

US 6 Bridges Design Build Project

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Other Environmental Considerations Technical Memorandum

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List of Abbreviated Terms

CDOT	Colorado Department of Transportation
EB	eastbound
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
I-25	Interstate 25
NB	northbound
NRCS	National Resources Conservation Service
ROD	Record of Decision
ROD2	Record of Decision 2
RTD	Regional Transportation District
SB	southbound
US	United States
US 6	6 th Avenue
WB	westbound

Project Background

The Project includes modifications to the roadway, interchanges, and bridges along 6th Avenue (US 6) between Sheridan Boulevard and the BNSF Railway in Denver, Colorado. The Colorado Department of Transportation (CDOT) is preparing a Reevaluation and Record of Decision (ROD2) to document the impacts of and mitigation for the Project.

The Valley Highway Project

The Federal Highway Administration (FHWA) and CDOT prepared a Final Environmental Impact Statement (FEIS) in 2006 and a ROD in 2007 for the Interstate 25 (I-25) Valley Highway Project, located in Denver, Colorado. The Valley Highway Project includes the reconstruction of I-25 and reconfiguration of interchanges from Logan Street to United States Highway (US) 6, US 6 from I-25 to Federal Boulevard, and the crossing of Santa Fe Drive and Kalamath Street at the Consolidated Main Line railroad. The Preferred Alternative, as described in the FEIS, includes the following elements:

- I-25 Mainline: Widening of I-25 to provide a consistent section with four through lanes plus auxiliary lanes in each direction throughout the project area
- I-25/Broadway: Tight diamond interchange
- I-25/Santa Fe Drive: Single point urban interchange with a flyover ramp for northbound Santa Fe Drive to northbound I-25
- I-25/Alameda/Santa Fe/Kalamath: Offset partial urban interchange at I-25 and Alameda Avenue; Santa Fe Drive and Kalamath Street grade separated under the railroad close to their current alignments
- US 6: Ramp improvements at the I-25/US 6 interchange; closure of the Bryant Street interchange; diamond interchange at US 6/Federal Boulevard with slip ramps to Bryant Street and a braided ramp from Federal Boulevard to eastbound US 6; reconstruction of US 6 with collector-distributor roads/auxiliary lanes throughout the project area

The Preferred Alternative of the Valley Highway Project is shown in Figure 1.



Figure 1: I-25 Valley Highway Project Preferred Alternative

US 6 Bridges Design Build Project

The Project includes the reconstruction of US 6, reconfiguration of interchanges from Federal Boulevard to I-25, and replacement of the US 6 bridges from Federal Boulevard to the bridge over the BNSF Railway. More specifically, the Project includes the following elements:

- The replacement of five bridges along US 6: Federal Boulevard, Bryant Street, South Platte River, I-25, and BNSF Railway. Three of these bridges are in poor condition and the other two are functionally obsolete. The project would also add a tunnel immediately east of I-25 under US 6 to separate traffic on northbound I-25 from traffic exiting the interstate to travel east and west on US 6.
- Ramp improvements at the I-25/US 6 interchange, closure of the westbound (WB) US 6 to Bryant Street ramp, a diamond interchange at US 6/Federal Boulevard with slip ramps to Bryant Street, and a braided ramp from Federal Boulevard to eastbound (EB) US 6.
- Reconstruction of US 6 with collector-distributor roads/auxiliary lanes from Federal Boulevard to the BNSF Railway bridge structure
- Conversion of 5th Avenue to two-way traffic from Federal Boulevard to Decatur Street
- Widening of Federal Boulevard, from five to six lanes, from 5th to 7th Avenues to accommodate current and future improvements
- Pavement resurfacing of US 6 from Knox Boulevard to Sheridan Boulevard
- In-kind replacement of impacted facilities for Barnum East Park
- A bicycle/pedestrian bridge structure over US 6, connecting Barnum North Park and Barnum Park (also known as Barnum Park South, and herein referred to as Barnum Park South)
- Upgrading portions of the South Platte River Trail to current standards

Figure 2 shows the Project.

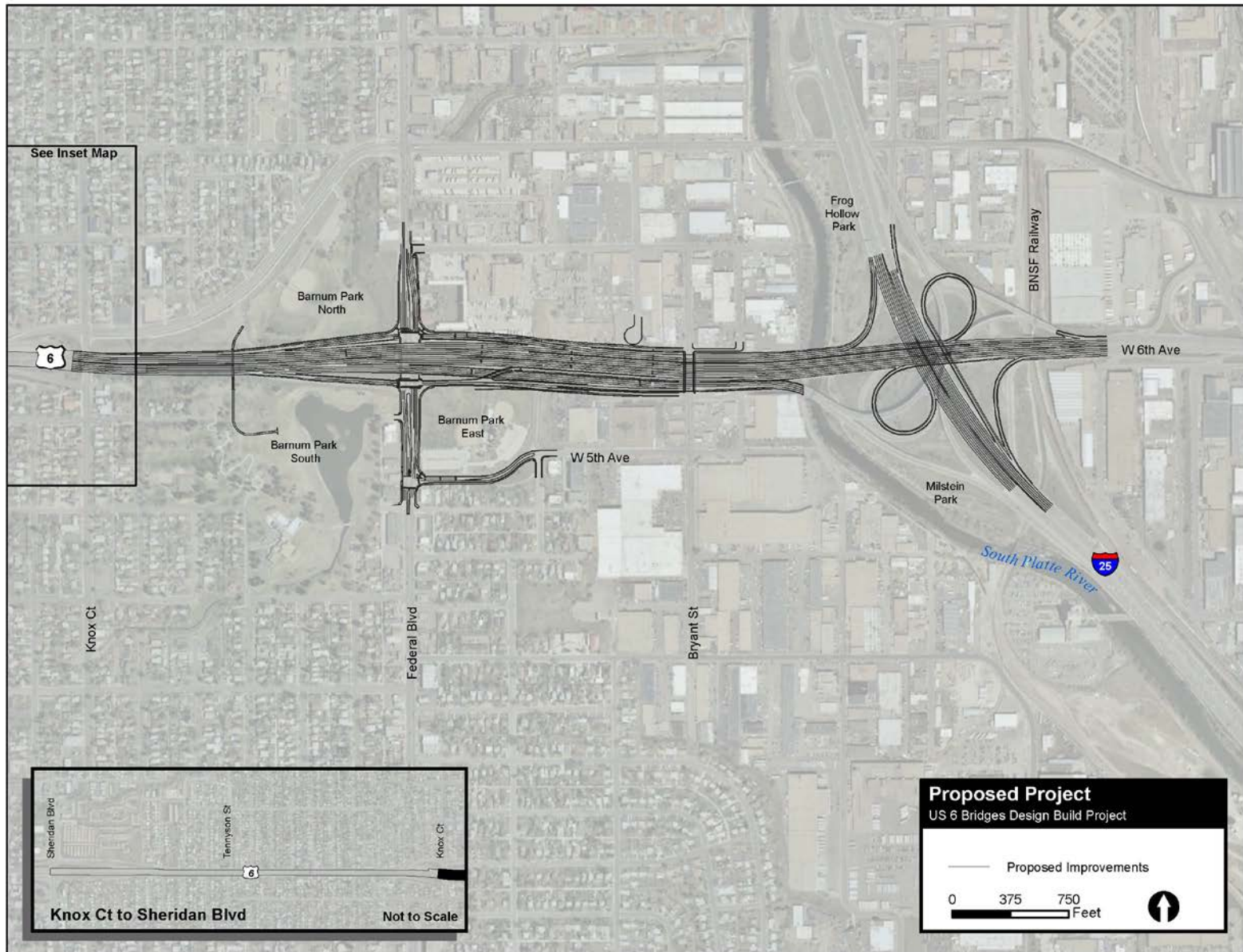


Figure 2: Project

Relationship of the Valley Highway Project and the US 6 Bridges Design Build Project

At the time of the FEIS, funding had not been identified for the entire Preferred Alternative. Although budget placeholders were included in the 2030 Regional Transportation Plan (RTP), these budgets fell short of the estimated cost of the Preferred Alternative. Therefore, FHWA and CDOT planned for a phased implementation of the Preferred Alternative. These six phases are outlined in Chapter 7 of the FEIS. The ROD2 for the Project will reevaluate part of Phase 1 (the part including the US 6/Federal Boulevard interchange) as presented in the 2007 ROD, and provide a decision for Phase 5 of the Valley Highway Project. The ROD2 for the Project will also address six new, minor project elements, which were not part of the FEIS. Due to the minor environmental significance and nature of these additional components, they are included in the ROD2 and will not affect the independent utility, logical termini, or Preferred Alternative of the Valley Highway Project.

Phasing of the FEIS Preferred Alternative

The Project includes elements of two of the six construction phases—Phase 1 and Phase 5—from the Valley Highway Project. A decision on construction Phase 1 of the Valley Highway Project, which included the US 6/Federal Boulevard bridge and ramps, excluding the braided ramp, was made in the 2007 ROD. Figure 3 shows the phases of the Valley Highway Project’s Preferred Alternative and Figure 4 shows the Project Elements and how they relate to the FEIS phasing.

Additional Project Elements in the Project

At this time, the Project includes six additional elements that were not included in the FEIS or 2007 ROD:

- Reconstruction of the southbound (SB) I-25 to EB US 6 ramp;
- A bicycle/pedestrian bridge structure over US 6, connecting Barnum North and Barnum South parks;
- Replacement of the US 6 bridge over Bryant Street;
- Replacement of the US 6 bridge over I-25;
- Replacement of the US 6 bridge over the BNSF Railway; and
- Pavement resurfacing of US 6 between Sheridan Boulevard and Knox Court

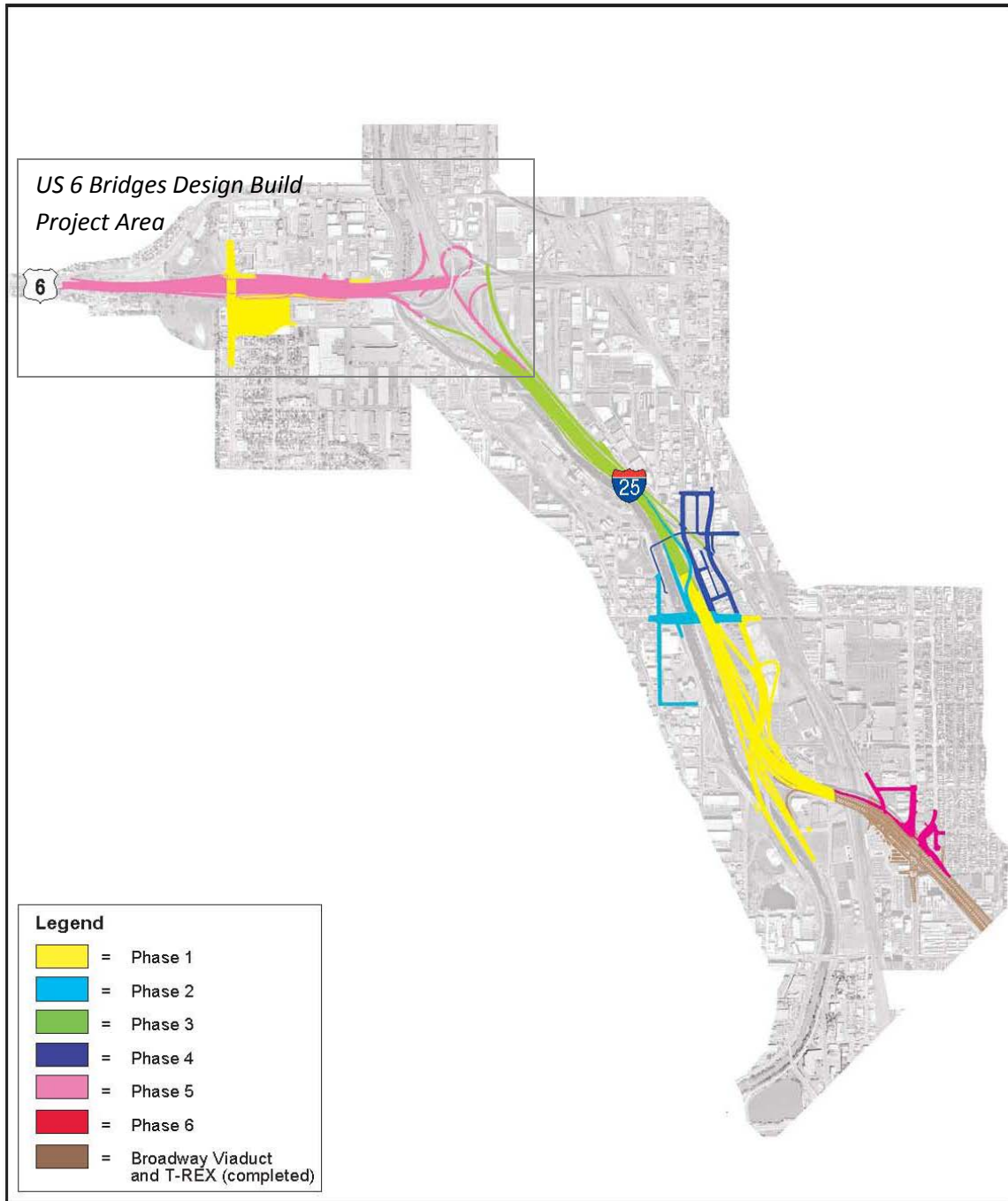


Figure 3: FEIS Phased Implementation of the Preferred Alternative
(source: I-25 Valley Highway FEIS)

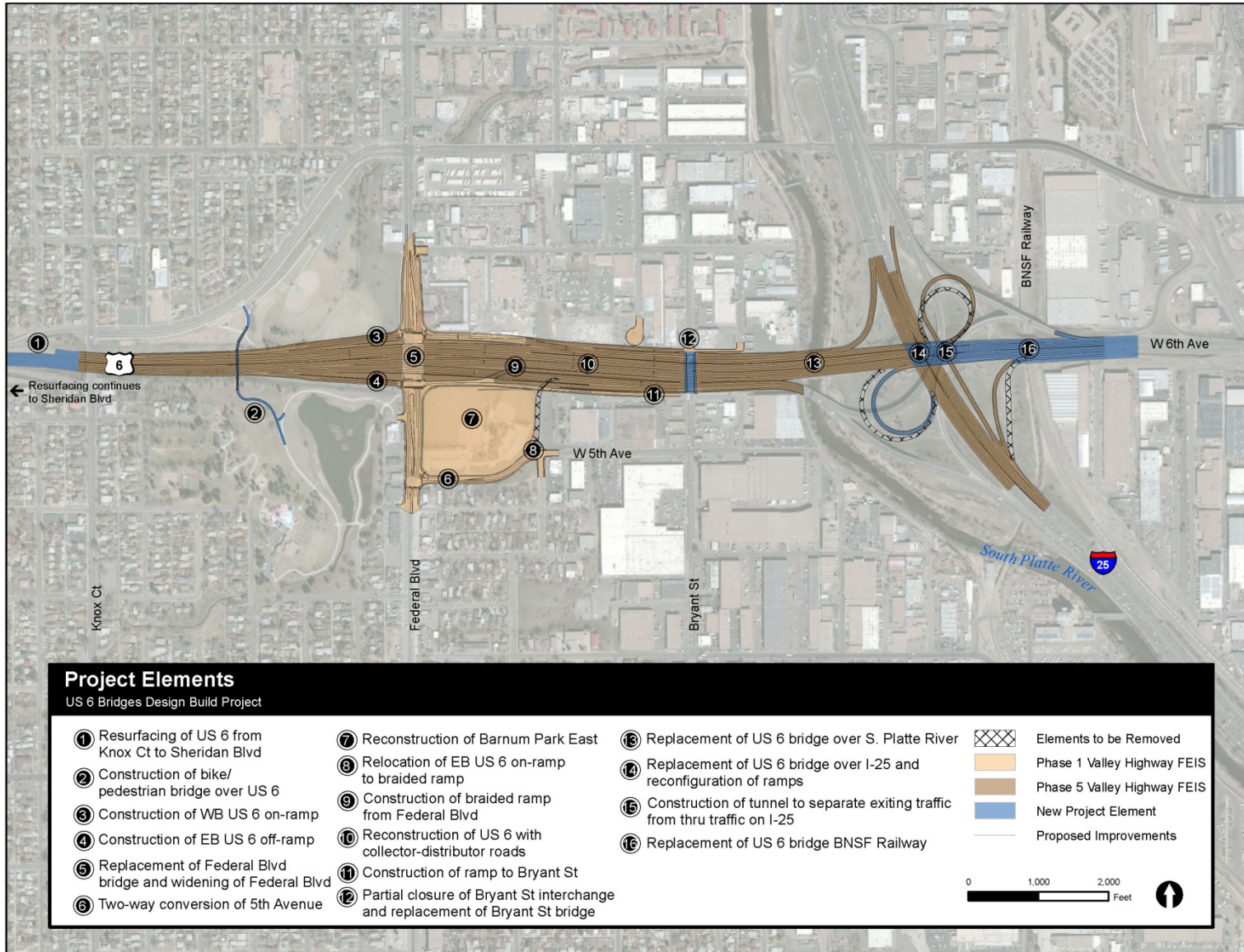


Figure 4: Project Elements

Other Environmental Considerations

Introduction

Resources previously analyzed as part of the FEIS that are not impacted by the Project are described in this report. As determined through a scoping process with CDOT and FHWA, the issues previously studied that required no additional analysis are socio-economic and community, soils and geology, energy, short-term uses and long-term productivity, irreversible and irretrievable resources, and cumulative impacts. A brief discussion of these resources and mitigation measures, as identified in the FEIS and 2007 ROD, are discussed below. A summary of the impacts and mitigation measures for all resources is provided in the ROD2, Section 4.

The Project study area extends beyond the study area of the FEIS. Specifically, the pavement resurfacing from Sheridan Boulevard to Knox Court extends the FEIS study area to the west, and the replacement of the US 6 bridge over the BNSF Railway extends the FEIS study area to the east. These improvements are within the footprint of the existing transportation facilities and do not have impacts for socio-economic and community, soils and geology, energy, short-term uses and long-term productivity, irreversible and irretrievable resources, and cumulative impacts.

Socio-Economic and Community

The FEIS, which includes the Project area, studied land use, social, economic, and community characteristics of the Project area. Impacts to these resources and any mitigation elements would remain unchanged based on the proposed design, phasing changes, and additional elements.

Land Use

Land use surrounding the Project is primarily park land, industrial with a few areas of residential, multi-use/residential, and commercial towards the west end of the Project. The following residential properties were identified as being adjacent or very close to the Project area:

- Along the south side of US 6 near Knox Court, at the western end of the Project area
- Along west Short Place, just east of Federal Boulevard and south of the existing on-ramp to US 6 from Federal Boulevard

There are no new residential areas adjacent to or very close to the Project area.

Commercial properties are located adjacent or very close to the Project area in the following areas:

- In the northeast quadrant of US 6 and Federal Boulevard
- Along Bryant Street just north and south of US 6.

Mitigation

The proposed design, phasing changes, and additional elements would accommodate future land use as envisioned in *Blueprint Denver*. Changing land uses to a different type of use would be unlikely to result from the identified Project. Changes to existing land uses would be determined by local and regional planning processes and implemented through local planning and zoning ordinances.

The Project would require the acquisition of some land for transportation facilities and the relocation of several businesses. In addition, residential relocations would be required. The specific relocations required are presented in detail in the ROD2, Appendix A. In implementing transportation improvements, CDOT seeks only to acquire property needed for the Project. Detailed procedures are specified in the CDOT *Right-of-Way Manual*.

Community Facility, Services, and Neighborhood Cohesion Existing Conditions

This section of the FEIS described existing community facilities and public services. The Project will make improvements to an existing facility that will not further divide or isolate neighborhoods. It will not sever or bisect existing service boundaries for school, police, or fire districts. Travel patterns of motorists, pedestrians, and bicyclists in and between neighborhoods would not be permanently altered.

There are several parks within the Project area. There is no new parkland within, adjacent to, or very close to the Project area. In Barnum North Park, part of the park was developed into a bike skills course by the City and County of Denver.

Impacts to parks along the corridor have been carefully considered and are discussed in the ROD2, Section 3 and in Appendix K.

FHWA reaffirms its previous Section 4(f) finding that there are no prudent and feasible alternatives to the use of publicly owned parkland, and the Project includes all possible planning to minimize harm resulting from such use.

Mitigation

The mitigation planned as part of the Project in Barnum Park North and Barnum Park East is more substantial than that presented in the FEIS, and mitigates the use of these Section 4(f) properties and conversion of a Section 6(f) property. The Section 4(f) and 6(f) mitigation is disclosed in Appendix K and in the ROD2.

Demographics

Similar to when the FEIS was prepared, the Project study area includes a diverse community with a broad range of racial and ethnic backgrounds. The racial and ethnic diversity reflects the population within the City and County of Denver, which is generally more diverse than within the state of Colorado as a whole. The population within the City and County of Denver grew 8.2% from a population of 554,636 in 2000 to 600,158 in 2010 (US Census Bureau, 2010). The national average growth for this same period was 9.7%, which is faster than the City and County of Denver. The diversity of the populations within neighborhood is shown below in Table 1.

Table 1: Demographics of the Study Area Neighborhoods - 2009 Estimates

Neighborhood	Census Tract (Denver)	% white non-Hispanic	% black or African American	% American Indian or native Alaskan	% Asian/native Hawaiian /pacific islander	% Hispanic/Latino
Sun Valley	8	11.8	44.6	0	7.2	33.6
Barnum	9.03	13.7	1.7	0	0.7	82.7
Villa Park	9.04	15.6	0.4	0	0.2	83.9
Villa Park	9.05	12.5	0.9	1.3	0	85.2
Valverde	10	12.2	3.3	0	8.3	76.1
Lincoln Park	19	37.3	20.9	0	3.5	37.3
Baker	21	42.7	2.1	0	0.2	53.2

Source: US Census Bureau, 2009 American Community Survey 5-Year Estimates

The diversity of individual neighborhood populations reported in the FIES compared to the 2009 estimates is similar; the percent of the population that is non-Hispanic white in 2000 and 2009 is within ten percentage points of each other. Much of the study area is dominated by the Hispanic/Latino community, especially in the Barnum, Villa Park, and Valverde neighborhoods.

Economics

US 6 is an existing transportation corridor. The Project would not introduce new transportation infrastructure to areas that do not already have access to these facilities, with the exception of the bicycle/pedestrian bridge connecting Barnum Park North and South, which is mitigation for Section 4(f) impacts. This new infrastructure will improve multimodal access and connectivity. Improvements to the highway transportation system would help maintain access and reduce traffic congestion. Reduced congestion will improve overall accessibility to businesses and employment centers in the vicinity of the Project and the regional area. The existing, substandard interchange at US 6 and Bryant Street would be closed but access to the businesses in that area would be provided by alternative routes; this was also part of the FEIS.

Mitigation

No mitigation is required as the Project will improve overall accessibility.

Environmental Justice

As discussed in the FEIS, FHWA and CDOT concluded that the system alternatives are not likely to have disproportionately high and adverse impact on minority and/or low income populations, provided that the mitigation measures identified in FEIS are implemented and future detailed project planning/design/implementation phases continue to consider and honor the principles of environmental justice. Table 2 shows updated employment and income information for the Project area, by neighborhood.

Table 2: Employment and Income within the Study Area Neighborhoods – 2009 Estimates

Neighborhood	Census Tract (Denver)	Average Household Income (\$)	Persons below Poverty (%)	Unemployment Rate (%)
Sun Valley	8	\$12,674	78.4	14.5
Barnum	9.03	\$45,601	25.4	9.6
Villa Park	9.04	\$39,236	20.3	11.9
Villa Park	9.05	\$41,958	20.5	3.5
Valverde	10	\$43,932	36.1	10.5
Lincoln Park	19	\$35,852	60.9	40.5
Baker	21	\$57,759	23.1	12

Source: US Census Bureau, 2009 American Community Survey 5-Year Estimates

Compared to the FEIS, there is an increase in the percentage of Persons Below Poverty and Unemployment Rate for Lincoln Park. This change is accounted for because of the reduction in the study area boundaries for the Project, which reduced the number of census tracts included in the percentage. Since the remaining census tract is in a more industrial area and the number of residents is small, the percentages for Persons Below Poverty and Unemployment Rate for Lincoln Park appear disproportionately high.

Mitigation

The Project has incorporated mitigation measures to reduce or eliminate adverse impacts on the local community. The following mitigation measures are consistent with the FEIS and have been incorporated into the ROD2 documentation:

- Aesthetic and Urban Design
- Air Quality
- Noise and Vibration
- Construction Impacts

Soils and Geology

The soil and geologic resource investigation of the FEIS project area, which includes the current Project area, has not changed or altered from the descriptions provided in the FEIS.

The NRCS of the U.S. Department of Agriculture has not conducted a formal soil survey for the City and County of Denver. Urbanization has altered the natural soils due to fill, excavation, and other construction activities.

Mitigation

Avoidance of subsurface hazards is not possible due to the distribution of these conditions throughout the Project area. However, impacts of these subsurface conditions will be minimized through appropriate geotechnical investigation, design, and construction measures. These measures will be considered and specified in detail during final design. As in all roadway construction projects, a detailed geotechnical analysis of the surrounding subsurface will be required during the preliminary/final design process to determine the structural stability and load-bearing capacity of the geological formation within the limits of the proposed structures. The extent of these analyses is determined by federal, state, and local requirements. The results of the geotechnical analysis will be used to establish the design of the roadway and structures such as bridge piers, retaining walls, and grade separation structures.

Energy

The energy evaluation for the FEIS project area, which includes the US 6 Project area, will not have a significant impact to energy resources. The Project focuses on the replacement of bridges to meet current design standards in addition to providing a more efficient and reliable transportation system, improving the connectivity between transportation modes, and improving pedestrian/bicycle mobility across the Project corridor. These contributions will contribute to the overall vision for the corridor and will only slightly improve energy consumption in the corridor.

The Project will make some changes in signal and streetlight features in the Project area. Some features might be removed or added, but in the aggregate, these features and their energy use should be similar or less than existing conditions. A variety of energy-saving measures may be available to minimize energy use including the use of energy-efficient light bulbs in signals and lights on pedestrian bridges.

The construction of the pedestrian bridge over US 6 at Barnum Park will be a prominent structural feature on the US 6 corridor. The location of this bridge between Knox Court and Federal Boulevard has the potential to connect bicycle, pedestrian, and other alternative transportation modes. This continuous network supports healthy communities and the utilization of non-motorized transportation modes, which would reduce energy consumption.

Construction associated with the Project would increase energy consumption over the short-term, but this would be balanced by the long-term per-vehicle energy savings in the corridor associated with improved traffic flow.

Mitigation

No significant impacts to energy resources are anticipated; therefore, no mitigation measures are necessary. A variety of energy-saving measures may be available to minimize energy use. During final design, measures will be considered to reduce long-term energy use within the corridor by planning for energy efficiency. These measures may include:

- energy-efficient light bulbs in signals and lights
- more durable pavement to minimize the frequency of maintenance-induced traffic delays and material consumption
- use of recycled materials, wherever practicable, to increase energy efficiency

Short-Term Uses and Long-Term Productivity

The short-term uses and long-term benefits for the FEIS project area, which includes the US 6 Project area, involve a substantial amount of road construction, so uses of the environment typical of road construction would be necessary. Some of these short-term uses may include:

- Loss of soil through erosion and fugitive dust
- Temporary disruption of traffic and business in the corridor
- Temporarily undesirable viewsheds and aesthetics
- Temporary noise impacts
- Relocation of residences or businesses from properties needed for construction.

The Project supports the long-term benefits. Some of the long-term productivity benefits expected from these alternatives include:

- Improving safety for the traveling public
- Increasing the efficiency of a critical transportation corridor
- Modernizing deteriorating and out-of-date transportation infrastructure
- Creating a more environmentally friendly and aesthetically pleasing transportation corridor
- Improving the energy efficiency of vehicle movement through the corridor
- Improving corridor air quality by reducing congestion

The transportation improvements associated with the Project are consistent with state and local comprehensive planning that considers the need for present and future traffic requirements in the context of present and future land use development. Therefore, the local short-term impacts and use of resources are consistent with the maintenance and enhancement of long-term productivity for the local area.

Irreversible and Irretrievable Resources

The irreversible and irretrievable resources for the FEIS project area, which includes the US 6 Project area, are similar and have not changed from the description provided in the FEIS. Additional property for road right-of-way would be necessary, and this is considered an irreversible commitment. The Project corridor is in a highly developed urban area, and right-of-way acquisition would require relocations. Potential relocations are described in Appendix A of ROD2. Conversely, disruption to natural areas would be minimal because of the urbanized environment. Land used temporarily during construction would also be a commitment, but only during construction.

Highway construction materials, such as cement, aggregate, fuel, and bituminous material, would be consumed. Additionally, labor and natural resources would be used in the fabrication and preparation of construction materials. Consumption of these materials would generally be irretrievable. However, these materials are not in short supply and their use would not have an adverse effect on the continued availability of such resources.

Construction would require the expenditure of both state and federal funds, which also are irretrievable.

Mitigation

Sustainable construction and designs can mitigate irreversible and irretrievable resource depletion and improve air quality, noise, traffic, and community relations.

Sustainable practices will be explored during the Project design phase to the extent practicable. Some of the concepts to be explored may include, but are not limited to:

- Resource conservation
- Material reuse
- Waste minimization
- Minimal use of virgin materials
- Conservation and efficient use of water and energy
- Air pollution prevention
- Use of locally available resources

Cumulative Impacts

Cumulative impact analysis was conducted in the FEIS and considered in the 2007 ROD. For a cumulative impact to occur for any given resource and environmental consideration, there must be an adverse impact. The following table summarizes those environmental resources considered, whether their disclosed impacts are adverse, and if so, whether the Project has cumulative impacts different from what was previously disclosed in the FEIS/2007 ROD.

Table 3: Summary of Environmental Resource Impacts

Resource	Adverse Impact	Consistent and Previously Disclosed in FEIS/2007 ROD
Air Quality	No adverse impact.	Consistent.
Water Quality/Floodplains	No adverse Impact. Mitigated through adherence to CDOT's MS4 permit.	Consistent. Overall improvement through regional conformity.
Wetlands and Waters of the States/US	No adverse impact. Mitigated through wetland banking.	Consistent.
Vegetation and Wildlife	No adverse impact.	Consistent.
Historic and Archaeological Preservation	No adverse impact. Mitigated through 4(f) process.	Consistent.
Paleontology	No adverse impact.	Consistent.
Socioeconomic and Community	No adverse impact.	Consistent.
Traffic and Transportation	No adverse impact. Overall benefit.	Consistent.
Socioeconomic and Community	No adverse impact.	Consistent.
Parks and Recreation/Section 4(f)/6(f) Resources	No adverse impact. Mitigated through 4(f)/6(f) processes.	Consistent.
Noise	No impact.	Consistent.
Aesthetic and Urban Design	No adverse impacts.	Consistent.
Energy	No adverse impacts.	Consistent.
Hazardous Materials	No adverse impacts. Mitigated through Phase 1 and Phase II Environmental Site Assessment.	Consistent.
Traffic and Transportation	No adverse impact. Overall benefit.	Consistent.

References

U.S. Census Bureau. (2010). *State & County Quickfacts: Denver County, CO* Retrieved August 25, 2012, from <http://quickfacts.census.gov>.