane Length (feet)

TRAVEL CENTER JOHNSTOWN
 JOHNSTOWN, COLORADO
 EXISTING LANE CONFIGURATIONS

FIGURE 3



THURSDAY, OCTOBER 29, 2020
7:30 TO 8:30 AM (4:30 TO 5:30 PM)

1	<p>1(11) ←</p> <p>8(37) ←</p> <p>35(5) ↗</p> <p>61(90) ←</p>
<p>5(0) →</p> <p>100(144) →</p>	<p>WCR-48 / COMMERCE DR</p>

THURSDAY, OCTOBER 29, 2020
7:30 TO 8:30 AM (4:30 TO 5:30 PM)

2	<p>9(27) ↘</p> <p>30(48) ↘</p> <p>47(16) ↗</p> <p>88(68) ←</p>
<p>24(4) →</p> <p>85(175) →</p>	<p>WCR-48 / GATEWAY CIR</p>

THURSDAY, OCTOBER 29, 2020
7:15 TO 8:15 AM (4:30 TO 5:30 PM)

3	<p>12(17) ↘</p> <p>78(131) ↘</p> <p>109(107) ↗</p> <p>114(67) ←</p>
<p>21(20) →</p> <p>102(203) →</p>	<p>WCR-48 / GATEWAY DR</p>

THURSDAY, OCTOBER 29, 2020
7:15 TO 8:15 AM (4:30 TO 5:30 PM)

4	<p>85(50) ↘</p> <p>1(1) ↘</p> <p>86(280) ↘</p> <p>139(124) ←</p> <p>292(150) ←</p>
<p>79(247) →</p> <p>89(92) ↘</p>	<p>WCR-48 / I-25 SB RAMP</p>

5	<p>275(184) ↗</p> <p>412(211) ←</p>
<p>35(57) ↗</p> <p>107(458) →</p> <p>51(57) ↘</p> <p>1(3) ↘</p> <p>83(167) ↘</p>	<p>WCR-48 / I-25 NB RAMP</p>

THURSDAY, OCTOBER 29, 2020
7:00 TO 8:00 AM (4:45 TO 5:45 PM)

6	<p>50(40) ↘</p> <p>0(1) ↘</p> <p>14(57) ↘</p> <p>90(55) ↗</p> <p>631(361) ←</p> <p>0(1) ↘</p>
<p>18(24) ↘</p> <p>168(564) →</p> <p>4(11) ↘</p> <p>6(14) ↘</p> <p>5(2) ↘</p> <p>3(5) ↘</p>	<p>WCR-48 / FRONTAGE RD</p>

THURSDAY, OCTOBER 29, 2020
7:00 TO 8:00 AM (4:30 TO 5:30 PM)

LEGEND

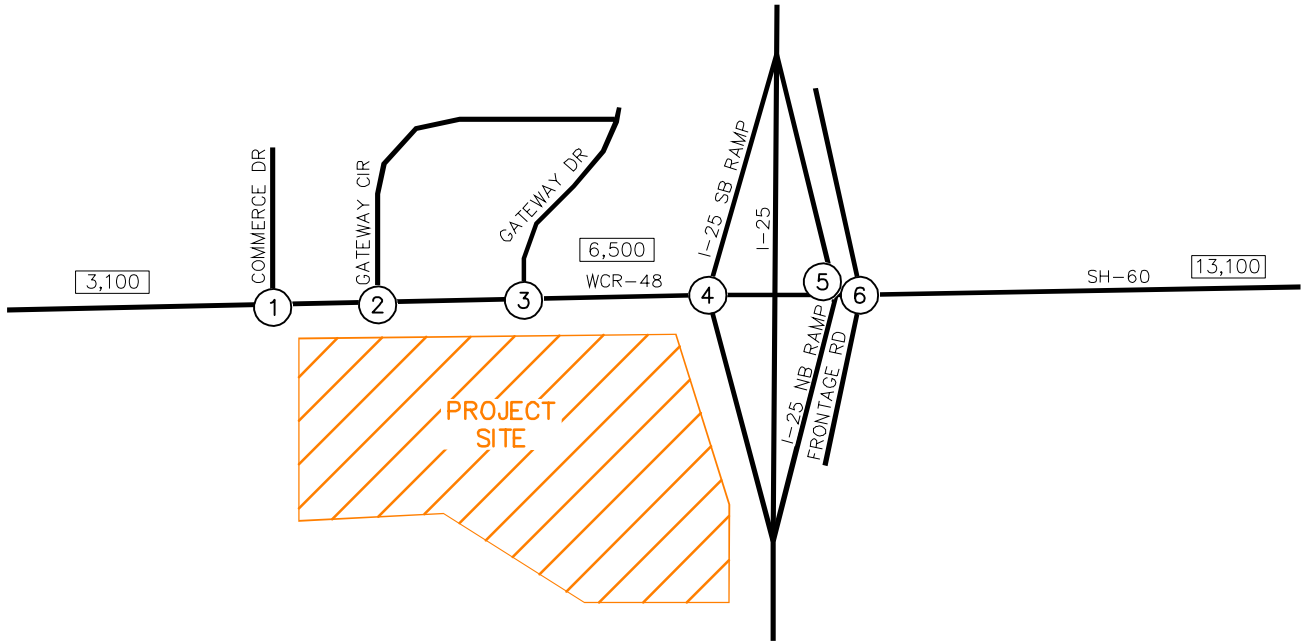
(X) Study Area Key Intersection

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

XX,X00 Estimated Daily Traffic Volume

TRAVEL CENTER JOHNSTOWN
JOHNSTOWN, COLORADO
EXISTING TRAFFIC VOLUMES

FIGURE 4



①	1(14) 10(47) 44(6) 77(113)
6(0) 126(181)	
WCR-48 / COMMERCE DR	

②	11(34) 38(60) 59(20) 111(86)
30(5) 107(221)	
WCR-48 / GATEWAY CIR	

③	15(21) 98(165) 137(135) 144(84)
26(25) 129(256)	
WCR-48 / GATEWAY DR	

④	107(63) 1(1) 108(353) 175(156) 368(189)
100(311) 112(116)	
WCR-48 / I-25 SB RAMP	

⑤	347(232) 519(266)
44(72) 135(577)	64(72) 1(4) 105(210)
WCR-48 / I-25 NB RAMP	

⑥	63(60) 0(1) 18(72) 113(69) 795(455) 0(1)
23(30) 212(711) 5(14)	8(18) 6(3) 4(6)
WCR-48 / FRONTAGE RD	

LEGEND

(X) Study Area Key Intersection

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

XX,X00 Estimated Daily Traffic Volume

TRAVEL CENTER JOHNSTOWN
 JOHNSTOWN, COLORADO
 2020 ADJUSTED TRAFFIC VOLUMES

FIGURE 5

4.0 FUTURE CONDITIONS

4.1 Proposed Project Access and Future Roadway Improvements

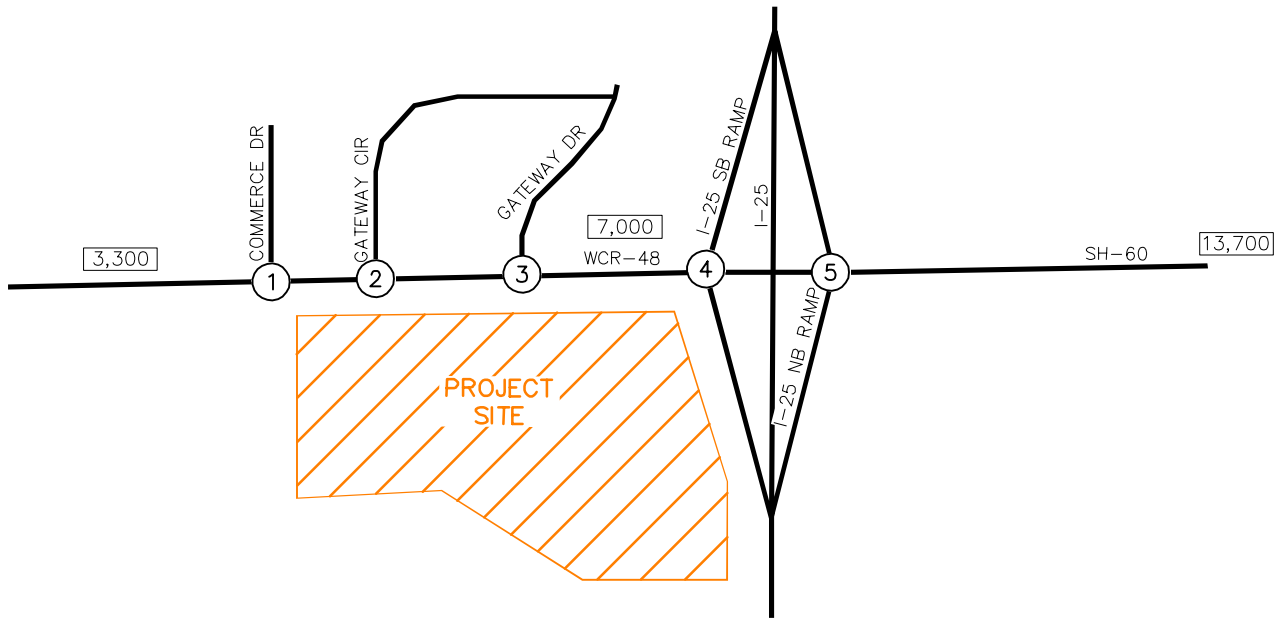
Direct access to the project is proposed from a public street access on the east side of the future extension of Commerce Drive and from a private access aligning with Gateway Circle along the south side of WCR-48. A two-lane roundabout is proposed as part of this project at the intersection of WCR-48 and Gateway Circle. As part of this project or if not sooner as part of the Welty Ridge development, Commerce Drive will be extended south of WCR-48 and this intersection will remain full movement in the short-term. As Welty Ridge continues development, the intersection of WCR-48 and Commerce Drive is recommended to be restricted to three-quarter turning movements due to the proximity to the intersection of WCR-48 and Gateway Circle intersection. As remaining land within Welty Ridge is developed, a new Commerce Drive is proposed on the section line to the west of the existing Commerce Drive, and the future realigned intersection of WCR-48 and Commerce Drive should be signalized. There will be two public accesses to the Welty Ridge development from WCR-48: one a three-quarter access at the existing Commerce Drive intersection and the other will be a signalized access at the new Commerce Drive intersection.

An I-25 and State Highway 60 / Weld County Road 48 Interchange Type Selection Report was prepared for CDOT Region 4 in December 2019. Based on this study, CDOT is currently in design stages of implementing a diverging diamond interchange (DDI) at the WCR-48 and I-25 interchange and is expected to be completed by 2023. With construction of this DDI, the E I-25 Frontage Road will be removed and essentially be served with a future south leg at the SH-60 and High Plains Boulevard intersection. The current design plans for the DDI interchange are attached in **Appendix B**, and the proposed lane configurations have been utilized in analysis of this study.

4.2 Unspecified Development Traffic Growth

Based on information provided on the website for CDOT, the 20-year growth factor along SH-60 directly east of the study area is 1.56. This growth factor equates to an annual growth rate of approximately 2.25 percent per year. Based on this, a 2.25 percent annual growth rate was used to calculate future traffic volume estimates in 2023 at the study area intersections. In addition, CDOT is proposing a diverging diamond interchange at the I-25 ramps with WCR-48 and the future traffic projections from the *I-25 and State Highway 60 / Weld County Road 48*

Interchange Type Selection Report completed in December 2019 were utilized as background traffic volumes in 2040. These 2040 traffic projections were further refined to incorporate future traffic volumes from the Welty Ridge Outline Development Plan (ODP). Applicable documents from both of these studies, as well as traffic information from the CDOT Online Transportation Information System (OTIS) website are attached in **Appendix B**. The calculated background traffic volumes for 2023 and 2040 are shown in **Figure 6** and **Figure 7**, respectively.



①	<p>1(15) ←</p> <p>11(50) ↓</p> <p>47(6) ↗</p> <p>82(121) ←</p>
<p>6(0) ↘</p> <p>135(193) →</p>	
WCR-48 / COMMERCE DR	

②	<p>12(36) ↓</p> <p>146(240) ↓</p> <p>63(21) ↗</p> <p>119(92) ←</p>
<p>60(32) ↘</p> <p>114(236) →</p>	
WCR-48 / GATEWAY CIR	

③	<p>16(22) ↓</p> <p>146(144) ↗</p> <p>154(90) ←</p>
<p>138(274) →</p>	
WCR-48 / GATEWAY DR	

④	<p>114(67) ↓</p> <p>1(1) ↓</p> <p>115(377) ↓</p> <p>187(167) ←</p> <p>393(202) ←</p>
<p>107(332) →</p> <p>120(124) ↘</p>	
WCR-48 / I-25 SB RAMP	

⑤	<p>371(248) ↗</p> <p>555(284) ←</p>
<p>47(77) ↗</p> <p>144(617) →</p> <p>68(77) ↗</p> <p>1(4) ↗</p> <p>112(224) ↗</p>	
WCR-48 / I-25 NB RAMP	

LEGEND

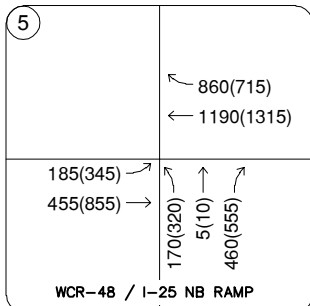
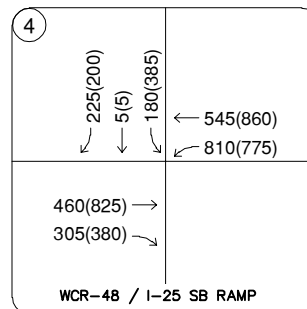
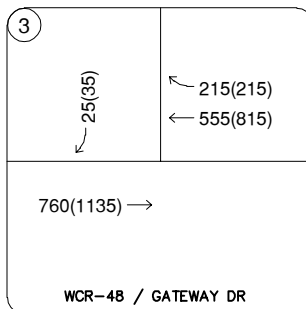
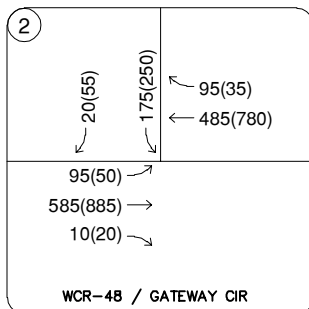
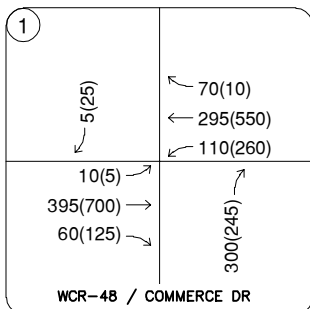
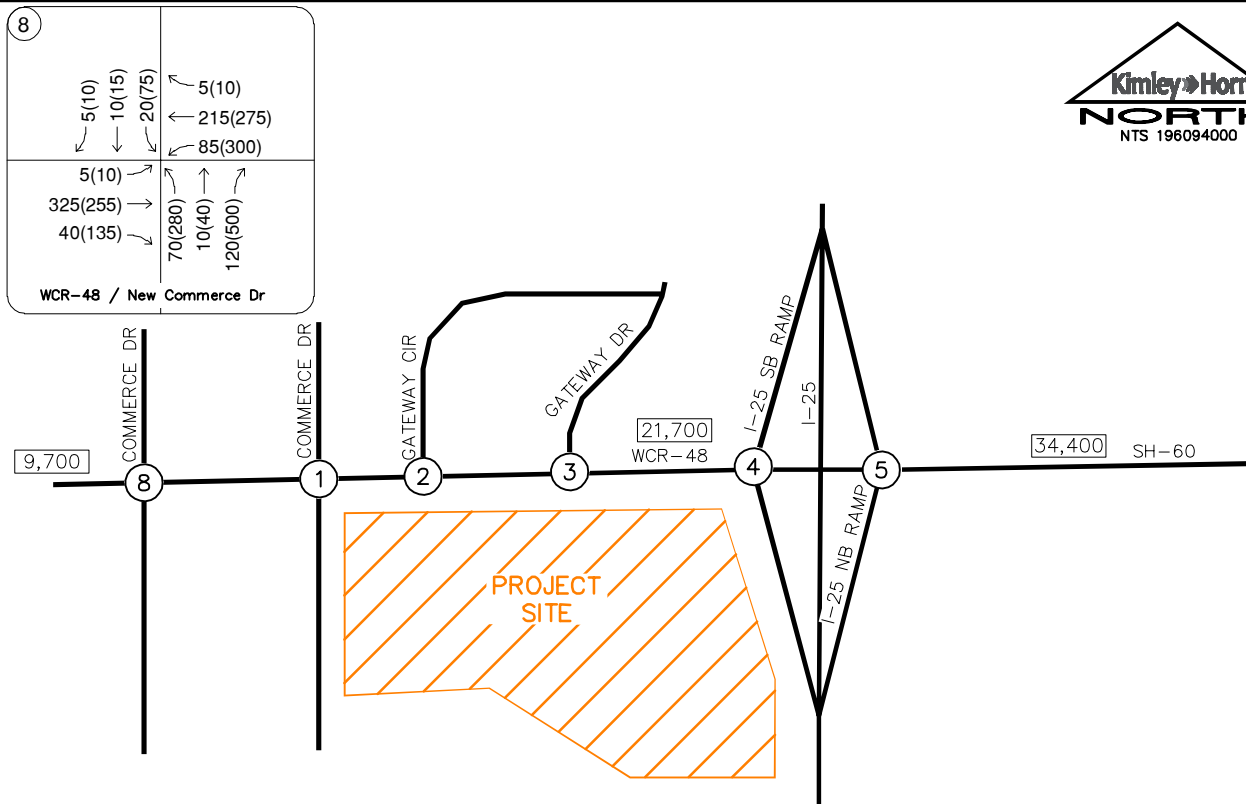
(X) Study Area Key Intersection

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

XX,X00 Estimated Daily Traffic Volume

TRAVEL CENTER JOHNSTOWN
JOHNSTOWN, COLORADO
2023 BACKGROUND TRAFFIC VOLUMES

FIGURE 6



LEGEND

- (X) Study Area Key Intersection
- XXX(XXX) Weekday AM(PM) Peak Hour Traffic Volumes
- XX,X00 Estimated Daily Traffic Volume

TRAVEL CENTER JOHNSTOWN
 JOHNSTOWN, COLORADO
 2040 BACKGROUND TRAFFIC VOLUMES

FIGURE 7

5.0 PROJECT TRAFFIC CHARACTERISTICS

5.1 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, trip generation estimates were developed using trip information from other travel center sites operated by the same ownership as this site. Data collected at nine (9) sites were used in developing average trips rates and to estimate trips for this site. It is important to note that due to the total number of fueling positions for this development, ITE data was not used for project trip generation estimates. The average number of fueling positions for the applicable use with ITE Trip Generation is 14 fueling positions which is well under the proposed 120 fueling positions for this travel center.

Since the project is a travel center adjacent to an interstate freeway, diverted link trips are expected with the proposed development. These diverted link trips are vehicles already on the roadway network that divert their route to stop at the proposed development while in route to another destination. Diverted trip rates were obtained from user specific data. A diverted link rate of 85 percent was applied for the morning peak hour and the afternoon peak hour for the proposed travel center. Travel Center Johnstown is anticipated to generate a total of approximately 23,084 daily weekday trips with 1,220 of these trips occurring during the morning peak and 1,692 trips occurring during the afternoon peak hour. Accounting for diverted trips, expected net new trips (non diverted trips) to the surrounding street network results in approximately 3,463 new weekday daily trips, of which 186 and 254 new trips are anticipated during the weekday morning and afternoon peak hours, respectively. The project traffic generation is shown in **Table 1** while the trip generation calculation worksheet and traffic generation data for the sample sites is in **Appendix C**.

¹ Institute of Transportation Engineers, *Trip Generation Manual*, Tenth Edition, Washington DC, 2017.

Table 1 – Travel Center Johnstown Project Trip Generation

Use and Size	Daily	Weekday Vehicle Trips					
		AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Travel Center – 120 Fueling Positions	23,084	647	573	1,220	812	880	1,692
New Trips (non diverted trips)	3,463	97	86	183	122	132	254
Diverted Link Trips	19,621	550	487	1,037	690	748	1,438

5.2 Trip Distribution

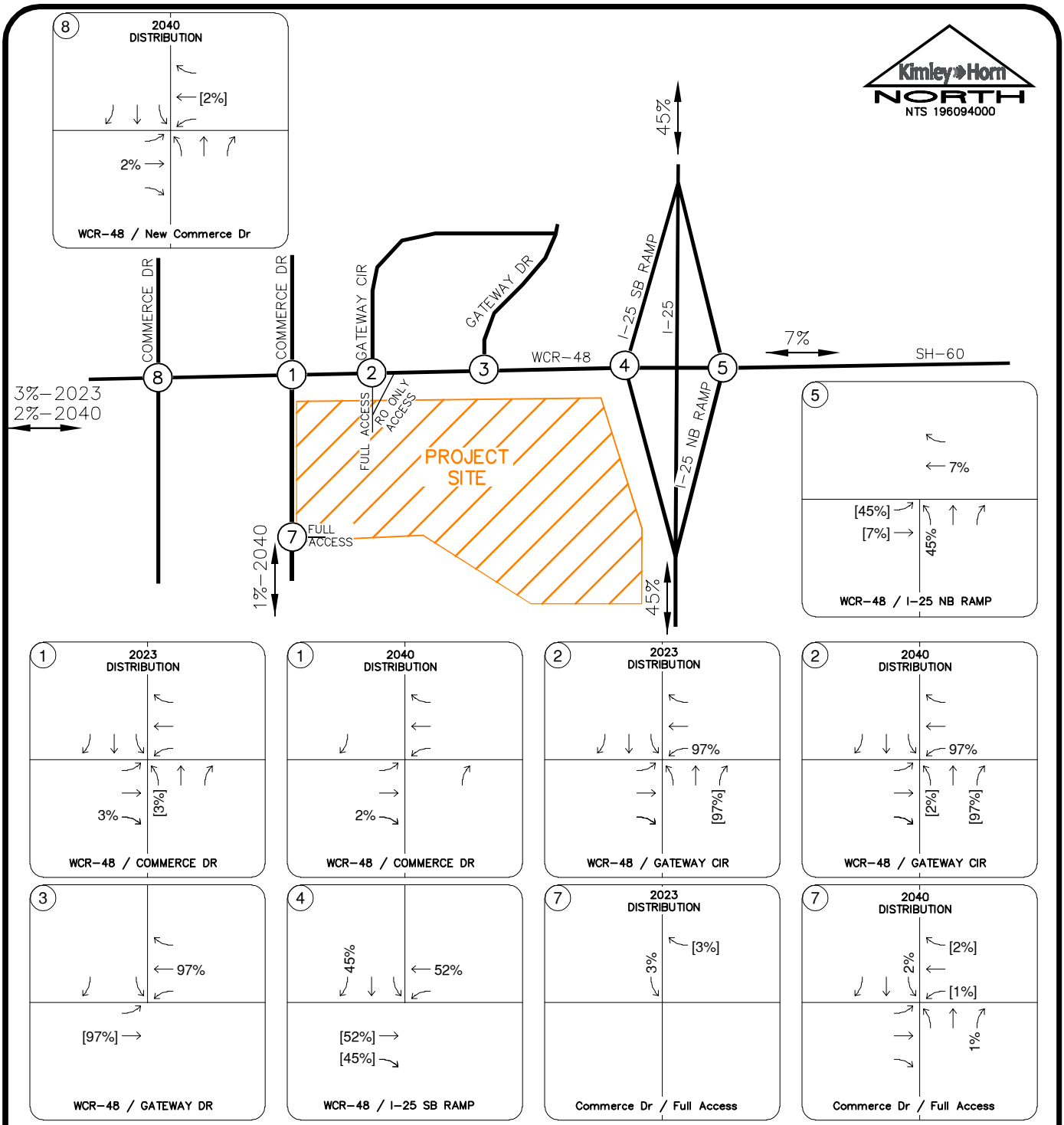
Distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, existing and anticipated surrounding demographic information, and the proposed access system for the project. The directional distribution of traffic is a means to quantify the percentage of site-generated traffic that approaches the site from a given direction and departs the site back to the original source. The new project trip distribution for the proposed development trips is illustrated in **Figure 8** while the diverted trip distribution is illustrated in **Figure 9**.

5.3 Traffic Assignment

Traffic assignment was obtained by applying the distributions from **Figure 8** and **Figure 9** to the estimated traffic generation of the project shown in **Table 1**. The total traffic assignment is shown in **Figure 10**.

5.4 Total (Background Plus Project) Traffic

Project traffic volumes were added to the background volumes to represent estimated traffic conditions for the short-term 2023 horizon. **Figure 11** illustrates the background plus project traffic volumes for the 2023 horizon at the study key intersections. The 2040 total full buildout traffic volumes for the study area are shown in **Figure 12**.



LEGEND

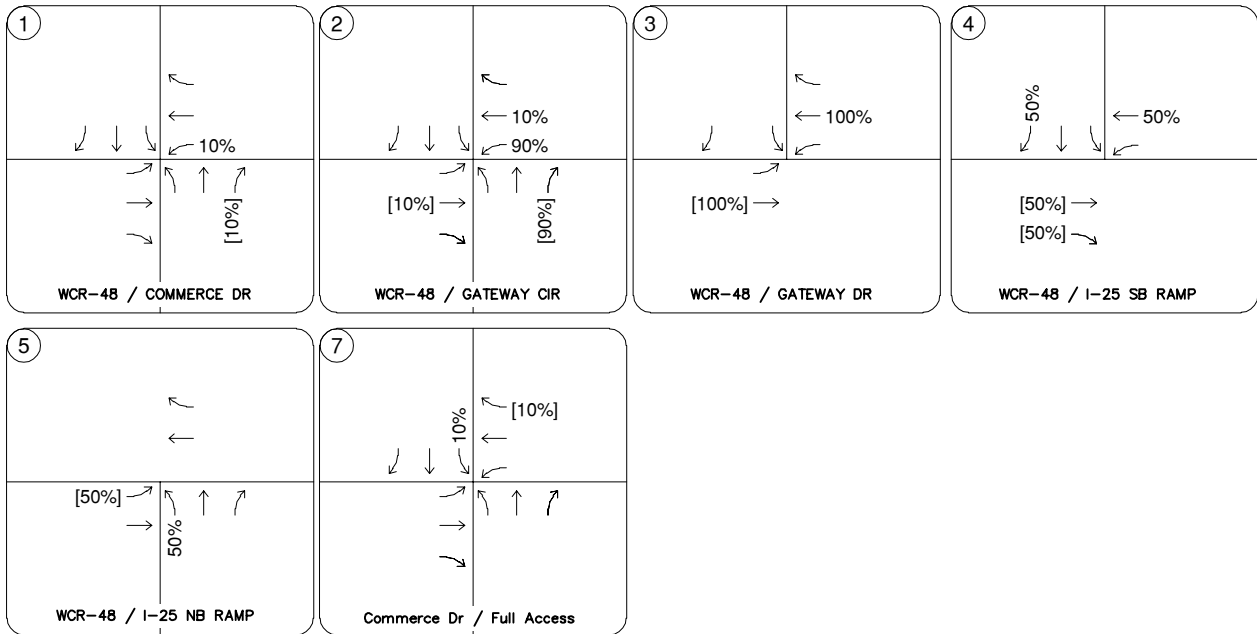
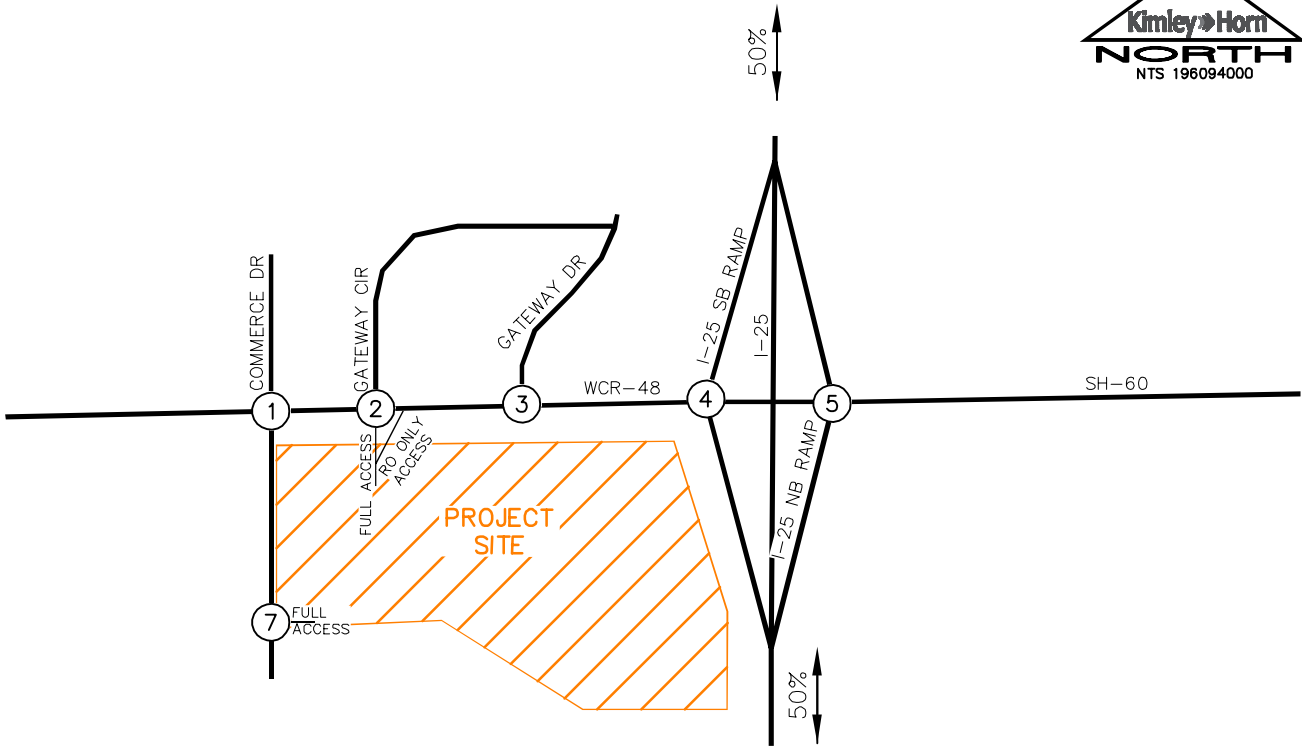
(X) Study Area Key Intersection

XX% External Trip Distribution Percentage

XX%(XX%) Entering(Exiting) Trip Distribution Percentage

TRAVEL CENTER JOHNSTOWN
 JOHNSTOWN, COLORADO
 TRIP DISTRIBUTION

FIGURE 8

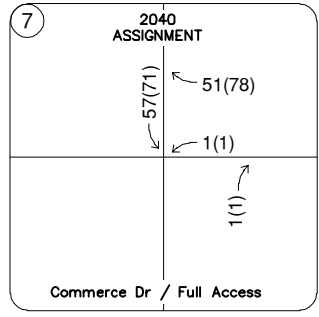
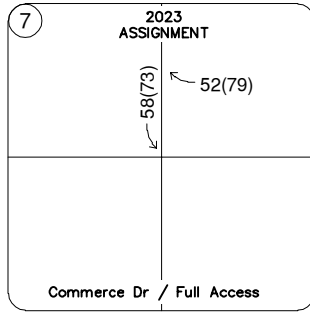
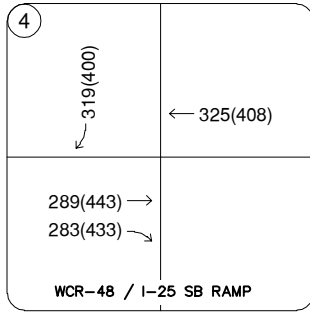
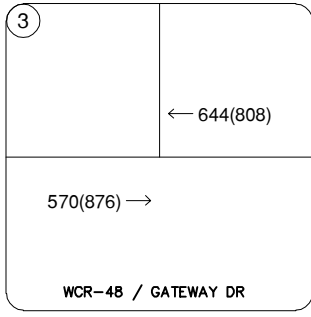
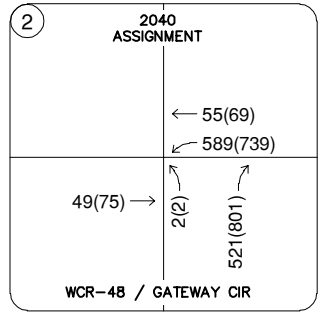
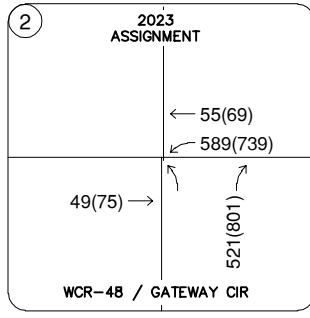
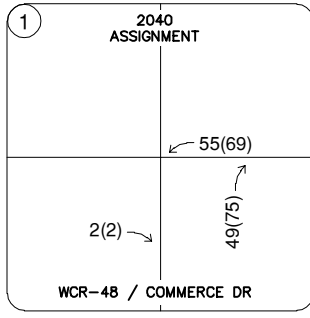
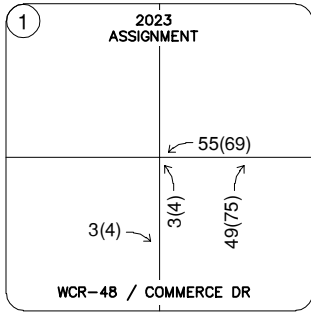
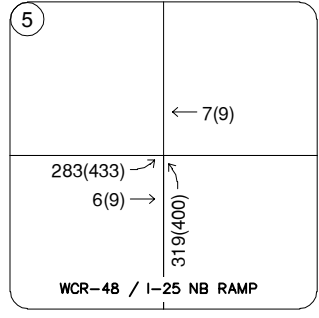
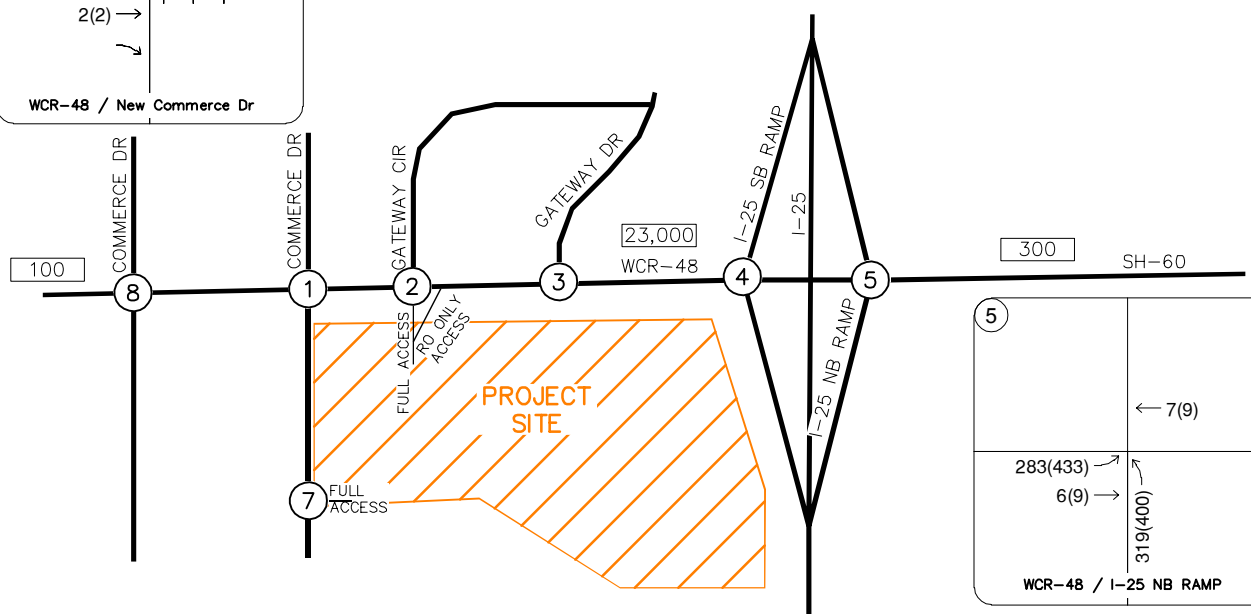
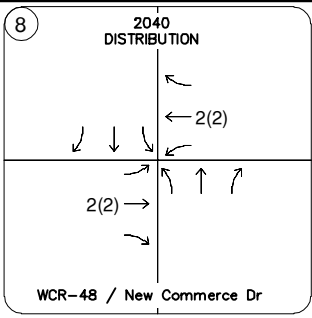


LEGEND

- (X) Study Area Key Intersection
- XX% External Trip Distribution Percentage
- XX%(XX%) Entering(Exiting) Trip Distribution Percentage

TRAVEL CENTER JOHNSTOWN
 JOHNSTOWN, COLORADO
 DIVERTED TRIP DISTRIBUTION

FIGURE 9



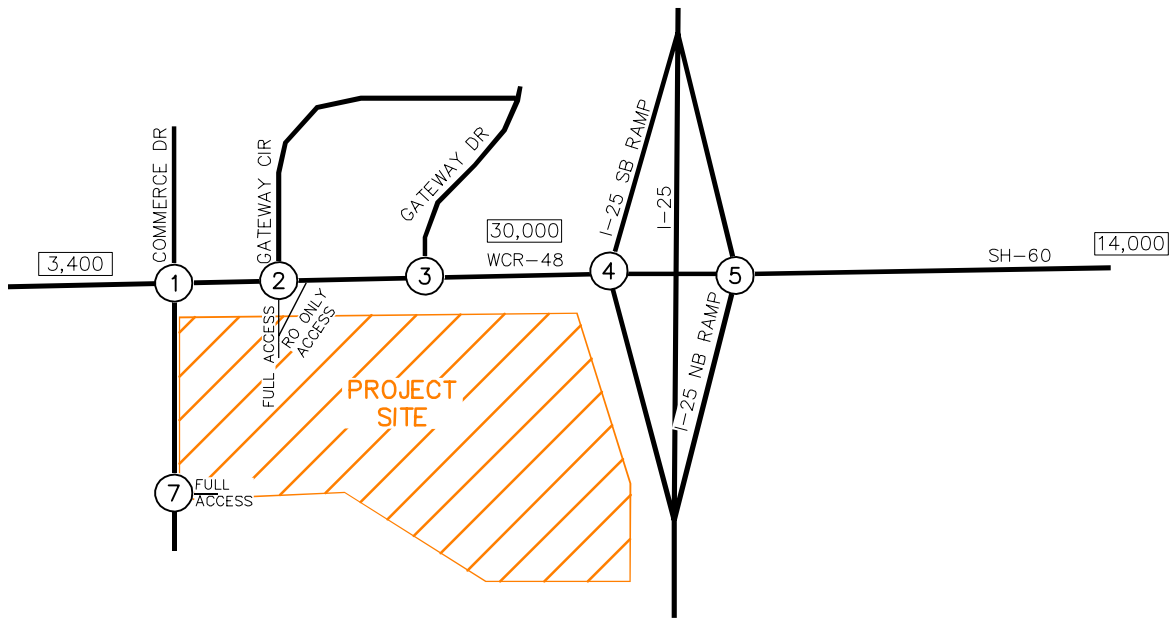
LEGEND

(X) Study Area Key Intersection

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

TRAVEL CENTER JOHNSTOWN
JOHNSTOWN, COLORADO
PROJECT TRAFFIC ASSIGNMENT

FIGURE 10



1	<p>1(15) ←</p> <p>11(50) ↓</p> <p>47(6) ↗</p> <p>82(121) ←</p> <p>55(69) ↘</p>
	<p>6(0) ↗</p> <p>135(193) →</p> <p>3(4) ↓</p> <p>3(4) ↗</p> <p>49(75) ↘</p>
WCR-48 / COMMERCE DR	

2	<p>12(36) ↓</p> <p>146(240) ↘</p> <p>63(21) ↗</p> <p>174(161) ←</p> <p>589(739) ↘</p>
	<p>60(32) ↗</p> <p>163(311) →</p> <p>521(801) ↗</p>
WCR-48 / GATEWAY CIR	

3	<p>16(22) ↓</p> <p>146(144) ↗</p> <p>798(898) ←</p>
	<p>708(1150) →</p>
WCR-48 / GATEWAY DR	

4	<p>433(467) ↓</p> <p>1(1) ↓</p> <p>115(377) ↓</p> <p>512(575) ←</p> <p>393(202) ↘</p>
	<p>396(775) →</p> <p>403(557) ↓</p>
WCR-48 / I-25 SB RAMP	

5	<p>371(248) ↗</p> <p>562(293) ←</p>
	<p>330(510) ↗</p> <p>150(626) →</p> <p>387(477) ↗</p> <p>1(4) ↗</p> <p>112(224) ↗</p>
WCR-48 / I-25 NB RAMP	

7	<p>58(73) ↓</p> <p>52(79) ↗</p>
Commerce Dr / Full Access	

LEGEND

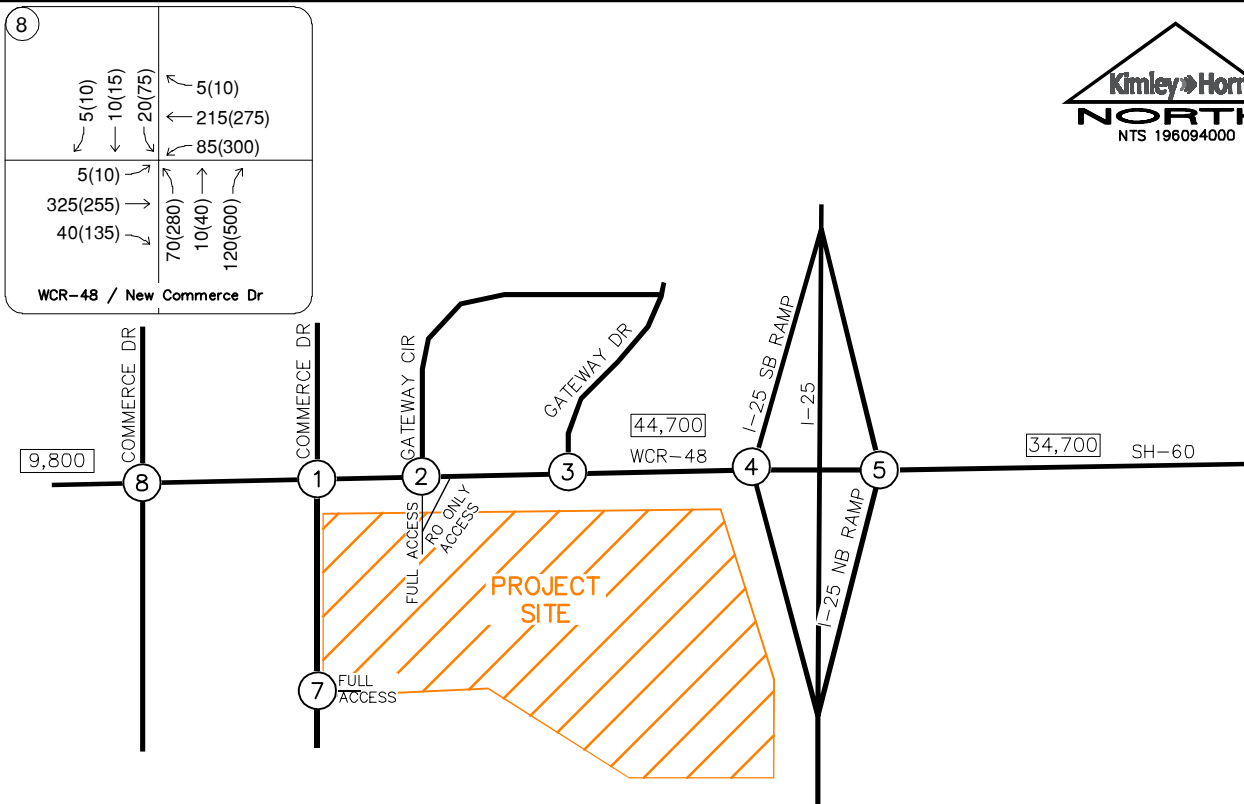
(X) Study Area Key Intersection

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

XX,X00 Estimated Daily Traffic Volume

TRAVEL CENTER JOHNSTOWN
JOHNSTOWN, COLORADO
2023 TOTAL TRAFFIC VOLUMES

FIGURE 11



<p>5(25)</p> <p>70(10)</p> <p>295(550)</p> <p>165(330)</p>	<p>5(10)</p> <p>10(15)</p> <p>20(75)</p> <p>5(10)</p> <p>215(275)</p> <p>85(300)</p>
<p>10(5)</p> <p>395(700)</p> <p>65(130)</p> <p>350(320)</p>	<p>5(10)</p> <p>325(255)</p> <p>40(135)</p> <p>70(280)</p> <p>10(40)</p> <p>120(500)</p>
WCR-48 / COMMERCE DR	

<p>20(55)</p> <p>175(250)</p> <p>95(35)</p> <p>540(850)</p> <p>590(740)</p>	<p>70(10)</p> <p>295(550)</p> <p>165(330)</p>
<p>95(50)</p> <p>635(960)</p> <p>10(20)</p> <p>5(5)</p> <p>525(805)</p>	<p>5(10)</p> <p>215(215)</p> <p>1200(1625)</p>
WCR-48 / GATEWAY CIR	

<p>25(35)</p> <p>1330(2015)</p>	<p>215(215)</p> <p>1200(1625)</p>
WCR-48 / GATEWAY DR	

<p>545(600)</p> <p>5(5)</p> <p>180(385)</p> <p>870(1270)</p> <p>810(775)</p>	<p>5(10)</p> <p>325(255)</p> <p>40(135)</p> <p>70(280)</p> <p>10(40)</p> <p>120(500)</p>
<p>750(1270)</p> <p>590(815)</p>	<p>5(10)</p> <p>325(255)</p> <p>40(135)</p> <p>70(280)</p> <p>10(40)</p> <p>120(500)</p>
WCR-48 / I-25 SB RAMP	

<p>860(715)</p> <p>1200(1325)</p>	<p>5(10)</p> <p>325(255)</p> <p>40(135)</p> <p>70(280)</p> <p>10(40)</p> <p>120(500)</p>
<p>470(780)</p> <p>465(865)</p> <p>490(720)</p> <p>5(10)</p> <p>460(555)</p>	<p>5(10)</p> <p>325(255)</p> <p>40(135)</p> <p>70(280)</p> <p>10(40)</p> <p>120(500)</p>
WCR-48 / I-25 NB RAMP	

<p>30(70)</p> <p>135(285)</p> <p>60(75)</p> <p>60(85)</p> <p>5(5)</p> <p>10(10)</p>	<p>5(10)</p> <p>325(255)</p> <p>40(135)</p> <p>70(280)</p> <p>10(40)</p> <p>120(500)</p>
<p>55(80)</p> <p>5(5)</p> <p>5(5)</p> <p>5(5)</p> <p>290(225)</p> <p>10(10)</p>	<p>5(10)</p> <p>325(255)</p> <p>40(135)</p> <p>70(280)</p> <p>10(40)</p> <p>120(500)</p>
Commerce Dr / Full Access	

LEGEND

(X) Study Area Key Intersection

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

XX,X00 Estimated Daily Traffic Volume

TRAVEL CENTER JOHNSTOWN
JOHNSTOWN, COLORADO
2040 TOTAL TRAFFIC VOLUMES

FIGURE 12

6.0 TRAFFIC OPERATIONS ANALYSIS

Kimley-Horn’s analysis of traffic operations in the vicinity of the site was conducted to determine potential capacity deficiencies in the 2023 and 2040 development horizons at the identified key intersections. The acknowledged source for determining overall capacity is the current edition of the *Highway Capacity Manual*².

6.1 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, common 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 LOS 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 a signalized and four-way stop controlled intersection is defined for each approach and for the intersection. The intersection analysis was conducted using Synchro software with the analysis results reported using the Highway Capacity Manual (HCM) procedure.

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

6.2 Intersection Operational Analysis

Calculations for the LOS at the study key intersections are provided in **Appendix D**. The LOS analyses are based on the lane geometry and intersection control shown in **Figure 2**. The LOS analyses determine what improvements may be needed at the study area key intersections and proposed local street access to handle background traffic growth and project related traffic in the two study horizons. Existing cycle lengths and timing splits for the key signalized intersections were utilized in the existing condition. The short-term 2023 horizon was evaluated with future planned roadway improvements at the study area key intersections. These improvements include a diverging diamond interchange at WCR-48 and I-25 and the resultant widening of WCR-48, a two-lane roundabout at the WCR-48 and Gateway Circle intersection, and Commerce Drive being extended south of WCR-48. Synchro traffic analysis software was used to analyze the study area intersections for intersection delay and level of service. Sidra software was utilized to evaluate the proposed roundabout at the intersection of WCR-48 and Gateway Circle.

WCR-48 & Commerce Drive (Existing Alignment)

WCR-48 and Commerce Drive operates as an unsignalized intersection with stop control on the southbound approach of Commerce Drive. The movements at this intersection currently operate acceptably with LOS B or better during the morning and afternoon peak hours.

With the buildout of the project and the background Welty Project, Commerce Drive will extend south of WCR-48 to the project site. Based on planned improvements and the extension of Commerce Drive south of WCR-48, the northbound and southbound approaches of this intersection were evaluated with a designated left turn lane and a shared through/right turn lane in the short-term horizon. The eastbound approach of this intersection is proposed to include a left turn lane and two through lanes while the westbound approach will include a left turn lane, one through lane, and a dropped right turn lane. With planned improvements and the addition of project traffic, all movements at this intersection are anticipated to operate acceptably at LOS B or better during the peak hours in 2023.

By 2040, this intersection is recommended to be restricted to three-quarter movements and a second westbound through lane is proposed to be constructed. This restriction is due to the proximity to the intersection of WCR-48 and Gateway Circle intersection. As remaining land within Welty Ridge is developed, a new Commerce Drive is proposed on the section line to the

west of the existing Commerce Drive, and the future realigned intersection of WCR-48 and Commerce Drive should be signalized. There will be two public accesses to the Welty Ridge development from WCR-48: one a three-quarter access at the existing Commerce Drive intersection and the other will be a signalized access at the new Commerce Drive intersection. With this intersection being restricted to three-quarter movements by 2040, the intersection movements are anticipated to operate at LOS B or better during the morning and afternoon peak hours. **Table 3** provides the results of the LOS at this intersection.

Table 3 – WCR-48 and Commerce Drive LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2020 Existing				
Eastbound Left	7.5	A	0.0	A
Southbound Approach	10.1	B	10.8	B
2023 Background #				
Eastbound Left	7.5	A	0.0	A
Southbound Left	9.7	A	10.3	B
Southbound Right	8.8	A	9.0	A
2023 Background Plus Project #				
Northbound Left	11.8	B	12.2	B
Northbound Right	8.9	A	9.4	A
Eastbound Left	7.5	A	0.0	A
Westbound Left	7.6	A	7.9	A
Southbound Left	11.0	B	12.5	B
Southbound Right	8.8	A	9.0	A
2040 Background ##				
Northbound Right	10.9	B	11.8	B
Eastbound Left	8.1	A	8.7	A
Westbound Left	8.1	A	9.6	A
Southbound Right	9.2	A	10.4	B
2040 Background Plus Project ##				
Northbound Right	11.5	B	13.0	B
Eastbound Left	8.1	A	8.7	A
Westbound Left	8.3	A	10.2	B
Southbound Right	9.2	A	10.4	B

= Proposed improvements and remaining full movement; ## = Restricted to three-quarter movements

WCR-48 & Gateway Circle

WCR-48 and Gateway Circle operates as an unsignalized intersection with stop control on Gateway Circle. The movements at this intersection currently operate acceptably with LOS B or better during peak hours.

The background condition (without project traffic) in 2023 and 2040 was evaluated with a standard stop control intersection and two eastbound and westbound through lanes due to the future widening of WCR-48 coinciding with the implementation of the diverging diamond interchange at I-25. Without the project and a standard T-intersection, this intersection is expected to operate acceptably in 2023; however, southbound left turn movements may experience long delays during the afternoon peak hour in 2040.

The total traffic volume condition (background plus project traffic) in 2023 was evaluated with the proposed two-lane roundabout associated with this project. The eastbound and westbound approaches of the roundabout include two lanes while the northbound and southbound approaches include a single lane. However, the northbound approach of the proposed roundabout includes dual right turn lanes with the outside lane being a combination acceleration to deceleration lane with the I-25 Southbound Ramp to the east. The south leg of this intersection will provide full movement access to the proposed development. With the proposed roundabout control associated with this project, this intersection is expected to operate acceptably with LOS A during the peak hours in the 2023 horizon.

By 2040, the ultimate roundabout configuration includes an additional westbound lane. The westbound approach configuration will consist of a left turn lane, a shared through/left, and a shared through/right. With this geometry, the roundabout is expected to operate acceptably with LOS D or better during the peak hours for the 2040 horizon. Of note, the future south leg of Gateway Circle at WCR-48 will only provide access to proposed travel center as providing cross access to the Welty Ridge development will likely overload the proposed roundabout. **Table 4** provides the results of the LOS at this intersection.

Table 4 – WCR-48 and Gateway Circle LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2020 Existing				
Eastbound Left	7.7	A	7.5	A
Southbound Left	11.1	B	11.6	B
Southbound Right	9.1	A	9.0	A
2023 Background #				
Eastbound Left	7.8	A	7.5	A
Southbound Left	13.4	B	15.6	C
Southbound Right	8.9	A	8.8	A
2023 Background Plus Project ^	5.4	A	7.2	A
2040 Background #				
Eastbound Left	9.3	A	10.1	A
Southbound Left	25.1	D	96.3	F
Southbound Right	10.5	B	12.2	B
2040 Background Plus Project ^ ##	9.4	A	33.7	D

= Addition of EBT Lane, Convert WBR to Shared WBT/R; ^= Proposed Roundabout;

^ ## = Proposed Roundabout with Two Westbound Through Lanes

WCR-48 and Gateway Drive

WCR-48 and Gateway Drive operates as an unsignalized intersection with stop control on the southbound approach of Gateway Drive. All movements currently operate acceptable at LOS C or better during the peak hours under existing conditions.

The short term (2023) and long term (2040) horizons were based on the proposed lane configuration associated with the proposed development. As such, this intersection was evaluated with movements being restricted to right-in/right-out and with two eastbound and westbound through lanes due to the future widening of WCR-48 coinciding with the implementation of the diverging diamond interchange at I-25.

The left turn lane volumes at this intersection have been rerouted to the WCR-48 and Gateway Circle intersection due to this intersection being restricted to right-in/right-out movements. An R3-2 “No Left Turn” sign should be placed under the stop sign on the southbound approach of this intersection while a R6-1R “One-Way” sign should be placed within the future raised median along WCR-48 due to this intersection being restricted to right-turn movements. With the recommended lane configurations and control, all movements are anticipated to operate acceptably at LOS C or better during the peak hours in 2023 and 2040. **Table 5** provides the results of the LOS this intersection.

Table 5 – WCR-48 & Gateway Drive LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2020 Existing				
Eastbound Left	8.0	A	7.4	A
Southbound Left	12.8	B	15.4	C
Southbound Right	9.2	A	8.8	A
2023 Background#				
Southbound Right	9.4	A	9.1	A
2023 Background Plus Project#				
Southbound Right	12.9	B	13.3	B
2040 Background#				
Southbound Right	11.5	B	13.3	B
2040 Background Plus Project#				
Southbound Right	16.4	C	22.7	C

= Provide two EB and WB through lanes and restrict to right-in/right-out movements

WCR-48/SH-60 and Interstate 25 Southbound Ramp

The WCR-48/SH-60 and I-25 Southbound Ramp intersection is signalized with all three entering approaches of this intersection containing a single lane for shared movements. The intersection currently operates at LOS C during the morning peak hour and afternoon peak hour.

By 2023, the previously referenced diverging diamond interchange is expected to be complete at this intersection. As such, this intersection was evaluated a diverging diamond interchange and the current improvement plans for this intersection can be referenced in **Appendix B**. With the proposed improvements, the intersection is anticipated to operate acceptably with LOS D or better during the peak hours throughout the 2040 horizon. **Table 6** provides the results of the LOS at this intersection.

Table 6 – WCR-48/SH-60 & I-25 Southbound Ramp LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2020 Existing	23.5	C	26.2	C
2023 Background#	13.2	B	14.2	B
2023 Background Plus Project#	19.6	B	18.2	B
2040 Background#	20.3	C	20.5	C
2040 Background Plus Project#	21.5	C	46.4	D

= Diverging Diamond Interchange

WCR-48/SH-60 and Interstate 25 Northbound Ramp

The WCR-48/SH-60 and I-25 Northbound Ramp intersection is signalized with all three entering approaches of this intersection containing a single lane for shared movements. The intersection currently operates at LOS B during the peak hours.

By 2023, the previously referenced diverging diamond interchange is expected to be complete at this intersection. As such, this intersection was evaluated a diverging diamond interchange and the current improvement plans for this intersection can be referenced in **Appendix B**. With the proposed improvements, the intersection is anticipated to operate acceptably with LOS B during the peak hours throughout the 2040 horizon. **Table 7** provides the results of the LOS at this intersection.

Table 7 – WCR-48/SH-60 & I-25 Northbound Ramp LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2020 Existing	10.4	B	15.9	B
2023 Background#	15.5	B	13.3	B
2023 Background Plus Project#	17.2	B	13.4	B
2040 Background#	19.0	B	19.0	B
2040 Background Plus Project#	19.3	B	19.5	B

SH-60 and E I-25 Frontage Road

SH-60 and I-25 Frontage Road operates as a signalized intersection. All four approaches consist of a shared lane for all movements. With the current control and geometry, the existing intersection operates acceptably at LOS B during the peak hours.

With the buildout of the diverging diamond interchange, the E Interstate 25 Frontage Road traffic will be removed; therefore, only the existing condition was evaluated at this intersection.

Table 8 provides the results of the LOS analysis at this intersection during existing conditions.

Table 8 – SH-60 & E I-25 Frontage Road LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2020 Existing	13.1	B	11.9	B

Commerce Drive Public Street Access Intersection

With completion of the Travel Center Johnstown project, access to the site is proposed from a public street access on the east side of the future extension of Commerce Drive (south of WCR-48) and from a private access aligning with Gateway Circle along the south side of WCR-48 (previously evaluated as the WCR-48 and Gateway Circle intersection). The proposed public street access along Commerce Drive is located approximately 700 feet (measured center to center) south of WCR-48.

With buildout of the entire Welty Ridge project, the Commerce Drive and Public Street Access intersection is proposed to be a four-legged intersection with separate left turn lanes and a shared through/right turn lane on each approach. The eastbound and westbound approaches of this intersection are recommended to operate under stop control with installation of R1-1 “STOP” signs. This intersection may only provide a north and east leg in the interim if the proposed project constructs prior to surrounding development within Welty Ridge. With the recommended lane configurations and control, all movements are anticipated to operate an acceptable level of service during the peak hours throughout the 2040 horizon. **Table 9** provides the results of the LOS at this intersection.

Table 9 – Commerce Drive Access LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2023 Background Plus Project				
Southbound Left	0.0	A	0.0	A
Westbound Right	0.0	A	0.0	A
2040 Background Plus Project				
Northbound Left	7.6	A	8.1	A
Eastbound Left	18.6	C	28.0	D
Eastbound Approach	12.0	B	13.7	B
Westbound Left	15.0	C	17.8	C
Westbound Approach	11.0	B	10.8	B
Southbound Left	8.1	A	7.9	A

WCR-48 and Commerce Drive (Future Intersection)

By 2040, it is recommended that a new Commerce Drive roadway follow the section line west of the existing Commerce Drive to provide additional future project access to the Welty Ridge Project and the Travel Center Johnstown project. With the new realigned intersection of WCR-48 and Commerce Drive, the existing intersection of WCR-48 and Commerce Drive is recommended to be restricted to three-quarter movements. This restriction is due to the proximity to the intersection of WCR-48 and Gateway Circle intersection. There will be two public accesses to the Welty Ridge development from WCR-48: one a three-quarter access at the existing Commerce Drive intersection and the other will be a signalized access at the new Commerce Drive intersection.

A MUTCD Four-Hour signal warrant was evaluated for the long-term background volumes. It was determined the morning peak hours do not meet the threshold for requiring signalization, but it is anticipated that the shoulder afternoon hours of 3:00 to 4:00 PM and 6:00 to 7:00 PM may meet signal warrants with the third and fourth hour. Therefore, the intersection was analyzed as a signalized intersection with separate eastbound and westbound left turn lanes with two through lanes in each direction. The signal warrant analysis worksheet is attached in **Appendix F**. The northbound approach will need a left turn lane, a through lane, and a right turn lane, while the southbound approach can provide a left turn lane and a shared through/right turn lane. With the recommended lane configurations and control, the intersection is anticipated to operate at LOS C during the peak hours throughout the 2040 horizon. **Table 10** provides the results of the LOS at this intersection.

Table 10 – WCR-48 & New Commerce Drive LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2040 Background	29.0	C	30.0	C
2040 Background Plus Project	29.0	C	30.0	C

6.3 Queue Analysis

A vehicle queuing analysis was conducted for turn lanes at the study area key intersections. Results were obtained from the 95th percentile queue lengths obtained from the Synchro analysis and Sidra. Queue length calculations for unsignalized intersections are provided within the level of service operational sheets provided in **Appendix D** and **Appendix E** for signalized intersections. Results of the queuing analysis and recommendations at the study area intersections are provided in **Table 11**.

Table 11 – Turn lane Length Analysis Results

Intersection Turn Lane	Existing Turn Lane Length (feet)	2023 Calculated Queue Length (feet)	2023 Recommended Turn Lane Length (feet)	2040 Calculated Queue Length (feet)	2040 Recommended Turn Lane Length (feet)
WCR-48 & Commerce Drive					
Northbound Right	DNE	25'	150'	-	C
Eastbound Left	DNE	25'	150'	50'	150'
Westbound Left	DNE	25'	150' (*275')	50'	150' (*275')
Westbound Right	DNE	25'	C (*275')	25'	150' (*275')
Southbound Right	DNE	25'	150'	25'	C
WCR-48 & Gateway Circle					
Eastbound Approach	DNE	39'	C (* 275')	607'	C (* 275')
Westbound Approach	DNE	55'	C (450')	73'	C (450')
WCR-48 & I-25 Southbound Ramp					
Eastbound Approach	DNE	285'	C (* 500')	586'	C (* 500')
Westbound Approach	DNE	163'	C (* 575')	571'	C (* 575')
WCR-48 & I-25 Northbound Ramp					
Eastbound Approach	DNE	87'	C (* 575')	181'	C (* 575')
Westbound Approach	DNE	130'	C	304'	C
Commerce Drive Public Access					
Northbound Left	-	-	-	25'	150'
Eastbound Left	-	-	-	50'	150'
Westbound Left	-	-	-	25'	150'
Southbound Left	-	-	-	25'	150'
WCR-48 & New Commerce Drive					
Eastbound Left	-	-	-	13'	150'
Westbound Left	-	-	-	178'	200'
Northbound Left	-	-	-	178'	200'
Northbound Right	-	-	-	70'	150'
Southbound Left	-	-	-	53'	150'

DNE = Does Not Exist; C = Continuous Lane; (* XX') = Separation Distance from Adjacent Intersection (measured edge to edge)

As shown in the vehicle queuing table, all vehicle queues are expected to be contained within the proposed turn lane lengths as well as critical through lane approaches without spilling back into adjacent intersections in 2023. The westbound left turn lane at the WCR-48 and Commerce Drive intersection is expected to have one (1) vehicle queue during the peak hour in 2023 and

two (2) vehicles queued during the peak hour in 2040; therefore, vehicles are not expected to extend into the proposed roundabout intersection of WCR-48 and Gateway Circle located approximately 275 feet to the east (measured edge to edge). Likewise, the eastbound approach of the proposed roundabout intersection of WCR-48 and Gateway Circle is not expected to extend into the proposed intersection of WCR-48 and Commerce Drive located approximately 275 feet to the west (measured edge to edge) in 2023. If 2045 volumes are realized, the eastbound approach could extend beyond the future three-quarter WCR-48 and Commerce Drive intersection.

6.4 Vehicle Weave Analysis

Highway Capacity Software was utilized to determine the weaving maneuver level of service for eastbound approach at the I-25 Southbound Ramps from the intersection of WCR-48 and Gateway Circle. It should be noted that the outside northbound right turn lane at the WCR-48 and Gateway Circle intersection is proposed to provide an acceleration lane designated for southbound I-25 traffic and will be signed appropriately for exclusive access to southbound I-25. The inside northbound right turn lane at the WCR-48 and Gateway Circle intersection will provide a yield condition; therefore, should not result in any vehicle weaving. However, in the event that a small volume of northbound right turn movements in the outside lane transition out of the acceleration lane and do not gain access to southbound I-25, a vehicle weaving analysis was performed in the revised traffic study. The acknowledged source for determining overall weaving capacity is the Sixth Edition of the *Highway Capacity Manual (HCM)*. A one-sided weaving segment was evaluated based Chapter 13 of the HCM. As such, the weaving analysis reports that the weave maneuver is expected to operate with LOS B during both the morning and afternoon peak hours in 2040. The weaving analysis outputs are attached in **Appendix F**.

6.5 WCR-48 and Gateway Drive Alternative Analysis

An alternative analysis for the WCR-48 and Gateway Drive intersection has been provided due to the developments north of WCR-48 pursuing signalization of this intersection. Existing peak entering and exiting peak hour traffic volumes plus future redevelopment traffic was utilized for the alternative signalized analysis of the WCR-48 and Gateway Drive intersection. The 2040 traffic volumes projections along WCR-48 from this study were utilized in the alternative analysis; however, the volumes were refined to account for allowing for eastbound and southbound left turn movements at this intersection. CDOT has expressed concerns with allowing full turning movements and signalized control at the WCR-48 and Gateway Drive intersection due to the proposed spacing from the future diverging diamond southbound ramps with I-25. The future southbound ramp at I-25 is proposed to be located approximately 500 feet east of the Gateway Drive intersection with WCR-48 (measured edge to edge and 600 feet center to center). It should be noted that Johnstown’s access control policy guidelines along an arterial roadway have a spacing of at least a quarter mile (1,320 feet) between signals. If the WCR-48 and Gateway Drive intersection is signalized, the spacing to the I-25 Southbound Ramp only provides approximately 600 feet (0.11 miles < 0.25 miles).

An analysis has been completed with the WCR-48 and Gateway Drive intersection operating with signal control in 2040 during the morning and afternoon peak hour. As shown in **Table 12**, the signalized intersection of WCR-48 and Gateway Drive is anticipated to operate acceptably with LOS C during the morning peak hour and LOS D during the afternoon peak hour in 2040.

Table 12 – WCR-48 & Gateway Drive Additional LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2040 Background Plus Project	24.9	C	44.3	D

In addition, 95th percentile queue lengths have been reported and compared to the separation distance to adjacent intersections and is documented in **Table 13**. With 2040 future traffic projections and signal control at the WCR-48 and Gateway Drive intersection, vehicle queues at the westbound approach of the WCR-48 and Gateway Drive intersection are expected to extend beyond the southbound ramp of the future diverging diamond interchange (DDI). The reported queue is 856 feet while the distance between the west DDI is only 500 feet (measured edge to edge). In addition, the eastbound approach at the west DDI intersection has a projected queue

of 586 feet which would extend back into the WCR-48 and Gateway Circle intersection as only 500 feet of separation (measured edge to edge) is anticipated to be provided between these two intersections.

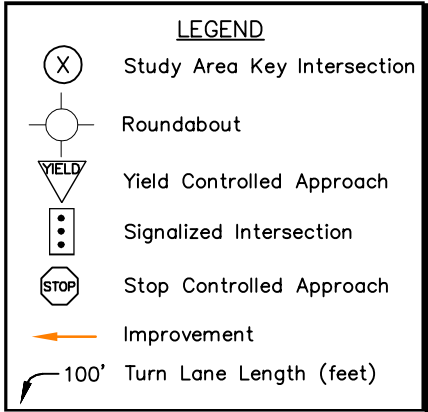
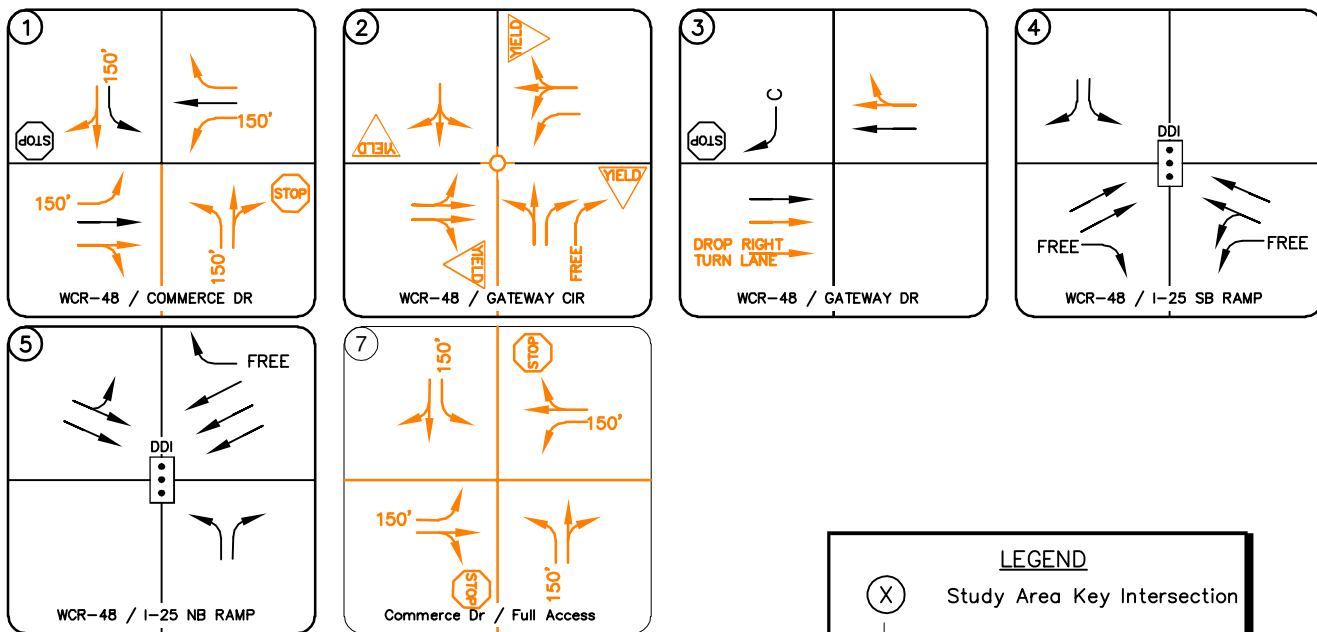
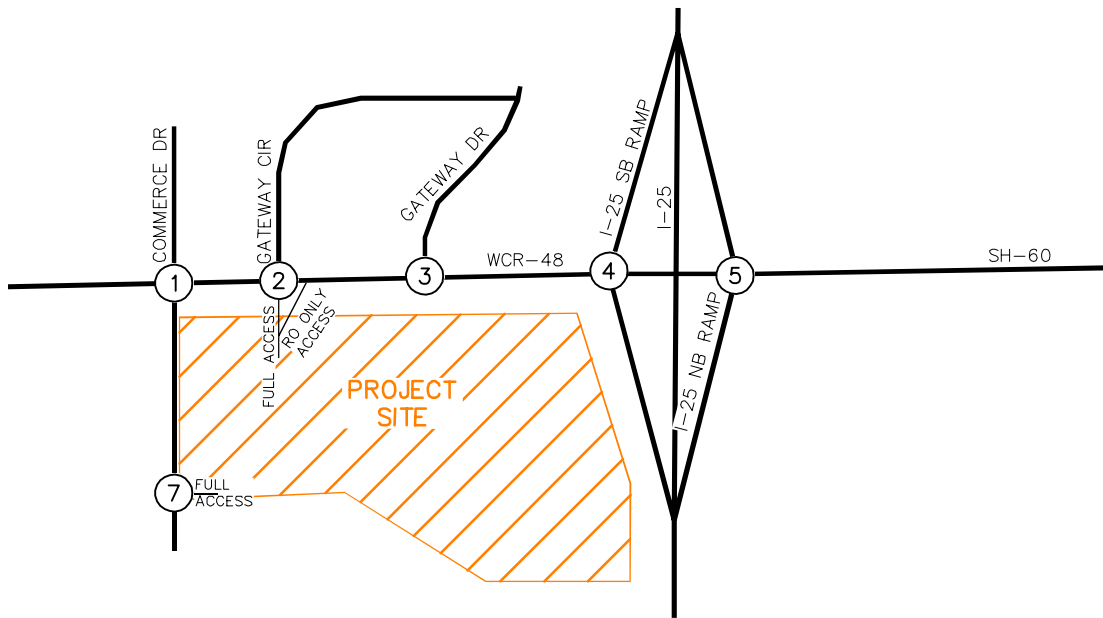
Table 13 – WCR-48 & Gateway Drive Additional Queue Results

Intersection Turn Lane	Length Between Adjacent Intersections (feet – edge to edge)	2040 Calculated Queue Length (feet)
WCR-48 & Gateway Circle Westbound Approach	450' from Gateway Drive	74' (PM)
WCR-48 & Gateway Drive Eastbound Approach Westbound Approach	450' from Gateway Circle 500' to DDI	339' (PM) 856' (PM)
WCR-48 & I-25 Southbound Ramp Eastbound Approach	500' to DDI	586' (PM)

The intersection level of service and vehicle queue output sheets for the alternative signalized analysis of the WCR-48 and Gateway Drive intersection are included in **Appendix G**. The Town of Johnstown and CDOT could consider monitoring traffic volumes in the future to determine if the intersection of WCR-48 and Gateway Drive should be restricted to right-in/right-out movements.

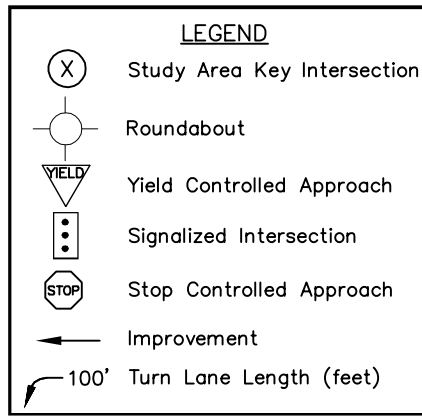
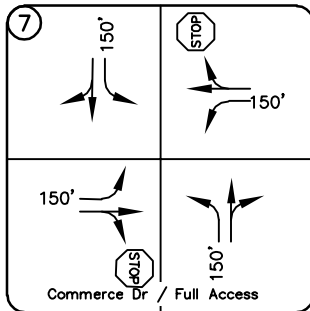
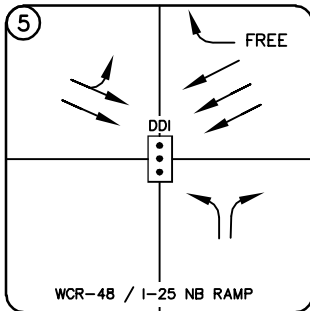
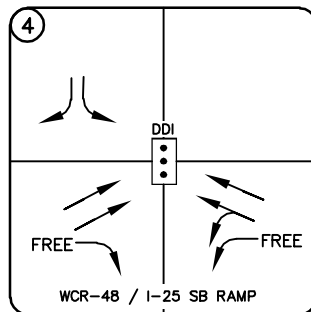
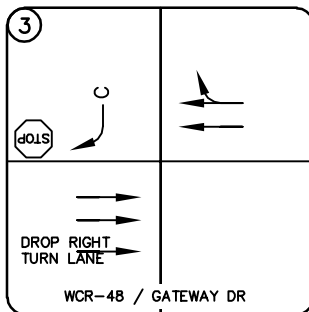
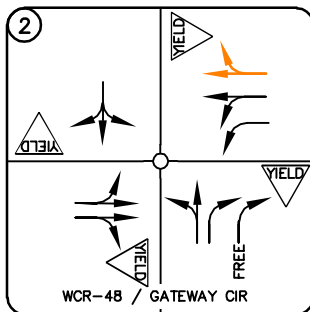
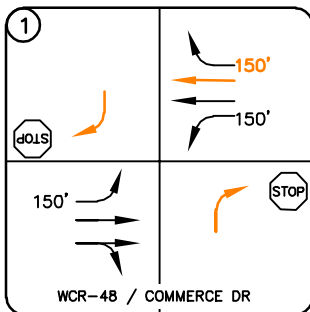
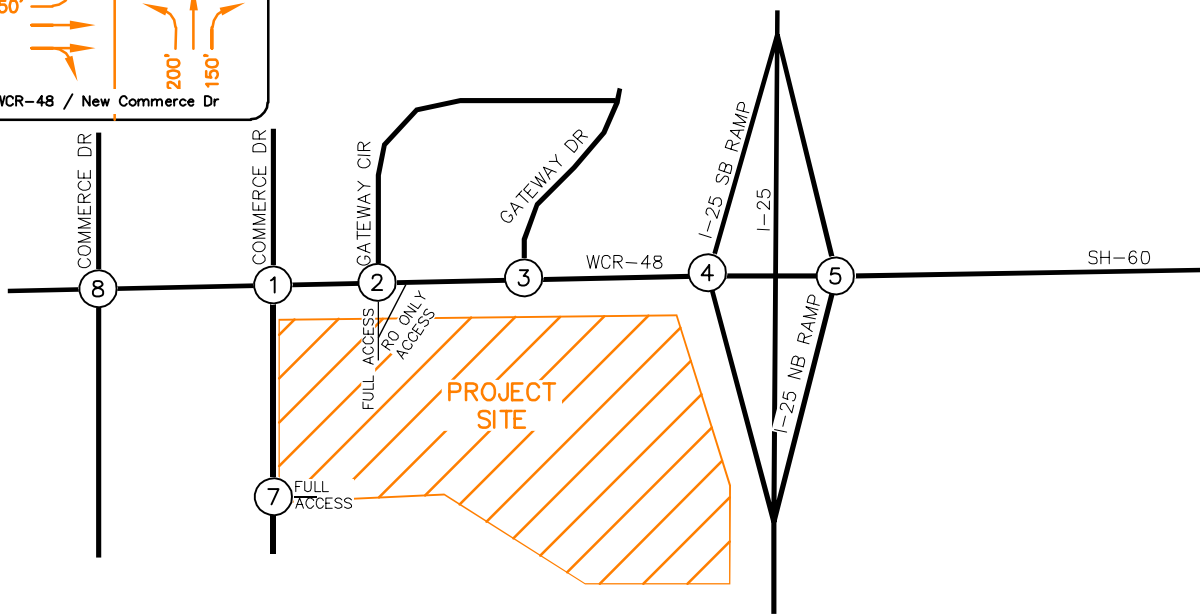
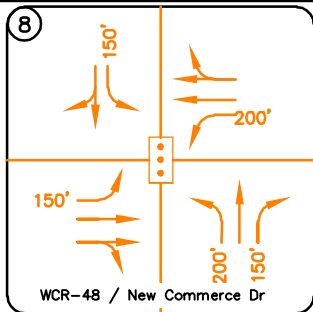
6.6 Improvement Summary

Based on the results of the intersection operations and turn lane queuing analysis, improvements were identified as being needed at key study intersections throughout the long term 2040 twenty-year planning horizon. These improvements are summarized in **Figure 12** for the 2023 horizon and **Figure 13** for the 2040 horizon.



TRAVEL CENTER JOHNSTOWN
 JOHNSTOWN, COLORADO
 2023 RECOMMENDED INTERSECTION
 LANES AND CONTROL

FIGURE 13



TRAVEL CENTER JOHNSTOWN
 JOHNSTOWN, COLORADO
 2040 RECOMMENDED INTERSECTION
 LANES AND CONTROL

FIGURE 14

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, Kimley-Horn believes the proposed Travel Center Johnstown project 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 recommendations:

2023 Recommendations

- Direct access to the project is proposed from a public street access on the east side of the future extension of Commerce Drive and from a private access aligning with Gateway Circle along the south side of WCR-48. As part of this project or if not sooner as part of the Welty Ridge development, Commerce Drive will be extended south of WCR-48. As additional portions of Welty Ridge develop, the public access intersection along Commerce Drive will provide four legs and stop control with installation of R1-1 “STOP” signs is recommended along the eastbound and westbound approaches. Designated left turn lanes with 150 feet of length are recommended at all four approaches of the public street access with Commerce Drive.
- An I-25 and State Highway 60 / Weld County Road 48 Interchange Type Selection Report was prepared for CDOT Region 4 in December 2019. Based on this study, CDOT is currently in design stages of implementing a diverging diamond interchange (DDI) at the WCR-48 and I-25 interchange and is expected to be completed by 2023. With construction of this DDI, the E I-25 Frontage Road will be removed and essentially be served with a future south leg at the SH-60 and High Plains Boulevard intersection. Coinciding with the implementation of the diverging diamond interchange at I-25, two eastbound and westbound through lanes are proposed along WCR-48 extending through the project limits from Commerce Drive to I-25.
- As the future south leg is provided at the WCR-48 and Commerce Drive intersection, it is recommended that the northbound and southbound approaches provide a designated left turn lane and a shared through/right turn lane. A left turn lane and two through lanes are proposed on the eastbound approach of this intersection while the westbound approach includes a left turn lane, one through lane, and a dropped right turn lane.

- A two-lane roundabout is proposed as part of this project at the intersection of WCR-48 and Gateway Circle. The eastbound and westbound approaches of the roundabout include two lanes while the northbound and southbound approaches include a single lane. However, the northbound approach of the proposed roundabout includes dual right turn lanes with the outside lane being a combination acceleration to deceleration lane with the I-25 Southbound Ramp to the east. The south leg of this intersection will provide full movement access to the proposed development.
- The intersection of WCR-48 and Gateway Drive is proposed to be restricted to right-in/right-out movements in association with this project and the future improvements associated with the interchange at WCR-48 and I-25. The approved Welty Ridge Outline Development Plan (ODP) identified a future south leg allowing full turning movements at the WCR-48 and Gateway Drive intersection. The current proposal is to amend the future south leg at the WCR-48 and Gateway Drive intersection and provide a south leg with full movement access at the WCR-48 and Gateway Circle intersection. This shift in full movement access to the west will provide additional spacing from the WCR-48 and I-25 interchange. An R3-2 “No Left Turn” sign should be placed under the stop sign on the southbound approach of the WCR-48 and Gateway Drive intersection while a R6-1R “One-Way” sign should be placed within the future raised median along WCR-48 due to this intersection being restricted to right-turn movements.

2040 Recommendations

- The intersection of WCR-48 and Commerce Drive is recommended to be restricted to three-quarter turning movements due to the proximity to the intersection of WCR-48 and Gateway Circle intersection. As remaining land within Welty Ridge is developed, a new Commerce Drive is proposed on the section line to the west of the existing Commerce Drive, and the future realigned intersection of WCR-48 and Commerce Drive should be signalized. There will be two public accesses to the Welty Ridge development from WCR-48: one a three-quarter access at the existing Commerce Drive intersection and the other will be a signalized access at the new Commerce Drive intersection. It is anticipated that a signal will be warranted at the new intersection of WCR-48 and Commerce Drive based on projected 2040 background volumes. Two eastbound and westbound through lanes with one northbound and southbound through lane are recommended to be provided at this new

intersection alignment. In addition, separate left turn lanes on all four approaches and a separate northbound right turn lane are recommended at this intersection.

- At the proposed WCR-48 and Gateway Drive roundabout, an additional westbound through lane is identified for to provide the ultimate cross-section for WCR-48. The westbound approach will provide a separate left turn lane, a shared through/left, and a shared through/right turn lane entering the roundabout.

General Recommendations

- Any on-site and off-site signing and striping improvements should be incorporated into the Civil Drawings and conform to Town of Johnstown, Weld County, and CDOT standards as well as the Manual on Uniform Traffic Control Devices – 2009 Edition (MUTCD).