

This chapter describes the proposed project phases of the Combined Alternative Package (Preferred Alternative) and documents that all applicable environmental laws and requirements will be adhered to for each of the project phases before they are constructed. This phased approach is necessary because the identified transportation improvements are estimated to cost more to implement than what is currently available in the *2035 Metro Vision Regional Transportation Plan (2035 MVRTP)*, as amended (DRCOG 2009). Metropolitan Planning Regulations (23 Code of Federal Regulations [CFR] 450.322) and the Clean Air Act (CAA) Transportation Conformity Rule (40 CFR 93.104) work together to require that a project located in a Metropolitan Planning Area, and/or in a CAA nonattainment or maintenance area, be contained in a conforming, fiscally-constrained long-range regional transportation plan. Through a phased Record of Decision (ROD), the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) can approve project improvements which are included in this conforming, fiscally-constrained regional transportation plan.

After the Final Environmental Impact Statement (FEIS) has been made available to the public and the comment period concludes, FHWA, FTA, Colorado Department of Transportation (CDOT), and Regional Transportation District (RTD) will select an initial phase for implementation. Phase 1, as identified in this chapter, is proposed as the initial phase for the first ROD. Consideration of the FEIS and the first ROD will be part of future implementation of projects. Subsequent RODs will be completed as additional funding becomes available to construct.

The identification of a Preferred Alternative for the entire project in this FEIS is consistent with FHWA's/FTA's objective of analyzing and identifying transportation solutions on a broad enough scale to provide meaningful analysis and to avoid segmentation. The identification of an initial phase for implementation is consistent with FHWA and FTA requirements to have funding for projects identified before final decisions are made. As funds become available, it is the intent of FHWA/CDOT and FTA/RTD to work toward implementation of the Combined Alternative Package (Preferred Alternative) in its entirety through this phased approach.

## 8.1 GENERAL DESCRIPTION OF PHASES

The Combined Alternative Package (Preferred Alternative) is expected to cost approximately \$1.3 billion in 2008 dollars. As described in Chapter 5, Financial Analysis, the *2035 MVRTP*, as amended (DRCOG 2009) identifies \$711.1 million for improvements in the United States Highway 36 (US 36) corridor, creating a \$600 million funding shortfall. The first phase would be constructed with *2035 MVRTP*, as amended, funding. Later phases would be constructed over time and as funding is available, and are described here in concept.

To accommodate these funding limitations, the Combined Alternative Package (Preferred Alternative) has been separated into three phases. The first phase would cost approximately \$536 million (2008 dollars), would be constructed with the funding available in the *2035 MVRTP*, as amended (DRCOG 2009), and is planned to be completed by 2035. Phase 2 would cost approximately \$449 million (2008 dollars), and Phase 3 would cost approximately \$290 million (2008 dollars). These later phases would be constructed over time as funding is available and may not actually follow exactly as discussed for Phase 2 and Phase 3, depending on the funding and transportation need at the time the funding is identified.

FHWA conducted a Cost Estimate Review workshop to review the above estimated base costs. As a result of the workshop, it was determined that there is a 70 percent probability that the entire Combined Alternative Package (Preferred Alternative) would cost \$1.337 billion or less, and a 70 percent probability that Phase 1 would cost \$553 million or less, both in 2008 dollars.

The Preferred Alternative Committee (PAC) (described in Chapter 6, Public Involvement Program) provided input into the development of the Combined Alternative Package (Preferred Alternative) by setting priorities on which elements should be advanced in the various phases within the funding limitations presented in the 2035 MVRTP, as amended (DRCOG 2009). The PAC set priorities of constructing the managed lane along the entire length of the corridor, making some interchange improvements, and providing as much of the bikeway as feasible in the first phase. Using this prioritization and the following guiding principles, the phases were developed.

### **Safety**

- Provide bus refuge (in the median in case of breakdowns).
- Meet standards or reasonable design exceptions.

### **Operations**

- Ensure reliability of toll lanes (ability to bypass breakdowns).
- Provide enforcement (cruiser locations for managed lanes).

### **Maximize Investment**

- Minimize throwaway.
- Address maintenance needs.

### **Preferred Alternative Committee Priorities**

- Acknowledge the PAC's priorities of the managed lane, bikeway, and Wadsworth Parkway interchange.

### **Purpose and Need**

- Provide multi-modal capacity improvements.
- Ensure maintenance of existing infrastructure.

By combining these requirements, Phase 1 was developed and consists of constructing a managed lane in each direction from Federal Boulevard to east of Foothills Parkway/Table Mesa Drive, improvements to the Sheridan Boulevard and Wadsworth Parkway interchanges, replacement of the Lowell Boulevard and Wadsworth Boulevard bridges, the bikeway throughout the entire corridor, pavement rehabilitation, shoulder widening, bus rapid transit (BRT) station enhancements, and intelligent transportation system (ITS) elements related to the managed lane and BRT operations. Figure 8.1-1, Phase 1 Elements, shows the elements of Phase 1. Drawings showing the details of Phase 1 and the Combined Alternative Package (Preferred Alternative) are provided in Appendix A, Corridor Reference Maps.

Phase 2 would complete the Combined Alternative Package (Preferred Alternative) elements from the Foothills Parkway/Table Mesa Drive interchange to east of the Wadsworth Parkway interchange. Phase 3 would complete the remaining Combined Alternative Package (Preferred Alternative) elements from east of the Wadsworth Parkway interchange to Interstate 25 (I-25). The major elements that these phases would contain are interchange improvements and the auxiliary lanes.

Figure 8.1-1: Phase 1 Elements



Note: The 116<sup>th</sup> Avenue Rail Station is not a part of the 2004 FasTracks Program. Additional stations were added in the early planning stages of the US 36 Environmental Impact Statement. Exact rail station locations and additional stations may be reconsidered in the U.S. Army Corps of Engineers/ Regional Transportation District Northwest Rail Environmental Assessment/Environmental Evaluation.

The CAA requires air quality conformity to be demonstrated for major transportation projects in non-attainment areas. Regional air quality conformity for Phase 1 is demonstrated by its inclusion in the fiscally-constrained 2035 MVRTP, as amended (DRCOG 2009) and will be documented in the ROD. For the entire Combined Alternative Package (Preferred Alternative), the Denver Regional Council of Governments (DRCOG) has considered this project and all phases of the Combined Alternative Package (Preferred Alternative) through the long-range transportation vision plan (non-fiscally constrained plan) to ensure that there will not be any significant regional air quality conformity impacts or exceedances of the State Implementation Plan once the project is completed. As additional funding becomes available, subsequent phases will be included in the fiscally-constrained regional transportation plan for purposes of air quality conformity. Each additional phase of the project will have to be in the 20-year constrained plan and as additional project phases are funded, this process (ROD) will be repeated until the entire project identified in the National Environmental Policy Act of 1969 (NEPA) document is completed.

## 8.2 PRIORITIZATION OF CONSTRUCTION STAGING

As defined in the 2035 MVRTP, as amended, not all the funding would be available for the entire first phase at once (DRCOG 2009). The incremental funding stream would require that all phases be constructed in pieces or stages.

Where right-of-way (ROW) is required for a construction stage, particularly in residential areas, every effort would be made to acquire the ROW necessary to construct the entire Combined Alternative Package (Preferred Alternative). This would be done so that property owners would be impacted by the ROW acquisitions only once during the life of the project, instead of multiple times as each phase is constructed. The only exception to this ROW process will be when Section 4(f) properties are affected. If only part of a park property, for example, is needed for an earlier phase, only that part will be purchased and any remaining park property required for future phases will be acquired in those relevant phases.

### Phasing Development

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To determine what elements of the Combined Alternative Package (Preferred Alternative) would be included in Phase 1 and future phases, a process was developed in collaboration with CDOT, RTD, FHWA, FTA, and the PAC to determine the overall philosophical approach. The engineering team developed six scenarios for consideration.

- **Scenario 1** – Build the Combined Alternative Package (Preferred Alternative) as one phase.
- **Scenario 2** – Prioritize the construction of interchanges.
- **Scenario 3** – Prioritize the construction of the managed lanes.
- **Scenario 4** – Prioritize construction of the Combined Alternative Package (Preferred Alternative) starting at Federal Boulevard and moving west.
- **Scenario 5** – Prioritize construction of the Combined Alternative Package (Preferred Alternative) starting at I-25 and moving west.
- **Scenario 6** – Prioritize construction of the Combined Alternative Package (Preferred Alternative) starting at Foothills Parkway/Table Mesa Drive and moving east.

These scenarios were evaluated in comparison to the amount of funding in the 2035 MVRTP, as amended (DRCOG 2009), the project Purpose and Need, and input from the local jurisdictions, which prioritized the managed lane, the bikeway, and the Wadsworth Parkway interchange.

Scenario 1 was eliminated due to funding limitations. Scenario 2 did not contain multi-modal improvements, an element of the project Purpose and Need and the 2035 MVRTP, as amended (DRCOG 2009). Scenarios 4, 5, and 6 met funding requirements and the Purpose and Need of the project but did not provide a corridor-wide solution on Phase 1 of construction. This criterion was a critical concern of the local jurisdictions.

Scenario 3 best met the funding constraints, the project Purpose and Need, and addressed the concerns of the local jurisdictions by providing benefits to the whole corridor sooner than the other scenarios. The elements in Scenario 3 provide increased trip capacity and congestion relief through multi-modal options. As the details of Scenario 3 were further developed, improved access to and from the corridor was provided by the inclusion of improvements to the interchanges at Wadsworth Boulevard and Sheridan Boulevard.

One drawback of Scenario 3 is that construction will have to occur a second time throughout the corridor in order to build the remaining Combined Alternative Package (Preferred Alternative) elements, such as the auxiliary lanes, in Phases 2 and 3. The Phase 2 and Phase 3 discussions below identify the additional

impacts that would result from an elongated construction period and the need to reconstruct certain elements during later phases of the project.

## **Phase 1**

### **List of Elements**

Phase 1 consists of first focusing on the managed lane to be built starting from Federal Boulevard at the end of the existing express lanes and working westward to just east of the Foothills Parkway/Table Mesa Drive interchange. This managed lane would be built in Phase 1 with certain pinch points affecting shoulder width and buffer width caused by existing bridge limitations that would be brought up to full widths in future phases. Then, working east to west, the improvements to the Sheridan Boulevard and Wadsworth Parkway interchanges; replacement of four bridges; pavement rehabilitation; shoulder widening; and BRT station enhancements would occur. Construction of the bikeway would occur from west to east or as local funding is identified for different segments of the bikeway. Other improvements would occur throughout the corridor earlier in the phased implementation and would include ITS elements related to the managed lane and BRT operations. Bridge, retaining wall, and sound wall elements built as a part of Phase 1 would generally be built to their ultimate Combined Alternative Package (Preferred Alternative) size and location. However, some elements of the Combined Alternative Package (Preferred Alternative) are in an interim location and would need to be reconstructed as future phases are completed, which would result in irretrievable losses of labor, funding, energy, and materials. These interim pieces of Phase 1 have been minimized where possible. The decision to proceed in phases was made due to existing funding limitations. The decision of what to include in Phase 1 was based on funding constraints, the project Purpose and Need, and concerns of the local jurisdictions. The elements of Phase 1, including managed lanes, interchange improvements, and the bikeway, are anticipated to provide a substantial benefit to corridor users and would offset the irreversible impacts. The elements of Phase 1 associated with each segment and their estimated costs are shown in Table 8.2-1, Phase 1 Elements and Cost. Detailed figures for Phase 1 are provided in Appendix A, Corridor Reference Maps.

For the remaining phases, remaining project elements would then generally be implemented from west to east to complete the ultimate Combined Alternative Package (Preferred Alternative) but would depend on the safety needs, funding, and transportation needs as discussed in Section 8.3, Implementation of Future Project Phases.

**Table 8.2-1: Phase 1 Elements and Cost**

Element	Cost (in millions of 2008 dollars)
<b>Denver Segment</b>	
None	N/A
<b>Adams Segment</b>	
Mainline from Federal Boulevard to Sheridan Boulevard:	\$93 (C)
Replace Lowell Boulevard bridge	\$2 (R)
Widen mainline/shoulders	\$95 Total
Rehabilitate pavement	
Retaining walls	
Sound walls	
Bikeway	

**Table 8.2-1: Phase 1 Elements and Cost**

Element	Cost (in millions of 2008 dollars)
<b>Westminster Segment</b>	
Sheridan Boulevard interchange: Widen mainline/shoulders Rehabilitate pavement Replace Sheridan Boulevard bridge Ramps Sheridan Boulevard Westminster Center BRT Station Retaining walls Bikeway (without bridges)	\$91 (C) \$26 (R) \$117 Total
Mainline from Sheridan Boulevard to Church Ranch Boulevard/104 <sup>th</sup> Avenue: Widen mainline/shoulders Rehabilitate pavement Retaining walls Sound walls Bikeway	\$24 (C) \$3 (R) \$27 Total
Church Ranch Boulevard/104 <sup>th</sup> Avenue interchange: Widen mainline/shoulders Rehabilitate pavement Bikeway	\$12 (C) \$4 (R) \$16 Total
Mainline from Church Ranch Boulevard/104 <sup>th</sup> Avenue to Wadsworth Parkway: Widen mainline/shoulders Rehabilitate pavement Replace Wadsworth Boulevard bridge with 112 <sup>th</sup> Avenue bridge Some retaining walls Bikeway	\$31 (C) \$3 (R) \$34 Total
<b>Broomfield Segment</b>	
Wadsworth Parkway interchange: Widen mainline/shoulders Rehabilitate pavement Replace Wadsworth Parkway bridge Northeast loop-ramp Other interim ramps Wadsworth Parkway to Industrial Lane Some retaining walls Bikeway	\$52 (C) \$21 (R) \$73 Total
Mainline from Wadsworth Parkway interchange to East Flatiron Circle: Widen mainline/shoulders Rehabilitate pavement Some retaining walls	\$15 (C) \$2 (R) \$17 Total
<b>Superior/Louisville Segment</b>	
Interlocken Loop interchange: Widen mainline/shoulders Rehabilitate pavement Widen East Flatiron Circle bridge East Flatiron Circle ramps Some retaining walls Bikeway	\$36 (C) \$6 (R) \$42 Total
West Flatiron Circle to McCaslin Boulevard: Widen mainline/shoulders Rehabilitate pavement Some retaining walls Bikeway	\$23 (C) \$2 (R) \$25 Total

**Table 8.2-1: Phase 1 Elements and Cost**

Element	Cost (in millions of 2008 dollars)
<b>Boulder Segment</b>	
McCaslin Boulevard interchange:	\$15 (C)
Widen mainline/shoulders	\$6 (R)
Rehabilitate pavement	\$21 Total
Some retaining walls	
Bikeway	
<b>Boulder Segment (continued)</b>	
McCaslin Boulevard to Foothills Parkway/Table Mesa Drive:	\$64 (C)
Widen mainline/shoulders	\$4 (R)
Rehabilitate pavement	\$68 Total
Some retaining walls	
Bikeway to Table Mesa Drive	
<b>Totals</b>	<b>\$456 (C) Total</b> <b>\$80 (R) Total</b> <b>\$536 Total</b>

Source: US 36 Mobility Partnership, 2009.

Notes:

The totals do not equal the sum of the subtotals due to rounding.

- BRT = bus rapid transit
- C = construction cost
- N/A = not applicable
- R = right-of-way cost

### **Purpose and Need**

Phase 1 would meet the project Purpose and Need in the following ways:

- **Transportation Need #1: Increase Trip Capacity** – the managed lane would provide additional capacity for up to 1,500 vehicles per hour.
- **Transportation Need #2: Expand Access** – the Sheridan Boulevard and Wadsworth Parkway interchange improvements would improve access to US 36 at these locations.
- **Transportation Need #3: Provide Congestion Relief** – the managed lane would allow high-occupancy vehicles (HOVs) to travel in the lane for no fee. Single-occupant vehicles (SOVs) would have the opportunity to use the lane for a fee. This function of the managed lane would reduce congestion in the general-purpose lanes as existing traffic would have an additional free-flow travel lane option to consider.
- **Transportation Need #4: Expand Mode of Travel Options** – the managed lane would provide a dedicated lane for BRT vehicles. The bikeway would provide an alternative travel mode choice as well. The managed lane would also add an additional choice for travelers for reliable travel times and level of service (LOS).
- **Transportation Need #5: Increase Efficiency of Transit Service** – the managed lane would provide a dedicated lane for BRT vehicles and provide enhanced BRT stations.
- **Transportation Need #6: Update Outdated Highway Facilities** – Four bridges would be replaced in Phase 1 that either have aging infrastructure or substandard clearances. Aging roadway surfaces would also be replaced.

Phase 1 was determined to have independent utility for the reasons described here.



The managed lane and the interchange improvements identified at Sheridan Boulevard and Wadsworth Boulevard have logical termini. The east end of the managed lane connects to the existing express lanes. On the west end, the lane ends west of Cherryvale Road, in the same configuration as the Combined Alternative Package (Preferred Alternative). The improvements at Sheridan Boulevard and Wadsworth Boulevard include the interchange and associated ramp, street, and intersection improvements that connect into the existing street network.

These improvements are considered to be a reasonable expenditure of funds and would meet the Purpose and Need of the project, even if no additional transportation improvements are made in the area.

The improvements proposed in Phase 1 would not restrict consideration of alternatives for other reasonably foreseeable transportation improvements. For example, planned improvements along the Northwest Rail corridor as part of the FasTracks Program would be accommodated as part of Phase 1.

### **Traffic**

A traffic analysis for Phase 1 for the years 2015 and 2035 was completed. The 2035 analysis evaluates traffic conditions at the completion of Phase 1 in 2035, since all of Phase 1 is not expected to be constructed until 2035. Because the Phase 1 elements will not be funded and built all at once, but as funding is available over the next 25 years, an “opening day” scenario was modeled for 2015. This is when the first improvements could reasonably be expected to be complete and a travel forecast model was available for analysis.

Because there is not enough funding identified in the 2035 *MVRTP*, as amended (DRCOG 2009) to build the entire Combined Alternative Package (Preferred Alternative) by 2035, the flow of traffic for the Combined Alternative Package (Preferred Alternative) as described in Chapter 3, Transportation Impacts and Mitigation, is not likely to be as effective at the end of Phase 1 as it would be for the full project build-out. Therefore, the information contained in this chapter, which describes anticipated operating conditions if only Phase 1 is built, is likely to describe a condition which may be in place for a long time period, until such funding becomes available that Phase 2 and Phase 3 can be built and the entire project completed.

### **2015 Traffic Analysis**

The information contained in this section describes anticipated operating conditions in 2015. The assumed improvements would be the conversion of the existing HOV lanes to a managed lane from I-25 to Federal Boulevard, and new managed lanes in the median from Federal Boulevard to west of Cherryvale Road.

As shown in Table 8.2-2, Phase 1 2015 a.m. Peak-hour Mainline Levels of Service and Average Volume per Lane, and Table 8.2-3, Phase 1 2015 p.m. Peak-hour Mainline Levels of Service and Average Volume per Lane, in 2015 improves the function of US 36 general-purpose lanes in most places. Traffic comparisons are shown by the yellow where the LOS is better, versus the red where the LOS is worse than Package 1 (No Action). The absence of color simply indicates that the functionality, at the large scale of LOS, is the same and has not changed.

**Table 8.2-2: Phase 1 2015 a.m. Peak-hour Mainline Levels of Service and Average Volume per Lane**

Segment/Direction	General-purpose Lanes		Special Lanes	
	Package 1 (No Action)	Combined Alternative Package (Preferred Alternative) — Phase 1	Package 1 (No Action)	Combined Alternative Package (Preferred Alternative) — Phase 1
<b>Eastbound Direction</b>				
Foothills Parkway to McCaslin Boulevard	1,660	1,350	N/A	730
McCaslin Boulevard to West Flatiron Circle	1,840	1,740	N/A	700
East Flatiron Circle to Wadsworth Parkway	970	880	N/A	740
Wadsworth Parkway to Church Ranch Boulevard	1,470	1,460	N/A	590
Church Ranch Boulevard to Sheridan Boulevard	1,680	1,610	N/A	820
Sheridan Boulevard to Federal Boulevard	2,080	2,270	1,140	770
Federal Boulevard to Pecos Street	1,810	1,870	1,090	1,040
Pecos Street to Broadway	1,980	2,070	1,440	1,020
<b>Westbound Direction</b>				
Broadway to Pecos Street	1,250	1,330	N/A	N/A
Pecos Street to Federal Boulevard	1,330	1,420	0	N/A
Federal Boulevard to Sheridan Boulevard	1,560	1,560	N/A	680
Sheridan Boulevard to Church Ranch Boulevard	1,850	1,860	N/A	1,070
Church Ranch Boulevard to Wadsworth Parkway	1,830	1,760	N/A	1,270
Wadsworth Parkway to East Flatiron Circle	1,380	1,280	N/A	1,120
West Flatiron Circle to McCaslin Boulevard	1,610	1,430	N/A	970
McCaslin Boulevard to Foothills Parkway	1,690	1,490	N/A	820
<b>Number of Sections Operating at LOS E or LOS F</b>	<b>7</b>	<b>4</b>	<b>0</b>	<b>0</b>

Source: US 36 Mobility Partnership, 2009.

Notes:

- a.m. = morning
- LOS = level of service
- green shading = LOS D
- yellow shading = LOS E
- red shading = LOS F

**Table 8.2-3: Phase 1 2015 p.m. Peak-hour Mainline Levels of Service and Average Volume per Lane**

Segment/Direction	General-purpose Lanes		Special Lanes	
	Package 1 (No Action)	Combined Alternative Package (Preferred Alternative) — Phase 1	Package 1 (No Action)	Combined Alternative Package (Preferred Alternative) — Phase 1
<b>Eastbound Direction</b>				
Foothills Parkway to McCaslin Boulevard	1,550	1,400	N/A	480
McCaslin Boulevard to West Flatiron Circle	1,580	1,610	N/A	400
East Flatiron Circle to Wadsworth Parkway	1,250	1,250	N/A	620
Wadsworth Parkway to Church Ranch Boulevard	1,680	1,760	N/A	800
Church Ranch Boulevard to Sheridan Boulevard	1,730	1,790	N/A	890
Sheridan Boulevard to Federal Boulevard	1,990	2,150	0	450
Federal Boulevard to Pecos Street	1,490	1,420	0	660
Pecos Street to Broadway	1,550	1,250	N/A	N/A
<b>Westbound Direction</b>				
Broadway to Pecos Street	1,500	1,560	1,000	1,000
Pecos Street to Federal Boulevard	1,340	1,520	1,120	660
Federal Boulevard to Sheridan Boulevard	1,980	1,490	N/A	1,050
Sheridan Boulevard to Church Ranch Boulevard	2,250	1,710	N/A	950
Church Ranch Boulevard to Wadsworth Parkway	2,130	1,550	N/A	970
Wadsworth Parkway to East Flatiron Circle	1,470	1,060	N/A	790
West Flatiron Circle to McCaslin Boulevard	2,050	1,680	N/A	720
McCaslin Boulevard to Foothills Parkway	1,950	1,470	N/A	720
<b>Number of Sections Operating at LOS E or LOS F</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>0</b>

Source: US 36 Mobility Partnership, 2009.

Notes:

- LOS = level of service
- p.m. = evening
- green shading = LOS D
- yellow shading = LOS E
- red shading = LOS F

This 2015 “opening day” stage of Phase 1 results in improvements in LOS in several segments, with substantial improvement (LOS F to LOS D) in the westbound direction, evening (p.m.) peak hour, on four of the five segments between Church Ranch Boulevard and Foothills Parkway. In general, improvements to general-purpose lane LOS are attributed to the addition of capacity to the highway, in the form of the managed lane. While the number of general-purpose lanes would remain identical to Package 1 in Phase 1, two effects could result in better general-purpose lane conditions. These are:

- Where an HOV lane exists in Package 1, conversion to a managed lane (allowing SOVs to use the lane if they pay a toll) would provide additional capacity to SOVs. In Package 1, SOVs are required to use the general-purpose lanes, while in the Combined Alternative Package (Preferred Alternative), they could use either the managed lane or the general-purpose lane. If the number of SOVs that choose to use the managed lane in the Combined Alternative Package (Preferred Alternative) is greater than the number of general-purpose lane vehicles attracted to US 36 as a result of the managed lane, then the volume in the general-purpose lanes would be lower, and LOS could improve.

- Where no HOV lane exists in Package 1, the addition of a new managed lane would have the above effect of new capacity for SOVs, but also the same effect for HOVs. By 2015 it is assumed that the entire length of the managed lane would be constructed. HOVs that were forced to use the general-purpose lanes in Package 1 could shift to the new managed lane in the Combined Alternative Package (Preferred Alternative), which is likely to result in lower volumes in the general-purpose lanes. The LOS results in Table 8.2-2, Phase 1 2015 a.m. Peak-hour Mainline Levels of Service and Average Volume per Lane, and Table 8.2-3, Phase 1 2015 p.m. Peak-hour Mainline Levels of Service and Average Volume per Lane, indicate that the strongest general-purpose lane LOS improvements occur in segments where there is no HOV lane in Package 1.

In a few cases, the implementation of the managed lane could result in a slight degradation in general-purpose lane LOS, because in some segments, more traffic would be drawn to US 36 overall as a result of the improvement. The prevalence of this effect could depend in part on the availability and performance of alternate routes to US 36, which vary by segment.

All of the new managed lane segments in the Combined Alternative Package (Preferred Alternative) would be managed to optimize the use of the lane, maximize travel time savings, and keep the managed lane traffic operating at 45 miles per hour or faster in the 2015 Phase 1 condition.

### 2035 Traffic Analysis

For the 2035 traffic analysis, it was assumed that all the Phase 1 improvements would be implemented. Table 8.2-4, Phase 1 2035 a.m. Peak-hour Mainline Levels of Service and Average Volume per Lane, and Table 8.2-5, Phase 1 2035 p.m. Peak-hour Mainline Levels of Service and Average Volume per Lane, present the LOS and average volume per lane for each segment of US 36 during the morning (a.m.) and p.m. peak-hours for Package 1 and Phase 1 of the Combined Alternative Package (Preferred Alternative). These two tables also summarize the number of roadway sections that would operate at LOS E or F.

Under Package 1, average volumes per lane range from 1,060 vehicles per lane to 2,790 vehicles per lane. The forecast volumes result in nine segments of US 36 operating at LOS E or F during the a.m. peak-hour, and nine segments during the p.m. peak-hour. A total of 32 freeway segments were analyzed during both peak-hours. Package 1 operates at LOS E or F in 56 percent of those segments<sup>1</sup>.

Phase 1 of the Combined Alternative Package (Preferred Alternative) is forecast to serve 750 vehicles per lane to 2,300 vehicles per lane in the general-purpose lanes. Phase 1 is forecast to have six segments of US 36 operating at LOS E or F during the a.m. peak-hour, and three segments during the p.m. peak hour. This results in 28 percent of the segments operating at LOS E or F. Phase 1 is forecast to serve a similar amount of traffic across all lanes compared to Package 1. In many segments, Phase 1 would serve a higher total volume than the Package 1 condition. The added managed lanes in Phase 1 would allow traffic from the general-purpose lanes to use a less congested lane to travel the corridor, allowing more vehicles to use the US 36 corridor.

The LOS analysis shows that Phase 1 of the Combined Alternative Package (Preferred Alternative) is forecast to have fewer segments operating at LOS E or F compared to Package 1. The additional capacity provided in the managed lanes would allow general-purpose lanes to operate at an improved LOS.

The special lanes in each package are forecast to operate with less than 1,500 vehicles per lane in all analyzed segments of Phase 1. All managed lane segments are forecast to meet the CDOT special lane management policy under all analysis conditions.

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<sup>1</sup> It is recognized that not all sections are of the same length and number of lanes; performing the same calculation for lane-miles yielded similar results.

**Table 8.2-4: Phase 1 2035 a.m. Peak-hour Mainline Levels of Service and Average Volume per Lane**

Segment/Direction	General-purpose Lanes		Special Lanes	
	Package 1 (No Action)	Combined Alternative Package (Preferred Alternative) — Phase 1	Package 1 (No Action)	Combined Alternative Package (Preferred Alternative) — Phase 1
<b>Eastbound Direction</b>				
Foothills Parkway to McCaslin Boulevard	1,950	1,420	N/A	970
McCaslin Boulevard to West Flatiron Circle	1,950	1,870	N/A	890
East Flatiron Circle to Wadsworth Parkway	1,060	750	N/A	940
Wadsworth Parkway to Church Ranch Boulevard	1,530	1,130	N/A	670
Church Ranch Boulevard to Sheridan Boulevard	1,750	1,280	N/A	860
Sheridan Boulevard to Federal Boulevard	2,790	2,050	N/A	1,310
Federal Boulevard to Pecos Street	2,090	1,730	1,120	1,510
Pecos Street to Broadway	2,220	2,300	1,330	840
<b>Westbound Direction</b>				
Broadway to Pecos Street	1,440	1,410	N/A	N/A
Pecos Street to Federal Boulevard	1,520	1,470	N/A	N/A
Federal Boulevard to Sheridan Boulevard	1,730	1,740	N/A	750
Sheridan Boulevard to Church Ranch Boulevard	1,920	2,160	N/A	990
Church Ranch Boulevard to Wadsworth Parkway	1,840	1,930	N/A	1,270
Wadsworth Parkway to East Flatiron Circle	1,490	1,350	N/A	1,270
West Flatiron Circle to McCaslin Boulevard	1,970	1,580	N/A	1,170
McCaslin Boulevard to Foothills Parkway	1,930	1,550	N/A	780
<b>Number of Sections Operating at LOS E or LOS F</b>	<b>9</b>	<b>6</b>	<b>0</b>	<b>0</b>

Source: US 36 Mobility Partnership, 2009.

Notes:

LOS are color-coded to facilitate comparison between packages.

- |      |   |                  |                |   |            |
|------|---|------------------|----------------|---|------------|
| a.m. | = | morning          | white shading  | = | LOS B or C |
| LOS  | = | level of service | green shading  | = | LOS D      |
| N/A  | = | not available    | yellow shading | = | LOS E      |
|      |   |                  | red shading    | = | LOS F      |

**Table 8.2-5: Phase 1 2035 p.m. Peak-hour Mainline Levels of Service and Average Volume per Lane**

Segment/Direction	General-purpose Lanes		Special Lanes	
	Package 1 (No Action)	Combined Alternative Package (Preferred Alternative) — Phase 1	Package 1 (No Action)	Combined Alternative Package (Preferred Alternative) — Phase 1
<b>Eastbound Direction</b>				
Foothills Parkway to McCaslin Boulevard	1,880	1,620	N/A	570
McCaslin Boulevard to West Flatiron Circle	2,080	1,880	N/A	470
East Flatiron Circle to Wadsworth Parkway	1,480	1,170	N/A	780
Wadsworth Parkway to Church Ranch Boulevard	1,740	1,270	N/A	1,020
Church Ranch Boulevard to Sheridan Boulevard	1,770	1,410	N/A	1,040
Sheridan Boulevard to Federal Boulevard	2,130	1,910	N/A	1,230
Federal Boulevard to Pecos Street	1,550	1,040	N/A	1,320
Pecos Street to Broadway	1,620	1,740	N/A	N/A
<b>Westbound Direction</b>				
Broadway to Pecos Street	1,620	1,580	1,000	1,000
Pecos Street to Federal Boulevard	1,450	1,590	1,110	610
Federal Boulevard to Sheridan Boulevard	2,120	1,570	N/A	1,250
Sheridan Boulevard to Church Ranch Boulevard	2,320	1,780	N/A	1,330
Church Ranch Boulevard to Wadsworth Parkway	2,190	1,540	N/A	1,370
Wadsworth Parkway to East Flatiron Circle	1,550	1,030	N/A	1,200
West Flatiron Circle to McCaslin Boulevard	2,350	1,860	N/A	1,170
McCaslin Boulevard to Foothills Parkway	2,170	1,620	N/A	950
<b>Number of Sections Operating at LOS E or LOS F</b>	<b>9</b>	<b>3</b>	<b>0</b>	<b>0</b>

Source: US 36 Mobility Partnership, 2009.

Notes:

LOS are color-coded to facilitate comparison between packages.

LOS	=	level of service	white shading	=	LOS B or C
N/A	=	not available	green shading	=	LOS D
p.m.	=	evening	yellow shading	=	LOS E
			red shading	=	LOS F

### Environmental Impacts

The environmental impacts of the different phases are discussed briefly below. The resources with the most impacts are presented for discussion and include ROW, parks and open space, noise, biological resources, farmlands, hazardous materials, wetlands, air quality, water quality, historic properties, and Section 4(f) properties. Mitigation commitments for these impacts are provided in Section 8.4, Mitigation. For more information on these and other resources, see Chapter 4, Affected Environment and Environmental Consequences.

The following bullets summarize several environmental resources for all segments that will not be discussed further because the impacts are negligible or minimal.

- The Combined Alternative Package (Preferred Alternative) and Phase 1 are generally compatible with existing land use plans.
- Economic impacts are largely tied to ROW acquisitions through loss of tax revenue of displaced businesses and residences, or indirect impacts from loss of parking spaces by Phase 1 elements. As a

result of phasing, the construction period of the project would be lengthened resulting in more disruptions to businesses over the course of the project. At the same time, there would be an economic benefit to the area as a result of multiple construction mobilizations and the need for additional construction workers.

- Utilities were not a factor in the identification of phases. The relocation and adjustment of all utilities will be finalized during final design.
- Energy was also not a factor in the identification of phases and will be addressed further in final design; however, as a result of the phasing, additional energy would be expended as a result of a longer construction period and the need to reconstruct portions of the project during later phases.
- Paleontological sites will be monitored during construction for all phases.
- Public safety and security was not a factor in the identification of phases and mitigation measures will be similar for all phases.
- Visual and aesthetic resources will be addressed during final design of all elements, such as sound walls and bridges, for compatibility with the theme in the area. As a result of the longer construction period, visual impacts such as exposed soils, staging areas, and construction lighting, would occur over a longer time period resulting in additional impacts to adjacent communities.
- Due to the small increase in upstream water surface elevation at Big Dry Creek, a conditional letter of map revision may be required for Phase 1. Phase 1 will comply with applicable municipal separate storm sewer system (MS4) permit and will use best management practices in areas outside of MS4 permit coverage. Water quality and floodplains were not a factor in determining phasing and will be further evaluated and addressed during final design.
- Indirect impacts for all segments and phases would be the same as those listed for each resource in Chapter 4, Affected Environment and Environmental Consequences.

### Phase 1

#### Denver Segment

There would be no impacts in the Denver Segment, as no construction would occur in this segment.

#### Adams Segment

Table 8.2-6, Adams Segment Resources Impacted by Phase, lists the resources in the Adams Segment that would be impacted by phases one through three.

**Table 8.2-6: Adams Segment Resources Impacted by Phase**

Resources	Combined Alternative Package (Preferred Alternative) Total Build-out	Phase 1	Phase 2	Phase 3
ROW Displacements (Residential/Business)	41/9	1/3	0	40/6
Parks and Open Space (Number of Areas/Acres)	4/0.6	2/0.6	0	2/<0.1
Noise (Feet)	34,000 feet of reconstructed sound walls	34,000 feet of reconstructed sound walls	0	0
Biological Resources (Acres)	0	0	0	0
Farmlands (Acres)	0	0	0	0
Hazardous Materials Sites (Moderate/High Risk Potential)	19/1	3/0	0/0	16/1
Wetlands (Wetland Acres/Open Water Acres)	1.04/0.05	1.04/0.05	0	0

**Table 8.2-6: Adams Segment Resources Impacted by Phase**

Resources	Combined Alternative Package (Preferred Alternative) Total Build-out	Phase 1	Phase 2	Phase 3
Historic Resources	5	5	0	5
Section 4(f) Properties	3	2	0	1

Source: US 36 Mobility Partnership, 2009.

Notes:

- < = less than
- ROW = right-of-way

*Right-of-way*

Of the 41 residential displacements and 9 business displacements in the Adams Segment, 1 residence and 3 businesses would be acquired and displaced for the improvements included in Phase 1. These acquisitions would occur at the beginning of Phase 1.

*Parks and Open Space*

Three park resources and one open space resource would be impacted by the Combined Alternative Package (Preferred Alternative) in this segment, totaling 0.6 acre, of which 0.6 acre would be impacted in Phase 1 (less than 0.1 acre would be impacted during Phase 3). Two park resources, Commissioners Park (Map Identification Number 578) and Westminster Hills Park (Map Identification Number 257), would be impacted in Phase 1.

*Noise*

Existing sound walls/fences would be replaced in kind where they currently exist from Federal Boulevard to Sheridan Boulevard with standard noise walls. This would complete the noise mitigation proposed for the Combined Alternative Package (Preferred Alternative) in this segment.

*Biological Resources*

There are no threatened and endangered species, nor sensitive habitats, located within the Adams Segment. There are also no prairie dog colonies identified in the impact area in this segment. Migratory bird impacts could include ground nesting or tree/shrub nesting birds, although no nests were observed within the impact areas in this segment.

*Farmlands*

There are no important farmlands that would be impacted in the Adams Segment.

*Hazardous Materials*

There are 19 recognizable hazardous material sites that are ranked as having moderate risk and 1 site ranked high risk in this segment, of which 3 moderate sites would be affected by Phase 1.

*Wetlands*

The entire quantity of impacts to wetlands and other water features in the Adams Segment, 1.04 acres and 0.05 acre, respectively, would be impacted by Phase 1.

*Historic*

There are five historic resources in this segment, all portions of Allen Ditch, that would be impacted with an “Adverse Effect.” All of these resources are associated with extending ditch culverts, all of which would occur in Phase 1.



**Section 4(f)**

There are three Section 4(f) properties in the Adams Segment that would be impacted by the Combined Alternative Package (Preferred Alternative) two parks and Allen Ditch. Phase 1 improvements would have the same impacts as the Combined Alternative Package (Preferred Alternative) in terms of severity and the area of Allen Ditch and Westminster Hills Park to be acquired. These resources would still need to be impacted, even if Phase 2 and Phase 3 were never implemented, in order to support the function required for Phase 1 to operate as expected. Commissioners Park would be impacted in Phase 3.

**Westminster Segment**

Table 8.2-7, Westminster Segment Resources Impacted by Phase, lists the resources in the Westminster Segment that would be impacted by phases one through three.

**Table 8.2-7: Westminster Segment Resources Impacted by Phase**

Resources	Combined Alternative Package (Preferred Alternative) Total Build-out	Phase 1	Phase 2	Phase 3
ROW Displacements (Residential/Business)	22/10	9/3	0	13/7
Parks and Open Space (Number of Areas/Acres)	7/16.2	7/16.2	0	0
Noise (Feet)	2,400 feet of new sound walls and 1,800 feet of reconstructed sound walls	2,400 feet of new sound walls and 1,800 feet of reconstructed sound walls	0	0
Biological Resources (Acres)	0	0	0	0
Farmlands (Acres)	0	0	0	0
Hazardous Materials Sites (Moderate/High Risk Potential)	11/2	10/1	0/0	1/1
Wetlands (Wetland Acres/Open Water Acres)	2.90/0.41	2.48/0.25	0	0.42/0.16
Historic Resources	3	3	0	0
Section 4(f) Properties	3	3	0	0

Source: US 36 Mobility Partnership, 2009.

Note:

ROW = right-of-way

**Right-of-way**

Of the 22 residential displacements and 10 business displacements in the Westminster Segment, 9 residences and 3 businesses would be displaced in Phase 1.

**Parks and Open Space**

Seven open space resources and one trail crossing would be impacted by the Combined Alternative Package (Preferred Alternative) in this segment, totaling 16.2 acres in area, all of which would be impacted in Phase 1. The resources impacted would be six Westminster Open Space properties (Map Identification Numbers 1198, 1209, 1197, 1187, 1184, and 1205), and the Big Dry Creek Open Space (Map Identification Number 1185). The Big Dry Creek Trail Crossing (Map Identification Number TC2) would also be impacted as a part of Phase 1.

**Noise**

Sound walls in this segment that are considered reasonable and feasible through the noise analysis (see Section 4.13, Noise) would be located at Madison Hill and Tuscany Trail multi-family homes. All sound walls identified in the noise analysis for both locations would be constructed in Phase 1.

*Biological Resources*

There are no threatened and endangered species located within the Westminster Segment. There are 12.67 acres of prairie dog colony impacts identified in this segment, 11.67 acres of which would be impacted in Phase 1. Burrowing owls are sometimes associated with prairie dog colonies and could be impacted along with the prairie dogs. Migratory bird impacts could include ground nesting or tree/shrub nesting birds.

*Farmlands*

There are no important farmlands that would be impacted in the Westminster Segment.

*Hazardous Materials*

There are 11 recognizable hazardous material sites that are ranked as having moderate risk and 2 sites ranked high risk in this segment, of which 10 moderate and 1 high site would be affected by Phase 1. The high-risk site is a dry cleaner that is located within the footprint.

*Wetlands*

The majority of wetlands and other water features impacted by the Combined Alternative Package (Preferred Alternative) in the Westminster Segment would be impacted in Phase 1. Some wetlands and open water at Walnut Creek, just east of Church Ranch Boulevard, would not be impacted by Phase 1.

*Historic*

There are two historic ditch resources, Niver Canal and Farmers Highline Canal, in this segment that would be impacted but that are determined to have No Adverse Effect. Both of these resources are associated with extending ditch culverts and would all occur in Phase 1. Additionally, there would be a bridge widening over the BNSF Railway in Phase 1, resulting in No Adverse Effect to this resource. No direct impacts would occur to the railroad ROW so the changes would be in setting only.

*Section 4(f)*

All three of the Section 4(f) properties impacted by the Combined Alternative Package (Preferred Alternative) would be impacted in Phase 1. Phase 1 improvements would have the same impacts as the Combined Alternative Package (Preferred Alternative) in terms of severity and area to be acquired. The impacted properties include the Big Dry Creek Trail Crossing, Niver Canal, and Farmers Highline Canal. These resources would still need to be impacted, even if Phase 2 and Phase 3 were never implemented, in order to support the function required for Phase 1 to operate as expected.

*Broomfield Segment*

Table 8.2-8, Broomfield Segment Resources Impacted by Phase, lists the resources in the Broomfield Segment that would be impacted by phases one through three.

**Table 8.2-8: Broomfield Segment Resources Impacted by Phase**

Resources	Combined Alternative Package (Preferred Alternative) Total Build-out	Phase 1	Phase 2	Phase 3
ROW Displacements (Residential/Business)	0/5	0/0	0/5	0/0
Parks and Open Space (Number of Areas/Acres)	6/5.4	6/5.4	0	0
Noise (Feet)	0	0	0	0
Biological Resources (Acres)	23.51*/14.39**	16.91*/14.39**	0	6.60*/0.00**

**Table 8.2-8: Broomfield Segment Resources Impacted by Phase**

Resources	Combined Alternative Package (Preferred Alternative) Total Build-out	Phase 1	Phase 2	Phase 3
Farmlands (Acres)	8.5 acres by the Wadsworth Boulevard interchange 1.9 acres by Rock Creek Farm	6.9 acres by the Wadsworth Boulevard interchange 1.9 acres by Rock Creek Farm	1.6 acres by the Wadsworth Boulevard interchange	0
Hazardous Materials Sites (Moderate/High Risk Potential)	5/9	5/8	0/1	0/0
Wetlands (Wetland Acres/Open Water Acres)	2.87/0.76	2.87/0.76	0	0
Historic	6	6	0	0
Section 4(f)	6	6	0	0

Source: US 36 Mobility Partnership, 2009.

Notes:

- \* = prairie dog impacts
- \*\* = sensitive wildlife habitat
- ROW = right-of-way

**Right-of-way**

Of the 5 business displacements in the Broomfield Segment, none would be displaced in Phase 1.

**Parks and Open Space**

East Interlocken Park (Map Identification Number 308), the Interlocken Golf Course (Map Identification Number 309), three Broomfield Open Space properties (Map Identification Numbers 523, 411, and 521), and the East Interlocken Trail Crossing (Map Identification Number TC5) would be impacted by the Combined Alternative Package (Preferred Alternative) in this segment. These impacts would total 5.4 acres in area, all of which would be impacted in Phase 1.

**Noise**

No sound walls are considered reasonable and feasible in the Broomfield Segment; therefore, no mitigation is being recommended.

**Biological Resources**

There are no threatened and endangered species located within the Broomfield Segment. There are 23.51 acres of prairie dog colony impacts identified in this segment, of which 16.91 acres would occur in Phase 1. Burrowing owls are sometimes associated with prairie dog colonies and could be impacted along with the prairie dogs. Additionally, there is an area identified as sensitive wildlife habitat, the Carolyn Holmberg Preserve/Rock Creek Farm Open Space, in this segment that would be impacted by the Combined Alternative Package (Preferred Alternative). A total of 14.39 acres would be impacted in Phase 1. These areas are important to large and small wildlife, and to migratory birds.

**Farmlands**

There are two areas of important farmland direct impacts; one that would affect 8.5 acres by the interchange modification at Wadsworth Parkway that is associated with the open space. The other 1.9 acres is associated with improvements just west of Rock Creek Farm. As part of Phase 1, 6.9 acres of the farmland around Wadsworth Parkway would be impacted, and 1.9 acres west of the Rock Creek Farm would be impacted.

*Hazardous Materials*

There are 5 recognizable hazardous material sites that are ranked as having moderate risk and 9 sites ranked high risk in this segment, of which all moderate and 8 high sites would be affected by Phase 1. The high risk sites include 6 open LUSTs and 2 facilities with previous operations that could have resulted in contamination.

*Wetlands*

The entire quantity of impacts to wetlands and other water features, 2.87 acres and 0.76 acre, respectively, would occur in Phase 1.

*Historic*

There are four historic ditch resources in this segment that would be impacted. Of these, two segments of Equity Ditch and Community Ditch have been determined to have No Adverse Effect. The fourth ditch, Dry Creek Valley Ditch, would be impacted by highway widening. All of these resources are associated with ditch impacts and would all occur in Phase 1. Additionally, there are two historic structures located in the Broomfield Segment. One property, 5BF109, is located near the Wadsworth Boulevard interchange and would be protected by a retaining wall. The historic structure at 8375 West 120<sup>th</sup> Avenue would be demolished as part of Phase 1, resulting in an Adverse Effect.

*Section 4(f)*

There are six Section 4(f) properties in the Broomfield Segment that would be impacted by the Combined Alternative Package (Preferred Alternative), all of which would occur in Phase 1. Phase 1 improvements would require the same impacts as the Combined Alternative Package (Preferred Alternative) in terms of severity and area to be acquired. The impacted properties include East Interlocken Park, East Interlocken Trail Crossing, a residence at 8375 West 120<sup>th</sup> Avenue in Broomfield (historic structure 5BF9), Dry Creek Valley Ditch, Community Ditch, and Equity Ditch. These resources would still need to be impacted, even if Phase 2 and Phase 3 were never implemented, in order to support the function required for Phase 1 to operate as expected.

*Superior/Louisville Segment*

Table 8.2-9, Superior/Louisville Segment Resources Impacted by Phase, lists the resources in the Superior/Louisville Segment that would be impacted by phases one through three.

**Table 8.2-9: Superior/Louisville Segment Resources Impacted by Phase**

Resources	Combined Alternative Package (Preferred Alternative) Total Build-out	Phase 1	Phase 2	Phase 3
ROW Displacements (Residential/Business)	0	0	0	0
Parks and Open Space (Number of Areas/Acres)	3/1.5	3/1.5	0	0
Noise (Feet)	600 feet of new sound walls	600 feet of new sound walls	0	0
Biological Resources (Acres) <sup>1</sup>	21.11*/0.00**	18.49*/3.13**	2.62*/0.00**	0
Farmlands (Acres)	1.2 acres in open space	1.2 acres in open space	0	0
Hazardous Materials Sites (Moderate/High Risk Potential)	0/0	0/0	0/0	0/0
Wetlands (Wetland Acres/Open Water Acres)	1.32/0.36	0.77/0.36	0.55/0	0

**Table 8.2-9: Superior/Louisville Segment Resources Impacted by Phase**

Resources	Combined Alternative Package (Preferred Alternative) Total Build-out	Phase 1	Phase 2	Phase 3
Historic Resources	2	2	0	0
Section 4(f) Properties	3	3	0	0

Source: US 36 Mobility Partnership, 2009.

Notes:

<sup>1</sup> The impact to the Carolyn Holmberg Preserve/Rock Creek Farm Open Space is already counted for in the Broomfield Segment Impacts. So as not to double count this impact, it is not called out again here.

\* = prairie dog impacts

\*\* = sensitive wildlife habitat

ROW = right-of-way

### *Right-of-way*

No residences or businesses in the Superior/Louisville Segment would be displaced as part of the Combined Alternative Package (Preferred Alternative).

### *Parks and Open Space*

Frank Varra Park (Map Identification Number 380), the Scriffiny (Carlson) Open Space (Map Identification Number 1134), and the Coal Creek Trail Crossing (Map Identification Number TC5) would be impacted by the Combined Alternative Package (Preferred Alternative) in this segment. These impacts would total 1.5 acres in area, all of which would occur in Phase 1.

### *Noise*

The sound wall in this segment that is considered reasonable and feasible and that is recommended as part of the project improvements is at Rock Creek Apartments. This sound wall would be constructed during Phase 1.

### *Biological Resources*

There are no threatened and endangered species located within the Superior/Louisville Segment. There are 21.11 acres of prairie dog colony impacts identified in this segment, of which 18.49 acres would occur in Phase 1. Burrowing owls are sometimes associated with prairie dog colonies and could be impacted along with the prairie dogs. In the Carolyn Holmberg Preserve/Rock Creek Farm Open Space, 3.13 acres of sensitive wildlife habitat would be impacted by Phase 1.

### *Farmlands*

There is one important farmland associated with the Louisville Open Space that would be directly affected in this segment. The Combined Alternative Package (Preferred Alternative) would impact 1.2 acres, all of which would occur in Phase 1.

### *Hazardous Materials*

No high or moderate risk hazardous materials sites were identified in this segment.

### *Wetlands*

The majority of wetlands and other water features impacted by the Combined Alternative Package (Preferred Alternative) in the Superior/Louisville Segment would be impacted in Phase 1. One wetland, inside the westbound on-ramp from West Flatiron Circle, would not be impacted by Phase 1. The estimated reduction in wetlands would be 0.55 acre. Approximately 0.77 acre of wetlands and 0.36 acre of other water features would be impacted in Phase 1.

*Historic*

There are two historic resources in this segment, Coal Creek Ditch and Louisville Reservoir Inlet, that would be impacted but are determined to have No Adverse Effect. These impacts are associated with extending the ditch culvert or replacing the pipes and laterals and would all occur in Phase 1.

*Section 4(f)*

All three of the Section 4(f) properties impacted by the Combined Alternative Package (Preferred Alternative) would be impacted in Phase 1. Phase 1 improvements would have the same impacts as the Combined Alternative Package (Preferred Alternative) in terms of severity and area to be acquired. The impacted properties include Frank Varra Park, Coal Creek Trail Crossing, and Coal Creek Ditch. These resources would still need to be impacted, even if Phase 2 and Phase 3 were never implemented, in order to support the function required for Phase 1 to operate as expected.

**Boulder Segment**

Table 8.2-10, Boulder Segment Resources Impacted by Phase, lists the resources in the Boulder Segment that would be impacted by phases one through three.

**Table 8.2-10: Boulder Segment Resources Impacted by Phase**

Resources	Combined Alternative Package (Preferred Alternative) Total Build-out	Phase 1	Phase 2	Phase 3
ROW Displacements (Residential/Business)	2/0	0/0	2/0	0/0
Parks and Open Space (Number of Areas/Acres)	12/18.9	12/18.9	0	0
Noise (Feet)	7,900 feet of new sound walls	0	7,900 feet of new sound walls	0
Biological Resources (Acres)	Preble's meadow jumping mouse: 41.72 <sup>1</sup> Ute ladies'-tresses orchid: 35.94 <sup>1</sup> Burrowing owl: 63.29 Prairie dog habitat: 6.0 Sensitive habitat: 37.0	Preble's meadow jumping mouse: 38.16 <sup>1</sup> Ute ladies'-tresses orchid: 33.82 <sup>1</sup> Burrowing owl: 53.09 Prairie dog habitat: 6.0 Sensitive habitat: 0.9	Preble's meadow jumping mouse: 3.56 <sup>1, 3</sup> Ute ladies'-tresses orchid: 2.12 <sup>1, 3</sup> Burrowing owl: 10.20 <sup>3</sup> Prairie dog habitat: 0 Sensitive habitat: 36.1 <sup>3</sup>	0 0 0 0 0
Farmlands (Acres)	2.0 acres in open space	2.0 acres in open space	0	0
Hazardous Materials Sites (Moderate/High Risk Potential)	5/3	3/0	2/3	0/0
Wetlands (Wetland Acres/Open Water Acres) <sup>2</sup>	12.88/1.02	8.67/0.51	4.21/0.51	0
Historic Resources	9	6	3	0
Section 4(f) Properties	14	12	2	0

Source: US 36 Mobility Partnership, 2009.

Notes:

<sup>1</sup> Acres of T&E habitat.

<sup>2</sup> Impacts for the Combined Alternative Package (Preferred Alternative) "Local Streets Option" would be 12.85 acres of wetlands and 0.86 acre of other water features.

<sup>3</sup> These totals depend on the timing of the bus-only lane that may, or may not be built in Phase 2. This westbound bus-only lane will only be built if the appropriate triggers are met as described in Chapter 2, Alternatives Considered, and some of these impacts are associated with that action. For this discussion, these impacts are included in these other impacts that would occur in a later phase in this segment.

ROW = right-of-way

T&E = threatened and endangered

### *Right-of-way*

Of the 2 residential displacements in the Boulder Segment, none would be displaced in Phase 1.

### *Parks and Open Space*

Eleven open space resources and one trail crossing would be impacted by the Combined Alternative Package (Preferred Alternative) in this segment, totaling 18.9 acres in area, all of which would occur in Phase 1. These resources include:

- City on the Hill Open Space (Map Identification Number 909)
- Gallucci Open Space (Map Identification Number 903)
- Jirkovsky Open Space (Map Identification Number 906)
- Yunker Open Space (Map Identification Numbers 898, 897, 892, and 893)
- Van Vleet Open Space (Map Identification Numbers 885, 886, and 887)
- Short Open Space (Map Identification Number 889)
- South Boulder Creek Trail Crossing (Map Identification Number TC12)

### *Noise*

There are two sound walls considered reasonable and feasible in this segment (at Moorhead Avenue Homes and Apache Road and Pima Court Homes). These walls would be located west of the Foothills Parkway/Table Mesa Drive interchange. The elements of Phase 1 construction end to the east of the Foothills Parkway/Table Mesa Drive interchange, therefore, these walls would not be constructed as part of Phase 1. Once improvements are addressed for this area, mitigation recommendations will be implemented.

### *Biological Resources*

Much of the impacts to wildlife and threatened and endangered species associated with the Combined Alternative Package (Preferred Alternative) occur in the Boulder Segment. Over half of the impacts associated with the Combined Alternative Package (Preferred Alternative) in this segment occur in Phase 1.

The impacts to Preble's meadow jumping mouse habitat in Phase 1 would be 38.16 acres in comparison to 41.72 acres for the entire Combined Alternative Package (Preferred Alternative). The impacts to Ute ladies'-tresses orchid would be 33.82 acres in Phase 1, in comparison to 35.94 acres for the entire Combined Alternative Package (Preferred Alternative). The impacts to Burrowing owl habitat in Phase 1 would be 53.09 acres in Phase 1, in comparison to 63.29 acres for the entire Combined Alternative Package (Preferred Alternative).

Additionally, 6 acres of prairie dog habitat would be impacted in Phase 1, representing all of the impacts to prairie dog colonies in this segment. Burrowing owls are sometimes associated with prairie dog colonies and could be impacted along with the prairie dogs. There would be 42.59 acres of total impact to the South Boulder Creek Natural Area and 11.34 acres of total impact to the Colorado Tallgrass Prairie Natural Area. Of these, 37.00 acres of 0.90 acre would be impacted in Phase 1.

### *Farmlands*

There are 2 acres of important farmlands that would be directly affected in this segment located north and south of US 36 and east and west of Cherryvale Road, and these are associated with City of Boulder Open Space. These impacts would be associated with the water quality pond planned for this area. All of this impact is expected to occur in Phase 1.

### *Hazardous Materials*

There are 5 recognizable hazardous material sites that are ranked as having moderate risk and 3 sites ranked high risk in this segment, of which 3 moderate would be directly affected by Phase 1.

### *Wetlands*

The improvements proposed in Phase 1 would impact many of the wetlands and other water features located in the Boulder Segment. The wetlands and other water features from McCaslin Boulevard to South Boulder Creek would be the most affected. The estimated reduction in wetlands and other water features would be 12.88 acres and 1.02 acres, respectively, for the Combined Alternative Package (Preferred Alternative). Approximately 8.67 acres and 0.51 acre of wetlands and other water features, respectively, would be impacted by Phase 1.

### *Historic*

There are eight historic ditch resources in this segment that would be impacted but are all determined to have No Adverse Effect. All of these resources are associated with extending ditch culverts, six of which would occur in Phase 1 from South Boulder Creek east to Davidson Ditch, including Davidson Ditch, Goodhue Ditch, Shearer Ditch, Marshallville Ditch, South Boulder Canyon Ditch, and McGinn Ditch. The US 36 roadway from Foothills Parkway to Davidson Mesa is a historic segment of roadway that would be reconstructed during Phase 1, causing an adverse impact to this resource. The Viele Homestead would not be impacted by the Combined Alternative Package (Preferred Alternative).

### *Section 4(f)*

Twelve of the fourteen Section 4(f) properties impacted by the Combined Alternative Package (Preferred Alternative) would be impacted in Phase 1. Improvements near the Anderson Extension Ditch, Marshallville Ditch, and McGinn Ditch, would be impacted in Phase 2. The Davidson Ditch, Goodhue Ditch, Shearer Ditch, Marshallville Ditch, South Boulder Canyon Ditch, and McGinn Ditch, as well as all four of the open space properties (Gallucci Open Space, Yunker Open Space, Van Vleet Open Space, and Short Open Space), US 36 itself, and the South Boulder Creek Trail Crossing would all be impacted in Phase 1. Phase 1 improvements would have the same impacts as the Combined Alternative Package (Preferred Alternative) in terms of severity and area to be acquired. These resources would still need to be impacted, even if Phase 2 and Phase 3 were never implemented, in order to support the function required for Phase 1 to operate as expected. The Viele Homestead would not be impacted by the Combined Alternative Package (Preferred Alternative).

## **Phase 2**

### ***List of Elements***

Phase 2 would complete the remaining Combined Alternative Package (Preferred Alternative) elements not built in Phase 1 from west of the Foothills Parkway/Table Mesa Drive interchange to east of the Wadsworth Parkway interchange. This includes the climbing lanes between Foothills Parkway/Table Mesa Drive and McCaslin Boulevard; auxiliary lanes between McCaslin Boulevard and Interlocken Loop; BRT station improvements; and interchange improvements at Foothills Parkway/Table Mesa Drive, McCaslin Boulevard, Interlocken Loop, and Wadsworth Parkway.

Several improvements constructed as part of Phase 1 would be impacted as a result of Phase 2 construction. These areas are described in the paragraphs below.

A portion of the bikeway at the west end of the corridor that was constructed in Phase 1 would be relocated due to the realignment of the Foothills Parkway on-ramp to eastbound US 36. The additional cost of the relocation of the bikeway is estimated at \$3 million (2008 dollars).

Also in Phase 2, the Wadsworth Parkway interchange would be constructed in the ultimate configuration. Elements such as the 120<sup>th</sup> Avenue ramps would be constructed as part of this interchange. The on- and



off-ramps on the south side of US 36 that were built in Phase 1 would be removed and replaced with a loop-ramp and a slip-ramp in the ultimate configuration. The eastbound off-ramp to Wadsworth Parkway, the southbound Wadsworth Parkway to eastbound US 36 on-ramp, and the bikeway would then be built in their ultimate location as part of the Phase 2 improvements. The cost of constructing the Wadsworth Parkway interchange in Phase 1 is estimated to cost \$77.5 million (2008 dollars). Approximately half of these improvements would need to be removed and reconstructed, resulting in an additional cost.

As part of the Phase 2 improvements, the entire pavement area would be reconstructed. Even though some of this pavement would be new or completely replaced as part of the Phase 1 improvements, it is expected that it would be nearing the end of its useful life, as Phase 2 is expected to be built after 2035. The additional cost of the pavement rehabilitation through all three phases of construction is estimated at \$100 million (2008 dollars).

### **Purpose and Need**

Phase 2 would meet the project Purpose and Need in the following ways:

- **Transportation Need #1: Increase Trip Capacity** – the auxiliary lanes would provide additional capacity for travel between interchanges.
- **Transportation Need #2: Expand Access** – the interchange improvements associated with Phase 2 would improve access to US 36 at these locations.
- **Transportation Need #3: Provide Congestion Relief** – the auxiliary lanes would provide congestion relief for trips between interchanges, particularly local buses.
- **Transportation Need #4: Expand Mode of Travel Options** – the completion of bikeway improvements in Phase 2 would provide a continuous bikeway from Boulder to Broomfield.
- **Transportation Need #5: Increase Efficiency of Transit Service** – the improvements associated with Phase 2 would increase transit service efficiency through the implementation of auxiliary lanes, station enhancements, and improved interchange access, such as queue jumps.
- **Transportation Need #6: Update Outdated Highway Facilities** – Phase 2 would complete the reconstruction of US 36 from Foothills Parkway/Table Mesa Drive to Wadsworth Parkway.

Phase 2 was determined to have independent utility for the reasons described below.

The Phase 2 improvements would begin at the western terminus of the project and continue east to the Wadsworth Boulevard interchange, establishing logical termini for this phase.

These improvements are considered to be a reasonable expenditure of funds and would meet the Purpose and Need of the project, even if no additional transportation improvements are made in the area.

The improvements proposed in Phase 2 would not restrict consideration of alternatives for other reasonably foreseeable transportation improvements. For example, improvements associated with the University of Colorado, Boulder South Campus may be necessary as this area is developed.

### **Traffic**

As improvements are made in Phase 2 to complete the Combined Alternative Package (Preferred Alternative), the traffic operations in these areas are expected to be the same as the Combined Alternative Package (Preferred Alternative). However, until those improvements are made, it is expected that traffic operations would continue to degrade from the 2035 Phase 1 traffic operations described above. Traffic operations and LOS in the area from Wadsworth Parkway to I-25 would continue to degrade, with the exception of the managed lane.

### **Environmental Impacts**

The remaining impacts and mitigation associated with the Boulder Segment and Superior/Louisville Segment would occur during Phase 2, except for the bus-only lane that descends Davidson Mesa going in either direction and that would only be built when and if certain triggers are met – see Chapter 2, Alternatives Considered, for details on these triggers. Tables 8.2-6 through 8.2-10 summarize the impacts for Phase 2.

### **Phase 3**

#### **List of Elements**

Phase 3 would complete the remaining Combined Alternative Package (Preferred Alternative) elements not built in Phase 1 from east of the Wadsworth Parkway interchange to I-25. This includes auxiliary lanes; BRT station improvements; and interchange improvements at Federal Boulevard and Broadway/I-25. Additionally, there would be interchange improvements at Church Ranch Boulevard/104<sup>th</sup> Avenue.

As part of the Phase 3 improvements, the entire pavement area would be reconstructed. Even though some of this pavement would be new or completely replaced as part of the Phase 1 improvements, it is expected that it would be nearing the end of its useful life, as Phase 3 is expected to be built after 2035. The additional cost of the pavement rehabilitation through all three phases of construction is estimated at \$100 million (2008 dollars).

#### **Purpose and Need**

Phase 3 would meet the project Purpose and Need in the following ways:

- **Transportation Need #1: Increase Trip Capacity** – the auxiliary lanes would provide additional capacity for travel between interchanges, as would the general-purpose lane from Sheridan Boulevard to I-25.
- **Transportation Need #2: Expand Access** – the interchange improvements associated with Phase 3 would improve access to US 36 at these locations.
- **Transportation Need #3: Provide Congestion Relief** – the auxiliary lanes would provide congestion relief for trips between interchanges, particularly for local buses.
- **Transportation Need #4: Expand Mode of Travel Options** – the completion of bikeway improvements in Phase 3 would provide a continuous bikeway from Boulder to Denver.
- **Transportation Need #5: Increase Efficiency of Transit Service** – the improvements associated with Phase 3 would increase transit service efficiency through the implementation of auxiliary lanes, station enhancements, and improved interchange access, such as queue jumps.
- **Transportation Need #6: Update Outdated Highway Facilities** – Phase 3 would complete the reconstruction of US 36 from Wadsworth Parkway to I-25.

Phase 3 was determined to have independent utility for the reasons described here.

The Phase 3 improvements would begin at the Wadsworth Boulevard interchange and continue east to the eastern terminus of the project at I-25, establishing logical termini for this phase.

These improvements are considered to be a reasonable expenditure of funds and would meet the Purpose and Need of the project, even if no additional transportation improvements are made in the area.

The improvements proposed in Phase 3 would not restrict consideration of alternatives for other reasonably foreseeable transportation improvements. For example, planned improvements along the Northwest Rail corridor as part of the FasTracks Program would be accommodated as part of Phase 3.

### **Traffic**

Phase 3 would complete the Combined Alternative Package (Preferred Alternative) and is expected to have the same future traffic operations as the Combined Alternative Package (Preferred Alternative). However, until those improvements are made, it is expected that traffic operations would continue to degrade from the 2035 Phase 1 traffic operations described above.

A system-to-system ramp from southbound I-25 to westbound US 36 is proposed for this phase. This would remove the existing access to Broadway from I-25 and US 36/I-270. Prior to any design being performed on this system-to-system ramp, a separate study will be undertaken. This separate study will evaluate local access in the area and re-evaluate the proposed action prior to a final determination on local access to/from the interstate(s) for this area.

### **Environmental Impacts**

The remaining impacts and mitigation associated with the Denver, Adams, Westminster, and Broomfield segments would occur during Phase 3. There would be no additional impacts to the Boulder Segment. Tables 8.2-6 through 8.2-10 summarize the impacts for Phase 3.



## 8.3 IMPLEMENTATION OF FUTURE PROJECT PHASES

The first phased ROD will be consistent with projects currently identified in the 2035 MVRTP, as amended (DRCOG 2009). Projects required to implement the Combined Alternative Package (Preferred Alternative) not included in the first phased ROD will be identified in future RODs which will be prepared as funding is identified. These projects will be designed to minimize interim pieces and to build to the ultimate configuration.

The following general considerations will be taken into account when determining the scope of future RODs: CDOT will consider equity issues in the corridor and will be cognizant of the need to balance the construction of improvements throughout the corridor. If funding becomes available to local agencies, such as earmarks or private funds, projects may be identified for inclusion in future RODs. Circumstances in the corridor may change such that agreements developed during the FEIS process would impact the decision as to which projects to advance. These circumstances could include the realization of triggers as identified in this FEIS.

If state and/or federal funds become available, CDOT will identify projects to include in future RODs based on the following priorities. The first priority will be given to replacing aging infrastructure and/or addressing safety issues. The replacement of aging infrastructure will be given priority when the infrastructure deteriorates to such an extent its conditions affect operations of the corridor or safety of the traveling public. Projects arising from safety considerations may be given priority when safety data indicate higher than average crash rates at a particular location or when a substandard area or pinch point has been identified which adversely impacts the public. Second priority will be given to projects that improve traffic operations of the managed lanes and/or the general-purpose lanes. These types of projects will be prioritized based on the degree to which they will positively impact transit and HOV/SOV functions, maximize travel time savings, and relieve congestion.

In determining the scope of future phased RODs, stakeholder input will be considered via the standard DRCOG planning process. Additionally, as a project is advanced through the design process, input would be sought from those local agencies affected as is typical in CDOT project planning. Stakeholder input would also be sought in accordance with agreements that were developed during the FEIS process. These agreements are detailed below.

Once the projects have been identified for the next phase, the ROD will identify impacts and appropriate mitigation measures that are associated with those actions, including confirming air quality conformity for that phase.

### **Agreement #1 — Access to Broadway from I-25**

During the Draft Environmental Impact Statement (DEIS) and the PAC process, Adams County and local stakeholders raised significant concerns about the elimination of local access at Broadway. Impacts associated with this proposed closure are presented in Chapter 4, Affected Environment and Environmental Consequences. Based on public comments, potential impacts, and the length of time that has elapsed between the Finding of No Significant Impact (FONSI) and Interstate Access Request (IAR) for this action, CDOT and FHWA have committed that prior to any change to local access from the highway system to Broadway, a separate study will be undertaken. This separate study will evaluate local access in the area and re-evaluate the proposed federal action prior to a final determination on local access to/from the interstate(s) for this area. A map reference addressing this issue can be found in Appendix A, Corridor Reference Maps. The scope of the separate study will include, but is not limited to the following:

- Local outreach and coordination with Adams County and the Broadway area community will include, but is not limited to:
  - Local governments
  - Local businesses

- Local school districts
- Public safety services and emergency responders
- Analysis of the impacts to the Broadway area community will include, but is not limited to:
  - Residential and community impacts
  - Business and economic impacts
  - School district impacts
  - Public safety impacts and emergency services impacts
  - Traffic impacts

The separate study will reference the Save Your Neighborhood Access (SYNA) Committee’s presentation made at the April 9, 2009 US 36 public meeting as a starting point in scoping the separate study. The county and community have stated they will submit the SYNA presentation as part of their comments for the US 36 Corridor FEIS.

### **Agreement #2 — Bus-Only Lane on West End**

The Combined Alternative Package (Preferred Alternative) includes one new climbing lane in each direction, extending westbound from McCaslin Boulevard and eastbound from Foothills Parkway/Table Mesa Drive to the top of Davidson Mesa. A bus-only continuous auxiliary lane is also included to cover the “gap” between the end of the climbing lane and the beginning of the downstream interchange off-ramp deceleration lane, approximately 2,700 feet in the eastbound direction and approximately 8,000 feet in the westbound direction.

This bus-only continuous auxiliary lane will be addressed and evaluated for construction only if certain bus-related triggers are met; only after a re-analysis process has been completed; and only after the Phase 1 improvements (one managed lane in each direction and bikeway elements) and climbing lanes have been built. The triggers for considering the bus-only auxiliary lane will include:

- Degradation of average peak-period bus travel times along US 36 in the segment between the existing McCaslin park-n-Ride and Table Mesa park-n-Ride due to persistent congestion. The degradation, for each respective direction, officially occurs when the peak-period peak direction bus travel time (initially measured and established 1 year after the managed lanes are open) has delays of 2 minutes or more for at least 2 days per week for at least 3 weeks in a row. The delay shall not include those associated with inclement weather, road maintenance, or special events, but shall include days with vehicle accidents or stalls since these are typical causes of congestion and would likely be avoided with a bus-only auxiliary lane.
- Degradation of average peak period bus (Dash) travel times resulting from congestion on US 36 along South Boulder Road between the Table Mesa park-n-Ride and McCaslin Boulevard. The degradation, for each respective direction, officially occurs when the peak-period peak direction bus travel time (initially measured and established 1 year after the managed lanes are open) has delays of 3 minutes or more for at least 2 days per week for at least 3 weeks in a row. The delay shall not include those associated with inclement weather, road maintenance, road construction, or special events, but shall include days with vehicle accidents or stalls since these are typical causes of congestion.
- Degradation of average peak-period bus travel times resulting from congestion on US 36 for Route 228 along McCaslin Boulevard between the McCaslin park-n-Ride at US 36 and South Boulder Road due to persistent congestion. The degradation officially occurs when the northbound peak-period bus travel time (initially measured and established 1 year after the managed lanes are open) has delays of 2 minutes or more for at least 2 days per week for at least 3 weeks in a row. The delay shall not include those associated with inclement weather, road maintenance, road construction, or special events, but shall include days with vehicle accidents or stalls since these are typical causes of congestion.

It is expected that the above triggers will be measured during normal monitoring cycles by RTD, CDOT, or the local agencies that have responsibility for these routes or modes so that extra efforts to monitor these triggers will not be necessary. At a minimum, the above triggers will be looked at when traffic numbers require updating during re-evaluation processes. If a trigger is met, a re-analysis process will be initiated and include all US 36 communities along with FHWA, CDOT, and RTD representatives to develop and evaluate methods to improve bus operations. Goals of this process are to improve bus operations on US 36 and parallel arterials. When a trigger is met, some action will be taken to improve transit operations as defined above. Should actions other than construction of the bus-only lane occur and the triggers are met again, the re-analysis process will be re-initiated as necessary.

The re-analysis process will follow the basic NEPA steps of establishment of need (based on current conditions), development of various options to respond to that need, including such options as, but not limited to, bus operation changes on US 36 or parallel arterials, addition of queue jump lanes or transit signal priority on parallel arterials, congestion pricing, or building the continuous bus-only lane. Then these various options will be evaluated in an objective manner to determine the effect of each of the factors, such as bus and passenger travel times, safety, capital and operating costs, air quality, and environmental impacts. The most cost-effective and practical alternatives shall be implemented. Full public and agency involvement will be included in this re-analysis process.

No use of the bus-only auxiliary lane for any other modes (such as general-purpose or HOV) is included as a part of this FEIS. If such a use were to be contemplated in the future, a separate and new NEPA evaluation would be initiated to include:

- Full public involvement
- Full analysis of impacts
- Full agency involvement with FHWA, the U.S. Army Corps of Engineers (USACE), CDOT, RTD, and all US 36 communities

### **Agreement #3 — University of Colorado, Boulder South Campus Access at Table Mesa Drive**

The FEIS will identify interchange improvements that will not preclude the University of Colorado's future development options with the understanding that the proponent would be required to adhere to CDOT's 1601 process and participate in cost sharing because the access option is development driven. One highly desirable feature will include potential direct access from the property to the eastbound US 36 on-ramp.

CDOT will re-evaluate the FEIS prior to future phases being completed consistent with NEPA. If land use conditions have not changed, CDOT may select the most fiscally conservative alternative that meets traffic projections and provides alternative access to the general street system. If land use plans have been adopted, they will be considered in the design of the Foothills Parkway/Table Mesa Drive interchange.

In the future, when the ROD for this phase of improvements is being prepared and the University of Colorado, Boulder South Campus master plan (to be prepared by the University of Colorado) is more fully developed, access alternatives will be prepared in order to provide sufficient access to the University of Colorado's property at that time. Access to the University of Colorado, Boulder South Campus property from Table Mesa Drive will be at least at current or improved levels of accessibility and service based on the University of Colorado's intended use of the property.

CDOT will coordinate with the University of Colorado, the City of Boulder, and Boulder County prior to beginning work on improvements at the Foothills Parkway/Table Mesa Drive interchange to ensure future work in the area does not preclude any major options for this area, including access to this property. A Memorandum of Understanding (MOU) will establish the working relationship between CDOT, the City of Boulder, Boulder County and the University; identify the design goals for the interchange; and identify the methods to resolve any differences. The MOU will include access to the University of Colorado, Boulder South Campus property from a major arterial or highway and will be at least at current or

improved levels of accessibility and service based on the University of Colorado's intended use of the property and consistent with CDOT's 1601 process. The MOU will also include:

- Concurrence points for decision-making and interactions.
- Goals and design review process for the Foothills Parkway/Table Mesa Drive interchange.
- Cost sharing and funding principles.
- Principles for assigning construction responsibilities, coordination, and facility maintenance.
- Public involvement and outreach.
- The process for re-evaluating the FEIS for interchange design and construction.

This agreement will not preclude opportunities for changes to the local surface street system and associated interchange reconfigurations as development plans advance.



## 8.4 MITIGATION

Table 8.4-1, Mitigation Summary— Phase 1, describes the mitigation measures that will be implemented for Phase 1.

Many of these measures will apply to Phase 2 and Phase 3 as well, unless all of the resource impacts are realized in Phase 1, as Tables 8.2-4 through 8.2-8 indicate. Phase 2 and Phase 3 have the additional mitigation of requiring further traffic and impact studies for the University of Colorado, Boulder South Campus access at Table Mesa Drive and the Broadway access preservation study from I-25/US 36/I-270, respectively.

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
<b>Chapter 3, Transportation Impacts and Mitigation</b>		
Delay at the Federal Boulevard and 80 <sup>th</sup> Avenue and 74 <sup>th</sup> Avenue intersections	Operations	<p>West 80<sup>th</sup> Avenue at Federal Boulevard:</p> <ul style="list-style-type: none"> <li>A southbound lane from West 80<sup>th</sup> Avenue to the westbound US 36 on-ramp will be added.</li> </ul> <p>West 74<sup>th</sup> Avenue at Federal Boulevard:</p> <ul style="list-style-type: none"> <li>The eastbound approach to left-turn, left-/through-, and right-turn lanes will be re-stripped.</li> <li>Signal phasing will be adjusted.</li> </ul>
Delay at the Wadsworth Parkway and Midway Boulevard intersection	Operations	<p>Wadsworth Parkway at Midway Boulevard:</p> <ul style="list-style-type: none"> <li>The westbound approach to two left-turn lanes, two through-lanes, and a separate right-turn lane will be re-stripped.</li> <li>Signal phasing will be adjusted.</li> </ul>
Delay at Dillon Road and McCaslin Boulevard	Operations	<ul style="list-style-type: none"> <li>Dillon Road east of McCaslin Boulevard will be widened to add one westbound lane. This lane will not extend through the McCaslin Boulevard intersection.</li> <li>The east leg of the intersection will have two left-turn lanes, a left or through-lane, and a separate right-turn lane under Package 2 and Package 4. No intersection mitigation will be necessary under the Combined Alternative Package (Preferred Alternative).</li> </ul>
Closure of local access to Broadway	Access	<ul style="list-style-type: none"> <li>Prior to any changes to local access from the highway system to Broadway, a separate study will be undertaken. The study will evaluate local access in the area and re-evaluate the previous federal proposed action to eliminate access to Broadway.</li> </ul>
Closure of local access to West 88 <sup>th</sup> Place	Access	<ul style="list-style-type: none"> <li>Directional signage and traveler information will be provided to guide users to Yates Street and West 88<sup>th</sup> Avenue by alternate routes.</li> </ul>
University of Colorado, Boulder South Campus access	Access	<ul style="list-style-type: none"> <li>Loop Drive access to the University of Colorado, Boulder South Campus will be retained. The Table Mesa Drive interchange will be modified to provide bus BRT access would be modified and the westbound to eastbound loop on-ramp will be eliminated.</li> <li>Based on an agreement with CDOT, the University of Colorado, the City of Boulder, and Boulder County, if access at Loop Drive is denied, Tantra Drive will be extended to provide access to the University of Colorado, Boulder South Campus.</li> </ul>
Transit Priority	Operations	<ul style="list-style-type: none"> <li>Analysis of, and if appropriate, implementation of signal priority at key intersections. The intent is to move buses quickly through intersections. The analysis that will be done will include current and projected delay at key intersections, capital and operating costs, and effects to other signals in the vicinity.</li> </ul>
Reduction of Parking Spaces at the McCaslin Station	Parking	<p>Consider the following mitigation measures during final design:</p> <ul style="list-style-type: none"> <li>Shift the bikeway closer to the westbound US 36 on-ramp from McCaslin Boulevard.</li> <li>Add a retaining wall along the north side of US 36 adjacent to the current leased parking.</li> <li>Realign the eastbound US 36 off-ramp to be parallel to US 36.</li> <li>If necessary, renegotiate the leased parking agreement to add more parking to the west of the current leased area and behind the theater building.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
<b>Section 4.2, Land Use</b>		
Compatibility and acquisitions	Construction	<ul style="list-style-type: none"> <li>Continued coordination with local jurisdictions will occur to ensure compatibility with land use plans and to address any incompatibilities.</li> <li>Coordination will occur with the University of Colorado and the City and County of Boulder to evaluate access requirements for master planning efforts near Table Mesa Drive.</li> <li>Property acquisitions will be reimbursed at fair market value and if possible, comparable land will be provided to compensate for open space acquisition.</li> </ul>
<b>Section 4.3, Economic Considerations</b>		
Loss of customers to businesses in activity centers due to access restrictions during construction	Construction	<ul style="list-style-type: none"> <li>The contractor will be required to maintain access to businesses during construction.</li> <li>Local jurisdiction or project sponsor will provide additional signage to enable customers to access businesses during construction.</li> </ul>
Loss of property tax	Operations	<ul style="list-style-type: none"> <li>Design will be refined at preliminary and final engineering to reduce ROW requirements.</li> <li>The contractor will consider a variety of ways of structuring ROW/acquisition needs, including securing easements and license agreements.</li> </ul>
Modifications to access	Operations	<ul style="list-style-type: none"> <li>A cooperative process will be employed during design to avoid or minimize access changes.</li> <li>Directional signage and traveler information, where access is substantially changed, will be provided.</li> </ul>
Modifications to parking	Operations	<ul style="list-style-type: none"> <li>A cooperative process will be employed during design to avoid or minimize disruption or displacement of business parking.</li> </ul>
<b>Section 4.4, Right-of-Way and Relocations</b>		
Acquisition of private and public property, and in some circumstances, displacement of occupants	Construction	<p><b>Acquisition</b> — For any person(s) whose real property interests may be impacted by this project, the acquisition of those property interests will comply fully with the Uniform Act. The Uniform Act is a federally mandated program that applies to all acquisitions of real property or displacements of persons resulting from Federal or federally-assisted programs or projects. It was created to provide for and ensure the fair and equitable treatment of all such persons. To further ensure that the provisions contained within this Act are applied "uniformly," CDOT requires Uniform Act compliance on any project for which it has oversight responsibility regardless of the funding source. Additionally, the Fifth Amendment of the United States Constitution provides that private property may not be taken for a public use without payment of "just compensation." All impacted owners will be provided notification of the acquiring agency's intent to acquire an interest in their property, including a written offer letter of just compensation specifically describing those property interests. A ROW Specialist will be assigned to each property owner to assist them with this process.</p>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
Acquisition of private and public property, and in some circumstances, displacement of occupants (continued)	Construction	<p><b>Relocation</b> — In certain situations, it may also be necessary to acquire improvements that are located within a proposed acquisition parcel. In those instances where the improvements are occupied, it becomes necessary to “relocate” those individuals from the subject property (residential or business) to a replacement site. The Uniform Act provides for numerous benefits to these individuals to assist them both financially and with advisory services related to relocating their residence or business operation. Although the benefits available under the Uniform Act are far too numerous and complex to discuss in detail in this document, they are available to both owner occupants and tenants of either residential or business properties.</p> <p>In some situations, only personal property must be moved from the real property, and this is also covered under the relocation program. As soon as feasible, any person scheduled to be displaced shall be furnished with a general written description of the displacing agency’s relocation program which provides, at a minimum, detailed information related to eligibility requirements, advisory services and assistance, payments, and the appeal process. It shall also provide notification that the displaced person(s) will not be required to move without at least 90 days advance written notice. For residential relocatees, this notice cannot be provided until a written offer to acquire the subject property has been presented, and at least one comparable replacement dwelling has been made available.</p> <p>Relocation benefits will be provided to all eligible persons regardless of race, color, religion, sex, or national origin. Benefits under the Uniform Act, to which each eligible owner or tenant may be entitled, will be determined on an individual basis and explained to them in detail by an assigned ROW Specialist.</p> <ul style="list-style-type: none"> <li>• CDOT will provide the required 90-day notice for Geodetic Control Monuments impacted by this project.</li> </ul>
<b>NOAA Geodetic Control Monuments</b>		
<b>Section 4.5, Social Impacts and Community Facilities</b>		
Reduced mobility in neighborhoods around transit stations	Construction	<ul style="list-style-type: none"> <li>• A CMP will be developed during final engineering, in conjunction with local jurisdictions, school districts, emergency services, and affected parties.</li> </ul>
<b>Section 4.6, Environmental Justice</b>		
Residential and commercial private property acquisitions	Construction	<ul style="list-style-type: none"> <li>• Refer to Section 4.4, Right-of-Way and Relocations.</li> <li>• All acquisitions and relocations will fully comply with the Uniform Act (42 USC 4601 et seq.) and Uniform Relocation Assistance and Real Property Acquisition for federal and federally-assisted programs (49 CFR 24 et seq.) (Uniform Act) and other statutes.</li> <li>• Relocation benefits will be provided to all eligible persons regardless of race, color, religion, sex, or national origin. Benefits which eligible owners or tenants may be entitled to will be determined on an individual basis and explained in detail by an assigned ROW Specialist.</li> <li>• Design in engineering phases will be refined to reduce ROW requirements.</li> <li>• A variety of ways to structure ROW acquisition needs will be considered, including easements and license agreements.</li> <li>• CDOT and RTD will coordinate with Adams County, municipalities, and other agencies to engage a contractor for additional outreach to meet with affected property and business owners to provide counseling and assistance in applying for funding. This will include research to summarize loans, grants, and federal aid available, and research of demographically similar areas.</li> <li>• All residential units that are being displaced will be considered for an RTD program to provide ECO passes for a year.</li> <li>• CDOT and RTD will conduct meetings and develop a relocation mitigation and enhancement plan in collaboration with the community to address indirect social/psychological/economic impacts to communities.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
Loss of parkland and open space	Construction	<ul style="list-style-type: none"> <li>• CDOT and RTD will coordinate with local jurisdictions to evaluate appropriate replacements or other acceptable mitigation measures.</li> <li>• Compensation for parkland acquisition will be negotiated with the public land's representatives. At a minimum, compensation shall include comparable replacement of parkland and facilities within approximately 2 miles of the affected parkland or adequate compensation, based on fair market appraisals.</li> <li>• All acquisition mitigation measures must conform to the Uniform Act.</li> <li>• Compensation for resource acquisitions shall be approved by the NPS in cooperation with public entities, as appropriate. Section 6(f) of the 1965 LWCF Act (16 USC 4601-4) requires that the Section 6(f) property at Rotary Park be replaced by recreation property of equal value and usefulness. This is only for Package 2 and Package 4.</li> <li>• Design meetings will be held with appropriate officials during final design to discuss how additions to Rotary Park could best be designed to meet the needs of the community. This is only for Package 2 and Package 4.</li> <li>• The design for the eastbound US 36 ramp to southbound Federal Boulevard will be revisited during subsequent design phases to identify design modifications to alleviate impacts. These design modifications will be coordinated with the local jurisdictions.</li> <li>• Design meetings will be held with the community during final design to determine the most context-sensitive solution.</li> </ul>
Visual impacts related to larger interchanges, wider pavements, sound walls, and retaining walls	Construction/ Operations	<ul style="list-style-type: none"> <li>• Existing sound walls will be reconstructed early in the construction schedule, where possible, to mitigate for construction noise.</li> </ul>
Noise	Construction/ Operations	<ul style="list-style-type: none"> <li>• Refer to the Construction Mitigation outlined in Section 4.22, Construction-Related Impacts.</li> </ul>
General construction impacts to the community	Construction	<ul style="list-style-type: none"> <li>• CDOT and RTD will implement an overall CMP to address communications, community impacts, visual protection, air quality, safety controls, noise controls, and traffic controls to minimize impacts to low-income households and minority populations and to maintain access to local businesses, residences, and emergency services. Hotel vouchers will be offered to residents in the Adams Segment should any nighttime construction be anticipated.</li> <li>• Efforts will be made within the Adams Segment to connect contractors with local residents to fill construction jobs.</li> <li>• During the construction contracting process, goals will be established for the use of small and disadvantaged businesses.</li> <li>• Access to local businesses will be maintained during construction and signs will be used to enable customers to access businesses during construction.</li> <li>• CDOT and RTD will coordinate to minimize impacts to local and regional bus routes.</li> </ul>
Financial equity of managed lanes on low-income populations	Operations	<ul style="list-style-type: none"> <li>• In Package 2 and the Combined Alternative Package (Preferred Alternative), tolling costs will be set to give consideration to not exclude low-income drivers from participating. Transponders are free, but an account must be set up with a reserve balance to pay for each use. In addition, technology changes, such as License Plate Tolling being implemented on E-470, would provide options for low-income drivers that would not require setting up an account. Details of the tolling program are included in Chapter 5, Financial Analysis.</li> <li>• During design and after implementation of the project, CDOT and RTD will conduct meetings with low-income and minority communities to assess the operations and equity of the tolling program and managed lanes.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
<b>Section 4.7, Historic and Archaeological Preservation</b>		
Removal or impact to structure	Permanent	<ul style="list-style-type: none"> <li>Avoidance and minimization will be addressed first.</li> <li>A Programmatic Agreement with all parties will be established.</li> <li>Relocation of structure, if possible, will take place.</li> </ul>
Impact to a portion of a parcel	Permanent	<ul style="list-style-type: none"> <li>Avoidance and minimization will be addressed first.</li> <li>A Programmatic Agreement with all parties will be established.</li> </ul>
Impact to archaeological resource or linear feature	Permanent	<ul style="list-style-type: none"> <li>Avoidance and minimization will be addressed first.</li> <li>Data recovery and excavation will be provided.</li> <li>Construction monitoring will be provided, as necessary, in areas with archaeological resources.</li> </ul>
Direct effects to some or all sites: dust and debris	Temporary/Construction	<ul style="list-style-type: none"> <li>Precautionary measures, such as temporary shields to reduce the impact of dust, will be implemented.</li> <li>Contractor training to prevent flying debris effects will take place.</li> </ul>
Indirect effects to some or all sites: visual, auditory, and decreased access	Temporary/Construction	<ul style="list-style-type: none"> <li>Planned construction staging will be provided to avoid these effects, wherever possible.</li> <li>Signage and well-marked alternate routes for access will be provided.</li> </ul>
Indirect impact to remaining sites: visual and noise	Indirect/Permanent	<ul style="list-style-type: none"> <li>Case-by-case consultation will be performed.</li> <li>Sound walls or visual barriers will be constructed.</li> </ul>
<b>Section 4.8, Paleontology</b>		
Disturbance of paleontological resources during construction	Construction	<ul style="list-style-type: none"> <li>Construction monitoring by a qualified paleontologist may be necessary for excavation into potentially fossiliferous Laramie, Arapahoe, and Denver Formation outcrops.</li> </ul>
<b>Section 4.9, Parks and Open Space</b>		
Trail crossings	Construction	<ul style="list-style-type: none"> <li>Adequate trail detours and advanced notice and signing prior to beginning construction will be provided.</li> </ul>
Trail relocations	Construction	<ul style="list-style-type: none"> <li>Trails will be returned to their existing or comparable state following construction.</li> </ul>
Temporary occupancy of parkland during construction	Construction	<p>In coordination with local jurisdictions, plans will be prepared and implemented defining the BMPs for the following:</p> <ul style="list-style-type: none"> <li>Public safety and security for the project site will be planned. This plan will include all appropriate access, signing, and public information BMPs.</li> <li>A traffic, pedestrian, and bicycle access management plan will be provided for the project area during construction.</li> </ul>
Loss of vegetation	Construction	<ul style="list-style-type: none"> <li>Disturbed areas will be seeded with native grasses and forbs. Native shrubs will be added to the mix as appropriate. Trees will be replaced at a 1:1 ratio in locations where soils support the highest probability for re-establishment of vegetation. New trees will be planted near areas that naturally receive adequate water, such as near drainage areas or wetlands. Sapling trees in riparian areas may require initial watering for establishment.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
Spread of noxious weeds	Construction	<ul style="list-style-type: none"> <li>Weed control will use the principles of integrated pest management to treat target weed species efficiently and effectively by using a combination of two or more management techniques (biological, chemical, mechanical, and/or cultural). Weed control methods will be selected based on the management goal for the species; the nature of the existing environment, and methods recommended by Colorado State University, county weed boards, and other weed experts. The presence of important wildlife habitat or T&amp;E species will be considered when choosing control methods.</li> </ul>
Erosion control	Construction	<ul style="list-style-type: none"> <li>The following activities will take place: provision of BMPs, in accordance with the CDOT Drainage Design Manual, will be used during construction to control erosion (refer to Section 4.20, Water Resources: Water Quality and Floodplains); protect cultural resources (refer to Section 4.7, Historic and Archaeological Preservation, and Section 4.8, Paleontology); minimize visual degradation (refer to Section 4.11, Visual and Aesthetic Resources); and assure prompt revegetation (refer to Section 4.14, Biological Resources: Wildlife, Vegetation, and Threatened and Endangered Species).</li> </ul>
Future planned park, trail, and open space projects	Construction	<ul style="list-style-type: none"> <li>During final design, coordination will occur with public land's representatives to reasonably address future park, trail, and open space projects included in adopted plans.</li> </ul>
Parkland acquisition	Operations	<ul style="list-style-type: none"> <li>Compensation for parkland acquisition will be negotiated with the public land's representatives. At minimum, compensation will include comparable replacement of parkland and facilities within approximately 2 miles of the affected parkland or adequate compensation, based on fair market appraisals. All acquisition mitigation measures must conform to the Uniform Act.</li> </ul>
Section 6(f) resources acquisition (Package 2 and Package 4)	Operations	<ul style="list-style-type: none"> <li>Compensation for resource acquisitions will be approved by the NPS in cooperation with public entities, as appropriate. Section 6(f) requires that any Section 6(f) property affected by this project be replaced by recreation property of equal value and usefulness. All acquisition mitigation measures must conform to the Uniform Act.</li> </ul>
Open space acquisition	Operations	<ul style="list-style-type: none"> <li>Open space acquisition will be reimbursed at fair market value to the owner of the public lands. It should be the responsibility of the project sponsors to identify comparable lands that may be purchased to replace open space lands that are acquired. All acquisition mitigation measures must conform to the Uniform Act.</li> </ul>
Impacts to wildlife habitat	Construction/ Operations	<ul style="list-style-type: none"> <li>See Section 4.14, Biological Resources: Wildlife, Vegetation, and Threatened and Endangered Species.</li> </ul>
Trail crossings	Operations	<ul style="list-style-type: none"> <li>Pedestrian underpasses more than 20 feet in length will be lighted to standards for safety and security.</li> </ul>
Trail relocations	Operations	<ul style="list-style-type: none"> <li>Trailhead and trail connections to residential and commercial developments will be preserved. Alternate trail routes accomplishing a similar connection will be provided, where trails must be adjusted.</li> <li>Trails that must be relocated to a public street due to property acquisition will be enhanced with signs and additional plantings (where possible) commensurate with the impact. Vegetation selection will be determined by the owner of the public land's Parks and Recreation Department.</li> </ul>
Visual impacts to parkland and open spaces	Construction	<ul style="list-style-type: none"> <li>Disturbed parkland and open space areas due to construction will be returned to their previous condition. Options include seeding with native grasses and forbs. Native shrubs will be added to the mix as appropriate. Trees will be replaced at a 1:1 ratio in locations where soils support the highest probability for re-establishment of vegetation, such as near riparian resources. For the Combined Alternative Package (Preferred Alternative), visual impacts were mitigated in the Boulder Segment by using slopes instead of retaining walls.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
<b>Section 4.10, Public Safety and Security</b>		
Crime at transit stations	Operations	<ul style="list-style-type: none"> <li>• RTD will hire additional transit security personnel to inspect transit station areas as needed.</li> </ul>
Fire at transit stations	Operations	<ul style="list-style-type: none"> <li>• RTD will provide training to local fire departments to address the special needs of transit fires as needed.</li> </ul>
Crime at the Westminster Center and 116 <sup>th</sup> Avenue transit stations	Operations	<ul style="list-style-type: none"> <li>• RTD will monitor these transit stations and implement more aggressive security measures as needed.</li> <li>• CCTV/video surveillance will be incorporated into the plans at all transit stations. Surveillance will include both personal and video surveillance. Video surveillance systems will be capable of transmitting real-time video to RTD via a fiber optic transmission backbone or other suitable transmission network. Personal surveillance will include uniformed officers who sporadically inspect transit stations. CPTED strategies will be incorporated in the entire design. The purpose of CPTED is to minimize potential threats and vulnerabilities to the transit system, facilities, and patrons, and maximize safety and security through engineering and design. CPTED strategies that will be included are: <ul style="list-style-type: none"> <li>• Maximizing the visibility of people, parking areas, patron flow areas and building/structure areas.</li> <li>• Providing adequate lighting to minimize shadows.</li> <li>• Installing graffiti guards and removing graffiti when discovered</li> <li>• Using Mylar shatter guard protection for glass windows.</li> <li>• Installing landscape plantings that maximize visibility.</li> <li>• Installing gateway treatments, decorative fencing, perimeter control, and a minimum number of parking structures access points.</li> <li>• Coordinating and cooperating with municipalities to promote transit friendly land uses, and avoiding land uses that have links to crime (e.g., liquor stores, taverns, pawnshops, pool halls, vacant lots, and abandoned buildings).</li> <li>• Establishing maintenance programs that provide for the repair of broken windows, the pick up of litter, and the management streetscapes and public spaces.</li> </ul> </li> </ul>
Safety issues at transit platforms	Operations	<p>Design elements and electronic technology may be used to ensure the transit platform area is safe and free of hazards. Representative measures may include:</p> <ul style="list-style-type: none"> <li>• Active and passive warning devices that alert persons of risks and hazards.</li> <li>• LED flashing pedestrian warning signs that warn of approaching transit vehicles.</li> <li>• Pavement coloring and texturing to notify pedestrians of hazards and/or risk areas.</li> <li>• On platforms with poor sight distance, installing pedestrian barriers such as swing gates, automatic pedestrian gates, or Z-crossings to prevent pedestrians from entering the transit guideway.</li> </ul>
Limiting of emergency access/egress at transit stations	Operations	<ul style="list-style-type: none"> <li>• Transit stations will be designed to meet the requirements for stations as identified in NFPA 130 guidelines. All stations will have a minimum of two access/egress points. Access/egress will be in a manner that facilitates safe and efficient evacuation from the station platform in 4 minutes or less.</li> </ul>



**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
Decrease in emergency response times due to roadway closures and detours	Construction	<ul style="list-style-type: none"> <li>The construction phasing and sequencing will be carefully designed to minimize potential impacts to public services. The effectiveness of the phasing and sequencing plan will be monitored and adjusted as necessary.</li> <li>RTD will coordinate with emergency response groups regarding local closures, changes in circulation, and detour routes both during and after construction. See Section 4.22, Construction-Related Impacts, for more information.</li> </ul>
<b>Section 4.11, Visual and Aesthetic Resources</b>		
Construction staging materials	Construction	<ul style="list-style-type: none"> <li>Staging areas along US 36 will be fenced and/or screened.</li> </ul>
Construction staging areas	Construction	<ul style="list-style-type: none"> <li>Staging areas will be rehabilitated to enhance the surrounding setting; vegetation will be replaced with native grass, forbs, shrubs, or trees, as appropriate. Staging area rehabilitation will reflect the original setting. For example, if native grass field areas are disturbed for staging, they will be replaced with similar native vegetation.</li> </ul>
Construction lighting and illumination	Construction	<ul style="list-style-type: none"> <li>Lighting will be limited to that required for safety and security. Lighting will be shielded and directed at working areas to minimize glare and ambient light conditions in nearby areas including adjacent travel lanes.</li> </ul>
Removal of residences and business	Construction	<ul style="list-style-type: none"> <li>Structure removal and area improvements will be expedited to reduce impact on remaining neighbors. The contractor will be required to adhere to the agreed-upon schedule.</li> </ul>
Freeway and transit station visual nuisance to adjacent property owners	Operations	<ul style="list-style-type: none"> <li>In coordination with local government entities, visual buffers (such as stamped patterns in sound wall, Boston ivy, trees, or other landscaping) will be provided, whenever possible. Coordination will determine which entity will maintain the improvements.</li> </ul>
Retaining walls	Operations	<ul style="list-style-type: none"> <li>Retaining walls will reflect natural appearance in textures and colors and be graffiti-resistant. Walls will be tiered, where feasible.</li> </ul>
Sound walls	Operations	<ul style="list-style-type: none"> <li>Aesthetics of sound walls will be coordinated with local jurisdictions and will be graffiti resistant.</li> </ul>
Landscaping removal	Operations	<ul style="list-style-type: none"> <li>All landscaping, such as trees, shrubs, lawn, and perennials, and in some cases native grasses, will be replaced where it was removed or where the property owner/public entity selects.</li> <li>Where tree diameters are greater than 10 inches measured breast height off the ground, the replacement ratio will be two trees, unless tree ordinances direct otherwise. Typical replacement materials will include 4- to 6-foot evergreens, 1.5- to 2-inch deciduous trees, or 5-gallon shrubs. CDOT Region 6 tree replacement policy will be followed.</li> </ul>
Replacing or adding a new bridge structure	Operations	<ul style="list-style-type: none"> <li>Corridor design guidelines will be applied using materials and colors similar to existing structures in the area. It is recommended that the design elements from existing bridge designs located at Interlocken Loop and other similar examples be used. When possible, widenings will match existing aesthetic materials and design elements.</li> </ul>
Transit stations	Operations	<ul style="list-style-type: none"> <li>Although BRT station designs will be reviewed and approved by the local jurisdictions, it is recommended these sites be integrated into the landscape. Parking at transit stations will adhere to local parking ordinances regarding shading, landscaping, lighting, and visibility. Entries to parking and transit stations will be designed using local materials and colors.</li> </ul>
Lighting	Operations	<ul style="list-style-type: none"> <li>Lights will be directional and shielded, and timers and sensors will be used to minimize the time that lights are on in areas where lighting is not normally needed for safety, security, or operation. Lights at the transit stations will be directional and shielded to reduce off-site light scatter and glare.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
Section 4.12, Air Quality Criteria Pollutants	Construction	<ul style="list-style-type: none"> <li>• APEN and an air permit is required for projects over 25 acres and that last more than 6 months in length. APEN will cover APCD required mitigation measures for active construction.</li> <li>• CDOT will include language in the construction specifications requiring all construction equipment to be equipped to burn ultra-low sulfur diesel fuel.</li> <li>• Usage of water or wetting agents to manage dust.</li> <li>• Usage of wind barriers and wind screens to minimize the spread of dust in areas where large amounts of materials are stored.</li> <li>• Usage of a wheel wash station and/or large-diameter cobble apron at egress/ingress areas to minimize dirt being tracked onto public streets.</li> <li>• Usage of vacuum-powered street sweepers to control dirt tracked onto streets.</li> <li>• Coverage of all dump trucks leaving the site.</li> <li>• Coverage or wetting temporary excavated materials.</li> <li>• Usage of a binding agent for long-term excavated materials.</li> <li>• For winter time construction, engine pre-heater devices will be installed to eliminate unnecessary idling.</li> <li>• Tampering with equipment to increase horsepower or to defeat emissions control devices effectiveness will be prohibited.</li> <li>• Construction vehicle engines will be required to be properly tuned and maintained.</li> <li>• Usage of construction vehicles and equipment with the minimum practical engine size for the intended jobs.</li> <li>• Active grading and parking areas will be watered as required.</li> <li>• BMPs will be used for stockpiles.</li> <li>• All trucks hauling dirt, sand, or other loose material will be covered or maintain freeboard in accordance with local jurisdiction requirements.</li> <li>• Refer to the CMP in Section 4.22, Construction-Related Impacts.</li> </ul>
Visibility/Opacity	Construction	<ul style="list-style-type: none"> <li>• Refer to the CMP in Section 4.22, Construction-Related Impacts.</li> </ul>
Ozone	Construction/ Operations	<ul style="list-style-type: none"> <li>• Commitment to any appropriate Regional Air Quality Council adopted mitigation measures for ozone.</li> </ul>
MSATs	Construction/ Operations	<ul style="list-style-type: none"> <li>• Truck routes will be restricted to avoid sensitive receptor populations.</li> <li>• Pavement durability will be improved to reduce the frequency of repaving.</li> <li>• Ultra-low sulfur diesel will be used in non-road equipment.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
<p>Section 4.13, Noise</p> <p>Noise impacts to local communities during construction</p>	<p>Construction</p>	<p>The following noise control measures will be implemented during construction:</p> <ul style="list-style-type: none"> <li>• Permanent sound walls will be constructed at the beginning of the project when feasible.</li> <li>• The contractor will be required to prepare a noise control plan that outlines allowable daytime and nighttime uses, projected noise levels, and locations and types of noise abatement measures that may be required to meet specified noise limits.</li> <li>• The contractor will comply with all applicable local sound control and noise ordinances and regulations.</li> <li>• The following is a list of construction noise mitigation measures that will be employed where the noise control plan specifies (note that these measures will be implemented only where feasible and needed): <ul style="list-style-type: none"> <li>— Use low-noise equipment with mufflers, intake silencers, engine enclosures, and acoustically attenuating shields or shrouds.</li> <li>— Use hydraulically or electrically powered equipment.</li> <li>— Stage construction timing or sequencing to avoid sensitive times of the day. Combine noisy operations so they occur in the same time period. The total noise level produced will not be substantially greater than the level produced if the operations were performed separately.</li> <li>— Locate stationary noise sources as far from sensitive receptors as possible.</li> <li>— Use natural and artificial barriers, such as ground elevation and existing buildings, to shield construction noise. Staging areas should be kept as far from sensitive noise receptors as possible.</li> <li>— Limit pile driving and blasting to daytime working hours near land uses with sensitive receptors.</li> <li>— Use sonic or vibratory pile drivers instead of impact pile drivers.</li> <li>— Avoid placing haul routes through residential areas.</li> </ul> </li> <li>• Use quieter demolition methods where possible, such as sawing bridge decks into sections that can be loaded onto trucks, resulting in lower cumulative noise levels than impact demolition by pavement breakers.</li> </ul>
<p>When noise levels exceed NAC due to traffic and buses</p>	<p>Operations</p>	<ul style="list-style-type: none"> <li>• Sound walls are the only feasible noise mitigation measure, and will be provided in the following locations (subject to refinement as part of final design): <ul style="list-style-type: none"> <li>— All locations where existing sound walls will need to be removed to accommodate the proposed improvements. <ul style="list-style-type: none"> <li>— Madison Hill homes.</li> <li>— Tuscany Trail.</li> <li>— Rock Creek Apartments.</li> <li>— Apache Road and Pima Court neighborhood.</li> <li>— Moorhead Avenue neighborhood.</li> </ul> </li> </ul> </li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
Section 4.14, Biological Resources: Wildlife, Vegetation, and Threatened and Endangered Species  Loss of vegetation including sensitive habitats	Construction	<ul style="list-style-type: none"> <li>• During final design, the grading plan will be developed to minimize the removal of riparian vegetation where possible.</li> <li>• During construction, vehicle operation will be limited to the designated construction area, and the limits of the construction area will be fenced to exclude and protect sensitive habitats, including prairie dog towns, riparian areas, wetlands, and upland trees and shrubs.</li> <li>• Silt fencing, erosion logs, temporary berms, and other BMPs may be used to prevent degradation of habitats adjacent to the construction area by transport of eroded sediment.</li> <li>• Graded areas within the ROW will be seeded with an appropriate mixture of native grasses and forbs; shrubs will be planted where appropriate.</li> <li>• Restoration of disturbed riparian habitat will include planting of native trees and shrubs, as well as seeding and regrading. Native grasses, forbs, and shrubs will also be seeded in riparian areas. SB 40 requires replacement of riparian trees at a 1:1 ratio, and shrubs on a square-foot basis.</li> <li>• To compensate for the effects of riparian habitat loss, equivalent areas of riparian habitat will be enhanced or restored. This may include, but is not limited to the planting of native trees and shrubs, control of noxious weeds, the seeding of native species, or establishment of conservation easements on riparian areas in the vicinity of the project.</li> <li>• All landscaping, such as trees, shrubs, lawn, perennials, and in some cases, native grasses, will be replaced where it was removed. CDOT Region 6 tree replacement policy will be followed.</li> <li>• See also landscaping removal mitigation under Section 4.11, Visual and Aesthetic Resources.</li> <li>• Impacts to sensitive areas will be avoided or minimized during final design, including the South Boulder Creek Natural Area, and the Colorado Tallgrass Prairie PCA.</li> </ul>
Loss of prairie dog colonies	Construction	<p>CDOT has a state-wide policy on black-tailed prairie dog mitigation that will be implemented for prairie dogs located within the US 36 corridor. This policy identifies a four-step process to be used when black-tailed prairie dogs may be affected by a project:</p> <ul style="list-style-type: none"> <li>• Avoidance of impacts</li> <li>• Minimization of impacts</li> <li>• Relocation</li> <li>• If relocation is impossible or impractical, impacted black-tailed prairie dogs will be humanely removed from burrows that will be directly affected by the project, and donated for feeding of captive black-footed ferrets or raptors. The remaining individuals to be affected will be humanely euthanized.</li> </ul> <p>Additionally, each of the county or city municipalities within the study area has policies for the management of prairie dogs on their property. These policies are generally similar to CDOT's policy in the steps required: avoidance, relocation, live-trapping, or lethal control.</p>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
Disturbance to nesting raptors that could result in nest failure	Construction	<ul style="list-style-type: none"> <li>• Trees in the construction footprint will be cleared prior to December 1 or after August 31 to prevent raptors (and other birds) from nesting (including courtship) on-site and to avoid the take of or disturbance to active nests during the breeding and courtship season. If construction is planned to begin after December 1 or prior to August 31, nest surveys will be conducted by a qualified biologist prior to construction to determine the absence or presence of nesting migratory birds. The USFWS Colorado Field Office will be contacted for further guidance if the field surveys identify the existence of active bird nests that cannot be avoided by construction activities.</li> <li>• Raptor nest surveys will be conducted annually during an appropriate season (generally May 1 through June 1) to determine the presence of active raptor nests. If an active nest is located, monitoring or seasonal buffers may be established and coordinated with CDOW to prevent disturbance to nesting birds during construction.</li> <li>• Protective buffer zones may be established around active nests during construction to avoid disturbance while nesting, if deemed necessary.</li> <li>• Individual trees important for raptor perching that are to be removed in the ROW will be replaced at a 1:1 ratio or as specified by state and federal wildlife agencies to ensure raptor perch trees are replaced for future use. New trees may be planted near areas that naturally receive adequate water, such as near drainage areas or wetlands, or as determined by CDOT to ensure survival (if irrigation is available, that would be sufficient as well). Sapling trees in riparian mitigation areas may require initial watering for establishment.</li> <li>• Artificial perches may be erected where important large perch trees are removed to provide perches until newly planted trees have matured.</li> </ul>
Potential loss of eggs or young of nesting migratory birds	Construction	<ul style="list-style-type: none"> <li>• Destruction or disturbance of nests that results in loss of eggs or young is a violation of the MBTA. To comply with the MBTA (USFWS 2004), land-clearing activities will be timed to avoid the breeding season (primarily April 1 through August 31, but differs according to species) to avoid impacts to active bird nests, as described for raptors (see the first bullet above). In addition, any reconstruction of bridge structures may destroy or disturb swallows nesting on the underside of the bridge. Bridge reconstruction and demolition may be scheduled to avoid impacts to these birds, or actions to discourage nesting activities will be taken prior to the nesting season and will be continued through demolition. Birds that establish a nest in an active construction zone do so at their own risk and are not subject to this protection – a final determination of this status would be made by the CDOT wildlife biologist.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
<p>Disruption/blockage of existing wildlife corridors and habitat fragmentation</p>	<p>Operations</p>	<p><b>Specific Recommendations —</b></p> <ul style="list-style-type: none"> <li>• Big Dry Creek — the City of Westminster/Urban Drainage agreement that does not allow modification of the hydraulic capacity of the existing structures should be revisited to allow either a separate dry crossing for wildlife (preferred), or modification of the existing stream culvert to facilitate wildlife movement.</li> <li>• Rock Creek — replace triple box culvert with a bridge in the Combined Alternative Package (Preferred Alternative). The bridge will have an opening large enough to facilitate wildlife movement.</li> <li>• Davidson, Goodhue, and Marshallville ditches — the culvert openings may be enlarged to compensate for increased length, and should be modified to facilitate wildlife crossing, or a separate dry crossing provided.</li> <li>• Box culverts will be installed where feasible for small- to medium-sized animal crossings between the unnamed ditch on Davidson Mesa and Davidson Ditch; between South Boulder Creek and Upper Dry Creek Ditch; and west of 88<sup>th</sup> Street.</li> <li>• Oversize culverts and/or modified culverts or dry culverts will be installed, where feasible, to facilitate wildlife crossing at Allen Ditch, Niver Canal, Farmers Highline Canal, Equity Ditch, Community Ditch, the unnamed tributary of Rock Creek, and the unnamed ditch on Davidson Mesa.</li> </ul> <p><b>General Guidelines for Wildlife Crossings —</b></p> <ul style="list-style-type: none"> <li>• Promote the improvement of wildlife corridors and connectivity to the extent practicable.</li> <li>• Where feasible, box culverts will be replaced with bottomless box culverts or bridges with natural substrate to promote animal usage. Where new culverts will be installed, bottomless box culverts or bridges will be used. Culverts will be installed in proximity to trees/shrub cover if possible, and will protect existing trees and shrubs near culverts and bridges from unnecessary encroachment and loss of habitat. Detailed final design will address protection from stormwater scour and sedimentation within proposed bottomless box culverts.</li> <li>• Bridge structures should span the largest amount of riparian habitat possible under a constructed bridge to limit the amount of disturbance to vegetation and to allow for dry passage along the water's edge. Riparian areas with dense vegetation are favored by many species for travel corridors.</li> <li>• Where feasible, large animal underpasses could be utilized to promote connectivity and movement. In general, riparian areas within the corridor would provide the most practical locations for large animal underpasses. Minimum dimensions for a large animal underpass should be 8-feet tall by 24-feet wide, with an openness ratio calculated in meters of 0.9 to 2.0 (height x width/length [meters]). As the width of the roadway increases, the height and width of the underpass structure should be increased proportionately. This openness will prevent a tunneling effect that would discourage animal use. Bridges and culverts will meet an openness ratio greater than 0.9 where it makes engineering sense.</li> <li>• Where feasible, if a stream or ditch conveys water, animals will be provided a shelf or a raised dry ledge on the side of the channel above ordinary high water to use as a dry walkway under the structure under normal flows. Shelves will be at least 1 foot higher than the normal water level and at least 1.3 feet wide to be effective (Forman et al. 2002).</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
<p>Disruption/blockage of existing wildlife corridors and habitat fragmentation (continued)</p>	<p>Construction</p>	<ul style="list-style-type: none"> <li>• Where feasible, vegetative debris, such as old stumps, logs, and small brush will be placed along one edge of the bottom of an underpass (approximately 1 foot wide) as cover for small mammals and amphibians when crossing. Vegetative debris will be anchored in place.</li> <li>• Crossing structures (i.e., culverts) should have natural bottom substrates, such as coarse sand, to facilitate wildlife use. Materials such as riprap and concrete should be avoided at culvert entrances and floors, if feasible.</li> </ul> <p><b>Recommendations for Small Animal Crossings —</b></p> <ul style="list-style-type: none"> <li>• Small animals will use small-diameter culverts (less than 3 feet in diameter) more than large culverts. Reptiles prefer circular pipes, while amphibians, rabbits, and domestic animals prefer rectangular vessels. Therefore, a variety of types of small animal crossings would be most effective.</li> <li>• Small animal culvert size would be less than 5 feet in diameter or height.</li> <li>• Where feasible, vegetative debris, such as old stumps, logs, and small brush will be placed along one edge of the bottom of an underpass (approximately 1 foot wide) as cover for small mammals and amphibians when crossing. Vegetative debris will be anchored in place.</li> </ul>
<p>Spread of noxious weeds</p>	<p>Construction</p>	<p>An integrated Noxious Weed Management Plan may be developed during final design and in consultation with appropriate land management agencies where designated sensitive habitats occur and project work will extend over several years, or be handled in the plans and specifications as directed by CDOT biologists in consultation with these agencies. This plan will be implemented during construction and may include identification of noxious weeds in the area, weed management goals and objectives, and preventive and control methods. Upon completion of project construction, the area would fall under the control of a local or CDOT maintenance plan. Preventive measures may include, but are not limited to, the following:</p> <ul style="list-style-type: none"> <li>• Contractor vehicles may be inspected before they are used for construction to ensure that they are free of soil and debris capable of transporting noxious weed seeds or roots. Heavy construction equipment may be cleaned.</li> <li>• Noxious weeds observed in and near the construction area at the start of construction will be treated with herbicides or physically removed to prevent seeds blowing into disturbed areas during construction.</li> <li>• Periodic surveys should occur during the construction period to identify and treat noxious weeds that have developed, depending on how long the project is under construction.</li> <li>• Potential areas of topsoil salvage will be assessed for presence and abundance of noxious weeds prior to salvage. Topsoil from heavily infested areas will either be treated by spraying, taking it off site, or burying it during construction.</li> <li>• Disturbed areas will be reclaimed in phases throughout the project construction and seeded using a permanent native seed mixture. If areas are completed and permanent seeding cannot occur due to the time of year, mulch and mulch tackifier will be used for temporary erosion control until seeding can occur.</li> <li>• Fertilizer will not be used in seeded areas because it can enhance the growth of noxious weeds at the expense of desired vegetation.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
Spread of noxious weeds (continued)	Construction	<ul style="list-style-type: none"> <li>Only certified weed-free mulch and bales will be used on the project (Title 35, Article 27.5, Forage Crop Certification 35-27.5-101).</li> <li>Weed control may use the principles of integrated pest management to treat target weed species efficiently and effectively by using a combination of two or more management techniques (biological, chemical, mechanical, and/or cultural). Weed control methods may be selected based on the management goal for the species, the nature of the existing environment, and methods recommended by Colorado State University, county weed boards, and other weed experts, but will keep in mind the applicability of these methods during construction and the likelihood that these methods will be used. The presence of important wildlife habitat or T&amp;E species will be considered when choosing control methods.</li> </ul>
Potential loss of fisheries and aquatic habitat	Construction/ Operations	<ul style="list-style-type: none"> <li>BMPs will be used to control erosion and sedimentation during construction and to protect water quality in streams. BMPs may include berms, brush barriers, check dams, erosion control blankets, filter strips, sandbag barriers, sediment basins, sheet mulching, silt fences, straw-bale barriers, surface roughening, and/or diversion channels. A spill prevention and emergency response plan will be prepared and used during construction for storage, handling and use of chemicals, fuels, and similar products.</li> <li>Under Colorado SB 40, any project affecting SB 40 jurisdictional streams, their banks, or tributaries is required to consult with CDOW. Following final design, an application for SB 40 Wildlife Certification may be required if the project does not fall within CDOT's Programmatic Agreement with CDOW, including detailed plans and specifications. CDOW will review the plans to ensure that they are technically adequate to protect and preserve fish and wildlife resources, and provide recommendations or alternative plans if the project would adversely affect a stream.</li> <li>Streams requiring channelization, realignment, or diversion will be restored equal to or better than pre-construction conditions, and restoration will be addressed in the Section 404 Permit. Stream restoration should create a meandering channel with varying side slopes rather than a straight, trapezoidal channel, and should include pools and other habitat features. To control erosion, bioengineering or the use of plants to control erosion may be used instead of riprap or other unnatural bank stabilization techniques. Banks will be planted with native plant species.</li> <li>Also refer to Section 4.20, Water Resources; Water Quality and Floodplains, and Section 4.22, Construction-Related Impacts.</li> </ul>
Loss of listed FT and FE species or their habitat	Construction/ Operations	<p>FHWA and FTA have initiated consultation with the USFWS. A PBA will be released with the FEIS for public comment. Conservation measures for impacts to federally-listed species were developed as part of the PBA. During final design, detailed mitigation measures related to T&amp;E species will be developed in consultation with the USFWS. The following mitigation measures are proposed:</p> <p><b>Preble's meadow jumping mouse —</b></p> <ul style="list-style-type: none"> <li>Direct impacts (death) will be avoided or minimized by use of silt fencing or similar visible barriers, restrictions in the area of disturbance, and construction limited to the non-active season (November 1 through April 30) in occupied habitat.</li> <li>Occupied habitat removed for project construction will be replaced through creation or enhancement of suitable habitat. Mitigation areas should link fragmented habitat patches by restoring areas of non-habitat between zones of occupied habitat. Mitigation for Preble's meadow jumping mouse could be coordinated with wetlands and riparian mitigation, where possible. A complete list of conservation measures will be developed through formal consultation with the USFWS.</li> <li>Small mammal ledges should be used in culverts to enhance mouse mobility.</li> </ul>



**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
Loss of listed FT and FE species or their habitat (continued)	Construction/ Operations	<p><b>Ute ladies'-tresses orchid</b> —</p> <ul style="list-style-type: none"> <li>• Surveys will be conducted to identify and map Ute ladies'-tresses orchid habitat within and adjacent to the construction footprint in the area from Davidson Ditch to the west edge of Van Vleet open space. Surveys should be conducted for 3 years, when feasible, because the number of flowering plants varies widely from year, and would be done prior to final design. Surveys will be done during the flowering season by qualified botanists.</li> <li>• Impacts will be avoided or minimized, where possible, by relocation of project components, such as detention ponds, by use of roadside ditches instead of ponds for water quality control, and/or by narrowing of the construction footprint.</li> <li>• Project components within Ute ladies'-tresses orchid habitat will be designed to not adversely affect the hydrology of adjacent Ute ladies'-tresses orchid habitat. Monitoring wells may be needed to assess pre-construction water levels and to monitor changes during and after construction.</li> <li>• In Colorado, the primary mitigation for unavoidable impacts to plants and habitat will be protection or enhancement of other existing populations. The conservation requirements will be commensurate with the level of impact, and will be determined in consultation with the USFWS.</li> <li>• Ute ladies'-tresses orchids that cannot be avoided will be transplanted to a mitigation site or to a botanical garden. Removal and transplant of Ute ladies'-tresses orchids or the topsoil of their habitat will be conducted by botanists after tubers have formed in the fall. Detention ponds may be designed to provide suitable habitat for Ute ladies'-tresses orchids and may serve as transplant sites. Selection of a mitigation site will be coordinated with the mitigation for the Preble's meadow jumping mouse and wetlands, and will consider habitat suitability, benefits to the species, and provisions for long-term management and protection.</li> </ul> <p><b>Colorado Butterfly Plant</b> —</p> <ul style="list-style-type: none"> <li>• Surveys will be conducted within and adjacent to the construction footprint at Dry Creek and Walnut Creek. If Colorado butterfly plants are found, CDOT will consult with the USFWS regarding appropriate conservation measures.</li> </ul>
Potential loss of state-listed threatened or endangered species and other sensitive species	Construction	<p><b>Burrowing Owl</b> —</p> <ul style="list-style-type: none"> <li>• Surveys will be conducted between April 1 and July 31 of the construction year to determine the presence of burrowing owls and the locations of occupied nests.</li> <li>• If nests are identified, construction will be avoided within 50 yards (150 feet) of an active nest site from April 1 to July 31 or as determined necessary by a CDOT wildlife biologist.</li> <li>• If a nest becomes occupied after the start of active construction, a seasonal buffer zone will be required to prevent violation of the MBTA.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
Potential loss of state-listed threatened or endangered species and other sensitive species (continued)	Construction	<p><b>Other Sensitive Animal Species —</b></p> <ul style="list-style-type: none"> <li>Mitigation for nesting ospreys will be the same as for raptors (see above).</li> <li>Pre-construction nest surveys will be conducted for barn owls in suitable riparian habitat (such as Walnut Creek) prior to construction if land clearing occurs between April 1 and September 30.</li> <li>Land-clearing activities will be avoided in known bobolink nesting habitat in the Boulder Segment during their nesting season (May 15 through July 30) unless the habitat has been surveyed by a qualified biologist and no nests were found to be present.</li> <li>To mitigate for impacts to common garter snakes in areas where BMPs will control erosion, coconut-straw erosion blankets with a biodegradable thread will be used rather than TRMs, which can harm snakes. The framework will be manufactured with openings of sufficient size and “give” to allow for safe passage of snakes through the blanket. Use of a netless excelsior blanket (Curtex NetFree brand) combined with a heavy woven coir mat has been found successful (install the coir mat on top of the netless excelsior and anchor down).</li> </ul> <p><b>Other Sensitive Plant Species —</b></p> <ul style="list-style-type: none"> <li>Prior to construction, presence/absence surveys will be conducted for all areas that would be affected by project activities within designated sensitive habitats, including the South Boulder Creek Natural Area, Colorado Tallgrass Prairie Natural Area, and Colorado Tallgrass Prairie PCA. The survey(s) will be conducted by qualified botanists during an appropriate season for best observation and identification of the sensitive species. If found, mitigation for impacts to these sensitive habitats (which includes mesic and xeric tallgrass communities) will be developed based on the relative numbers of plants that would be affected, the potential for avoidance or minimization of impacts, and the potential for transplanting of individuals and seedbeds to suitable habitat on adjoining property. Mitigation measures will be developed in consultation with the land management agencies where the impacts will occur.</li> </ul>
<b>Section 4.15, Mineral Resources, Geology, and Soils</b>		
Expansive soils	Construction	<ul style="list-style-type: none"> <li>Engineering measures, such as installation of deep foundation systems, raft foundations, and floating floor slabs will be considered during preliminary and final design.</li> </ul>
Unstable slopes	Construction	<ul style="list-style-type: none"> <li>Engineering measures, such as cantilevered retaining walls, soil nail walls, ground anchors, and MSE walls will be considered during preliminary and final design.</li> </ul>
Expansive subgrade soils	Construction	<ul style="list-style-type: none"> <li>Engineering measures, such as soil stabilization with lime treatment, removal and recompaction, or removal and replacement with imported fill material will all be considered during preliminary and final design.</li> </ul>
Collapsible subgrade soils	Construction	<ul style="list-style-type: none"> <li>Engineering measures, such as stabilization by flooding, deep dynamic compaction, over-excavation, and pre-loading prior to construction will be considered during preliminary and final design.</li> </ul>
Steeply dipping bedrock	Construction	<ul style="list-style-type: none"> <li>Engineering measures, such as stabilization by over-excavation and replacement with imported fill materials will be considered during preliminary and final design.</li> </ul>
Soil erosion	Construction/ Operations	<ul style="list-style-type: none"> <li>Refer to Section 4.20, Water Resources: Water Quality and Floodplains, and the CMP discussion in Section 4.22, Construction-Related Impacts.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
<b>Section 4.16, Farmlands</b>		
Impacts to irrigation pipes and ditches	Construction	<ul style="list-style-type: none"> <li>All irrigation pipes and ditches will be replaced in-kind.</li> <li>Irrigation will not be interrupted during construction.</li> </ul>
New ROW required	Construction/ Operations	<ul style="list-style-type: none"> <li>Mitigation will be provided to agricultural properties, consistent with the ROW policies described in Section 4.4, Right-of-Way and Relocations.</li> </ul>
Access to property	Construction/ Operations	<ul style="list-style-type: none"> <li>Existing, legal access to farm properties will remain available during and after construction. Typically, access rights are demonstrated by easements, license agreements, or other legal permits, etc.</li> </ul>
<b>Section 4.17, Hazardous Materials</b>		
Existing hazardous material sites adjacent to or within the corridor	Construction/ Long-term management	<ul style="list-style-type: none"> <li>Site-specific Phase II ESAs will be conducted with subsurface investigation (soil and groundwater) for sites that may affect final design.</li> <li>A Materials Handling Plan will be prepared to address contaminated soil and groundwater, and a Health and Safety Plan will be developed as required by Section 250.03 of the CDOT Standard Specifications for Road and Bridge Construction (CDOT 2005).</li> <li>Engineering controls will be determined to minimize quantity of contaminated materials.</li> <li>Responsible parties will be identified for design, build, and operation of remediation systems.</li> <li>Cost recovery of hazardous material sites where removal actions and long-term maintenance is required will be determined.</li> <li>A heavy-metal-based paint survey will be prepared for bridges in the project area.</li> <li>An asbestos survey will be prepared in the event of building and/or bridge acquisition or demolition, or if asbestos is known to be present.</li> <li>Soil Characterization and Management Plans will be prepared according to CDPHE HMWMD if construction debris is encountered during construction activities and is suspected to contain asbestos.</li> </ul>
Acquisition of additional ROW or new property	Construction/ Long-term management	<ul style="list-style-type: none"> <li>An individual site-specific Phase I ESA will be conducted on properties before acquiring any ROW.</li> <li>Site-specific Phase II ESAs will be conducted with subsurface investigation (soil and groundwater) for sites that may affect final design.</li> <li>A Materials Handling Plan will be prepared to address contaminated soil and groundwater and a Health and Safety Plan will be developed as required by Section 250.03 of the CDOT Standard Specifications for Road and Bridge Construction (CDOT 2005).</li> <li>Engineering controls will be determined to minimize the quantity of contaminated materials.</li> <li>Responsible parties will be identified for design, build, and operation of remediation systems, and to ensure CDOT and RTD are not liable for future operations.</li> <li>Cost recovery of hazardous material sites where removal actions and long-term maintenance is required will be determined.</li> <li>A heavy-metal-based paint survey of bridges in the project area will be prepared.</li> <li>An asbestos survey for any building acquisition or demolition, if asbestos is known to be present, will be prepared.</li> <li>Soil Characterization and Management Plans will be prepared according to CDPHE HMWMD if construction debris is encountered during construction activities and is suspected to contain asbestos.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
<b>Section 4.18, Utilities</b>		
Adjustment or relocation of irrigation ditches	Construction	<ul style="list-style-type: none"> <li>Construction will be scheduled during periods of non-use (November through March), wherever possible.</li> <li>Design will be modified to avoid/minimize conflict wherever possible.</li> </ul>
Relocation of electric transmission towers	Construction	<ul style="list-style-type: none"> <li>Construction will be scheduled during periods of low demand (October through April), wherever possible.</li> <li>Design will be modified to avoid/minimize conflict wherever possible.</li> </ul>
Adjustment or relocation of high-pressure gas lines	Construction	<ul style="list-style-type: none"> <li>Construction will be scheduled during periods of low demand (May through September), wherever possible.</li> <li>Design will be modified to avoid/minimize conflict wherever possible.</li> </ul>
Adjustment or relocation of buried fiber optic	Construction	<ul style="list-style-type: none"> <li>Early coordination with utility owners will take place wherever possible.</li> <li>Design will be modified to avoid/minimize conflict wherever possible.</li> </ul>
Adjustment or relocation of water lines and sanitary sewers	Construction	<ul style="list-style-type: none"> <li>Design will be modified to avoid conflict wherever possible.</li> <li>Disruption of service for low-use period will be scheduled.</li> <li>Disruption of service will be minimized with wet tie-in wherever possible.</li> </ul>
Relocation of storm sewers	Construction	<ul style="list-style-type: none"> <li>Design will be modified to avoid conflict wherever possible.</li> </ul>
New roadway or reduced cover on buried utilities	Construction	<ul style="list-style-type: none"> <li>Encasement or protective covers over utilities will be added as appropriate.</li> </ul>
<b>Section 4.19, Energy</b>		
Increases in bus VMT	Operations	<ul style="list-style-type: none"> <li>RTD's policy on sustainability will be implemented.</li> </ul>
Use of energy resources during construction	Construction	<ul style="list-style-type: none"> <li>CDOT and RTD sustainable practices will be incorporated into the project planning, construction, and maintenance to minimize impacts.</li> </ul>
<b>Section 4.20, Water Resources: Water Quality and Floodplains</b>		
Destruction of riparian vegetation	Construction	<ul style="list-style-type: none"> <li>Temporary BMPs for construction, including re-establishment of native vegetation, will be installed and implemented.</li> </ul>
Untreated stormwater runoff entering surface waterway during construction	Construction	<ul style="list-style-type: none"> <li>NPDES guidelines for stormwater quality, including obtaining a CDPS stormwater construction permit, will be followed.</li> <li>All work performed on the project within CDOT ROW will conform to Section 107.25 (Water Quality), and Section 208 (Erosion Control) of the CDOT Standard Specifications for Road and Bridge Construction (CDOT 2005).</li> <li>A Stormwater Management Plan will be developed that will detail the BMPs to be used for construction. Practices from the Erosion Control and Stormwater Guide (ECSOG) (CDOT 2002 or most current volume) will be followed.</li> <li>park-n-Ride areas for transit stations will follow local water quality ordinances of the local jurisdiction where the transit stations are located. Local requirements will require the permanent BMPs to treat runoff from developed areas.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
Untreated stormwater runoff entering surface waterway during construction (continued)	Construction	<ul style="list-style-type: none"> <li>Adequate storm drainage systems for the existing and proposed improvements near the interchanges will be developed to prevent high levels of sediment and pollutants from being carried into the wetlands, natural drainageways, and irrigation ditches. Non-structural BMPs, such as pesticide and fertilizer application guidelines and anti-icing and de-icing guidelines, will be employed to improve water quality in conjunction with BMP implementation. Other non-structural BMPs, such as water quality signage adjacent to the receiving streams and irrigation ditches, are examples of other tools that will be considered for implementation. A construction dewatering discharge permit may be required for groundwater dewatering activities.</li> <li>A Section 404 Permit will be obtained for instream work performed to retrofit any bridge and channel improvements, and 401 certification will be required to ensure that water quality standards will not be violated.</li> </ul>
Control of storm runoff from new and existing impervious surfaces within CDOT ROW	Construction/ Operations	<ul style="list-style-type: none"> <li>Permanent BMPs will be constructed in compliance with the Urban Drainage Criteria Manual (UDFCD 2004) and the CDOT New Development and Redevelopment Program, where practical, for use during the construction phase to improve the water quality control at the site.</li> <li>In the tributary to Big Dry Creek, operational BMPs such as alternative de-icing measures that minimize the use of salts or operational guidelines that more closely manage the application of salts, will be considered.</li> <li>Permanent BMPs will be designed and constructed in compliance with the CDOT New Development and Redevelopment Program for all highway improvements.                             <ul style="list-style-type: none"> <li>All highway runoff will be collected and treated to the level required by the CDOT New Development and Redevelopment Program. The US 36 corridor improvements fall into Tier 1 BMP requirements under this program. BMPs within the project corridor will need to provide 100% of the required water quality capture volume, or the project needs to provide BMPs designed to remove at least 80% of the average annual total suspended solids loading from the average storm event.</li> </ul> </li> </ul>
Control of industrial wastes	Operations	<ul style="list-style-type: none"> <li>All proposed new connections to CDOT's storm sewer system will be inspected and verified during the construction phase to ensure the connections are constructed as designed and improper connections are avoided.</li> </ul>
Replacement and relocation of domestic wells	Groundwater	<ul style="list-style-type: none"> <li>Up to four domestic wells will be replaced.</li> </ul>
Floodplain encroachment	Construction	<ul style="list-style-type: none"> <li>If a CLOMR is required for Big Dry Creek, a LOMR will be prepared by the project sponsors at the completion of project construction.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
<b>Section 4.21, Wetlands and Other Waters</b>		
Loss of wetlands due to the placement of dredged or fill material	Construction	<ul style="list-style-type: none"> <li>Wetland mitigation to include banking, establishment, restoration, enhancement, and/or preservation. Banking, establishment and restoration is typically at a 1:1 ratio.</li> </ul>
Sedimentation and erosion of wetlands and other water features	Construction	<ul style="list-style-type: none"> <li>BMPs will be implemented during all phases of construction to reduce impacts from sedimentation and erosion, including the use of berms, brush barriers, check dams, erosion control blankets, filter strips, sandbag barriers, sediment basins, silt fences, straw-bale barriers, surface roughening, and/or diversion channels.</li> <li>When practicable, construction in waterways will be performed during low-flow or dry periods.</li> <li>Flowing water will be diverted around active construction areas.</li> <li>No fill material will be stored in wetlands or other water features.</li> <li>No unpermitted discharges will be allowed.</li> </ul>
<b>Section 4.22, Construction-Related Impacts</b>		
Direct construction impacts on all resources	Construction	<p>A CMP will be developed during final design as the key mitigation measure for offsetting the construction impacts. The plan will be developed in cooperation with the affected communities, CDOT, and RTD. The CMP will include the following key elements:</p> <p><b>Communications Plan</b> — to address:</p> <ul style="list-style-type: none"> <li>Construction safety issues.</li> <li>Road closures.</li> <li>Operating protocols.</li> <li>Disruption of utility service.</li> <li>Signage plan to inform the public of lane changes, temporary interchange closures, etc.</li> </ul> <p><b>Community Impact Plan</b> — to address:</p> <ul style="list-style-type: none"> <li>Reduction of construction dust, noise, visual degradation, and traffic impacts.</li> <li>Maintenance of access to local businesses during construction.</li> <li>Reduction of the duration of construction in residential areas.</li> </ul> <p><b>Visual Protection</b> — to address:</p> <ul style="list-style-type: none"> <li>Screening construction staging and storage areas.</li> <li>Replacement of ground cover over exposed areas in a timely manner.</li> <li>Removal of unused detour pavements or signage.</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
Direct construction impacts on all resources (continued)	Construction	<p><b>Air Quality Protection</b> — to address:</p> <ul style="list-style-type: none"> <li>• Control of dust through watering or dust palliatives.</li> <li>• Revegetation of exposed soils.</li> <li>• Stabilization of stockpiles.</li> <li>• Control of off-site tracking of mud and debris.</li> <li>• Usage of clean fuels to bio fuels in equipment to reduce emissions.</li> </ul> <p><b>Noise Control</b> — to address:</p> <ul style="list-style-type: none"> <li>• Construction of sound walls prior to construction.</li> <li>• Use of noise-mitigated equipment.</li> <li>• Minimization of the duration of construction in residential areas to the extent possible.</li> <li>• Minimization of night construction in residential areas to the extent possible.</li> <li>• Re-routing construction traffic away from residential areas where possible.</li> <li>• Usage of alternative construction methods, such as sonic or vibratory pile driving.</li> <li>• Performance of high-noise activities during daytime hours when possible (e.g., pile driving).</li> <li>• Providing hotel vouchers for those residents within 300 feet of the source when high-noise activities must be completed during evening or early morning hours.</li> </ul> <p><b>Biological Resource Protection</b> — BMPs and other practices will be reviewed and adopted to address:</p> <ul style="list-style-type: none"> <li>• Reduction of loss of vegetation in sensitive habitats.</li> <li>• Reduction of loss of prairie dog colonies.</li> <li>• Minimization of disturbances to nesting raptors and songbirds.</li> <li>• Reduction of disruption of wildlife corridors.</li> <li>• Reduction of the amount of road kill.</li> <li>• Minimization and avoidance of habitat fragmentation.</li> <li>• Reduction of the loss of fisheries and aquatic habitat.</li> <li>• Reduction of the loss of T&amp;E habitat and species.</li> <li>• Reduction of the spread of noxious weeds.</li> </ul> <p><b>Hazardous Waste Control</b> — to address:</p> <ul style="list-style-type: none"> <li>• Identification of hazardous wastes prior to construction through conducting Phase II Site Assessments.</li> <li>• Preparation of a Hazardous Materials Management Plan prior to construction.</li> <li>• Compliance with Occupational, Safety, and Health Administration requirements, including preparation of Health and Safety Plans prior to construction (if not included above).</li> </ul>

**Table 8.4-1: Mitigation Summary — Phase 1**

Impact	Impact Type	Mitigation Measures
Direct construction impacts on all resources (continued)	Construction	<p><b>Utilities Relocation</b> — to address:</p> <ul style="list-style-type: none"> <li>• Notification of citizens of possible utility outages.</li> <li>• Scheduling of construction to reduce outages.</li> <li>• Coordination with local utilities.</li> </ul> <p><b>Water Quality and Wetlands Protection</b> — to address:</p> <ul style="list-style-type: none"> <li>• Implementation of BMPs for erosion control.</li> <li>• Treatment of contaminated dewatering effluents.</li> <li>• Fulfilling municipal Separate Stormwater System requirements.</li> <li>• Minimization of impacts to wetlands and riparian areas.</li> <li>• Identification of locations for replacement wetlands.</li> <li>• Usage of wetland replacement to help mitigate wildlife habitat fragmentation.</li> </ul> <p><b>Traffic Control</b> — to address:</p> <ul style="list-style-type: none"> <li>• Minimization of impacts to emergency services.</li> <li>• Reduction of congestion through development of traffic management plans.</li> <li>• Coordination of bridge demolition and detour routes to avoid overloading local streets with detour traffic.</li> <li>• Limiting ramp closures to low-volume ramps.</li> <li>• Limiting high-volume ramp closures to nights and weekends.</li> <li>• Maintenance of access to local businesses and residences.</li> </ul> <p>The detailed elements of the CMP will be developed as a part of the preliminary engineering design and FEIS for the Preferred Alternative.</p>

Source: US 36 Mobility Partnership, 2009.

Notes:

- % = percent
- APCD = Air Pollution Control District
- APEN = Air Pollution Emissions Notice
- BMP = best management practice
- BRT = bus rapid transit
- CCTV = closed circuit television
- CDOT = Colorado Department of Transportation
- CROW = Colorado Department of Wildlife
- CDPHE = Colorado Department of Public Health and Environment
- CDPS = Colorado Discharge Permit System
- CFR = Code of Federal Regulations
- CLOMR = Conditional Letter of Map Revision
- CMP = Construction Management Plan
- CPTED = Crime Prevention through Environmental Design
- ECSSQG = Erosion Control and Stormwater Quality Guide
- ESA = Environmental Site Assessment
- FE = federally endangered
- FEIS = Final Environmental Impact Statement
- FHWA = Federal Highway Administration
- FT = federally threatened
- FTA = Federal Transit Administration
- HMWMD = Hazardous Materials and Waste Management Division
- LED = light emitting diode
- LOMR = Letter of Map Revision
- LWCF = Land and Water Conservation Fund
- MBTA = Migratory Bird Treaty Act
- MSAT = mobile source air toxics
- MSE = mechanically stabilized earth
- NAC = noise abatement criteria
- NFPA = National Fire Protection Agency
- NOAA = National Oceanic and Atmospheric Administration
- NPDES = National Pollutant Discharge Elimination System
- NPS = National Park Service
- PBA = Programmatic Biological Assessment
- PCA = Potential Conservation Area
- ROW = right-of-way
- RTD = Regional Transportation District
- SB = Senate Bill
- T&E = threatened and endangered
- TRM = turf reinforcement mats
- Uniform Act = Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended
- US # = United States Highway Number
- USC = United States Code
- USFWS = U.S. Fish and Wildlife Service
- VMT = vehicle miles traveled