

To: Abra Geissler, PE – CDOT Region 4

From: I-25/WCR 38 1601 Project Team

CC: Erika Rasmussen, Town of Mead; Robert Eck, Land Asset Strategies

Date: 5/29/2025 – Revised 8/15/2025

Re: I-25/WCR 38 Phase I Technical Memorandum

1. Purpose

The purpose of this technical memorandum is to document the efforts completed to date for Phase I of the I-25/WCR 38 1601 System Level Study (SLS), which is a pre-NEPA traffic analysis supporting an Interstate Access Justification Report (IAJR). Phase I includes the compilation and analysis of existing land use, safety, and traffic data to support the determination of the purpose, needs, and goals of the interchange project. Modeling and analysis of existing traffic operations and safety were undertaken to identify existing and future infrastructure needs within the Mead to Berthoud I-25 travelshed area that is defined by CO 56, 3 miles to the north of WCR 38; WCR 34, 2 miles to the south of WCR 38; and extending approximately two miles east and west of I-25. To further support the project's Purpose and Need, a traffic operations analysis of 2050 No Action conditions is also included herein.

The I-25/WCR 38 IAJR study will evaluate and select implementable solutions to current and projected traffic, access, and multimodal connectivity issues to and from I-25 within the Mead to Berthoud I-25 travelshed area. Improvements are needed to enhance regional mobility with existing and proposed land uses, property access, and future connections with I-25 mobility hubs; improve safety and operations for all travel modes; mitigate projected congestion; and improve multimodal mobility and connectivity to integrate travel options for WCR 38 and I-25 corridor users.

2. Existing Conditions Analysis

Analysis Area and Existing Network Characteristics

The Mead to Berthoud I-25 travelshed comprises the analysis area for the I-25/WCR 38 pre-NEPA traffic analysis. The travelshed is defined by CO 56 to the north and WCR 34 to the south and extends approximately 2 miles east (to WCR 13) and west (to WCR 5) of I-25 (see **Figure 1**).

WCR 34, WCR 38, and CO 56/WCR 44 are the primary east-west arterials that serve the Mead to Berthoud I-25 travelshed. WCR 38 currently lacks a direct connection with I-25. The lack of connectivity to I-25 within the central Mead to Berthoud I-25 travelshed creates out-of-direction travel for users seeking to access I-25. This is exacerbated by the 5-mile distance that separates the existing I-25 interchanges at WCR 34 and CO 56, the absence of continuous frontage roads to the east and west of I-25 within the travelshed, and the lack of nearby alternatives to I-25. US 287, located over 5 miles to the west of I-25, is the closest north-south route that provides redundancy with I-25. To the east, the closest north-south route is US 85 which is over 8 miles east of I-25. Additionally, there are no direct connections between the Mead to Berthoud travelshed and either US 85 or US 287.

In the context of the existing travelshed roadway network, there is limited ability for emergency responders to travel safely and efficiently to and from I-25 and throughout the network. Response times for these critical services are impacted by limited existing network connectivity. Heavy truck/freight access to significant destinations within the travelshed, such as truck stops, major retail stores, and distribution centers, is also impacted by existing limited network connectivity.



Figure 1. I-25/WCR 38 Interchange Project Location

Existing Roadways

Roadway corridors that serve the Mead to Berthoud I-25 travelshed include Interstate 25 and I-25 Frontage Road segments, WCR 34, WCR 38, and CO 56/WCR 44. Within the travelshed, I-25 can be accessed from existing interchanges at CO 56/WCR 44 and WCR 34, which are located 5 miles apart. A crossing of I-25 without access to the I-25 mainline is available at WCR 38, 2 miles north of the I-25/WCR 34 interchange.

Interstate 25 (I-25)

I-25 is an access-controlled freeway that extends in a north-south direction throughout Colorado. Within the study limits, it is currently being widened from four lanes to six lanes and has a speed limit of 75 miles per hour (mph).

WCR 34

Weld County Road 34 is currently a two-lane roadway extending from East County Line Road in the west to WCR 21 in the east and has a posted speed limit of 45 mph. WCR 34 will be improved to accommodate multimodal users by adding on-street bike lanes and pedestrian sidewalks. In 2023, the ramp terminal intersections at I-25 were signalized. The signals will be replaced by roundabouts no later than 2027 with the current I-25 North Express Lanes Segment 5 construction project.

WCR 38

Weld County Road 38 is currently a two-lane roadway extending from WCR 3 in the west to CR 19.5 in the east and has a posted speed limit of 45 mph. WCR 38 passes over I-25 at approximately mile point 247.25, located 2 miles north of WCR 34 and 3 miles south of CO 56/WCR 44. The current functional classification of WCR 38 varies among local and regional plans and should be upgraded to a principal arterial classification consistent with forecast traffic that will use WCR 38.

CO 56/WCR 44

Colorado Highway 56 extends from US Highway 287 in the west to I-25, where it becomes WCR 44 on the east side of I-25 and extends east to WCR 15. CO 56 has a speed limit of 50 mph in the study area, and WCR 44 has a speed limit of 35 mph. For access control purposes, CO 56 is classified by Colorado Department of Transportation (CDOT) as a Non-Rural Principal (NR-A) Highway. The I-25/CO 56 interchange was recently improved, including the reconstruction of the ramp terminals as roundabouts.

I-25 E Frontage Road

The I-25 E Frontage Road runs along the east side of I-25, following the interstate's curvature, about 30 feet away from the I-25 mainline for most of its length (edge-of-pavement to edge-of-pavement). It is a two-lane road and intersects with many county roads, including WCR 34, WCR 38, WCR 40, and WCR 44. The I-25 East Frontage Road is transitioning to be replaced by High Plains Boulevard approximately 0.5 miles east of I-25 for most of its length. The segment of High Plains Blvd between WCR 32 and WCR 36 is currently under construction and is expected to be completed by 2026. The current frontage road will transition to a private property/utility access road and traffic using the current frontage road will transition over to High Plains Blvd.

Existing Intersections

Traffic operations for existing and 2050 No Action conditions, including I-25 ramp terminal intersections, frontage road intersections, and adjacent cross street intersections, were evaluated for this Phase I Technical Memorandum. These intersection locations shown in **Figure 2**, represented by ID# 1–4 and 7–12. In addition to these intersections, the complete SLS will include analysis of the proposed ramp terminals on WCR 38, represented by ID# 5–6 in the figure.

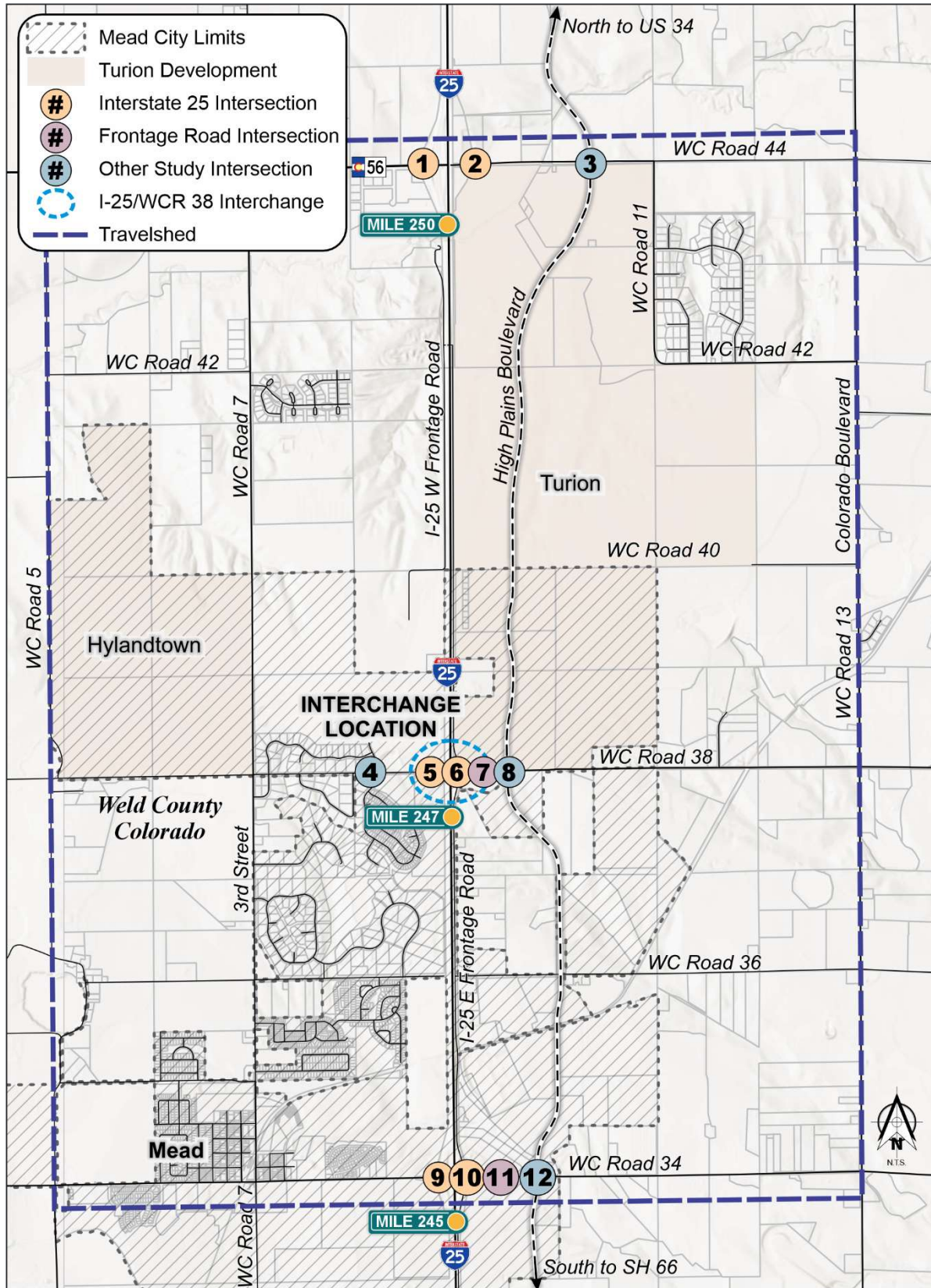


Figure 2. Study Area Intersection Locations

Existing (2024) Traffic Volumes

Data Collection

Traffic data was collected during the three-day period of April 30–May 2, 2024 (Tuesday–Thursday). The data included turning-movement counts at the six existing intersections within the study area (SH 56/I-25 SB Ramps, SH 56/I-25 NB Ramps, WCR 38/Margil Rd, WCR 38/I-25 Frontage Road, WCR 34/I-25 SB Ramps, WCR 34/I-25 NB Ramps) for the periods of 6:00–9:00 a.m. and 3:00–6:00 p.m., daily traffic counts on mainline I-25 at three locations (south of WCR 34, between WCR 34 and CO 56, and north of CO 56), daily traffic counts on the eight interchange ramps within the study area, and eight additional daily traffic counts spread across CO 56, WCR 44, WCR 38, I-25 Frontage Road, and WCR 34. It is important to note that the data collection was completed prior to the initiation of the I-25 Segment 5 construction project by CDOT that began in 2024 with expected completion in 2028.

The data revealed that the overall traffic peaks for the intersections within the study area occurred on Tuesday 7:00–8:00 a.m. and Thursday 4:30–5:30 p.m., and the overall peaks for mainline I-25 occurred on Wednesday 6:30 – 7:30 p.m., and Thursday 3:15–4:15 p.m. These peak periods were used for the analysis of existing conditions described herein.

Existing Mead to Berthoud I-25 Travelshed Traffic Volumes

Existing (April 2024) daily and peak hour traffic volumes for travelshed routes are shown in **Figure 3**, **Figure 4**, and **Figure 5** on the following pages.

The collected data indicates that the percentage of heavy vehicles on NB I-25 is approximately 14% in the AM peak hour and 8% in the PM peak hour, and on SB I-25 is approximately 9% in the AM and PM peak hours.

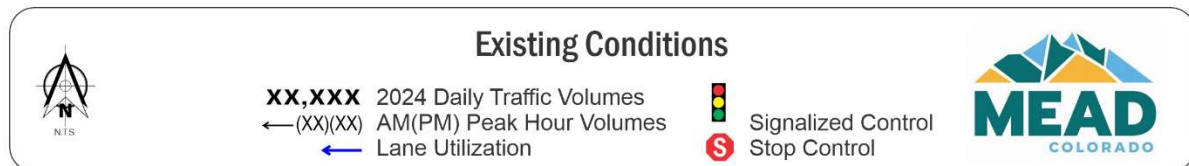
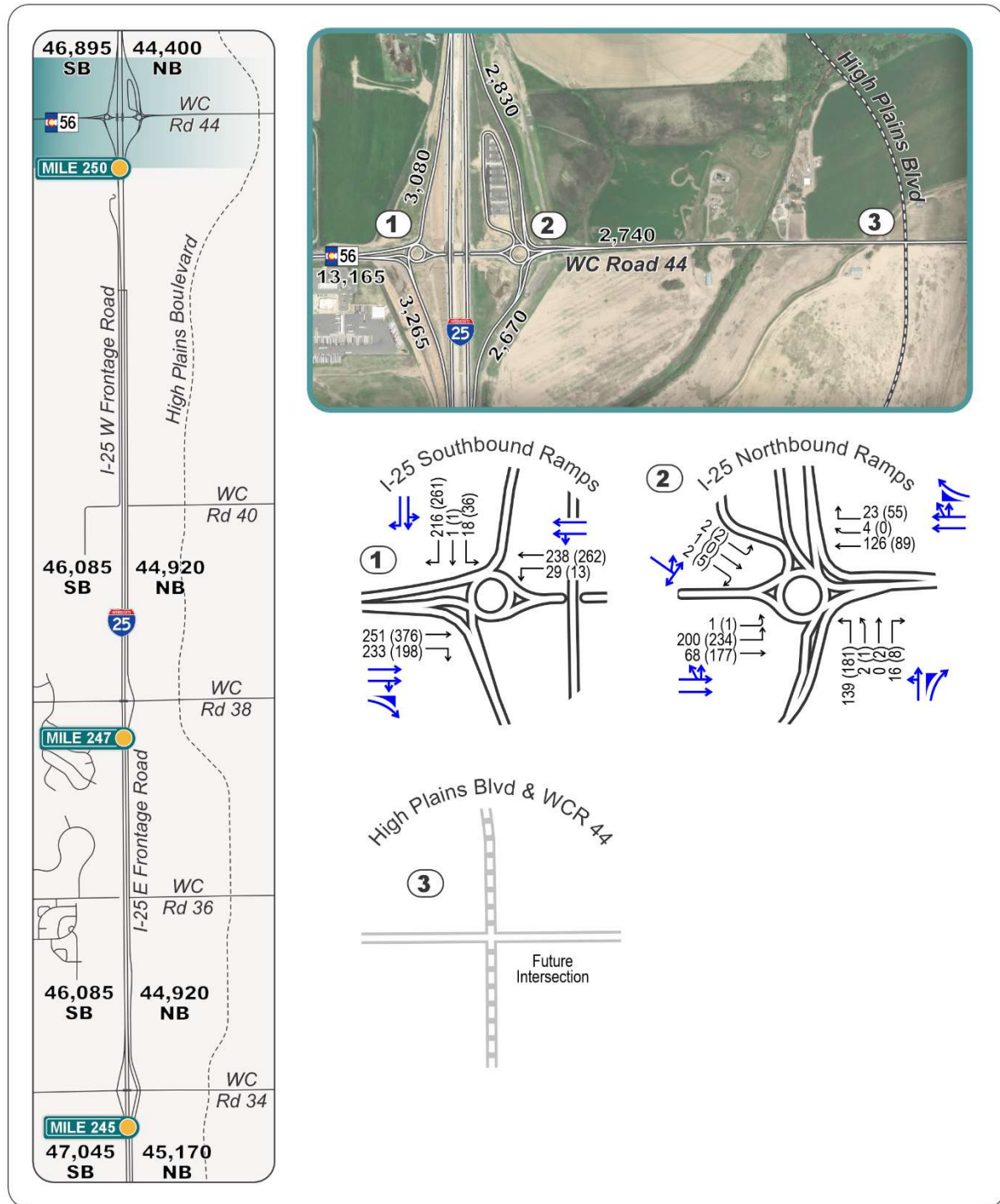


Figure 3. Existing Traffic Volumes – CO 56 / WCR 44

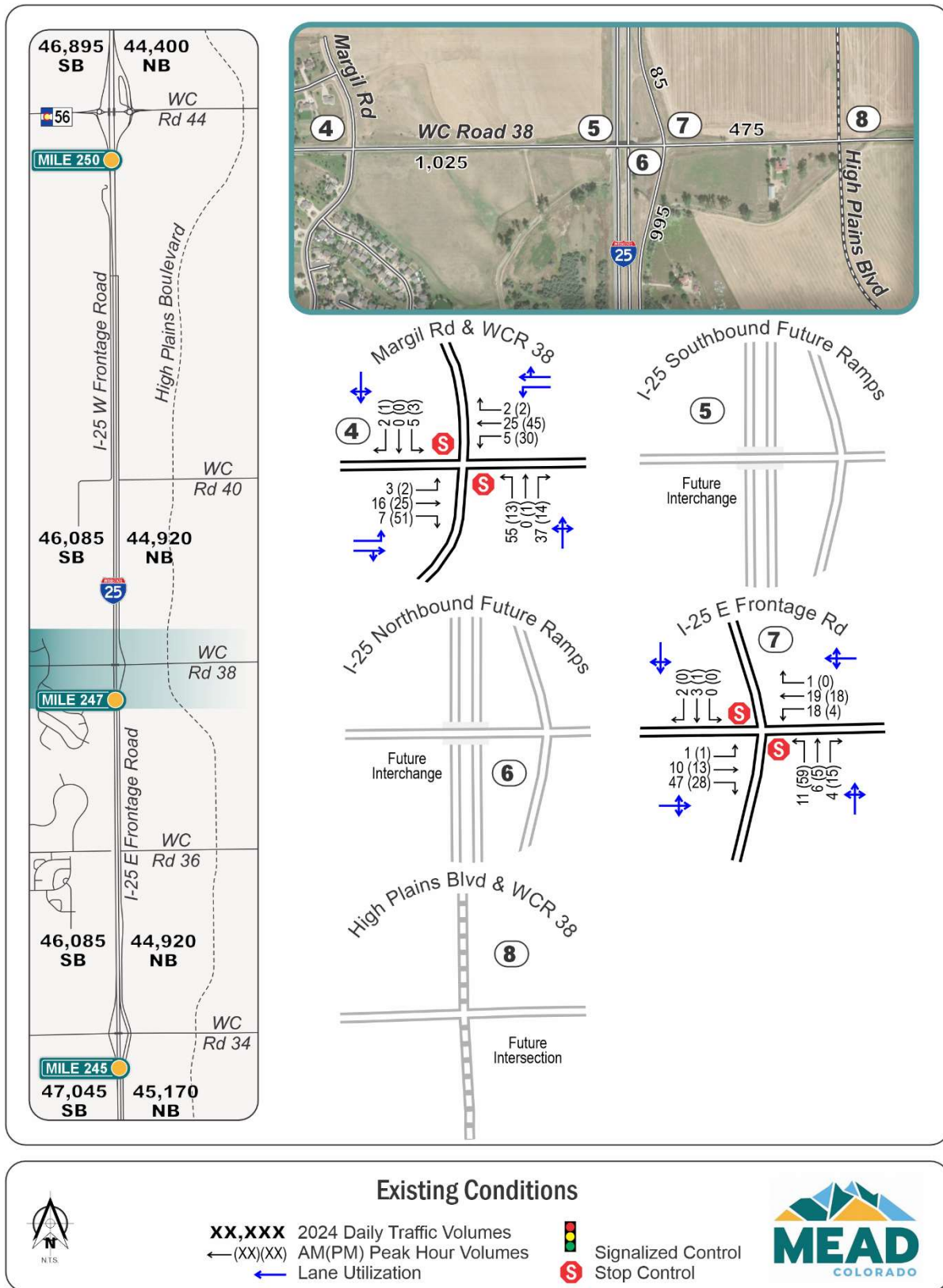


Figure 4. Existing Traffic Volumes – WCR 38

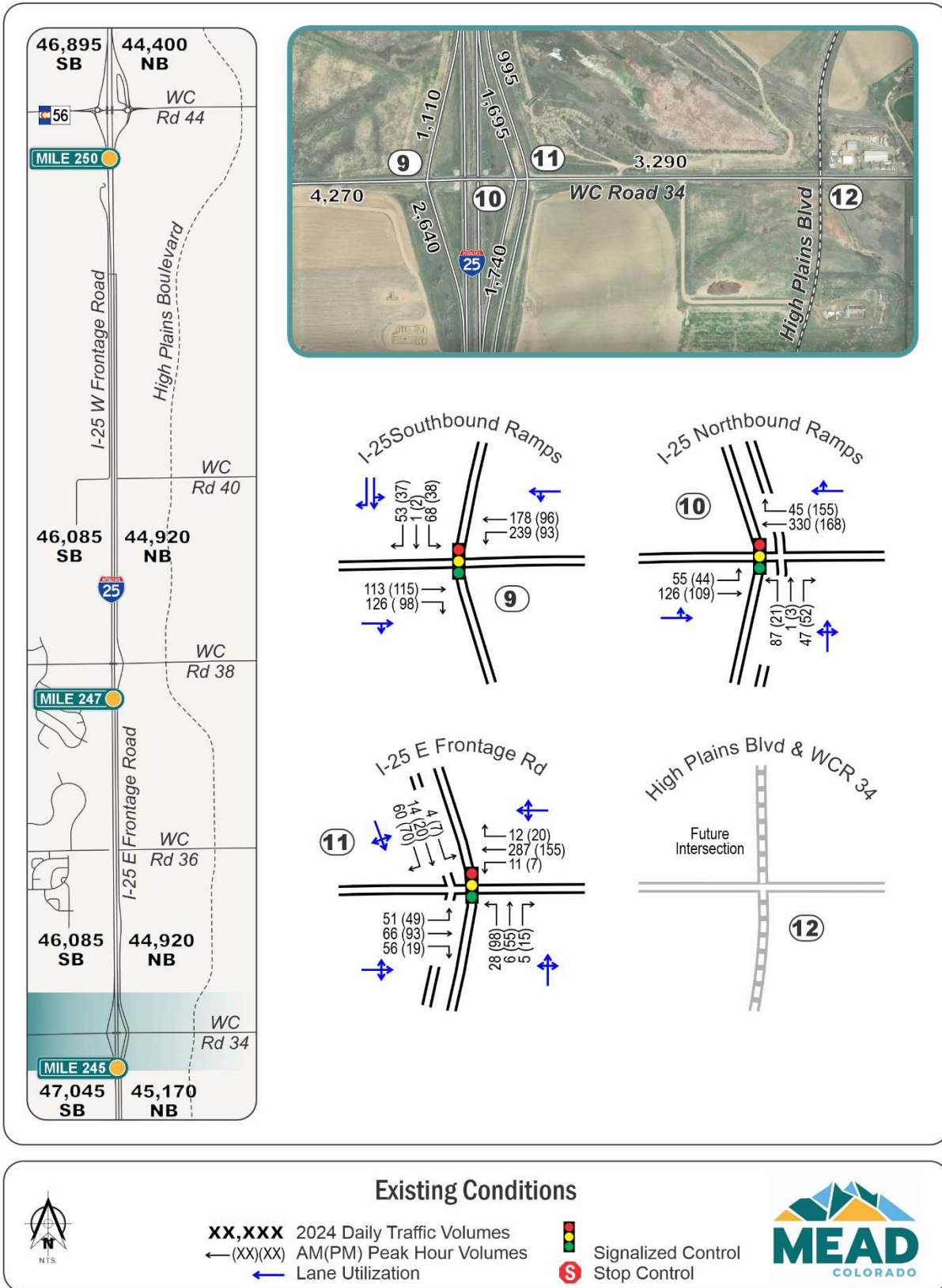


Figure 5. Existing Traffic Volumes – WCR 34

Existing Land Uses

Existing land use within the travelshed can best be described as transitional. There are areas of low density, residential lots, and greenfield ranch land that are being redeveloped into suburban character uses in the Town of Mead and in the Town of Berthoud in accordance with the comprehensive plans for each of these authorities. **Figure 6** shows a Google Earth aerial image (2025) of the Mead to Berthoud I-25 travelshed. As shown, predominant existing land uses within the travelshed include scattered low-density residential subdivisions, greenfield ranchland, and emerging suburban residential and mixed industrial uses.

Existing Multimodal Facilities

The transitional land use within the travelshed, including the area immediately adjacent to the I-25 corridor is predominately rural. A mobility hub/park-and-ride facility was recently built as part of interchange reconstruction at CO 56/WCR 44. This interchange and the new interchange under construction at WCR 34 were designed to accommodate future bicycle and pedestrian crossing accommodations. These facilities will be phased in at these interchanges and throughout the travelshed as development occurs and as demand develops for expanded multimodal accommodations.

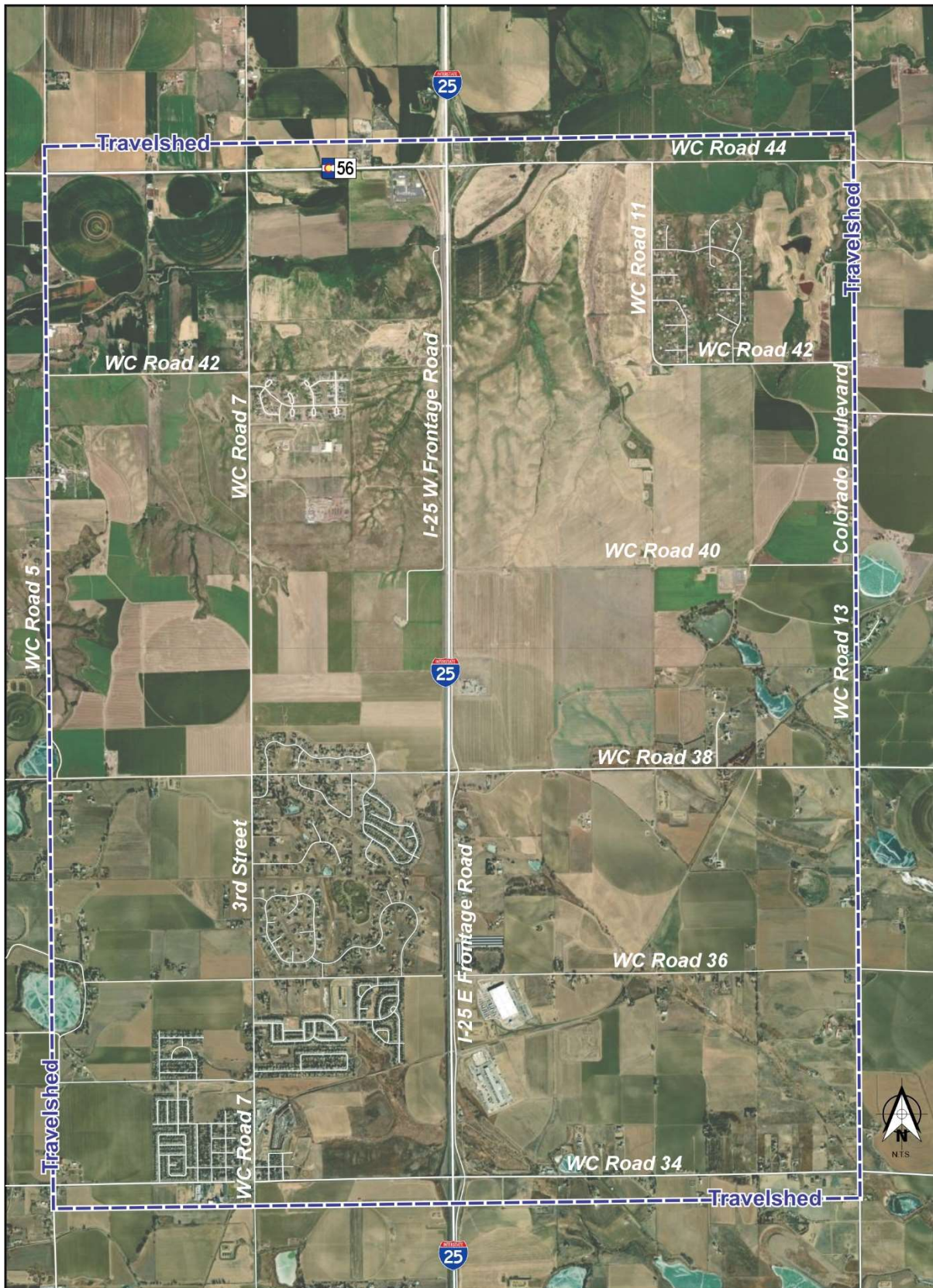


Figure 6. Existing Aerial Image of the Mead to Berthoud I-25 Corridor

Existing (2024) Conditions Traffic Operations Analysis

Methodology

Highway Capacity Software (HCS) version 2023 was chosen as the primary traffic operations analysis tool for this project, as previously identified in the *I-25/WCR 38 Interchange Traffic Analysis Methodology and Assumptions Technical Memorandum*, dated May 16, 2024. The existing conditions of the I-25/WCR 34 NB Ramps intersection were evaluated using Synchro and analyzed with the software's built-in HCM2000 methodology, as the more recent versions of the HCM are limited to analyzing intersections with more than four approaches.

The traffic operations analysis was conducted using the procedures and methodologies contained in the Transportation Research Board's *Highway Capacity Manual Seventh Edition* (HCM7, Transportation Research Board 2022) for signalized and unsignalized (two-way STOP-controlled (TWSC) and roundabout intersections, as well as for freeway facilities.

To measure and describe the operational performance of the roadway network and corresponding intersections, transportation engineers and planners commonly use the level of service (LOS) grading system. LOS is a description of the operation of a roadway segment or intersection, ranging from a LOS A (indicating free-flow traffic conditions with little or no delay) to a LOS F (representing oversaturated conditions where traffic flows exceed design capacity, resulting in long vehicle queues and delays).

Signalized Intersections

At signalized intersections, the operational analysis uses intersection characteristics (such as traffic volumes, lane geometry, and signal phasing) to calculate vehicle delay. For signalized intersections, the HCM defines the LOS as the average delay per vehicle for the overall intersection.

Unsignalized Intersections

For unsignalized intersections, operations are defined by the average control delay per vehicle (measured in seconds) for each STOP-controlled movement. The method incorporates delay associated with deceleration, acceleration, stopping, and moving up in the queue. For side street STOP-controlled intersections, LOS is reported for the approach with the highest average delay/vehicle.

Freeway Facilities

For freeway facilities, operations are defined by vehicle density (measured in passenger cars/mile/lane) for each type of segment within the freeway facility (basic, diverging, merging, weaving). The LOS for the freeway facility as a whole is based on the weighted average density for all segments within the study limits. The LOS thresholds for the overall freeway facility distinguish between urban and rural areas, with a rural designation being used for this project. A distinction between urban and rural is not made at the individual segment level.

Table 1 summarizes the relationship between delay and LOS for signalized intersections, unsignalized intersections, freeway facilities, and individual freeway components.

Table 1. HCM LOS Thresholds

LOS	Description	Signalized Intersections: Control Delay (sec/veh)	Unsignalized Intersections: Control Delay (sec/veh)	Rural Freeway Facility: Density (pc/mi/ln)	Basic Freeway Segment: Density (pc/mi/ln)	Freeway Merge & Diverge Segments: Density (pc/mi/ln)
A	Free Flow Traffic	≤10	≤10	≤6	≤11	≤ 10
B	Steady Traffic	>10 - 20	>10 - 15	>6 - 14	>11 - 18	> 10 - 20
C	Steady Traffic but Limited	>20 - 35	>15 - 25	>14 - 22	>18 - 26	> 20 - 28
D	Steady Traffic at High Density	>35 - 55	>25 - 35	>22 - 29	>26 - 35	> 28 - 35
E	Traffic at Saturation	>55 - 80	>35 - 50	>29 - 39	>35 - 45	> 35
F	Congestion/Overcapacity	> 80 or v/c > 1.0	> 50 or v/c > 1.0	> 39 or v/c > 1.0	> 45 or v/c > 1.0	v/c > 1.0

2024 Existing Conditions

Table 2 shows the existing levels of service for the existing intersections within the study area. As shown in the table, all intersections are reported to currently be operating at LOS C or better.

Table 2. Existing Intersection Levels of Service

Intersection		Control	LOS/Delay [in seconds/vehicle] (Critical Movement)	
ID #	Location		AM	PM
1	CO 56 / I-25 SB Ramps	Roundabout	A / 3.6	A / 3.9
2	CO 56 / I-25 NB Ramps	Roundabout	A / 4.4	A / 4.9
4	WCR 38 / Margil Rd	TWSC	A / 9.1 (NB)	A / 9.5 (SB)
7	WCR 38 / I-25 Frontage Rd	TWSC	A / 9.5 (NB)	B / 10.5 (SB)
9	WCR 34 / I-25 SB Ramps	Signal	A / 7.8	A / 9.2
10	WCR 34 / I-25 NB Ramps	Signal	B / 19.3	C / 25.0

Table 3 summarizes the overall average density and LOS, as well as space mean speed, for the I-25 corridor within the study area. North of CO 56, I-25 was modeled as three lanes in each direction as recently reconstructed. The inside lanes were not modeled as managed lanes because planned tolls had not yet been implemented and the prohibition of crossing the double white stripes was not being enforced at the time of the data collection.

Table 3. Existing I-25 Corridor Operations

Direction	Time Period	Average Density pc/mi/ln	LOS	Space Mean Speed mi/hr
Northbound	AM	24.1	D	63.5
	PM	23.0	D	66.9
Southbound	AM	24.4	D	62.6
	PM	21.8	C	64.7

Table 4 displays a summary of the disaggregated results by segment type including average density, LOS, and space mean speed. The individual segments of NB I-25 are reported to operate at LOS D to B (south to north) in both the AM and PM peak hours. The individual segments of SB I-25 are reported to operate at LOS C to E (north to south) in the AM peak hour and LOS C to D (north to south) in the PM peak hour. For a more detailed review of each segment, refer to the attached HCS reports.

Table 4: Existing (2024) I-25 Segment Type Operations

Northbound						
			AM		PM	
Type	Facility Type	HCS Segment Name	Density (pc/ln/mi)	LOS	Density (pc/ln/mi)	LOS
Basic	Freeway	I-25 South of WCR 34	27.3	D	24.5	C
Diverge	Freeway	I-25 at Off-Ramp to WCR 34	28.8	D	26.5	D
	Ramp		32.1		29.7	
Basic	Freeway	I-25 Between WCR 34 Ramps	25.6	C	23.7	C
Merge	Freeway	I-25 at On-Ramp from WCR 34	29.6	D	28.6	C
	Ramp		28.6		27.8	
Basic	Freeway	I-25 Between WCR 34 and CO 56	26.9	D	25.9	C
Diverge	Freeway	I-25 at Off-Ramp to CO 56	28.5	D	27.8	D
	Ramp		31.7		30.9	
Basic	Freeway	I-25 Between CO 56 Ramps	15.6	B	15.1	B
Merge	Freeway	I-25 at On-Ramp from CO 56	18.5	B	18.2	B
	Ramp		18.4		18.3	
Basic	Freeway	I-25 North of CO 56	16.9	B	16.6	B
Southbound						
			AM		PM	
Type	Facility Type	HCS Segment Name	Density (pc/ln/mi)	LOS	Density (pc/ln/mi)	LOS
Basic	Freeway	I-25 North of CO 56	19.3	C	18.3	C
Diverge	Freeway	I-25 at Off-Ramp to CO 56	20.6	C	19.7	C
	Ramp		24.6		23.7	
Basic	Freeway	I-25 Between CO 56 Ramps	18.0	B	16.6	B
Merge	Freeway	I-25 at On-Ramp from CO 56	21.3	C	19.6	B
	Ramp		21.0		19.3	
Basic	Freeway	I-25 Between WCR 34 and CO 56 (3 lanes)	17.7	B	16.3	B
Basic	Freeway	I-25 Between WCR 34 and SH 56 (2 lanes)	34.4	D	30.0	D
Diverge	Freeway	I-25 at Off-Ramp to WCR 34	33.1	E	30.5	D
	Ramp		36.8		34.0	
Basic	Freeway	I-25 Between WCR 34 Ramps	32.4	D	29.0	D
Merge	Freeway	I-25 at On-Ramp from WCR 34	40.9	E	34.1	D
	Ramp		35.2		31.7	
Basic	Freeway	I-25 South of WCR 34	38.9	E	31.7	D

Existing Conditions Safety Analysis

Crash History

Crash data over three-to-five-year periods were collected using Vision Zero Suite. The locations within the study area include mainline I-25, the ramps to/from I-25, WCR 38 between Margil Road and the I-25 Frontage Road, and the intersections within the study area. For mainline I-25, crash data for the period from January 1, 2021, to December 31, 2023, was collected to avoid the impacts of the COVID pandemic. For the CO 56 interchange, crash data for the period from January 1, 2016, to December 31, 2020, was collected to avoid the impacts of the construction that has recently occurred in the vicinity of the interchange. For the WCR 34 interchange, crash data from January 1, 2018, to December 31, 2022, was collected, as the ramp terminal intersections were signalized at some point during 2023. For WCR 38, crash data from the most recent available period from January 1, 2019, to December 31, 2023, was collected.

A review of the historical crash data shows that over the time periods analyzed for each individual component there were a total of 564 crashes within the study area. Of this total, 184 crashes resulted in injuries and 2 resulted in fatalities. **Table 5** summarizes the number of crashes that took place throughout the project area, broken down by severity, including property damage only (PDO), injuries (INJ), and fatalities (FAT) categories.

Table 5. Study Area Crashes by Severity

Location	Facility Type	Time Period	Crash Severity			
			PDO	INJ	FATAL	TOTAL
I-25 Mainline (MP 244.75-250.5)	Segment	2021-2023	327	157	2	486
WCR 34 & I-25 SB Ramps	Intersection	2018-2022	4	2	0	6
WCR 34 & I-25 NB Ramps/ Frontage Road	Intersection	2018-2022	18	7	0	25
WCR 34 NB Off Ramp	Segment	2018-2022	0	0	0	0
WCR 34 NB On Ramp	Segment	2018-2022	0	0	0	0
WCR 34 SB Off Ramp	Segment	2018-2022	0	1	0	1
WCR 34 SB On Ramp	Segment	2018-2022	0	1	0	1
WCR 38 & Margil Rd	Intersection	2019-2023	0	0	0	0
WCR 38 & I-25 Frontage Road	Intersection	2019-2023	3	2	0	5
WCR 38	Segment	2019-2023	4	0	0	4
CO 56 & I-25 SB Ramps	Intersection	2016-2020	5	3	0	8
CO 56 & I-25 NB Ramps	Intersection	2016-2020	4	3	0	7
CO 56 & I-25 Frontage Road (no longer exists)	Intersection	2016-2020	10	8	0	18
CO 56 NB Off Ramp	Segment	2016-2020	1	0	0	1
CO 56 NB On Ramp	Segment	2016-2020	0	0	0	0
CO 56 SB Off Ramp	Segment	2016-2020	0	0	0	0
CO 56 SB On Ramp	Segment	2016-2020	2	0	0	2
Total			378	184	2	564

Safety Assessment

The existing safety performance of a roadway facility is determined based on Safety Performance Function (SPF) models, which reflect the relationship between vehicle exposure measured in Average Annual Daily Traffic (AADT) and crash counts. The SPFs estimate the expected frequency and severity of crashes at study locations based on the performance of similar facilities within Colorado. The SPF outputs are then used to determine the Level of Service of Safety (LOSS) at study locations; LOSS characterizes roadway facilities into four categories that describe the potential for crash reduction:

- **LOSS I** – Indicates low potential for crash reduction
- **LOSS II** – Indicates low to moderate potential for crash reduction
- **LOSS III** – Indicates moderate to high potential for crash reduction
- **LOSS IV** – Indicates high potential for crash reduction

LOSS boundaries are calibrated by computing the 20th and 80th percentiles using the Gamma Distribution Probability Density Function.

Given the combined recent, ongoing, and planned roadway and traffic control changes within the study area including the widening of I-25 (recently completed north of the CO 56 interchange and ongoing to the south), the recent reconstruction of the CO 56 interchange and conversion of the ramp terminals from TWSC to roundabouts, and the recent signalization of the ramp terminals at the WCR 34 interchange and their planned reconstruction as roundabouts the analysis of the majority of the historical crash data within the study area is likely not relevant because these projects have or will profoundly impact the safety performance of the transportation system within the study area. Therefore, while a qualitative summary of the data is provided herein, the crash data was not analyzed to determine LOSS, other than for mainline I-25 and WCR 38.

I-25 Mainline

The vast majority of the crashes within the study area occurred on mainline I-25, representing 86% of all crashes and both of the fatal crashes. The recorded locations of the crashes are shown in the straight-line diagram in **Figure 7**.

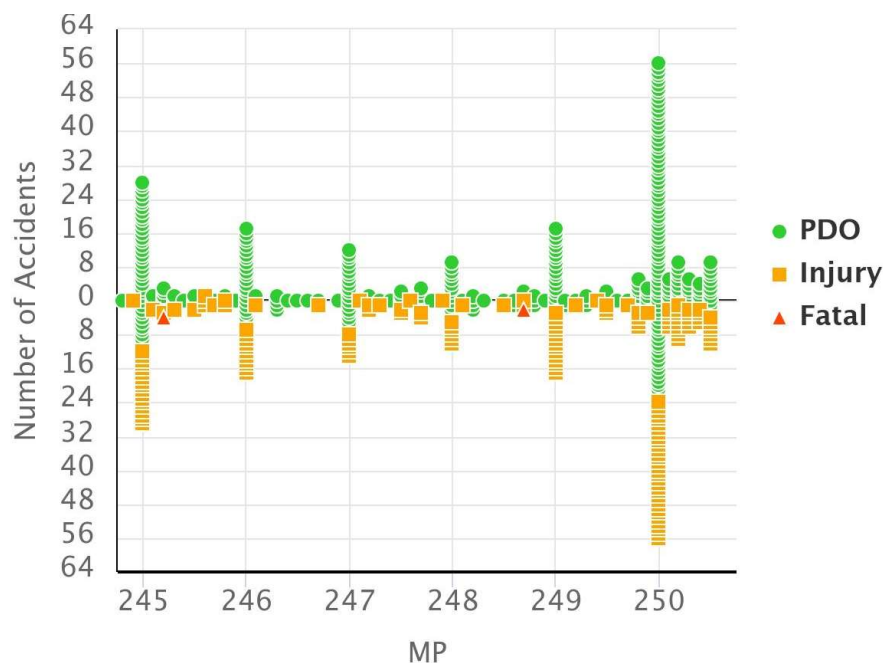


Figure 7. I-25 Mainline Crashes by Milepoint

As shown in **Figure 8**, 64.6% of the crashes on mainline I-25 were rear ends, which registers as a crash pattern for Rural Freeways carrying over 40,000 vpd (statewide norm for rear ends is 42.56%) and is likely indicative of the facility operating near capacity.

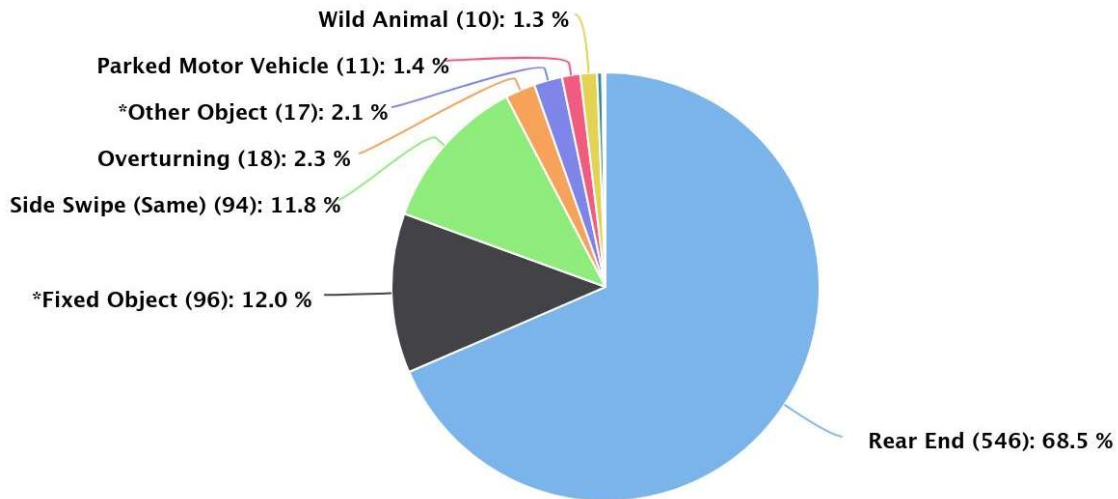


Figure 8. I-25 Mainline Crash Types

The northern portion of I-25 within the study limits was under construction for much of the analysis period. As such, 90 crashes were reported to have occurred within a construction zone, representing 18.5% of the crashes on mainline I-25. Of the construction-related crashes, 82.2% were rear ends. Even if the construction-related crashes are disregarded from the analysis, rear ends still register as a crash pattern within the study area.

The safety performance of mainline I-25 was analyzed based on the CO – Rural Flat and Rolling 4-lane Divided Freeways SPF. As shown in **Figure 9** and in **Figure 10**, I-25 has been operating at LOSS IV for total crashes and LOSS III for severe crashes. However, the ongoing project to widen I-25 and bring it up to current design standards is expected to significantly improve its safety performance.

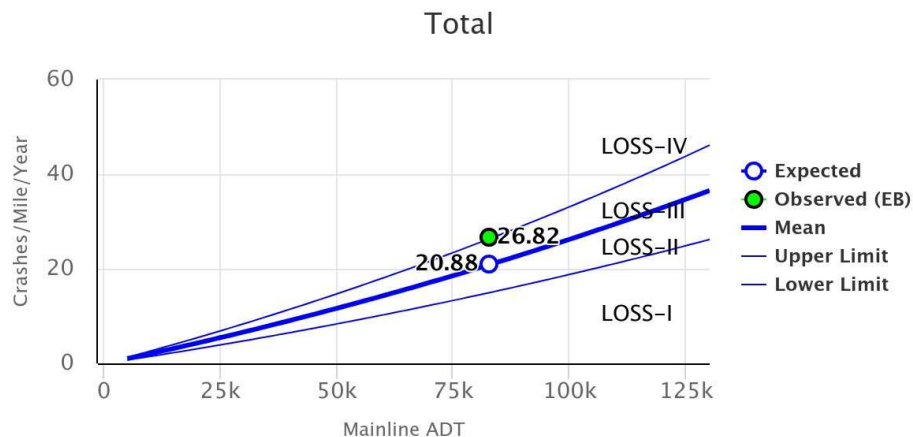


Figure 9. Mainline I-25 LOSS for Total Crashes

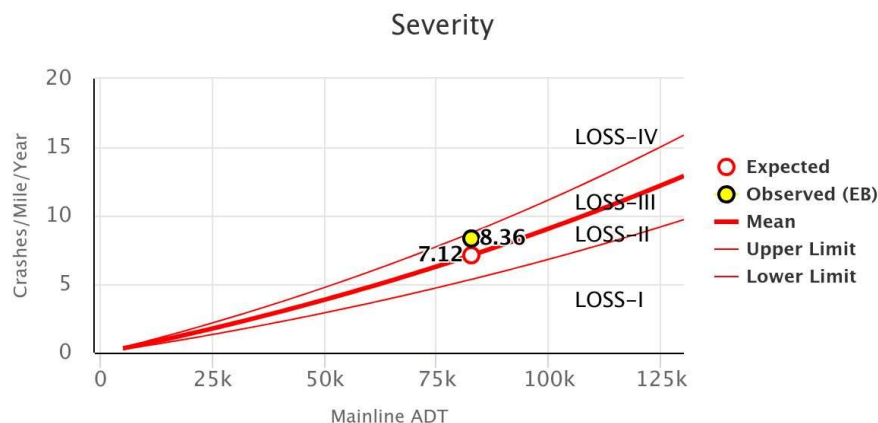


Figure 10. Mainline I-25 LOSS for Severe Crashes

WCR 34 Interchange

During the period of 2018–2022 and as STOP-controlled intersections, the SB ramp terminal experienced an average of approximately one crash per year, and the NB ramp terminal experienced an average of five crashes per year. The higher crash total at the NB ramp terminal can likely be attributed to the close frontage road intersection's close proximity to the ramp terminal. The recent signalization of the ramp terminals has likely improved the safety performance of these intersections and the planned reconstruction of the intersections as roundabouts will likely further improve the safety performance. The four ramps at the WCR 34 interchange experienced a combined total of two crashes during the period 2018–2022, indicating there are no obvious safety concerns related to the ramps.

WCR 38/I-25 Frontage Road

WCR 38/I-25 Frontage Road is a STOP-controlled intersection. The intersection experienced an average of one crash per year over the period 2019–2023. Two of the crashes resulted in injuries, three were broadsides, and two were rear ends.

The safety performance of the intersection was analyzed based on the CO – Rural 2-lane Undivided Unsignalized 4-Leg Intersections SPF. As shown in **Figure 11** and in **Figure 12**, the intersection operates at a LOSS IV for total and severe crashes, indicating there is a high potential for crash reduction. Although the intersection has experienced an average of only one crash per year, that crash frequency is greater than expected for an intersection that serves such a low volume of traffic.



Figure 11. WCR 38/I-25 Frontage Road LOSS for Total Crashes



Figure 12. WCR 38/I-25 Frontage Road LOSS for Severe Crashes

WCR 38/Margil Road

WCR 38/Margil Road is a STOP-controlled intersection. The intersection did not experience any crashes during the period 2019–2023.

WCR 38

WCR 38 is a two-lane undivided roadway. The roadway segment experienced an average of nearly one non-intersection related crash per year over the period 2019–2023. All of the crashes were PDO, two were sideswipes, and two involved an object.

The safety performance of the 1-mile-long roadway segment was analyzed based on the CO – Rural Flat and Rolling 2-lane Undivided Highways SPF. As shown in **Figure 13** and **Figure 14**, the roadway segment operates at a LOSS IV for total crashes, indicating there is a high potential for crash reduction, although the LOSS II for severe crashes indicates there is a low to moderate potential for severe crash reduction. Although the roadway segment has experienced an average of less than one crash per year, that crash frequency is greater than expected for a road segment that serves such a low volume of traffic.

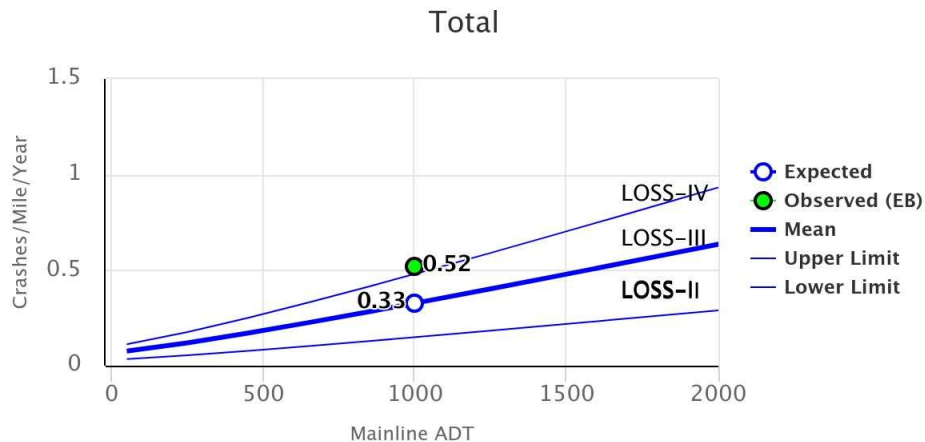


Figure 13. WCR 38 LOSS for Total Crashes

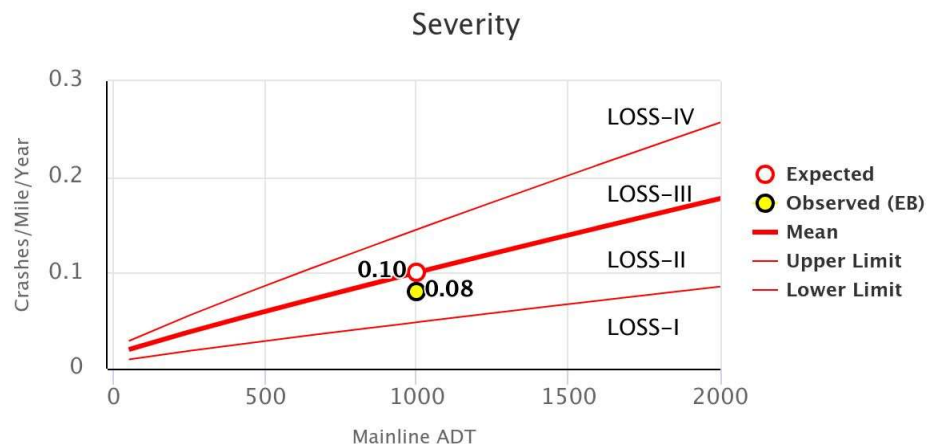


Figure 14. WCR 38 LOSS for Severe Crashes

CO 56 Interchange

During the period 2016–2020 and as STOP-controlled intersections, the SB and NB ramp terminals experienced an average of approximately 1.5 crashes per year. The recent reconstruction of the intersections as roundabouts has likely improved their safety performance.

The four ramps at the CO 56 interchange experienced a combined total of three crashes during the period 2016–2020, indicating there are no obvious safety concerns related to the ramps.

Existing Conditions Emergency Response Analysis

The Mead to Berthoud I-25 travelshed is served by two fire stations. One of these fire stations, Mountain View Fire Rescue Station #3, is located to the west of I-25, immediately to the north of WCR 34 on 3rd Street. The second fire station, Front Range Fire Rescue Station #1, is located at 100 Telep Avenue (WCR 15), north of WCR 60 and approximately one mile north of WCR 44/CO 56.

The NFRMP Regional Travel Demand Model was used to evaluate emergency response times from these two fire stations for the NFRMPO Model's 2019 Base Year network. Isochronal maps were created for 2019 scenarios with the WCR 34 bridge over I-25 open and with the bridge temporarily closed, a condition that had occurred in August of 2022. Emergency response times for the PM peak hour with the I-25/WCR 34 interchange and bridge over I-25 open are shown in **Figure 15**. The effect on emergency response times of a temporary closure of the I-25/ WCR 34 interchange bridge is shown in **Figure 16**.

With full access to I-25 at the WCR 34 interchange and bridges over I-25 at WCR 34 and WCR 38 open, response times between 9 and 12 minutes were modeled within the travelshed to both the east and west of the I-25 corridor. Response times of less than 6 minutes were modeled within 1 mile of each fire station, and there was a small pocket with response times between 12 and 15 minutes modeled in the northwest corner of the travelshed, south of CO 56.

With both access to I-25 and crossing of I-25 at WCR 34 and WCR 38 restricted, access to the east side of I-25 from Mountain View Fire Rescue Station #3 is severely impacted. As a result, emergency response times east of I-25 drop precipitously, from 3 to 9 minutes and from 9 to 12 minutes, with primary response from Front Range Fire Rescue Station #1. This is shown in **Figure 16**.

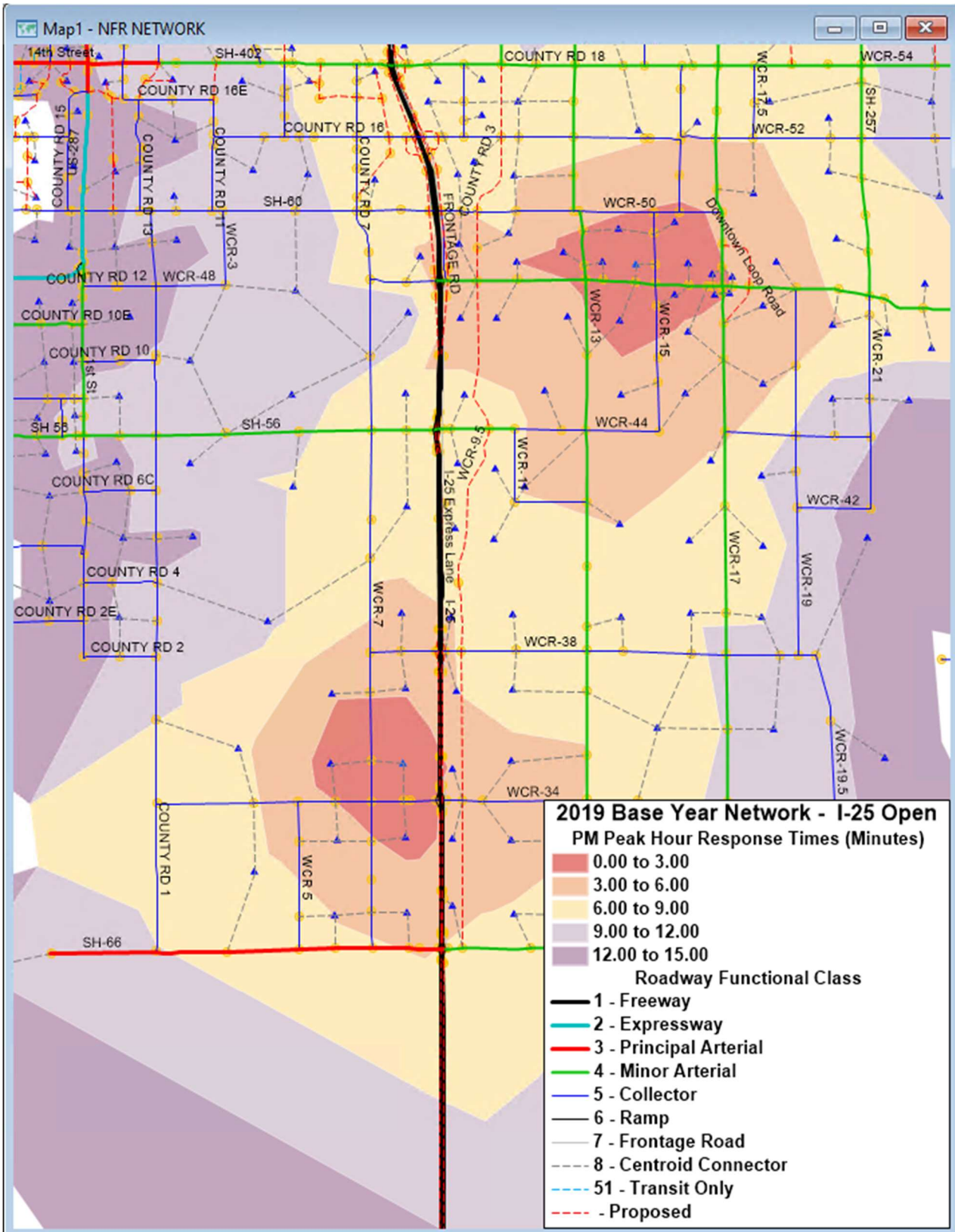


Figure 15. Base Year PM Peak Hour Emergency Response Times – I-25 Access/Crossings Open

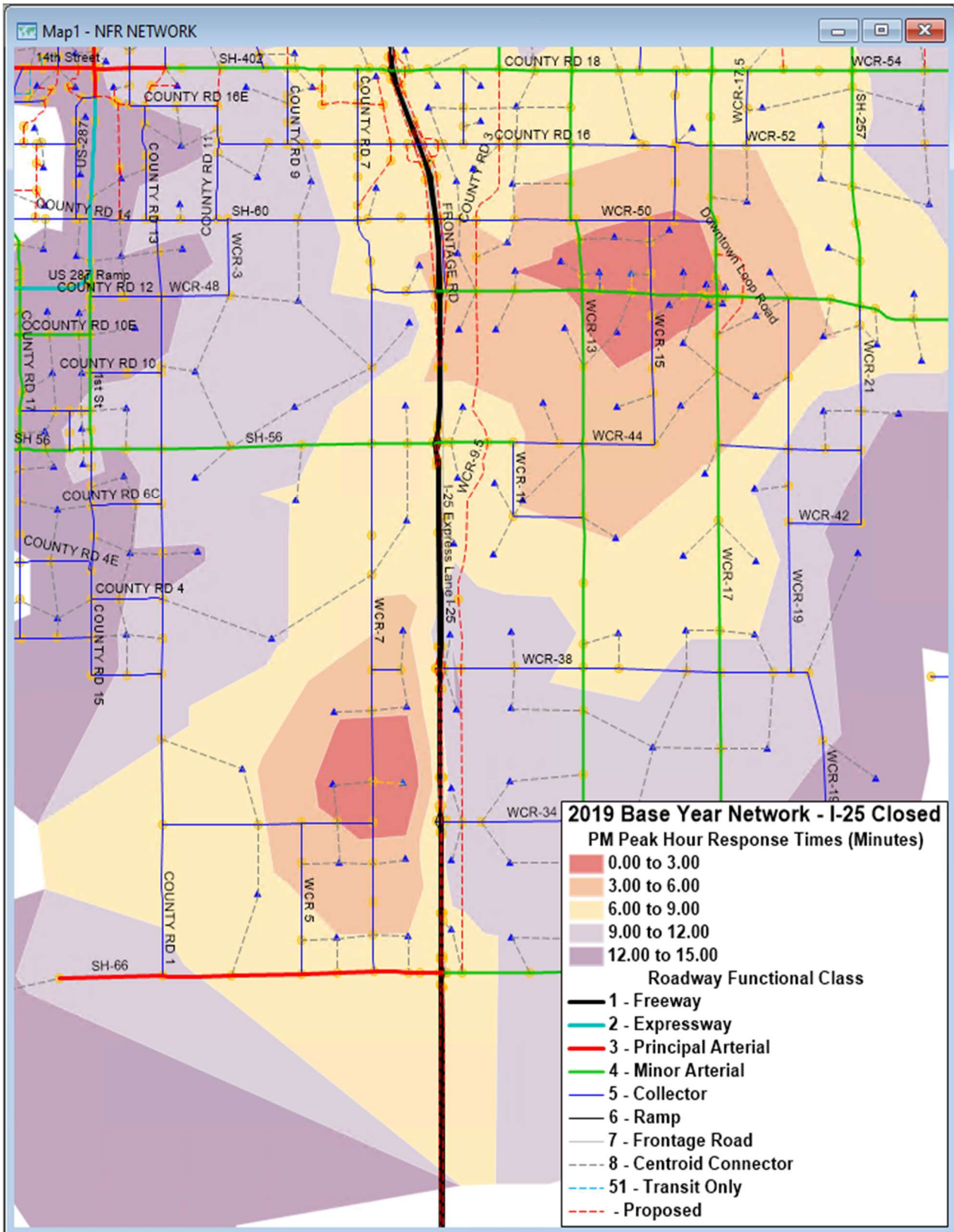


Figure 16. Base Year PM Peak Hour Emergency Response Times – I-25 Access/Crossings Closed

3. 2050 No Action Conditions Analysis

Future Land Uses

Planned Land Uses

The Town of Mead and the Town of Berthoud comprehensive plans identify planned future land uses within the travelshed to include business park, regional commercial, planned industrial mixed use, residential mixed use, and varying density residential uses (multifamily and single family at urban and suburban densities). The Berthoud comprehensive plan also identifies selected areas to be preserved as *innovation zones* and agricultural uses.

Approved/Active Development Plans

There are six new developments planned within the Mead to Berthoud I-25 travelshed that have either been approved or are actively pursuing approvals through the Mead or Berthoud development review processes. Two more are built out and in operation (the FedEx and Home Depot distribution centers). The largest of these are the Turion and Hylandtown developments. These developments, including other residential and mixed-use developments planned within the overall travelshed, are summarized in

Table 6 and shown in **Figure 19**.

Buildout of combined planned developments for the Mead to Berthoud travelshed, that are not fully accounted for by the North Front Range Metropolitan Planning Organization Model (NFRMPO Model) forecasts, will generate over 150,000 daily one-way external trips, including over 12,000 and 15,000 one-way external trips that will occur during the morning and evening peak hours, respectively. The extent and magnitude of planned development has the potential to significantly impact traffic operations using the I-25/WCR 34 and I-25/CO 56 interchanges.

Table 6. Approved/Active Development Plans

Development Name	Total Size	Land Use	Size by Use
Buffalo Highlands	293 Acres	Residential	293 Acres
AMK Annexation	12 Acres	Commercial	12 Acres
Turion Development	2,200 Acres	Residential	1,180 Acres
		Town Center	30 Acres
		Commercial	82 Acres
		Industrial/Office	322 Acres
		Schools	35 Acres
Hylandtown Development	850 Acres	Residential	750 Acres
		Commercial	50 Acres
		Office	50 Acres
Access 25	160 Acres	Commercial	160 Acres
Flying J Truck Stop	11 Acres	Commercial	11 Acres
Home Depot Distribution Center	48 Acres	Industrial/Office	45 Acres
FedEx Distribution Center	40 Acres	Industrial/Office	40 Acres

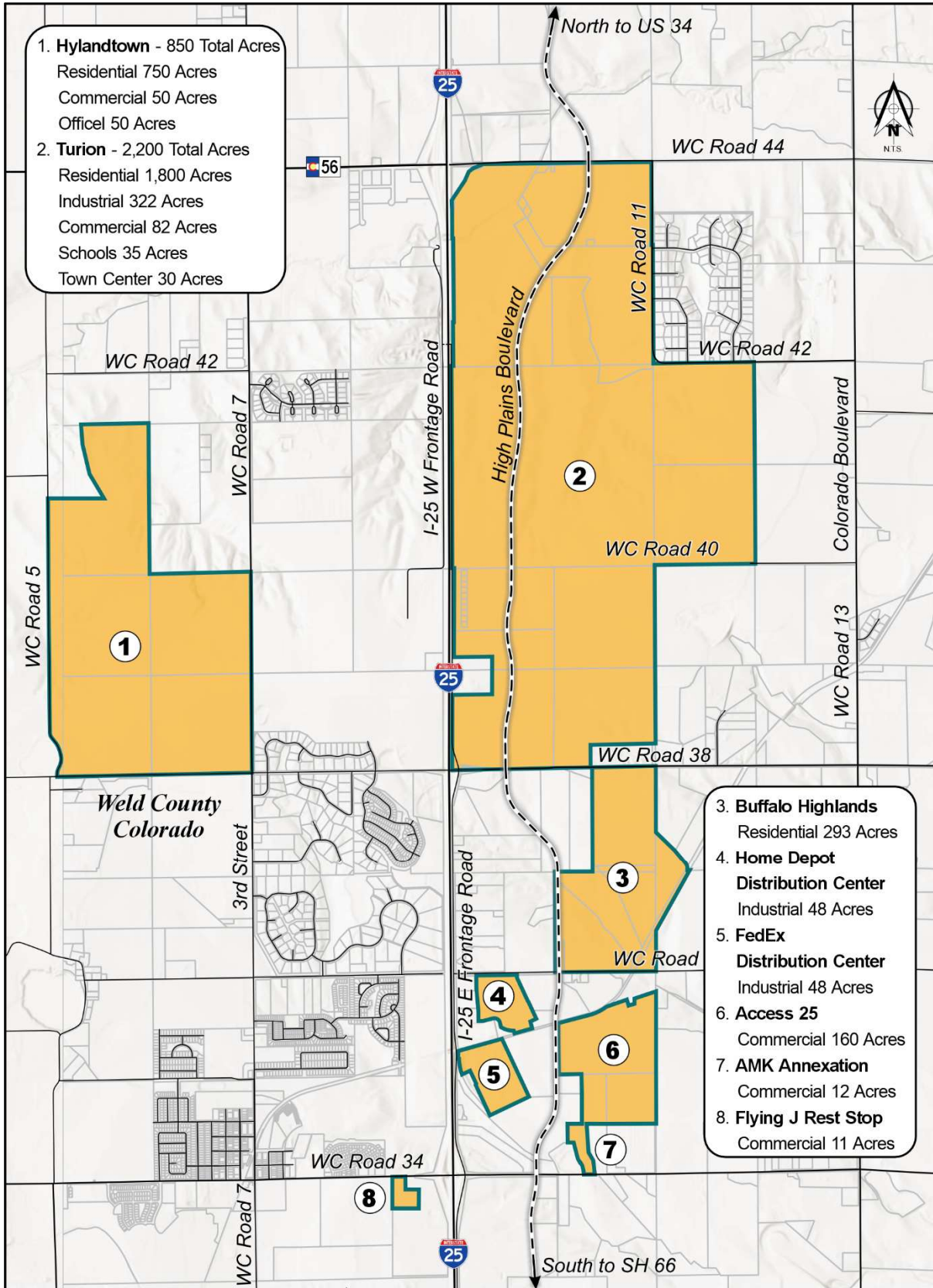


Figure 17. Active Development Plans

Travel Demand Forecasts

The current NFRMPO Model, adopted and released in the summer of 2024, was used as the basis for forecasting future peak hour travel demand within the travelshed. Travel model-based analysis was supplemented to include traffic anticipated to be generated by several large developments that were either adopted or are actively progressing through the Mead or Berthoud development review processes. Available detailed trip generation and phasing information obtained from available, recent traffic impact analysis reports for active major developments planned within the travelshed area were used to forecast development site-generated trips within the travelshed for 2030 and 2050 planning horizons. Peak hour traffic forecasts were prepared for both freeway segments and intersections.

The NFRMPO Model supports the fiscally constrained North Front Range Metropolitan Planning Organization 2050 Regional Transportation Plan (RTP) that sets the region's long-range vision for transportation over the next 20+ years. Adopted on September 7, 2023, the RTP incorporates the 10 federal planning factors into the planning process: 1) economic vitality, 2) safety, 3) security, 4) accessibility and mobility, 5) environment, 6) multimodal connectivity, 7) system management and operations, 8) system preservation, 9) resilience and reliability, and 10) travel and tourism.

The NFRMPO Model was calibrated and validated by the NFRMPO for the base model year of 2019. To support ongoing planning as well as air quality conformity demonstrations, the model includes future year scenarios for 2030, 2040, and 2050. For the full System Level Study for the proposed I-25/WCR 38 interchange, the 2030 NFRMPO Model scenario will be used as the basis for opening year (2030) travel demand forecasts and the NFRMPO Model fiscally constrained 2050 RTP model scenario will be used as the basis for the horizon year (2050) travel demand forecasts.

Modeling Approach and Methodology

The NFRMPO Model installation files were obtained from the NFRMPO and were used to develop travel demand forecasts for the Mead to Berthoud I-25 travelshed area. Full model scenario datasets for the NFRMPO Model 2019 base year and 2050 planning horizon were obtained, as were model outputs produced by NFRMPO in-house model runs for each of these scenarios. The 2030 dataset was also obtained, anticipating its use for the opening year scenario for the Systems Level Study. Full scenarios for NFRMPO Model and the NFRMPO-produced model results (output files) for the three scenarios were obtained to preserve flexibility to apply the model either fully or partially to address a variety of potential demand forecasting and analysis needs.

Model Installation and Testing

The NFRMPO Model (version 6) that was obtained from the NFRMPO was installed in accordance with NFRMPO policy for external user model use. Test runs were completed to confirm model function for the travelshed area. These tests included full runs for the scenarios provided and comparison to provided NFRMPO outputs to ensure consistency of traffic assignment results. Regional model performance within the interchange area was reviewed through comparison to 2019 ground count data for the 2020 model scenario consistent with industry standard "goodness of fit" criteria.

Network Modifications

The NFRMPO Model network within the study area subarea was enhanced to add the interchange in 2030 and 2050, add segments of High Plains Boulevard, and remove segments of the I-25 East Frontage Road for 2030 and 2050 scenarios with the proposed I-25/WCR 38 interchange.

Model Land Use Review

NFRMPO model land use assumptions were reviewed together with land use mix and densities for major active new developments. It was determined that the Turion development is not fully included in the forecast database for the NFRMPO Model. Use of the NFRMPO Model alone to develop traffic forecasts would risk both underestimating development traffic and not capturing trip generation rates for residential, public, and commercial land use types that may be higher than rates used for the NFRMPO Model.

To produce accurate forecasts of total traffic for the 2030 and 2050 analysis scenarios, the NFRMPO model was used to estimate background regional traffic. Detailed land uses and densities were used together with Institute of Transportation Engineers (ITE) trip generation rates to calculate site-generated traffic associated with major development that was determined to not be fully included in the NFRMPO forecasts. Total traffic for each scenario was calculated as background traffic plus site-generated development traffic and distribution. For consistency, site-generated development traffic and distribution from approved traffic studies for the developments and individual development phases were used. These traffic studies are either approved or active in development review approval processes of the Town of Mead and the Town of Berthoud, whichever jurisdiction has authority, processes that include a review by professional traffic staff, as well as a review/comment from CDOT staff.

Model Assignment Adjustments

Raw traffic assignment volumes produced by the model for the 2019 base year, 2030 opening year, and 2050 planning horizon scenarios were adjusted using modeled percent growth and absolute growth in traffic flows between the Base Year 2019, Year 2030, and Year 2050 NFRMPO Model scenarios, together with observed traffic count data for 2019 as validation. Adjustments to the raw assignment volumes to produce adjusted background traffic volumes were made in accordance with industry standard guidanceⁱ.

2050 No Action Traffic Volume Forecasts

The 2050 No Action traffic forecasts assume the following:

- Completion of the I-25 capacity expansion (3 lanes) through the travelshed corridor.
- Reconstruction of the I-25/WCR 34 interchange with roundabouts.
- Completion of the extension of High Plains Boulevard through the Mead to Berthoud I-25 travelshed. The new 4-lane roadway provides additional north-south capacity and its proximity to I-25 and allows High Plains Boulevard to replace the I-25 Frontage road as a reliever/incident management route.
- Widening of CO 56/WCR 44, WCR 38 and WCR 34 to 4-lanes adjacent to I-25 to provide both increased east-west capacity and improved connectivity to High Plains Boulevard.
- The current frontage road will transition to a private property/utility access road and traffic using the current frontage road will transition over to High Plains Blvd.
- Full buildout of major development not already included in the MPO forecasts, including the Turion and Hylandtown developments.

Adjusted 2050 No Action daily and peak hour traffic volumes, including 2050 background traffic and new development site-generated traffic are shown in **Figure 18, Figure 19, and Figure 20** on the following pages.

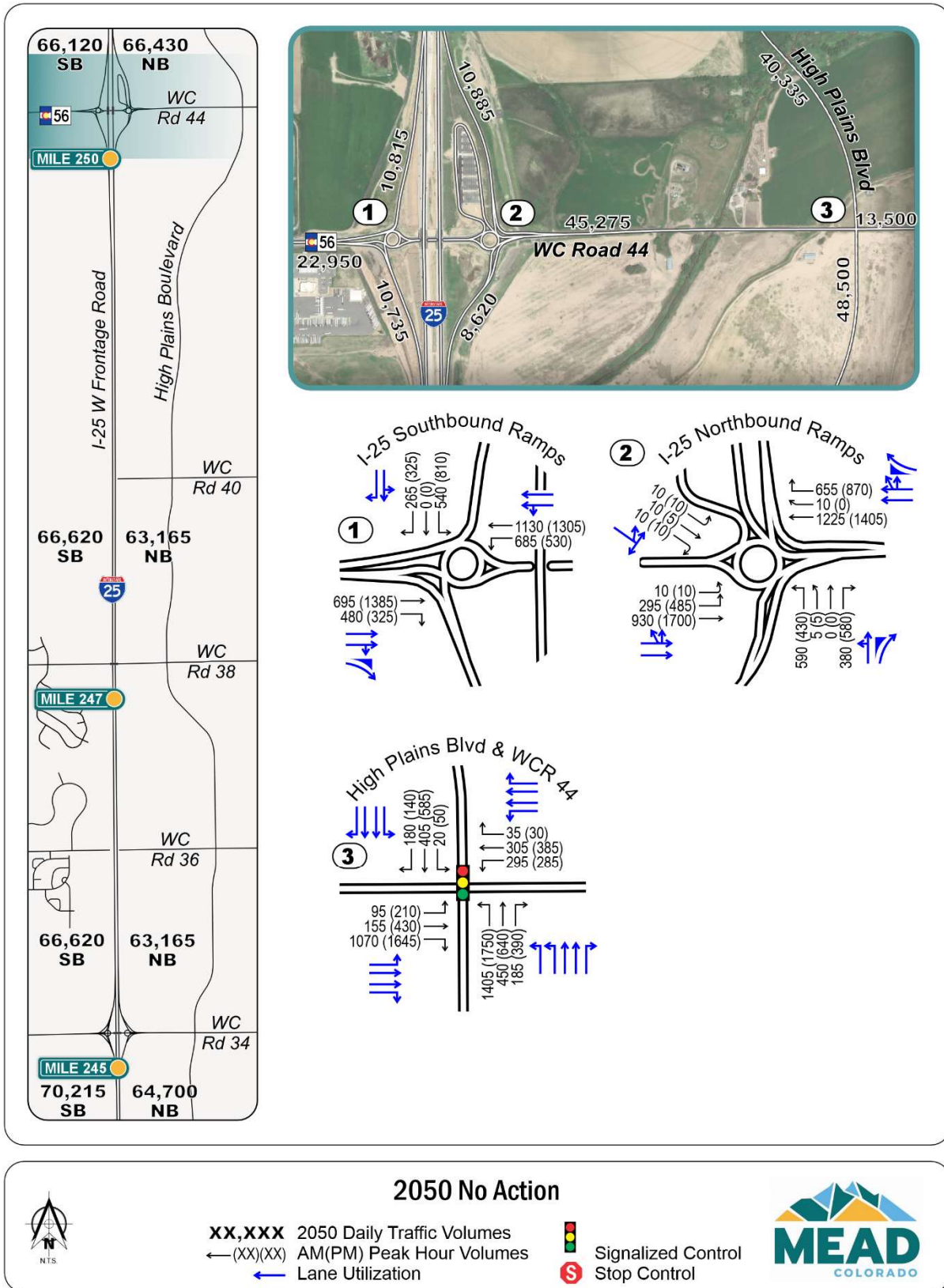


Figure 18. 2050 No Action Traffic Volumes – CO 56/WCR 44

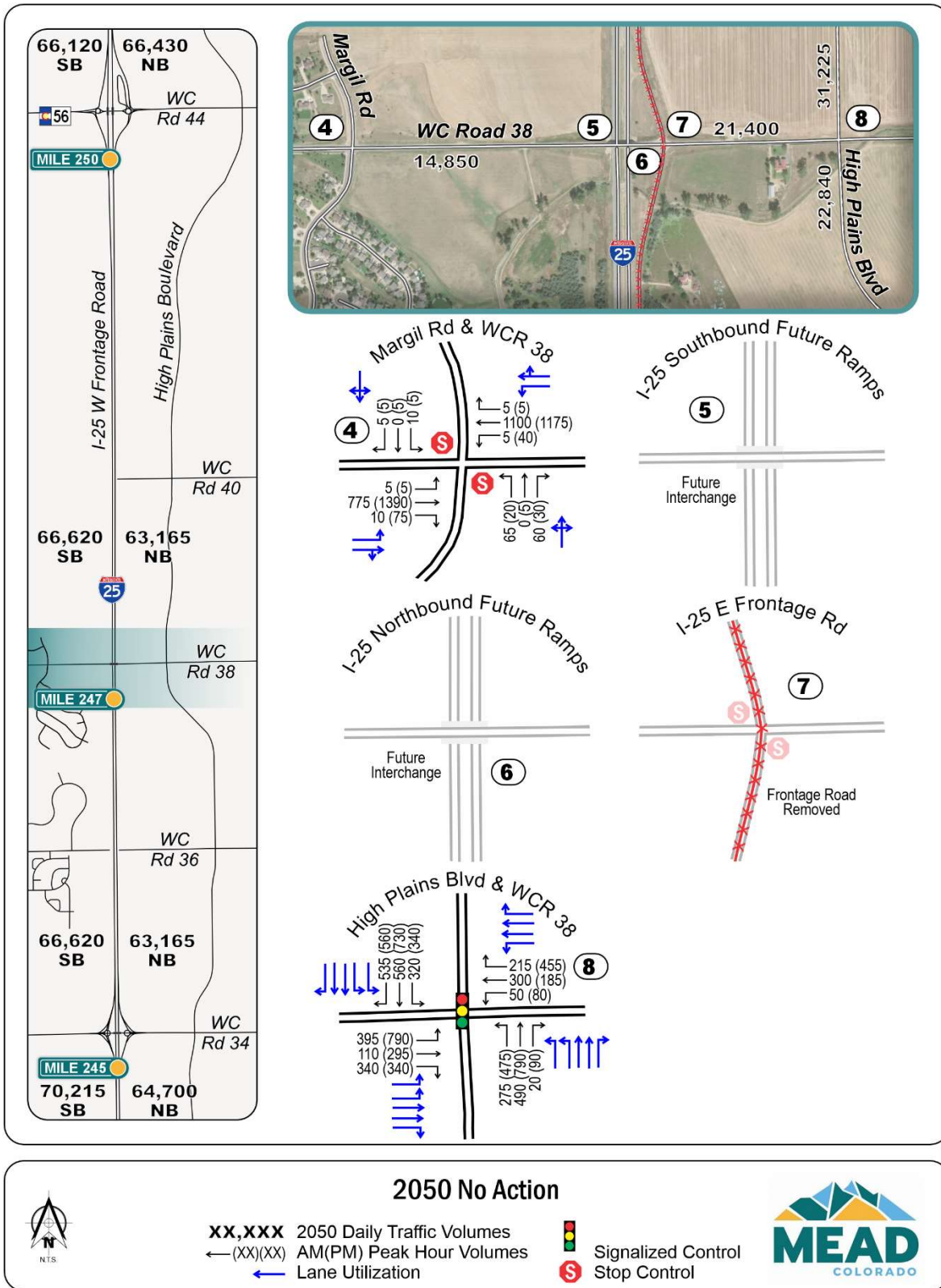


Figure 19. 2050 No Action Traffic Volumes – WCR 38

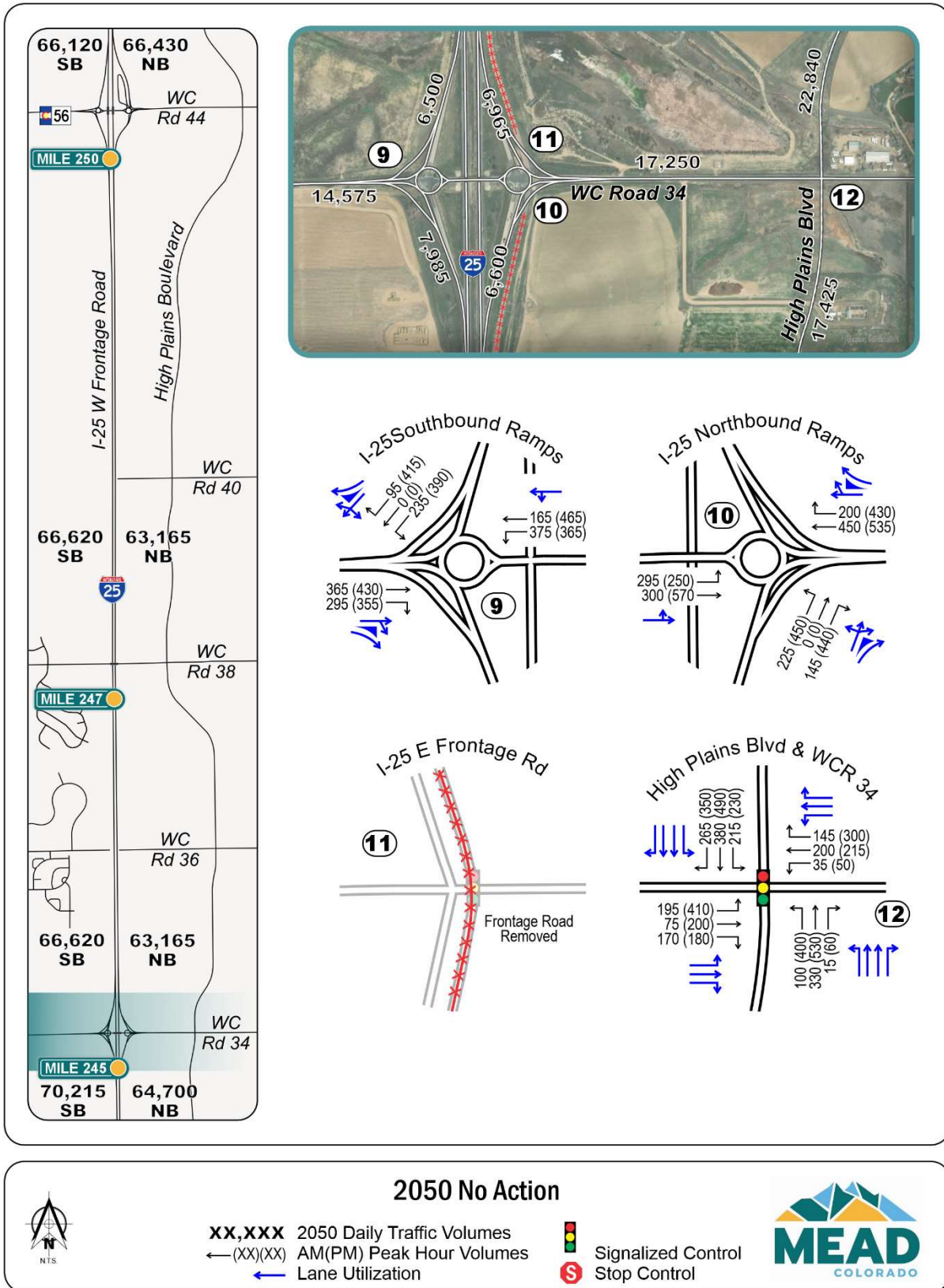


Figure 20. 2050 No Action Traffic Volumes – WCR 34

2050 No Action Conditions Traffic Operations Analysis

Table 7 shows the projected 2050 No Action levels of service for the intersections within the study area. As indicated by the intersection LOS results, the CO 56/WCR 44 corridor is projected to break down operationally in the No Action scenario by the year 2050. Both ramp terminals are projected to operate at LOS F and the identified critical movement at the WCR 44/High Plains Boulevard intersection is projected to operate at LOS F. Additionally, WCR 38/Margil Road is projected to operate at LOS F during the afternoon peak hour as a TWSC intersection, indicating a potential need to signalize it, or otherwise modify it to improve its level of service.

Table 7. 2050 No Action Intersection Levels of Service

Intersection		Control	LOS/Delay [in seconds/vehicle] (*Critical Movement)	
ID #	Location		AM	PM
1	CO 56 / I-25 SB Ramps	Roundabout	F / 130.2 * F / 1221.7 (SBL)	F / 388.3 * F / 1371.9 (SBL)
2	CO 56 / I-25 NB Ramps	Roundabout	F / 67.7 * F / 223.6 (NBL)	F / 167.1 * F / 717.0 (NBL)
3	WCR 44 / High Plains Blvd	Signal	C / 34.0 * F / 87.6 (WBL)	E / 77.1 * F / 201.9 (WBL)
4	WCR 38 / Margil Rd	TWSC	F / 118.8 (NB)	F / 2081.8 (NB)
8	WCR 38 / High Plains Blvd	Signal	C / 21.5	C / 33.0 * E / 68.4 (SBL)
9	WCR 34 / I-25 SB Ramps	Roundabout	A / 8.6	C / 15.5
10	WCR 34 / I-25 NB Ramps	Roundabout	A / 9.4	C / 21.7 * E / 40.0 (WBT)
12	WCR 34 / High Plains Blvd	Signal	B / 14.5	C / 28.9

Table 8 represents a summary of the overall average density and LOS, as well as space mean speed, for the I-25 corridor within the study area for the 2050 No Action conditions. For purposes of this technical memorandum, I-25 was modeled as three lanes in each direction throughout the study area as is currently being reconstructed. However, consistent with the existing conditions analysis, the inside lanes were not modeled as managed lanes for purposes of this technical memorandum. For the full System Level Study, including analysis of I-25/WCR 38 interchange alternative, managed lane details will be included in the analysis to support accurate comparison of future No Action and Build conditions. As shown in **Table 8**, the southbound direction of I-25 is projected to degrade to LOS E during the AM and PM peak hours by the year 2050 regardless of the additional travel lane.

Table 8. 2050 No Action I-25 Corridor Operations

Direction	Time Period	Average Density pc/mi/ln	LOS	Space Mean Speed mi/hr
Northbound	AM	26.5	D	63.7
	PM	25.6	D	64.1
Southbound	AM	33.5	E	58.7
	PM	31.0	E	60.6

Table 9 displays a summary of the disaggregated results by segment type including average density, LOS, and space mean speed. The individual segments of NB I-25 are reported to operate at LOS C to D (south to north) in the AM peak hour and LOS D to D (south to north) in the PM peak hour. Also, the individual segments of SB I-25 are reported to operate at LOS D to E (north to south) in the AM peak hour and LOS E to D (north to south) in the PM peak hour. For a more detailed review of each segment, refer to the attached HCS reports.

Table 9. 2050 No Action I-25 Segment Type Operations

Northbound			AM		PM	
Type	Facility Type	HCS Segment Name	Density (pc/ln/mi)	LOS	Density (pc/ln/mi)	LOS
Basic	Freeway	I-25 South of WCR 34	26.4	D	27.7	D
Diverge	Freeway	I-25 at Off-ramp to WCR 34	26.6	D	28.0	D
	Ramp		30.0		31.6	
Basic	Freeway	I-25 Between WCR 34 ramps	23.5	C	20.8	C
Merge	Freeway	I-25 at On-ramp from WCR 34	28.6	C	27.1	C
	Ramp		27.5		26.9	
Basic	Freeway	I-25 Between WCR 34 and CO 56	27.5	D	25.8	C
Diverge	Freeway	I-25 at Off-ramp to CO 56	28.0	D	26.8	D
	Ramp		31.7		30.9	
Basic	Freeway	I-25 Between CO 56 ramps	20.2	C	18.7	C
Merge	Freeway	I-25 at On-ramp from CO 56	28.5	D	30.0	D
	Ramp		28.6		30.5	
Basic	Freeway	I-25 North of CO 56	27.4	D	28.9	D
Southbound			AM		PM	
Type	Facility Type	HCS Segment Name	Density (pc/ln/mi)	LOS	Density (pc/ln/mi)	LOS
Basic	Freeway	I-25 North of CO 56	30.9	D	34.9	D
Diverge	Freeway	I-25 at Off-ramp to CO 56	30.0	D	32.6	E
	Ramp		33.0		35.3	
Basic	Freeway	I-25 Between CO 56 ramps	24.1	C	24.5	C
Merge	Freeway	I-25 at On-ramp from CO 56	35.2	D	32.5	D
	Ramp		33.4		31.1	
Basic	Freeway	I-25 Between WCR 34 and CO 56	34.7	D	31.9	D
Basic	Freeway	I-25 Between WCR 34 and CO 56	34.7	D	31.9	D
Diverge	Freeway	I-25 at Off-ramp to WCR 34	31.6	D	30.6	D
	Ramp		33.9		33.5	
Basic	Freeway	I-25 Between WCR 34 ramps	31.2	D	24.9	C
Merge	Freeway	I-25 at On-ramp from WCR 34	37.6	D	31.7	D
	Ramp		33.9		30.3	
Basic	Freeway	I-25 South of WCR 34	38.9	E	31.0	D

2050 No Action Emergency Response Analysis

The Mead to Berthoud I-25 travelshed is served by two fire stations. One of these fire stations, Mountain View Fire Rescue Station #3, is located to the west of I-25, immediately to the north of WCR 34 on 3rd Street. The second fire station, Front Range Fire Rescue Station #1, is located at 100 Telep Avenue/WCR 15, north of WCR 60 and approximately 1 mile north for WCR 44/CO 56.

The NFRMP Regional Travel Demand Model was used to evaluate emergency response times from these two fire stations using the NFRMPO Model's 2050 Fiscally Constrained Regional Transportation Plan as the 2050 No Action network. Isochronal maps were created for the 2050 No Action scenarios with the WCR 34 bridge over I-25 open and with the bridge temporarily closed, a condition that had occurred in August of 2022. Emergency response times for the PM peak hour with the I-25/WCR 34 interchange and bridge over I-25 open are shown in **Figure 21**. The effect on emergency response times of a temporary closure of the I-25/ WCR 34 interchange bridge is shown in **Figure 22**.

With the I-25/WCR 34 interchange and bridge over I-25 open, response times between 9 and 12 minutes were modeled within the travelshed to both the east and west of the I-25 corridor. Response times of less than 6 minutes were modeled within 1 mile of each fire station, and there was a small pocket with response times between 12 and 15 minutes modeled in the northwest corner of the travelshed, south of CO 56. This is similar to the 2019 Base Year with the bridge open. It is important to note that travelshed congestion modeled for the study area does not include site-generated external development traffic from the Turion and Hylandtown developments but does include the I-25 North Express lanes. For these reasons, the levels of congestion and response times represented by this scenario may be less than what may actually occur in 2050.

With the bridge closed and access to the east side of I-25 severely limited, emergency response times would drop precipitously as shown in **Figure 22**. In this scenario, response times for most of the travelshed on the east side of I-25 drop to 9 to 12 minutes and 12 to 15 minutes, with some areas (shown in white) unreachable within 15 minutes.

Taking a step beyond evaluation of 2050 No Action emergency response time, a third scenario was evaluated with the proposed interchange at WCR 38. As shown in **Figure 23**, modeled 2050 response times for both fire stations are improved for this scenario with a new interchange at WCR 38 compared with the 2050 RTP scenario without the proposed I-25/ WCR 38 interchange.

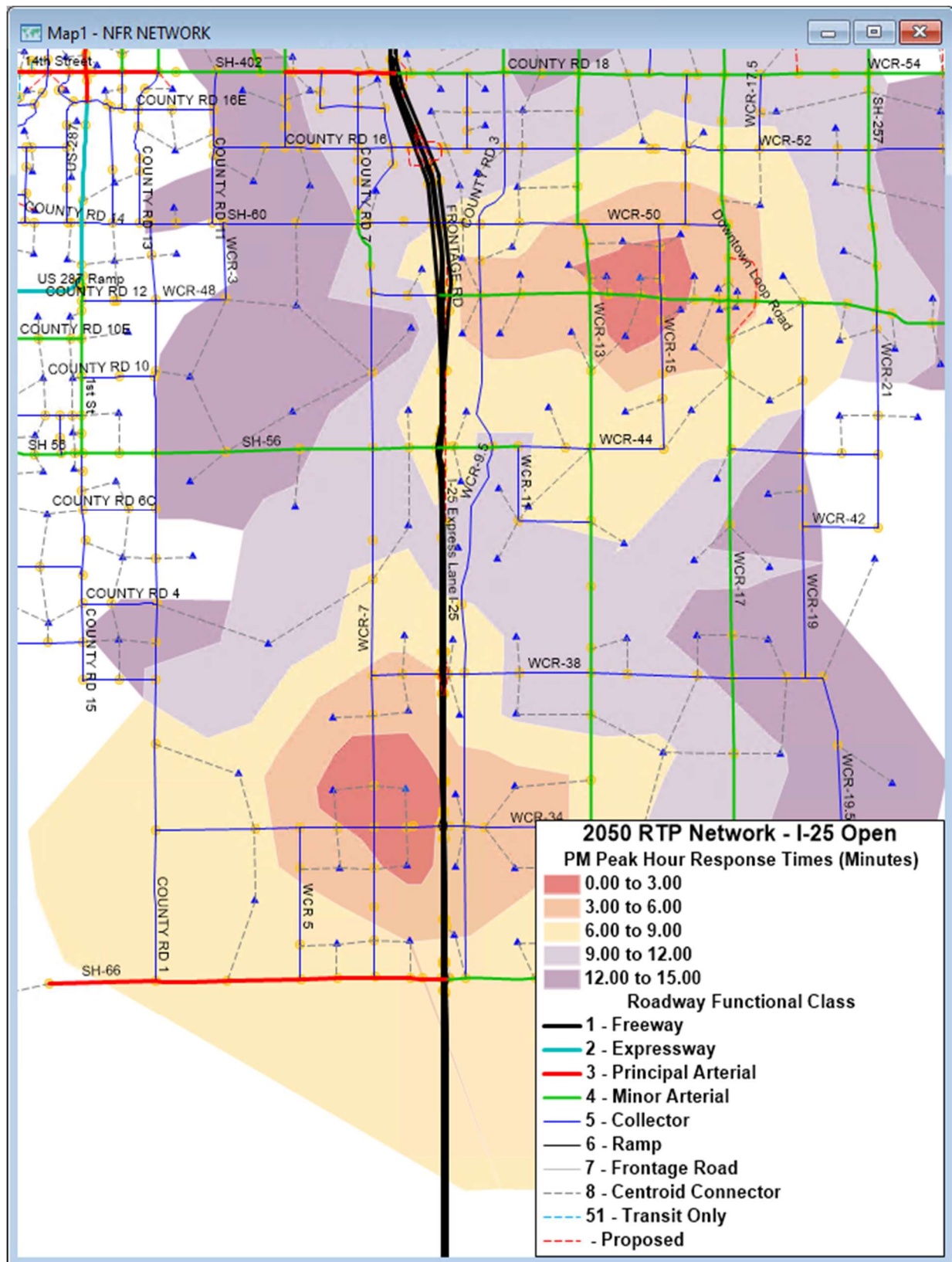


Figure 21. 2050 RTP PM Peak Hour Emergency Response Times – I-25 Access/Crossings Open

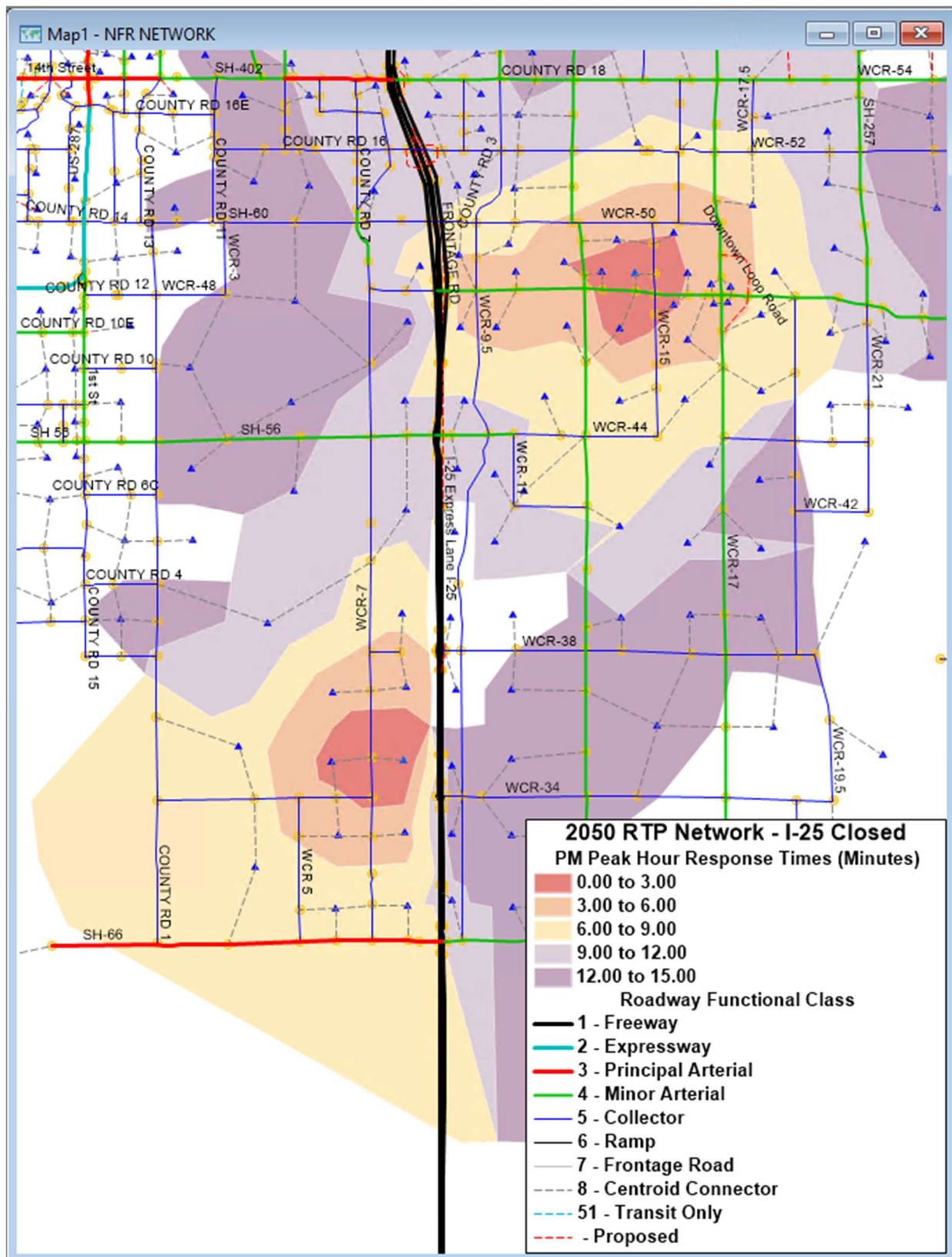


Figure 22. 2050 RTP PM Peak Hour Emergency Response Times – I-25 Access/Crossings Closed

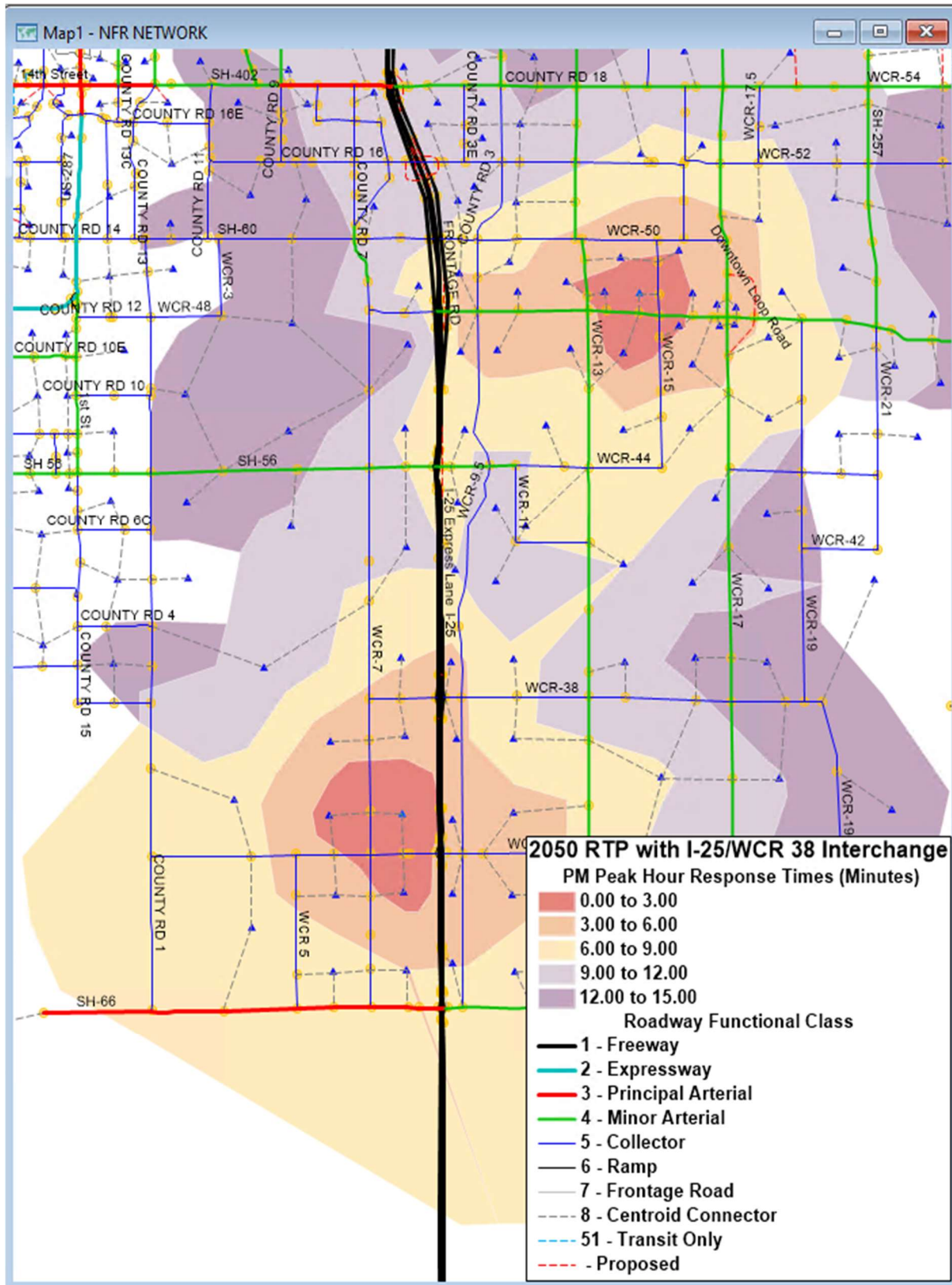


Figure 23. 2050 PM Peak Hour Emergency Response Times – With I-25/WCR 38 Interchange

4. Conclusions

Traffic operations analysis findings for 2050 without the I-25/WCR 38 interchange show failure of the existing I-25/CO 56 interchange and the broader CO 56/WCR 44 corridor as well as degradation of mainline I-25 southbound operations in the vicinity of the CO 56 interchange. In this context, it is clear that forecast increases in travel demand would outstrip existing network capacity to and from I-25 in this area and would create a high level of traffic congestion causing travel delays for both local and regional travelers. Challenged operations and congested corridor conditions would also negatively affect the overall multimodal transportation network and would result in increased out-of-direction travel and compromised access, emergency response, and connectivity to other modes of travel.

Given the anticipated impacts that traffic growth within the study area will have on the existing roadway network and the expected improvements to emergency response as well as incident management that would be provided by an additional access to I-25, a new interchange at WCR 38 is necessary and justified.

ⁱ NCHRP Report 255 – Highway Traffic Data for Urbanized Area Project Planning and Design, 1982;
NCHRP Report 765 – Analytical Travel Forecasting Approaches for Project-Level Planning and Design, 2014.