Final Environmental Impact Statement

Colorado Department of Transportation
Federal Highway Administration
November 2006

FHWA-CO-EIS-05-01-F

CDOT Project IM 0252-315
I-25 Valley Highway
Logan to US 6

FINAL ENVIRONMENTAL IMPACT STATEMENT
Final Section 4(f) Evaluation

Submitted Pursuant to
23 USC 138, 42 USC 4332 (2) (c) and 49 USC 303

By the
US DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

and

COLORADO DEPARTMENT OF TRANSPORTATION

COOPERATING AGENCIES
Federal Railroad Administration
Federal Transit Administration
Regional Transportation District
City and County of Denver

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ABSTRACT

The Federal Highway Administration (FHWA) and the Colorado Department of Transportation (CDOT) have examined a broad range of alternatives and identified a Preferred Alternative for improvements to portions of I-25 (the Valley Highway), US 6, and Santa Fe/Kalamath in south central Denver. The improvements would correct geometric deficiencies, increase safety, and replace deteriorating structures. Pedestrian/bicycle mobility across the I-25 corridor and access to transit facilities would also be improved. This Final Environmental Impact Statement (EIS) describes the Preferred Alternative, as well as the other alternatives that were examined and a No Action Alternative, which provides a baseline for comparison. The environmental consequences of the alternatives are described for a broad range of environmental categories including: socio-economics and community, right-of-way and displacements, parks and recreation, aesthetics and urban design, air quality, noise and vibration, historic preservation, paleontology, water resources, floodplains, wetlands, vegetation and wildlife, hazardous waste, soils and geology, energy, and construction impacts. Mitigation measures are identified to address impacts to these resources.

FHWA and CDOT plan to implement the Preferred Alternative in a series of phases. This Final EIS discusses the planned phasing approach. Following public comment on this Final EIS, FHWA and CDOT plan to prepare a Record of Decision to address public comments, and select an initial project phase for implementation.

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EXECUTIVE SUMMARY

INTRODUCTION

The Federal Highway Administration (FHWA), in cooperation with the Colorado Department of Transportation (CDOT), is proposing improvements to the following transportation facilities in south-central Denver, Colorado:

- Interstate 25 (I-25; the Valley Highway) from Logan Street on the south to US 6 (6th Avenue) on the north
- US 6 from I-25 on the east to Federal Boulevard on the west
- Adjacent portions of Santa Fe Drive and Kalamath Street, including the crossing between these streets and the Consolidated Main Line railroad corridor

These improvements are needed to:

- Provide lane continuity and balance on I-25 from Logan to US 6, linking with sections of I-25 to the north and south
- Optimize highway system operations while recognizing the constraints on highway expansion identified through the regional transportation planning process
- Improve connectivity between transportation modes
- Improve pedestrian and bicycle mobility across the project corridor
- Increase safety along and across the corridor for motorists, pedestrians, and bicyclists
- Correct roadway deficiencies along I-25 and US 6 to meet current design standards to provide a safer, more efficient, and more reliable transportation system
- Increase safety and reduce congestion and delays related to the at-grade crossing of Santa Fe Drive / Kalamath Street and the Consolidated Main Line railroad

Chapter 1 *Purpose and Need* presents detailed information on project needs and objectives.

The National Environmental Policy Act (NEPA) of 1969 requires an environmental impact statement (EIS) be prepared to address potential significant impacts that a federal action may have on the environment. A Draft EIS was issued by FHWA, as the lead federal agency, and CDOT in April 2005. The Draft EIS documented the impacts of the alternatives under consideration. A public hearing was held in June 2005 and comments were received from the public and other agencies.

Building on the Draft EIS, this Final EIS responds to public and agency comments, and presents the Preferred Alternative. The Preferred Alternative, which has been identified by CDOT and FHWA, balances transportation improvements to meet the project purpose and need with the environmental and social considerations.

This Final EIS is being made available for public, agency, and other interested parties review and comment. During the comment period, a public hearing will be held. Comments may be submitted at the public hearing or at any time during the comment period. Following the Final EIS comment period, FHWA and CDOT will review public and agency comments and prepare a Record of Decision (ROD).

SYSTEM ALTERNATIVES CONSIDERED IN THE DRAFT EIS

The Draft EIS described the process that was used to develop, evaluate, and eliminate or advance potential alternatives to meet the purpose and need for the project. A No Action Alternative and the following three System Alternatives were considered in detail in the Draft EIS:

- **No Action Alternative** – includes only those projects that have committed funds for improvements. This includes completion of the T-REX project and the Broadway Viaduct Replacement Project, which are currently underway. These improvements would be made whether or not any other improvements are made to the Valley Highway corridor. The No Action Alternative is basically a decision not to select a build alternative. The No Action Alternative has been fully evaluated in the EIS and serves as a "baseline" against which other alternatives are compared.
- **System Alternative 1 – Maximize Use of Existing Right of Way** – a combination of roadway improvements that provide the narrowest roadway width or/and had the least footprint, or were closest to the current configurations.
- **System Alternative 2 – Maximize Operation Performance / Safety** - a combination of roadway improvements that provide the most direct travel route, best avoid friction between traffic streams, or reduce traffic signals.
- **System Alternative 3 – Maximize Facilitation of Local Objectives** – a combination of roadway improvements that attempt to enhance the local street systems operations as well as to best meet local land use and community value goals. System Alternative 3 does not necessarily represent the City and County of Denver's preferred alternative, but rather includes a number of improvements suggested by the City and County of Denver to be evaluated through the EIS process.

These alternatives were fully evaluated in the Draft EIS with regard to transportation benefits and environmental considerations. The detailed evaluation of these alternatives has been carried through in this Final EIS, and is presented in **Chapter 2** *Alternatives*, **Chapter 3** *Transportation Analysis*, and **Chapter 4** *Environmental Consequences and Mitigation Measures*.

IDENTIFICATION OF THE PREFERRED ALTERNATIVE

CDOT and FHWA have identified a Preferred Alternative for the Valley Highway Project that combines elements of the three system alternates that were analyzed in the Draft EIS. The Preferred Alternative does not represent a new alternative, but rather a refinement based in the analysis contained in the Draft EIS and comments received from the public and agencies.

The Preferred Alternative includes the following major elements:

- **I-25 Mainline:** Widening of I-25 to provide a consistent section with four through lanes plus auxiliary lanes in each direction through the project area (these improvements were common to System Alternatives 1,2, and 3 in the Draft EIS)
- **I-25/Broadway:** Tight diamond interchange (these improvements were included in System Alternative 3 in the Draft EIS)
- **I-25/Sante Fe Drive:** Single point urban interchange with a flyover ramp for northbound Santa Fe Drive to northbound I-25 (these improvements were common to System Alternatives 1,2, and 3 in the Draft EIS)

- **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 (these improvements were included in System Alternative 1 in the Draft EIS)
- **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 through the project area (these improvements were included in System Alternative 2 in the Draft EIS)

Following identification of the major elements of the Preferred Alternative, CDOT and FHWA reviewed the elements in light of comments that had been received on the Draft EIS to establish whether any refinements should be made to the elements to address specific concerns. This resulted in a number of refinements being made to the Preferred Alternative, as follows:

Location	Refinement to Preferred Alternative	Reason for Refinement
I-25/Broadway	Retain signal and full movement operation at Broadway and Kentucky Avenue (instead of right-in right-out access)	Improved access to RTD station and park-n-Ride; avoids introduction of buses onto Exposition between Broadway and Lincoln St.
I-25/Alameda	Add auxiliary lane on westbound Alameda Avenue from Kalamath Street to northbound I-25 ramp	Improved operations
I-25/Alameda	Add auxiliary right turn lane on northbound Lipan Street at Alameda Avenue	Improved operations
Santa Fe/ Kalamath/ CML	Alignment refinements to Santa Fe Drive at CML and refinement of the bicycle/pedestrian bridge connection	To enhance constructability and local business access
US 6/Federal	Reposition braided ramp entrance to south side of combined ramp	Improved operations realized through easier weaving; ease of signing; and improved driver expectancy
US 6/Federal	Reconfiguration/reconstruction of Barnum East Park with the acquisition of additional property	To maintain and enhance park function to minimizes harm to the park

These refinements have been included in the Preferred Alternative as presented and analyzed in this Final EIS. The Preferred Alternative is described in detail in **Chapter 2** *Alternatives*.

The Preferred Alternative balances transportation improvements with social and environmental considerations. CDOT and FHWA have concluded that the Preferred Alternative:

- meets the project purpose and need
- is feasible to build
- does not restrict consideration of alternatives for other reasonably foreseeable transportation improvements
- meets the long-term vision
- meets the needs or objectives of social, economic and environmental concerns
- is the Environmentally Preferable Alternative in accordance with CEQ
- is the Least Environmentally Damaging Practicable Alternative in accordance with Clean Water Act Guidelines [404(b)(1)]
- best avoids and/or minimize harm to Section 4(f) properties
- has general public acceptance

The ***relative operational performance*** of the system alternatives, including the Preferred Alternative, has been evaluated in detail and can be summarized as follows:

Legend: ○ = Best, ◒ = Moderate, ● = Worst	US 6 / Federal / I-25 Area	Broadway Interchange Area	Alameda Interchange Area	Santa Fe Interchange Area	Overall Freeway Operations	Signalized Intersection Hours of Congestion	Overall Surface Street Operations	Overall Operations
No Action	●	●	●	◒	◒	●	●	●
System Alternative 1	○	◒	◒	○	○	◒	◒	◒
System Alternative 2	○	○	○	○	○	○	○	○
System Alternative 3	◒	○	○	○	○	◒	○	○
Preferred Alternative	○	○	◒	○	○	◒	○	○

The ***relative safety performance*** of the system alternatives, including the Preferred Alternative, can be summarized as follows:

Legend: ○ = Best, ◒ = Moderate, ● = Worst	US 6 Freeway and Interchanges	I-25 Mainline Freeway	Broadway Interchange Area	Santa Fe Interchange Area	Alameda Interchange Area	Overall Safety
No Action	●	●	●	●	●	●
System Alternative 1	◒	○	○	○	○	◒
System Alternative 2	○	○	○	○	○	○
System Alternative 3	○	○	○	○	○	○
Preferred Alternative	○	○	○	○	○	○

Chapter 3 *Transportation Analysis* provides detail regarding operations and safety.

ENVIRONMENTAL IMPACTS

The environmental impacts of the system alternatives, including the Preferred Alternative are summarized over the next seven pages.

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Socio-Economics and Community				
No land use impacts.	Displacement of businesses mostly in Areas of Change[1] as established by the City and County of Denver in *Blueprint Denver*. No displacement of residences.	Displacement of businesses mostly in Areas of Change[1] as established by the City and County of Denver in *Blueprint Denver*. Displacement of residences.	Displacement of businesses mostly in Areas of Change[1] as established by the City and County of Denver in *Blueprint Denver*. Displacement of residences.	Displacement of businesses mostly in Areas of Change[1] as established by the City and County of Denver in *Blueprint Denver*. Displacement of residences.
No pedestrian and bicycle improvements.	Pedestrian and bicycle improvements.	Pedestrian and bicycle improvements.	Pedestrian and bicycle improvements.	Pedestrian and bicycle improvements.
Continued safety problems and deteriorating facilities.	Improved safety; replacement/ improvement of deteriorating facilities.	Improved safety; replacement/ improvement of deteriorating facilities.	Improved safety; replacement/ improvement of deteriorating facilities.	Improved safety; replacement/ improvement of deteriorating facilities.
Increased cut-through traffic due to congestion on highways.	Reduced cut-through traffic due to reduction in congestion.	Reduced cut-through traffic due to reduction in congestion.	Reduced cut-through traffic due to reduction in congestion.	Reduced cut-through traffic due to reduction in congestion
Right-of-Way and Displacements				
No right-of-way impacts. No business or residential displacement impacts.	Requires acquisition of 18 acres of right-of-way. No displacement of residences. Full purchase of 32 properties. Partial purchase of 38 properties Access modification to 16 properties. Displacement of 25 businesses	Requires acquisition of 29 acres of right-of-way. Displacement of 9 residences. Full purchase of 60 properties. Partial purchase of 28 properties. Access modification to 13 properties. Displacement of 51 businesses.	Requires acquisition of 21 acres of right-of-way. Displacement of 3 residences. Full purchase of 39 properties. Partial purchase of 36 properties. Access modification to 14 properties. Displacement of 38 businesses.	Requires acquisition of 21 acres of right-of-way Displacement of 3 residences Full purchase of 36 properties Partial purchase of 33 properties Access modification to 17 properties Displacement of 30 businesses.
No relocation of Consolidated Mainline Railroad.	Relocation of Consolidated Main Line railroad.	Relocation of Consolidated Main Line railroad.	Relocation of Consolidated Main Line railroad.	Relocation of Consolidated Main Line railroad.

Environmental Impacts (continued)

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Parks and Recreation				
Continued poor east-west connection to South Platte Trail at Alameda Avenue.	Improved east-west connection to South Platte Trail at Bayaud Avenue.	Improved east-west connection to South Platte Trail at Bayaud Avenue.	Improved east-west connection to South Platte Trail at Bayaud Avenue.	Improved east-west connection to South Platte Trail at Bayaud Avenue.
No impacts to existing parks.	Requires use of small parts of Barnum (0.01 acre), Barnum North (0.02 acre), and Barnum East (0.16 acre) parks.	Requires use of small parts of Barnum (0.01 acre) and Barnum North (0.05 acre) parks, and a substantial portion of Barnum East (1.54 acres) park.	Requires use of small parts of Barnum (0.02 acre), Barnum North (0.40 acre), and Barnum East (0.14 acre) parks.	Requires use of small parts of Barnum (0.01 acre) and Barnum North (0.05 acre) parks, and a substantial portion of Barnum East (1.54 acre) park.
Aesthetics and Urban Design				
No change in current poor aesthetics and deteriorating visual condition of aging structures.	Improvements to highway landscapes, retaining walls, high-mast lighting, signage, slope and ditch paving, and concrete barriers.	Improvements to highway landscapes, retaining walls, high-mast lighting, signage, slope and ditch paving, and concrete barriers.	Improvements to highway landscapes, retaining walls, high-mast lighting, signage, slope and ditch paving, and concrete barriers.	Improvements to highway landscapes, retaining walls, high-mast lighting, signage, slope and ditch paving, and concrete barriers
Completion of T-REX project and I-25 / Broadway viaduct will improve aesthetics at southern limit of project.	Positive visual effect from movement of northbound I-25 on-ramp from Broadway away from residential area.	Positive visual effect from movement of northbound I-25 on-ramp from Broadway away from residential area. Grade separation of southbound Broadway to southbound I-25 would have a negative visual effect if a flyover structure were used.	Positive visual effect from movement of northbound I-25 on-ramp from Broadway away from residential area.	Positive visual effect from movement of northbound I-25 on-ramp from Broadway away from residential area.
No change at I-25 and Santa Fe Drive.	Increased visibility of northbound I-25 on-ramp from northbound Santa Fe Drive.	Increased visibility of northbound I-25 on-ramp from northbound Santa Fe Drive.	Increased visibility of northbound I-25 on-ramp from northbound Santa Fe Drive.	Increased visibility of northbound I-25 on-ramp from northbound Santa Fe Drive.
No change at Santa Fe Drive/Kalamath Street and the Consolidated Main Line.	Canyon-like effect of grade separation of Santa Fe Drive / Kalamath Street below the Consolidated Main Line.	Canyon-like effect of grade separation of Santa Fe Drive / Kalamath Street below the Consolidated Main Line. Visibility of elevated grade separation structure carrying Santa Fe / Kalamath Street over Alameda Avenue.	Canyon-like effect of grade separation of Santa Fe Drive / Kalamath Street below the Consolidated Main Line. Canyon-like effect of grade separation of Santa Fe Drive / Kalamath Street below Alameda Avenue.	Canyon-like effect of grade separation of Santa Fe Drive / Kalamath Street below the Consolidated Main Line.

Environmental Impacts (continued)

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Air Quality				
Poorer air quality due to increased traffic congestion.	Improved air quality due to improved traffic flow. Temporary increase in air emissions during construction.	Improved air quality due to improved traffic flow. Temporary increase in air emissions during construction.	Improved air quality due to improved traffic flow. Temporary increase in air emissions during construction.	Improved air quality due to improved traffic flow. Temporary increase in air emissions during construction.
Noise and Vibration				
Approximately 66 residences would exceed noise abatement criteria.	Approximately 66 residences would exceed noise abatement criteria.	Approximately 52 residences would exceed noise abatement criteria.	Approximately 58 residences would exceed noise abatement criteria.	Approximately 55 residences would exceed noise abatement criteria
Noise abatement criteria exceeded in portions of the following parks: - Barnum Park - Barnum Park East - Barnum Park North - Frog Hollow Park - Valverde Park - Habitat Park - Vanderbilt Park - Vanderbilt Park East	Noise abatement criteria exceeded in portions of the following parks: - Barnum Park - Barnum Park East - Barnum Park North - Frog Hollow Park - Valverde Park - Habitat Park - Vanderbilt Park - Vanderbilt Park East	Noise abatement criteria exceeded in portions of the following parks: - Barnum Park - Barnum Park East - Barnum Park North - Frog Hollow Park - Valverde Park - Habitat Park - Vanderbilt Park - Vanderbilt Park East	Noise abatement criteria exceeded in portions of the following parks: - Barnum Park - Barnum Park East - Barnum Park North - Frog Hollow Park - Valverde Park - Habitat Park - Vanderbilt Park - Vanderbilt Park East	Noise abatement criteria exceeded in portions of the following parks: - Barnum Park - Barnum Park North - Frog Hollow Park - Valverde Park - Habitat Park - Vanderbilt Park - Vanderbilt Park East
Noise abatement criteria would be exceeded along portions of the South Platte River Trail.	Noise abatement criteria would be exceeded along portions of the South Platte River Trail.	Noise abatement criteria would be exceeded along portions of the South Platte River Trail.	Noise abatement criteria would be exceeded along portions of the South Platte River Trail.	Noise abatement criteria would be exceeded along portions of the South Platte River Trail.
56 commercial properties would exceed the noise abatement criteria.	54 commercial properties would exceed the noise abatement criteria.	37 commercial properties would exceed the noise abatement criteria.	38 commercial properties would exceed the noise abatement criteria.	42 commercial properties would exceed the noise abatement criteria.
No vibration impacts.	No vibration impacts.	No vibration impacts.	No vibration impacts.	No vibration impacts
Historic and Archaeological Preservation				
No impacts.	No impacts.	Requires replacement of three historic bridges and one historic grade separation structure.	Requires replacement of three historic bridges and one historic grade separation structure.	No impacts.

Environmental Impacts (continued)

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Paleontology				
No impacts to paleontology.	Denver Formation fossils may be encountered; monitoring required.	Denver Formation fossils may be encountered; monitoring required.	Denver Formation fossils may be encountered; monitoring required.	Denver Formation fossils may be encountered; monitoring required
Water Resources				
No short-term sediment impacts.	Short-term increase in sediment from construction.	Short-term increase in sediment from construction.	Short-term increase in sediment from construction.	Short-term increase in sediment from construction.
No change in area drainage.	Increase in impervious drainage area.	Increase in impervious drainage area.	Increase in impervious drainage area.	Increase in impervious drainage area.
Continued discharge of stormwater directly to the South Platte River without benefit of water quality ponds or best management practices.	Consolidate stormwater runoff with fewer outfalls to the South Platte River. Improved quality of stormwater discharge due to construction of water quality ponds and best management practices.	Consolidate stormwater runoff with fewer outfalls to the South Platte River. Improved quality of stormwater discharge due to construction of water quality ponds and best management practices.	Consolidate stormwater runoff with fewer outfalls to the South Platte River. Improved quality of stormwater discharge due to construction of water quality ponds and best management practices.	Consolidate stormwater runoff with fewer outfalls to the South Platte River. Improved quality of stormwater discharge due to construction of water quality ponds and best management practices.
Floodplains				
Continued flooding of I-25 under Alameda Avenue.	Upstream floodplain elevation reduced by raising the US 6 bridge over the river. Temporary impacts during replacement of Santa Fe Drive, Alameda Avenue, and US 6 bridges and construction of Bayaud Avenue bicycle/pedestrian bridge. Encroachment into floodplain from southbound I-25 off-ramp to Alameda Avenue and I-25 off-ramp to Santa Fe Drive.	Upstream floodplain elevation reduced by raising the US 6 bridge over the river. Temporary impacts during replacement of Santa Fe Drive, Alameda Avenue, and US 6 bridges and construction of Bayaud Avenue bicycle/pedestrian bridge. Encroachment into floodplain from southbound I-25 off-ramp to Alameda Avenue and I-25 off-ramp to Santa Fe Drive. Grade Separation of Alameda Avenue and Santa Fe Drive/ Kalamath Street would channelize stormwater flow along Alameda.	Upstream floodplain elevation reduced by raising the US 6 bridge over the river. Temporary impacts during replacement of Santa Fe Drive, Alameda Avenue, and US 6 bridges and construction of Bayaud Avenue bicycle/pedestrian bridge. Encroachment into floodplain from southbound I-25 off-ramp to Alameda Avenue and I-25 off-ramp to Santa Fe Drive.	Upstream floodplain elevation reduced by raising the US 6 bridge over the river. Temporary impacts during replacement of Santa Fe Drive, Alameda Avenue, and US 6 bridges and construction of Bayaud Avenue bicycle/pedestrian bridge. Encroachment into floodplain from southbound I-25 off-ramp to Alameda Avenue and I-25 off-ramp to Santa Fe Drive.

Environmental Impacts (continued)

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Wetlands, Waters of the U.S. and Open Water				
No impacts to existing wetlands.	0.274 acre of jurisdictional and non-jurisdictional wetlands impacted. 0.495 acre of open water impacted.	0.281 acre of jurisdictional and non-jurisdictional wetlands impacted. 0.495 acre of open water impacted.	0.240 acre of jurisdictional and non-jurisdictional wetlands impacted. 0.495 acre of open water impacted.	0.274 acre of jurisdictional and non-jurisdictional wetlands impacted 0.495 acre of open water impacted.
Vegetation and Wildlife				
No impacts to vegetation.	Removal of vegetation during construction. Potential introduction of noxious weeds into areas disturbed by construction.	Removal of vegetation during construction. Potential introduction of noxious weeds into areas disturbed by construction.	Removal of vegetation during construction. Potential introduction of noxious weeds into areas disturbed by construction.	Removal of vegetation during construction. Potential introduction of noxious weeds into areas disturbed by construction.
Continued restriction of wildlife movement along the South Platte River due to low bridges.	Short-term disturbance of wildlife and aquatic habitat during construction. Improvements to US 6 and Santa Fe Drive bridges would move traffic away from wildlife habitat along the South Platte. Improvement of wildlife travel corridor by increased horizontal and vertical clearance of bridges.	Short-term disturbance of wildlife and aquatic habitat during construction. Improvements to US 6 and Santa Fe Drive bridges would move traffic away from wildlife habitat along the South Platte. Improvement of wildlife travel corridor by increased horizontal and vertical clearance of bridges.	Short-term disturbance of wildlife and aquatic habitat during construction. Improvements to US 6 and Santa Fe Drive bridges would move traffic away from wildlife habitat along the South Platte. Improvement of wildlife travel corridor by increased horizontal and vertical clearance of bridges.	Short-term disturbance of wildlife and aquatic habitat during construction. Improvements to US 6 and Santa Fe Drive bridges would move traffic away from wildlife habitat along the South Platte. Improvement of wildlife travel corridor by increased horizontal and vertical clearance of bridges.
Hazardous Waste				
No hazardous waste impacts.	14 properties identified with potential or recognized environmental conditions to be acquired for right-of-way.	19 properties identified with potential or recognized environmental conditions to be acquired for right-of-way.	13 properties identified with potential or recognized environmental conditions to be acquired for right-of-way.	13 properties identified with potential or recognized environmental conditions to be acquired for right-of-way.
	Excavations in the vicinity of Broadway / I-25 interchange would encounter contaminated groundwater and soil.	Excavations in the vicinity of Broadway / I-25 interchange and for southbound Broadway to southbound I-25 tunnel would encounter contaminated soil and groundwater, and could conflict with on-going remediation by others.	Excavations in the vicinity of Broadway / I-25 interchange would encounter contaminated groundwater and soil.	Excavations in the vicinity of Broadway / I-25 interchange would encounter contaminated groundwater and soil.

Environmental Impacts (continued)

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Hazardous Waste (continued)				
	Excavations in the vicinity of the Santa Fe Drive / I-25 interchange may encounter contaminated groundwater, soil, and fill material.	Excavations in the vicinity of the Santa Fe Drive / I-25 interchange may encounter contaminated groundwater, soil, and fill material.	Excavations in the vicinity of the Santa Fe Drive / I-25 interchange may encounter contaminated groundwater, soil, and fill material.	Excavations in the vicinity of the Santa Fe Drive / I-25 interchange may encounter contaminated groundwater, soil, and fill material.
	Excavations in the vicinity of the Alameda Avenue / I-25 interchange may encounter contaminated groundwater, soil, and fill material.	Excavations in the vicinity of the Alameda Avenue / I-25 interchange may encounter contaminated groundwater, soil, and fill material.	Excavations in the vicinity of the Alameda Avenue / I-25 interchange may encounter contaminated groundwater, soil, and fill material.	Excavations in the vicinity of the Alameda Avenue/ I-25 interchange may encounter contaminated groundwater, soil, and fill material.
	Relocation of Consolidated Main Line along I-25 parallel to existing track may encounter contaminated groundwater, soil, and fill material.	Relocation of Consolidated Main Line along I-25 parallel to existing track may encounter contaminated groundwater, soil, and fill material.	Relocation of Consolidated Main Line along I-25 parallel to existing track may encounter contaminated groundwater, soil, and fill material.	Relocation of Consolidated Main Line along I-25 parallel to existing track may encounter contaminated groundwater, soil, and fill material.
	Excavations in the vicinity of the I-25 / US 6 interchange may encounter contaminated groundwater, soil, fill material, and methane. Excavations along US 6 may encounter contaminated soil and groundwater.	Excavations in the vicinity of the I-25 / US 6 interchange may encounter contaminated groundwater, soil, fill material, and methane. Excavations along US 6 may encounter contaminated soil and groundwater.	Excavations in the vicinity of the I-25 / US 6 interchange may encounter contaminated groundwater, soil, fill material, and methane. Excavations along US 6 may encounter contaminated soil and groundwater.	Excavations in the vicinity of the I-25 / US 6 interchange may encounter contaminated groundwater, soil, fill material, and methane. Excavations along US 6 may encounter contaminated soil and groundwater.
	Santa Fe Drive, Alameda Avenue, and US 6 bridges may be coated with lead-based paint.	Santa Fe Drive, Alameda Avenue, US 6, and railroad bridges may be coated with lead-based paint.	Santa Fe Drive, Alameda Avenue, US 6, and railroad bridges may be coated with lead-based paint.	Santa Fe Drive, Alameda Avenue, US 6, and railroad bridges may be coated with lead-based paint.
Soils and Geology				
No impacts to soils.	Expansive soils and unsuitable fill material may be encountered.	Expansive soils and unsuitable fill material may be encountered.	Expansive soils and unsuitable fill material may be encountered.	Expansive soils and unsuitable fill material may be encountered

Environmental Impacts (continued)

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
		Energy		
Increase in fuel use due to inefficient fuel use from increased traffic congestion.	Increase in energy use due to construction. Decrease in fuel use due to decreased traffic congestion.	Increase in energy use due to construction. Decrease in fuel use due to decreased traffic congestion.	Increase in energy use due to construction. Decrease in fuel use due to decreased traffic congestion.	Increase in energy use due to construction. Decrease in fuel use due to decreased traffic congestion.
		Construction		
No short-term construction-related impacts.	Short-term fugitive dust emissions during construction. Short-term construction noise. Short-term increase in sediment from construction. Short-term traffic delays. Short-term visual impacts. Short-term utility impacts.	Short-term fugitive dust emissions during construction. Short-term construction noise. Short-term increase in sediment from construction. Short-term traffic delays. Short-term visual impacts. Short-term utility impacts.	Short-term fugitive dust emissions during construction. Short-term construction noise. Short-term increase in sediment from construction. Short-term traffic delays. Short-term visual impacts. Short-term utility impacts.	Short-term fugitive dust emissions during construction. Short-term construction noise. Short-term increase in sediment from construction. Short-term traffic delays. Short-term visual impacts. Short-term utility impacts.

Note: [1] Areas of Change have been identified by the City and County of Denver as areas in which land use change is either underway or desirable. These are primarily older industrial districts, major arterial corridors, and areas adjacent to existing or planned transit facilities.

Detail regarding environmental resources and consequences is provided in **Chapter 4** *Environmental Consequences and Mitigation Measures.*

MITIGATION MEASURES

Mitigation measures have been identified to address adverse environmental impacts of the Preferred Alternative and can be summarized as follows:

Socio-Economics and Community
• Continue information and discussions with local community during planning and implementation to minimize disruptions • Continue consideration of environmental justice through final design and implementation
Right-of-Way and Displacements
• Conform to the requirements set forth in the Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970 (Public Law 91-646) and the Uniform Relocation Act Amendments of 1987 (Public Law 100-17), each of which contains specific requirements that govern the manner in which a government entity acquires property for public use • Prepare a relocation analysis and provide relocation advisory service
Parks and Recreation
• Prepare final design to acquire the least possible amount of park land while meeting operational and safety requirements • Redesign/reconstruct Barnum East Park to provide equivalent or upgraded facilities
Aesthetics and Urban Design
• Use conceptual “kit of parts” in design of aesthetic elements and treatments • Continue coordination with other agencies through final design and implementation
Air Quality
• Maintain construction equipment in good working order • Implement a dust control plan • Ensure no excessive idling of inactive or unnecessary equipment or vehicles • Use higher-grade fuel in construction equipment • Locate stationary equipment as far from sensitive receivers as possible
Noise and Vibration
• Provide noise barrier along I-25 in the vicinity of 800 block of S. Lincoln St. and a portion of the South Platte River Trail • No vibration mitigation measures are necessary • During preparation of final design, consider elements to reduce “nuisance noise” experienced near the highway
Historic and Archaeological Preservation
• Mitigation not required for the Preferred Alternative
Paleontology
• Monitor, as feasible, areas where Denver Formation rocks may be disturbed. Have the CDOT paleontologist examine project design plans as each is finalized to determine the extent of impact to the Denver Formation, and the scope, if any, of monitoring work required

MITIGATION MEASURES (continued)

Water Quality and Water Resources
• Use construction BMPs to reduce temporary impacts • On-site project area runoff will be controlled through water quality ponds or other BMPs to settle and improve water quality runoff releasing to the South Platte River • Reduction of the overall number of outfalls into the South Platte River and installation of energy dissipaters, such as riprap, at outfalls to reduce erosion potential • Use of pump stations to remove runoff at underpasses on grades separations and water quality ponds to settle sediment and improve water quality releasing into the South Platte River • Application of the BMPs would be further defined during the final engineering phase of this project. Substantial conditions and designs would be developed during final design, as appropriate, and in accordance with CDOT's environmental mission statement and environmental policy
Floodplains
• Construct bridges on piers or outside of floodplain to minimize impacts • Restore bridge construction areas • Install storm sewer improvements to reduce flooding on I-25 under Alameda Avenue • Provide additional volume in areas of floodplain encroachment for overall "no rise" in floodplain
Wetlands, Waters of the U.S., and Open Water
• Mitigate jurisdictional and non-jurisdictional wetlands on a 1:1 basis • Minimize culvert lengths and use construction BMPs to reduce impacts • Use construction BMPs to reduce temporary impacts • Use water quality BMPs to minimize indirect impacts from non-point source pollution
Vegetation and Wildlife
• Revegetate construction areas using CDOT-approved native seed mix • If construction occurs outside of appropriate seeding windows, slopes will be temporarily protected from erosion using mulch and mulch tackifier • Replace trees greater than 2 inches in diameter on a 1:1 basis • Existing shrubs removed during construction will be replaced with native species to their pre-construction aerial coverage • Impacted landscape areas (irrigated or otherwise) shall be enhanced and incorporated into final design to ensure the existing landscape does not become fragmented • Clean construction vehicles before entering construction site to control noxious weed introduction • Prepare and implement an Integrated Weed Management Plan to target noxious weed populations • Conduct habitat disturbing activities, such as tree removal, grading, scraping, grubbing, etc., during the non-breeding season unless the area has been verified by a qualified biologist that no active nests are present
Hazardous Waste
• Conduct individual, site-specific initial site assessments of properties before acquiring right-of-way • Conduct a preliminary site investigation before final design to identify soil and groundwater contamination that may affect feasibility evaluation and final design • Prepare a materials handling plan and a health and safety plan, which includes asbestos-containing material, as required by Section 250.03 of the CDOT Standard Specifications for Road and Bridge Construction • Conduct an asbestos and miscellaneous material survey prior to demolition of any structures • Coordinate with OPS and CDPHE, as necessary, for properties being acquired • Perform a heavy metals based paint survey of bridges in the project area

MITIGATION MEASURES (continued)

Soils and Geology
• Consider potential for expansive soils and unsuitable fill during final design
Energy
• Where appropriate, CDOT will incorporate energy-saving features into the project design in accordance with CDOT's environmental mission statement and environmental policy.
Construction
Identify appropriate construction mitigation during final design and construction planning, with consideration of the following possible mitigation measures identified by the Citizens Working Group: • Use construction BMPs • Erect temporary noise walls / screens; make vouchers for hotels available to disturbed residents • Schedule construction during less noise-sensitive times; create noise hotline • Send information to affected public before implementing construction activities • Use noise blankets on equipment and quiet-use generators • Combine noisy operations and schedule to occur during the same time period • Use alternative construction methods, such as sonic or vibratory pile driving, in sensitive areas whenever possible • Use enhanced signing; develop alternate access enhancements • Use advertising / implement public relations activities • Do not close multiple interchanges concurrently • Limit detours to major arterial streets – ensure no local street detours • Schedule construction during periods of least traffic • Provide geometric enhancements including wider lanes and better visibility • Limit construction vehicles to major arterials • Enforce speed restrictions; provide adequate space for enforcement on I-25 • Implement use of Courtesy Patrol • Phase construction to limit traffic in neighborhoods • Coordinate work activities to avoid coinciding with local sporting / entertainment events • Advance traffic diversion (470 Beltway, Colfax as alternate to 6th Avenue) • Use intelligent transportation systems / variable message signs to advise and redirect traffic • Work with RTD to offer enhanced operations during peak construction • Develop traffic management plans; maintain access to local businesses and residents • Coordinate with emergency service providers to minimize delay and ensure access to properties • Use wetting / chemical inhibitors for dust • Implement procedures to ensure prompt and safe disposal of waste products • Develop stormwater management plan • Cover trucks hauling soil and other materials • Stabilize and cover stockpile areas • Minimize off-site tracking of mud and debris by washing construction equipment in contained areas and by temporary access stabilization • Avoid impacts to wetlands or other areas of important habitat value in addition to those impacted by the project itself • Control and prevent concrete washout and construction wastewater by including proper specifications in project designs, adhering to those specifications, and reviewing design specifications to ensure adequacy in preventing water pollution by concrete washout • Store equipment and materials in designated areas only • Remove any unused detour pavement markings or signs

BMP – best management practices
CDOT - Colorado Department of Transportation

Detail regarding mitigation measures is provided in **Chapter 4** *Environmental Consequences and Mitigation Measures.*

PHASED PROJECT IMPLEMENTATION

Total funding for the proposed action has not been identified at this time. Budget placeholders are included in the 2030 Regional Transportation Plan. These budgets fall short of the estimated costs for the system alternatives as reflected in this document. As a result, CDOT and FHWA are planning for phased implementation of the Preferred Alternative. Phased implementation was discussed with the public and agencies during preparation of the Draft EIS and at the Draft EIS public hearing.

With the ROD to be issued after this Final EIS has been made available and public comment received, FHWA and CDOT plan to select an initial phase (Phase 1) for implementation. The identification of a Preferred Alternative for the entire project in this Final EIS is consistent with the FHWA's objective of analyzing and selecting transportation solutions on a broad enough scale to provide meaningful analysis and avoid segmentation. The selection of an initial phase for implementation is consistent with FHWA requirements to have funding for projects identified before final decisions are made (this is known as "fiscal constraint" for transportation projects). It is the intent of CDOT and FHWA to work toward implementation of the Preferred Alternative in its entirety through this phased approach, as additional funds become available.

In cases where a project is implemented in more than one phase, care must be taken to ensure that the transportation system operates acceptably at the conclusion of each phase. This is referred to as "independent utility" – the ability of each phase to operate on its own. Additionally, it must be demonstrated that air quality conformity will not be jeopardized. In addition, any mitigation measures needed in response to project impacts must be implemented with the phase in which the impacts occur, rather than deferred to a later phase.

Phased implementation is typically detailed during final design. However, the requirements of fiscal constraint must be satisfied for FHWA to approve a ROD. Because the fiscally-constrained Regional Transportation Plan (RTP) does not contain the entire Preferred Alternative for the Valley Highway project, CDOT and FHWA believe that it is appropriate to identify project phasing within the NEPA process. This will allow consideration of phasing at an earlier time than for many projects, with the goal of better understanding of the impacts of phasing as well as increased opportunity for public involvement.

The fiscally-constrained element of the 2030 RTP establishes reasonably expected funding for the project corridor through the year 2030 as follows:

- I-25: Broadway to Alameda - $84.0 million
- US 6: Bryant – $15.0 million
- US 6: Federal - $8.1 million

This indicates that $107.1 million (in 2005 dollars) can reasonably be expected for the project corridor through the year 2030, including $84 million for I-25 and $23.1 million for US 6. This compares with estimated costs for the entire Preferred Alternative of $294 million.

CDOT and FHWA have identified six project phases for implementation of the entire Preferred Alternative, as follows:

Project Phases and Priorities

Phase	Phase Package Description Elements Included	Sequencing Restrictions	Probable Cost	Comments
1 Most critical on I-25	**I-25 / Santa Fe Interchange with Lane Continuity through Alameda** • Reconstruction of I-25/ Santa Fe Interchange • Construction of flyover ramp from NB Santa Fe to NB I-25 • Replacement of Alameda bridge over I-25 • Reconstruction of I-25 under Alameda with associated sump and drainage improvements	None	$81M $ 3M ROW $84M	NB and SB structures at Santa Fe both rated as structurally deficient with sufficiency rating of 20.2 and 22.8, respectively. A sufficiency rating of 50 or greater is considered acceptable. Continuous auxiliary lanes on I-25 (US 85 lane balance) will not be fully addressed until Mainline Widening is completed.
1 Most critical on US6	**US 6 / Federal Bridge and Ramps, excluding Braided Ramp and West Side US 6 / Federal Ramps** • Closure of Bryant Street Interchange to US 6 • Replacement of Federal Blvd. bridge over US 6 • Reconfiguration/reconstruction of ramps • Reconfiguration of Barnum East Park	None	$20M $ 3M ROW $23M	
2	**I-25/ Alameda Interchange and Alameda Bridge over South Platte** • Alameda widening from Lipan St. to Santa Fe Drive • Replacement of Alameda bridge over the S. Platte River • Construction of Lipan St. and closure of Platte River Drive north of Alameda • Widening of Lipan south of Alameda • Replacement of Alameda ramps to I-25	Must follow or be concurrent with **I-25 / Santa Fe Interchange**	$18M $ 5M ROW $23M	
3	**I-25 Mainline Widening From Alameda to US 6** • Relocation of CML railroad to allow widening of I-25 • Reconstruction of I-25 north of Alameda to full section with shoulders	Must follow or be concurrent with **I-25/ Alameda Interchange**	$28M $ 8M ROW $36M	Railroad relocation sequencing and logistics requires further detailed evaluation.
4	**Santa Fe/ Kalamath CML Grade Separation** • Construction of road underpasses taking Santa Fe and Kalamath under the CML • Construction of pedestrian/ bicycle bridge over Santa Fe, Kalamath, CML, I-25 and South Platte River along Bayaud alignment	Must follow **I-25/ Alameda Interchange.** Must follow or be concurrent with **I-25 Mainline widening from Alameda to US 6**	$22M $7M Ped.Br. $ 7M ROW $36M	
5	**US 6 from Federal to I-25 with Braided Ramp** • Reconstruction of US 6 from Federal to I-25 • Replacement of US 6 bridge over S. Platte River • Construction of braided ramp from Federal Blvd. to EB US6 • Construction of EB US 6 to Federal off ramp • Construction of Federal to WB US 6 on ramp	Must follow **US 6 / Federal Bridge and Ramps excl. Braided Ramp**	$75M $ 2M ROW $77M	
6	**I-25/ Broadway Interchange** • Reconfiguration/reconstruction of I-25/Broadway interchange	None	$13M $ 2M ROW $15M	

Phase 1 was selected to provide improvements aimed at addressing the most critical needs in the I-25 and US 6 corridors. Specifically:

- On I-25, Phase 1 provides for the replacement of structurally-deficient structures at I-25 and Santa Fe Drive
- Also on I-25, Phase 1 provides lane continuity with four through lanes on I-25 to match the sections to the north and south
- On US 6, Phase 1 provides for closure of the Bryant Street interchange with standardization of the Federal interchange. These actions will enhance safety through this high accident area.

It must be noted that these are current priorities. Priorities may change, especially with regard to how phases may fit with future funding amounts. In addition, actions to improve safety (for example, replacement of guard rails, barriers, or repairs on bridges) could occur separately from this effort and will be funded at that time by safety funds and/or other funding sources.

Following their issuance of this Final EIS, CDOT and FHWA will:

- Publish notice of availability of the Final EIS in the Federal Register
- Provide copies of the Final EIS for public review at convenient locations
- Hold a public hearing
- Receive public comments at the public hearing and through written submissions
- Review public comments, prepare responses, and refine the Preferred Alternative and/or project phases in response to comments, as appropriate
- Execute a ROD selecting a fiscally-constrained Phase 1 for implementation

Following execution of a ROD, CDOT and FHWA will proceed with final design and implementation of Phase 1.

Subsequent project phases will be implemented as additional funding become available, and as CDOT and FHWA work toward implementation of the entire Preferred Alternative. For each subsequent phase, a ROD will be issued detailing the phase to be implemented. CDOT and FHWA will review the information provided in this Final EIS and the initial ROD in preparing each subsequent ROD.

Additional detail is provided in **Chapter 7** *Phased Project Implementation.*

AREAS OF CONTROVERSY

Construction impacts and traffic noise were two topics of concern to a number of members of the public. This was discussed in the Draft EIS. Mitigation measures have been identified, and future coordination will be needed during design and implementation to address these concerns.

UNRESOLVED ISSUES

CDOT and FHWA are not aware of any major issues that are unresolved at this time.

OTHER FEDERAL ACTIONS REQUIRED

An individual Clean Water Act Section 404 permit may also be required from the U.S. Army Corps of Engineers, depending on the total area of wetlands and other waters of the U.S. that would be impacted by the Preferred Alternative. A Clean Water Act Section 401 water quality certification will also be required if an individual Section 404 permit is required.

TABLE OF CONTENTS

Page

EXECUTIVE SUMMARY ES-1

1.0 PURPOSE AND NEED 1-1
1.1 Project Location and Purpose 1-1
1.2 Project History and Status 1-3
1.3 Project Needs and Objectives 1-5
1.4 Detailed Identification of the Project Needs 1-6

2.0 ALTERNATIVES 2-1
2.1 Public and Agency Involvement in Alternatives Development 2-1
2.2 Alternatives Development and Screening Process 2-4
2.3 Alternatives Considered and Eliminated 2-7
2.4 System Alternatives Considered in Detail 2-22
2.5 Future Redevelopment and Transportation Improvements Near I-25 and Broadway 2-63
2.6 Preferred Alternative 2-65

3.0 TRANSPORTATION ANALYSIS 3-1
3.1 Existing Roadway and Traffic Conditions 3-1
3.2 Compatibility with Transportation Plans and Programmed Projects 3-8
3.3 Future Travel Demand 3-9
3.4 Freeway and Street Safety 3-33
3.5 Transit / HOV Access 3-34
3.6 Pedestrian and Bicycle Facilities 3-35
3.7 Freight and Rail Operations 3-37

4.0 ENVIRONMENTAL CONSEQUENCES 4-1
4.1 Socio-Economics and Community 4.1-1
4.2 Right-of-Way and Displacements 4.2-1
4.3 Parks and Recreation 4.3-1
4.4 Aesthetics and Urban Design 4.4-1
4.5 Air Quality 4.5-1
4.6 Noise and Vibration 4.6-1
4.7 Historic Preservation 4.7-1
4.8 Paleontology 4.8-1
4.9 Water Resources 4.9-1
4.10 Floodplains 4.10-1
4.11 Wetlands, Waters of the U.S. and Open Water 4.11-1
4.12 Vegetation and Wildlife 4.12-1
4.13 Hazardous Waste 4.13-1

TABLE OF CONTENTS (Continued)

Page

4.14 Soils and Geology 4.14-1
4.15 Energy 4.15-1
4.16 Short-term Uses and Long-term Productivity 4.16-1
4.17 Irreversible and Irretrievable Commitments of Resources 4.17-1
4.18 Construction Impacts 4.18-1
4.19 Permits Required 4.19-1
4.20 Cumulative Impacts 4.20-1
4.21 Summary of Environmental Consequences, Mitigation Measures and Monitoring Commitments 4.20-1

5.0 SECTION 4(f) EVALUATION 5-1
5.1 Parks 5-6
5.2 Coordination 5-21
5.3 Section 4(f) Finding 5-21

6.0 PUBLIC INVOLVEMENT 6-1
6.1 Objectives 6-1
6.2 Elements of Program 6-1
6.3 Agency Input 6-6
6.4 Public Input 6-11
6.5 Special Outreach to Low-Income and Minority Populations 6-20
6.6 Release of Draft EIS 6-25
6.7 Coordination Subsequent to Release of Final EIS 6-26

7.0 PHASED PROJECT IMPLEMENTATION 7-1
7.1 Phased Implementation Requirements 7-1
7.2 Identification of Logical Project Phases and Priorities 7-4
7.3 Detailed Discussion of Project Phases 7-7
7.4 Further Coordination and Decision Making after Final EIS 7-43

8.0 LIST OF PREPARERS 8-1
9.0 AVAILABILITY OF TECHNICAL REPORTS 9-1
10.0 REFERENCES 10-1
11.0 INDEX 11-1

APPENDIX A AGENCY COORDINATION
APPENDIX B PUBLIC COORDINATION
APPENDIX C WETLAND FINDING

LIST OF FIGURES

Page

Figure 1-1 Valley Highway EIS Study Area 1-2
Figure 1-2 Metro Denver Regional Highways 1-4
Figure 1-3 Existing Lane Continuity and Balance Deficiencies 1-7
Figure 1-4 Study Area Transit System 1-9
Figure 1-5 Mainline I-25 Geometric Deficiencies 1-14
Figure 1-6 I-25 / 6th Avenue Geometric Deficiencies 1-15
Figure 1-7 I-25 / Broadway Interchange Geometric Deficiencies 1-16
Figure 1-8 I-25 / Santa Fe Drive Geometric Deficiencies 1-17
Figure 1-9 I-25 / Alameda Avenue Geometric Deficiencies 1-18

Figure 2-1 Alternatives Development and Screening Results 2-8
Figure 2-2 No Action Alternative 2-23
Figure 2-3 System Alternative 1 – Maximize Use of Existing Right-of-Way 2-24
Figure 2-4 System Alternative 2 – Maximize Operational Performance / Safety 2-25
Figure 2-5 System Alternative 3 – Maximize Facilitation of Local Objectives 2-26
Figure 2-6 I-25 Common Sections 2-29
Figure 2-7 Common Elements at Broadway 2-30
Figure 2-8 Common Elements at Santa Fe Drive 2-31
Figure 2-9 Common Elements at Alameda Avenue 2-32
Figure 2-10 Common Elements at US 6 / I-25 2-33
Figure 2-11 Arterial Streets Common Sections with System Alternatives 2-34
Figure 2-12 System Alternative 1, I-25 Typical Section, Broadway to Santa Fe Drive 2-38
Figure 2-13 System Alternative 1, US 6/Federal Boulevard/Bryant Street Improvements 2-39
Figure 2-14 System Alternative 1, US 6 Typical Section, I-25 to Federal Boulevard 2-40
Figure 2-15 System Alternative 1, Broadway Interchange 2-41
Figure 2-16 System Alternative 1, Alameda Avenue Interchange 2-42
Figure 2-17 System Alternative 1 Simulation, Alameda / Santa Fe / Kalamath 2-43
Figure 2-18 System Alternative 1, Santa Fe Drive and Kalamath Street Grade Separation 2-44
Figure 2-19 System Alternative 1, Santa Fe Drive and Kalamath Street Typical Section 2-44
Figure 2-20 System Alternative 1, Broadway Bicycle / Pedestrian Facilities 2-45
Figure 2-21 System Alternative 1, Bayaud Avenue Bicycle / Pedestrian Structure 2-46
Figure 2-22 System Alternative 2, I-25 Typical Section, Broadway to Santa Fe Drive 2-48
Figure 2-23 System Alternative 2, US 6 / Federal Boulevard / Bryant Street Interchange 2-49
Figure 2-24 System Alternative 2, US 6 Typical Section, I-25 to Federal Boulevard 2-49
Figure 2-25 System Alternative 2, Broadway Interchange 2-50
Figure 2-26 System Alternative 2, Santa Fe Drive Interchange 2-51
Figure 2-27 System Alternative 2, Alameda Avenue Interchange 2-52
Figure 2-28 System Alternative 2, Alameda Avenue – Santa Fe Drive to Cherokee Street 2-52
Figure 2-29 System Alternative 2 Simulation, Santa Fe / Kalamath / Alameda 2-53
Figure 2-30 System Alternative 2, Broadway Bike / Pedestrian Facilities 2-54
Figure 2-31 System Alternative 3, US 6/Federal Boulevard/Bryant Street Improvements 2-56
Figure 2-32 System Alternative 3, Broadway Interchange 2-57
Figure 2-33 System Alternative 3, Santa Fe Drive Interchange 2-58
Figure 2-34 System Alternative 3, Alameda Avenue Interchange and Grade Separation 2-59
Figure 2-35 System Alternative 3 Simulation, Santa Fe / Kalamath / Alameda 2-60

LIST OF FIGURES (Continued)

Page

Figure 2-36 System Alternative 3, Broadway Bike / Pedestrian Facilities 2-62
Figure 2-37 System Alternative 3, Bayaud Avenue Bike / Pedestrian Structure 2-62
Figure 2-38 Preferred Alternative 2-66
Figure 2-39 Preferred Alternative – I-25 Typical Sections 2-77
Figure 2-40 Arterial Street Typical Sections with the Preferred Alternative 2-78
Figure 2-41 Preferred Alternative, Broadway Interchange 2-79
Figure 2-42 Preferred Alternative, Broadway Bicycle/Pedestrian Facilities 2-80
Figure 2-43 Preferred Alternative, Santa Fe Drive Interchange 2-81
Figure 2-44 Preferred Alternative, Alameda Avenue Interchange 2-83
Figure 2-45 Preferred Alternative Simulation – Santa Fe/Kalamath/Alameda 2-84
Figure 2-46 Preferred Alternative, Santa Fe Drive and Kalamath Street Grade Separation 2-85
Figure 2-47 Preferred Alternative, Santa Fe Drive and Kalamath Street Typical Section ... 2-86
Figure 2-48 Preferred Alternative, Bayaud Avenue Bicycle/Pedestrian Structure 2-86
Figure 2-49 Preferred Alternative, US 6/I-25 Interchange 2-87
Figure 2-50 Preferred Alternative, US 6/Federal Boulevard/Bryant Street Interchange 2-89
Figure 2-51 Preferred Alternative, US 6 Typical Section, I-25 to Federal Boulevard 2-89

Figure 3-1 Traffic Analysis Study Area 3-2
Figure 3-2 System Traffic Movements, Existing Conditions 3-4
Figure 3-3 Existing Conditions: Logan Street to Alameda Avenue, Levels of Service and Lane Geometry 3-6
Figure 3-4 Existing Conditions: US 6 Area, Levels of Service and Lane Geometry 3-7
Figure 3-5 System Traffic Movements, Year 2025 Forecasts 3-11
Figure 3-6 No Action Alternative: Logan Street to Alameda Avenue, 2025 Levels of Service and Lane Geometry 3-13
Figure 3-7 No Action Alternative: US 6 Area, 2025 Levels of Service And Lane Geometry 3-14
Figure 3-8 System Alternative 1: Logan Street to Alameda Avenue 2025 AM/PM Peak Hour Levels of Service and Lane Geometry 3-16
Figure 3-9 System Alternative 1: US 6 2025 AM/PM Peak Hour Levels of Service and Lane Geometry 3-17
Figure 3-10 System Alternative 2: Logan Street to Alameda Avenue 2025 AM/PM Peak Hour Level of Service and Lane Geometry 3-18
Figure 3-11 System Alternative 2: US 6 2025 AM/PM Peak Hour Levels of Service and Lane Geometry 3-19
Figure 3-12 System Alternative 3: Logan Street to Alameda Avenue 2025 AM/PM Peak Hour Levels of Service and Lane Geometry 3-20
Figure 3-13 System Alternative 3: US 6 2025 AM/PM Peak Hour Levels of Service andLane Geometry 3-21
Figure 3-14 Preferred Alternative: Logan Street to Alameda Avenue 2025 AM/PM Hour Levels of Service and Lane Geometry 3-22
Figure 3-15 Preferred Alternative: US 6 2025 AM/PM Peak Hour Levels of Service and Lane Geometry 3-23
Figure 3-16 CORSIM Network 2025 Delay Comparisons 3-26
Figure 3-17 Surface Street Submetwork Delay Comparisons 3-29

LIST OF FIGURES (Continued)

Page

Figure 4.1-1 Neighborhood Study Area 4.1-3
Figure 4.1-2 Existing Land Use - Generalized 4.1-5
Figure 4.1-3 Existing Zoning 4.1-6
Figure 4.1-4 Areas of Stability and Change 4.1-8
Figure 4.1-5 Future Concept Land Use 4.1-9
Figure 4.1-6 Baker Neighborhood Proposed Land Use 4.1-10
Figure 4.1-7 Cherokee Denver Transit Oriented Development Plan 4.1-12
Figure 4.1-8 Public and Community Facilities 4.1-14
Figure 4.1-9 Population by Neighborhood 4.1-18
Figure 4.1-10 Racial Minority Population by Census Block 4.1-19
Figure 4.1-11 African American Population by Census Block 4.1-20
Figure 4.1-12 Asian American Population by Census Block 4.1-21
Figure 4.1-13 Native American Population by Census Block 4.1-22
Figure 4.1-14 Hispanic Population by Census Block 4.1-23
Figure 4.1-15 Employment by Neighborhood 4.1-25
Figure 4.1-16 Low-Income Population by Census Block Group 4.1-26
Figure 4.1-17 Denver Enterprise Zone 4.1-27
Figure 4.1-18 Land Use Concept – System Alternative 1 ....4.1-32
Figure 4.1-19 Land Use Concept – System Alternative 2 ....4.1-33
Figure 4.1-20 Land Use Concept – System Alternative 3 ....4.1-34
Figure 4.1-21 Land Use Concept – Preferred Alternative 4.1-35
Figure 4.2-1 Displacements 4.2-9
Figure 4.3-1 Parks and Recreation Resources 4.2-2
Figure 4.3.2 Barnum East Park Concept - Preferred Alternative 4.2-13
Figure 4.4-1 Existing Land Use and Views along the Corridor 4.4-2
Figure 4.4-2 Photographs of Existing Views 4.4-3
Figure 4.4-3 Washington Park View Plane 4.4-5
Figure 4.4-4 System Alternative 1 – Recommended Aesthetic Features 4.4-19
Figure 4.4-5 System Alternative 2 – Recommended Aesthetic Features 4.4-20
Figure 4.4-6 System Alternative 3 – Recommended Aesthetic Features 4.4-21
Figure 4.4-7 Preferred Alternative – Recommended Aesthetic Features 4.4-22
Figure 4.5-1 Predicted National MSAT Emissions 4.5-7
Figure 4.6-1 Noise-Sensitive Areas 4.6-2
Figure 4.6-2 Typical Noise Levels 4.6-3
Figure 4.6-3 A-Weighting Adjustments 4.6-3
Figure 4.6-4 Noise Measurement Locations and Results 4.6-6
Figure 4.6-5 Noise Model Receiver Locations 4.6-7
Figure 4.6-6 Existing Conditions: Noise Contours 4.6-8
Figure 4.6-7 Existing Noise-Impacted Areas 4.6-12
Figure 4.6-8 Railroad Corridor Relocation Area 4.6-15
Figure 4.6-9 No Action Alternative: 2025 Noise Contours 4.6-18
Figure 4.6-10 System Alternative 1: 2025 Noise Contours 4.6-20
Figure 4.6-11 System Alternative 2: 2025 Noise Contours 4.6-21
Figure 4.6-12 System Alternative 3: 2025 Noise Contours 4.6-23

LIST OF FIGURES (Continued)

Page

Figure 4.6-13 Preferred Alternative: 2025 Noise Contours 4.6-25
Figure 4.6-14 Mitigation Barriers Evaluated 4.6-28
Figure 4.6-15 South Lincoln Street Mitigation Barrier 4.6-32
Figure 4.6-16 West Short Place Mitigation Barrier 4.6-34
Figure 4.6-17 South Platte Trail Mitigation Barrier 4.6-35
Figure 4.7-1 Historical Properties 4.7-3
Figure 4.7-2 Historic Properties – System Alternative 1 ..... 4.7-11
Figure 4.7-3 Historic Properties – System Alternative 2 ..... 4.7-13
Figure 4.7-4 Historic Properties – System Alternative 3 ..... 4.7-15
Figure 4.7-5 Historic Properties – Preferred Alternative 4.7-17
Figure 4.8-1 Geologic Map of the Valley Highway Project Area 4.8-3
Figure 4.9-1 South Platte River Basin 4.9-2
Figure 4.9-2 South Platte River Segments 14 and 15 ..... 4.9-4
Figure 4.9-3 Surface Waters 4.9-7
Figure 4.9-4 Existing Basins – US 6 Area 4.9-18
Figure 4.9-5 Existing Basins – 6th Avenue Interchange Area 4.9-19
Figure 4.9-6 Existing Basins – Alameda Area 4.9-20
Figure 4.9-7 Existing Basins - Broadway Area 4.9-21
Figure 4.9-8 Water Quality Ponds (BMPs) 4.9-25
Figure 4.10-1 Floodplains 4.10-2
Figure 4.11-1 Wetlands, Waters of the U.S., Open Water – Northern Project Area 4.11-3
Figure 4.11-2 Wetlands, Waters of the U.S., Open Water – Central Project Area 4.11-4
Figure 4.11-3 Wetlands, Waters of the U.S., Open Water – Southern Project Area 4.11-5
Figure 4.12-1 Vegetation and Wildlife – Northern Project Area 4.12-2
Figure 4.12-2 Vegetation and Wildlife – Central Project Area 4.12-3
Figure 4.12-3 Vegetation and Wildlife – Southern Project Area 4.12-4
Figure 4.13-1 Sites with Environmental Conditions – Northern Project Area 4.13-4
Figure 4.13-2 Sites with Environmental Conditions – Central Project Area 4.13-5
Figure 4.13-3 Sites with Environmental Concerns – Southern Project Area 4.13-6
Figure 4.13-4 Historical Fill / Landfill Areas 4.13-14
Figure 4.20-1 Cumulative Impact Study Area 4.20-4
Figure 4.20-2 Land Use – 1956 ..... 4.20-10
Figure 4.20-3 Land Use – 1962 ..... 4.20-11
Figure 4.20-4 Land Use – 1975 ..... 4.20-13
Figure 4.20-5 Land Use – 2002 ..... 4.20-14
Figure 4.20-6 Air Quality Monitoring Data from Nearby Monitoring Stations 4.20-25

Figure 5-1 Historic Properties and Parks Subject to Section 4(f) Use 5-3
Figure 5-2 Parks Impacts – System Alternative 1 5-7
Figure 5-3 Parks Impacts – System Alternative 2 5-8
Figure 5-4 Parks Impacts – System Alternative 3 5-9
Figure 5-5 Parks Impacts - Preferred Alternative 5-10

LIST OF FIGURES (Continued)

Page

Figure 5-6 Barnum East Park Concept – Preferred Alternative 5-19

Figure 6-1 Mailing Distribution Area 6-3

Figure 7-1 Phased Implementation Process 7-3
Figure 7-2 Phasing Plan 7-6
Figure 7-3 Phase 1 Layout for I-25 7-8
Figure 7-4 Phase 1 Layout for US 6 7-10
Figure 7-5 Phase 1 2025 AM/PM Peak Hour LOS – Logan to Alameda Avenue 7-12
Figure 7-6 Phase 1 2025 AM/PM Peak Hour LOS – US 6 7-13
Figure 7-7 Phase 2 Layout 7-19
Figure 7-8 Phase 3 Layout 7-24
Figure 7-9 Phase 4 Layout 7-29
Figure 7-10 Phase 5 Layout 7-34
Figure 7-11 Phase 6 Layout 7-39

LIST OF TABLES

Page

Table 1-1 Comparison of Roadway Deficiencies and Current Design Standards 1-19
Table 1-2 Current and Future Traffic at the Consolidated Main Line 1-23
Table 1-3 Current and Future Exposure Factors at the Consolidated Main Line 1-24

Table 2-1 Major Public Meetings 2-2
Table 2-2 Transportation Management Alternative Elements Considered 2-9
Table 2-3 Results of Element Screening 2-12
Table 2-4 System Alternatives Initially Considered 2-17
Table 2-5 Element Alternatives Packaged into System Alternatives 2-18
Table 2-6 Results of System Screening 2-18
Table 2-7 Value Engineering Proposals and Recommendations 2-20
Table 2-8 Elements Common to System Alternatives 2-27
Table 2-9 System Alternative 1 Differentiating Elements 2-37
Table 2-10 System Alternative 2 Differentiating Elements 2-47
Table 2-11 System Alternative 3 Differentiating Elements 2-55
Table 2-12 I-25 / Broadway Element Identified for the Preferred Alternative 2-69
Table 2-13 I-25/Alameda/Santa Fe/Kalamath Element Identified for the Preferred Alternative 2-71
Table 2-14 US 6/ Federal/ Bryant Element Identified for the Preferred Alternative 2-74
Table 2-15 Preferred Alternative Refinements 2-75

Table 3-1 System Alternative Treatment of Bryant Street Access 3-10
Table 3-2 Existing and 2025 No Action CORSIM Measures of Effectiveness 3-15
Table 3-3 Daily Hours of Congestion at Signalized Intersections 3-24
Table 3-4 Daily Hours of Congestion along I-25 Freeway Sections 3-25
Table 3-5 Peak Hour Travel Rate Index Comparison 3-27
Table 3-6 Relative Operational Performance of System Alternatives 3-33
Table 3-7 Relative Safety Performance of System Alternatives 3-34

Table 4.1-1 Demographics of the Neighborhood Study Area – 2000 ..... 4.1-17
Table 4.1-2 Employment and Income within the Neighborhood Study Area – 2000 ..... 4.1-24
Table 4.2-1 Additional Right-of-Way Required 4.2-2
Table 4.2-2 Property Impacts 4.2-4
Table 4.2-3 Displacements 4.2-10
Table 4.3-1 Park and Recreation Resources 4.3-1
Table 4.3-2 Impacts to Parks and Recreation Resources 4.3-6
Table 4.3-3 Elements of Barnum East Park Reconstruction 4.3-15
Table 4.4-1 Citizen Working Group Preferences for Corridor and Individual Element Identities 4.4-17
Table 4.5-1 National Ambient Air Quality Standards 4.5-1
Table 4.5-2 Project Intersection Levels of Service 4.5-2
Table 4.5-3 Maximum Modeled CO Concentrations 4.5-4
Table 4.6-1 Noise Abatement Criteria 4.6-4
Table 4.6-2 Noise Model Results 4.6-9
Table 4.6-3 Vibration Impact Criteria 4.6-14
Table 4.6-4 FTA Screening Distances 4.6-15

LIST OF TABLES (Continued)

Page

Table 4.6-5 Noise Impact Summary 4.6-17
Table 4.6-6 Vibration Impact Projections without Mitigation 4.6-26
Table 4.6-7 Noise Mitigation Barrier Summary 4.6-29
Table 4.7-1 Significant (NRHP-Eligible) Historic Resources in the Area of Potential Effects 4.7-4
Table 4.7-2 Impacts to Significant (NRHP-Eligible) Historic Resources 4.7-9
Table 4.8-1 Geologic Units within the Project Area and their Paleontologic Sensitivities 4.8-2
Table 4.8-2 Fossil Localities within the Valley Highway EIS Project Area 4.8-2
Table 4.9-1 Summary of Historical Water Quality Events 4.9-5
Table 4.9-2 Summary of Key Pollutants in Segment 14 ....4.9-9
Table 4.9-3 General Water Quality Conditions for South Platte River 4.9-10
Table 4.9-4 State of Colorado Groundwater Standards 4.9-14
Table 4.9-5 Existing Basin Information 4.9-16
Table 4.9-6 Existing Major Flooding Areas 4.9-17
Table 4.9-7 BMP Summary 4.9-27
Table 4.10-1 Existing Major Flooding Areas 4.10-4
Table 4.10-2 Drainage Basin Area 4.10-6
Table 4.10-3 Summary of Mitigation Measures for System Alternatives 4.10-8
Table 4.11-1 Area and Jurisdictional Status of Wetlands 4.11-6
Table 4.11-2 Area and Jurisdictional Status of Open Water 4.11-8
Table 4.11-3 Preliminary Estimates of Direct Impacts to Wetlands 4.11-10
Table 4.11-4 Preliminary Estimates of Direct Impacts to Open Water 4.11-11
Table 4.13-1 Summary of Sites with Potential and Recognized Environmental Conditions 4-13-8
Table 4.13-2 Recommendations for Additional Assessment / Investigation – System Alternative 1 ....4.13-19
Table 4.13-3 Recommendations for Additional Assessment / Investigation – System Alternative 2 ....4.13-22
Table 4.13-4 Recommendations for Additional Assessment / Investigation – System Alternative 3 ....4.13-25
Table 4.13-5 Recommendations for Additional Assessment / Investigation – Preferred Alternative 4.13-28
Table 4.18-1 Summary of Citizen Working Group Recommendations for Construction-Related Mitigation Strategies 4.18-6
Table 4.19-1 Summary of Permits and Approvals 4.19-1
Table 4.20-1 Key Cumulative Impact Resources and Area of Analysis 4.20-3
Table 4.20-2 Current and Future Transportation Projects within the Study Area 4.20-6
Table 4.20-3 Current Local Agency Planning Projects 4.20-7
Table 4.20-4 Current and Future Development Projects within the Study Area 4.20-7
Table 4.20-5 Potential Impacts of Other Projects 4.20-15
Table 4.20-6 Regional Conformity Emissions Results 4.20-24
Table 4.21-1 Summary of Direct and Indirect Impacts 4.21-1
Table 4.21-2 Summary of Mitigation Measures and Monitoring 4.21-9

LIST OF TABLES (Continued)

Page

Table 5-1 Summary of Section 4(f) Use by Alternative....5-4
Table 5-2 Section 4(f) Protected Parks Subject to Use....5-6
Table 5-3 Elements of Barnum East Park Reconstruction....5-20

Table 6-1 Local Media Contact List....6-5
Table 6-2 Agency and Local Government Involvement Activities....6-7
Table 6-3 Summary of Citizen Working Group Meetings....6-13
Table 6-4 Local Neighborhood Associations and Business Groups....6-15
Table 6-5 Neighborhood and Local Businesses Public Involvement Activities....6-16
Table 6-6 Summary of Comments Received from Neighborhood Associations, Business Groups, and Non-Profits....6-19
Table 6-7 Local Community Representatives Contacted....6-22
Table 6-8 Special Outreach Activities for Low-Income or Minority Populations....6-23

Table 7-1 Project Phases and Priorities....7-5
Table 7-2 Project Objectives Addressed by Phase 1....7-9
Table 7-3 Surface Street Levels of Service – Phase 1....7-14
Table 7-4 Phase 1 Environmental Consequences, Mitigation Measures, and Monitoring7-16
Table 7-5 Project Objectives Addressed by Phase 2....7-20
Table 7-6 Phase 2 Environmental Consequences, Mitigation Measures, and Monitoring7-21
Table 7-7 Project Objectives Addressed by Phase 3....7-25
Table 7-8 Phase 3 Environmental Consequences, Mitigation Measures, and Monitoring7-26
Table 7-9 Project Objectives Addressed by Phase 4....7-30
Table 7-10 Phase 4 Environmental Consequences, Mitigation Measures, and Monitoring7-31
Table 7-11 Project Objectives Addressed by Phase 5....7-35
Table 7-12 Phase 5 Environmental Consequences, Mitigation Measures, and Monitoring7-36
Table 7-13 Project Objectives Addressed by Phase 6....7-40
Table 7-14 Phase 6 Environmental Consequences, Mitigation Measures, and Monitoring7-41

LIST OF ABBREVIATED TERMS

A	AASHTO	American Association of State Highway and Transportation Officials
	ACHP	Advisory Council on Historic Preservation
	ADA	Americans with Disabilities Act
	AM	morning
	APE	area of potential effects
	AST	aboveground storage tank
	ASTM	American Society for Testing and Materials
	AT&SF	Atchison, Topeka & Santa Fe Railroad
B	BARD	Broadway Area Revitalization District
	BMP	best management practice
	BNSF	Burlington Northern and Santa Fe Railroad
C	C&S	Colorado & Southern Railroad
	$CaCO_3$	calcium carbonate
	CAQCC	Colorado Air Quality Control Commission
	CBD	Central Business District
	CCD	City and County of Denver
	CDM	Camp, Dresser, McKee
	CDOH	Colorado Department of Highways
	CDOT	Colorado Department of Transportation
	CDOW	Colorado Division of Wildlife
	CDPHE	Colorado Department of Public Health and Environment
	CDPS	Colorado Discharge Permit System
	CEQ	Council on Environmental Quality
	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
	CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
	CFR	Code of Federal Regulations
	cfs	cubic feet per second
	CGS	Colorado Geological Survey
	CHS	Colorado Historical Society
	CNAP	Colorado Natural Areas Program
	CNHP	Colorado National Heritage Program
	CO	carbon monoxide

LIST OF ABBREVIATED TERMS

	CORRACTS	RCRA corrective action
	CORSIM	corridor simulation traffic microsimulation tool
	CPV	Central Platte Valley
	CURE	South Platte Coalition for Urban River Evaluation
D	D&NO	Denver and New Orleans Railroad
	DHV	design hourly volume
	DRS	Denver Radium Site
	D&RG	Denver & Rio Grande Railroad
	dB	decibels
	dBA	A-weighted decibles
	DDT	dichlorodiphenyltrichloroethane
	DRCOG	Denver Regional Council of Governments
	DS	dry swale
E	EA	Environmental Assessment
	EAC	Early Action Compact
	EB	eastbound
	EDB	extended detention basin
	EDR	Environmental Data Resources
	EIS	Environmental Impact Statement
	EPA	U.S. Environmental Protection Agency
	ERNS	Emergency Response Notification System
F	FEMA	Federal Emergency Management Agency
	FHWA	Federal Highway Administration
	FHU	Felsburg Holt & Ullevig
	FINDS	facility index system
	FRA	Federal Railroad Administration
	FTA	Federal Transit Administration
G	GIS	geographic information system
	gpm	gallons per minute
	gps	global positioning system
H	HABS	Historic American Buildings Survey
	HAER	Historic American Engineering Record

LIST OF ABBREVIATED TERMS

	HOV	high-occupancy vehicle
I	I-25	Interstate 25
	ISA	initial site assessment
	ISO	International Organization for Standardization
	ITS	intelligent transportation system
L	lbs	pounds
	L_{eq}	equivalent continuous sound level
	LF	linear feet
	LLE	lacustrine, littoral, emergent
	LLU	lacustrine, limnetic, unconsolidated bottom
	LOS	level-of-service
	LOSS	level-of-service of safety
	LRT	light rail transit
	LUST	leaking underground storage tank
M	MESA	Modified Environmental Site Assessment
	mg/L	milligrams per liter
	mph	miles per hour
	MS4	municipal separate storm sewer system
	MSATs	mobile source air toxics
N	N	nitrogen
	NAAQS	National Ambient Air Quality Standards
	NAC	Noise Abatement Criteria
	NAWQA	USGS National Water Quality Assessment Program
	NB	northbound
	NDIS	Colorado Natural Diversity Information Source
	NEPA	National Environmental Policy Act
	NFRAP	no further remedial action planned
	NPDES	National Pollutant Discharge Elimination System
	NPL	National Priority List
	NRHP	National Register of Historic Places
	NRCS	Natural Resources Conservation Service

LIST OF ABBREVIATED TERMS

O	O_3	ozone
	OAHP	Office of Archaeology and Historic Preservation
	OAQPS	EPA Office of Air Quality Planning and Standards
	OPS	Colorado Department of Labor and Employment Division of Oil and Public Safety
P	PCB	polychlorinated biphenyl
	pCi/L	picocuries per liter
	PEP	palustrine, emergent, persistent wetland
	PFYC	probable fossil yield classification
	PM	afternoon and evening
	$PM_{2.5}$	particulate matter less than 2.5 microns in size
	PM_{10}	particulate matter less than 10 microns in size
	ppm	parts per million
	PSI	preliminary site investigation
	PSS	palustrine, scrub-shrub wetland
	PUC	Public Utilities Commission
Q	Q_{100}	100-year flow rate
	Qb	Broadway Alluvium
	Qp	Piney Creek Alluvium
	Qpp	Post-Piney Creek Alluvium
R	RCRA	Resource Conservation and Recovery Act
	RCRIS	Resource Conservation and Recovery Information System
	RI/FS	remedial investigation/feasibility study
	RMC	Revised Municipal Code
	RMP	Rocky Mountain Paleontology
	RMU	Residential Mixed Use
	RTD	Regional Transportation District
	RTP	Regional Transportation Plan
	RU	riverine, unconsolidated bottom
S	SB	southbound
	SHPO	State Historic Preservation Officer
	SPUI	single-point urban interchange
	SW	shallow wetland basin

LIST OF ABBREVIATED TERMS

T	TAZ	transportation analysis zones
	TCE	trichloroethene (also called trichloroethylene)
	TIP	transportation improvement plan
	TMDL	total maximum daily load
	TMU	Transit Mixed Use
	T-REX	Transportation Expansion Project
	TRI	travel rate index
	TSIS	Traffic Software Integrated System
U	UDFCD	Urban Drainage and Flood Control District
	µg/m³	micrograms per cubic meter
	µm	micrometers
	UPRR	Union Pacific Railroad
	µS/cm	micro-Siemens per centimeter
	US 6	6th Avenue
	USACE	U.S. Army Corps of Engineers
	USFWS	United States Department of Interior Fish and Wildlife Service
	USGS	United States Department of Interior Geological Survey
	UST	underground storage tank
V	VCUP	CDPHE Voluntary Clean-up Program
	Vdb	vibration decibels
	VE	value engineering
W	WB	westbound
	WET	Wetland Evaluation Technique
	WQCV	water quality capture value
	WQDV	water quality design volume
	WWTP	wastewater treatment plant

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TABLE OF CONTENTS

Page

1.0 PURPOSE AND NEED 1-1

1.1 Project Location and Purpose 1-1

1.2 Project History and Status 1-3

1.3 Project Needs and Objectives 1-5

1.4 Detailed Identification of the Project Needs 1-6

LIST OF FIGURES

Page

Figure 1-1 Valley Highway EIS Study Area 1-2
Figure 1-2 Metro Denver Regional Highways 1-4
Figure 1-3 Existing Lane Continuity and Balance Deficiencies 1-7
Figure 1-4 Study Area Transit System 1-9
Figure 1-5 Mainline I-25 Geometric Deficiencies 1-14
Figure 1-6 I-25 / 6th Avenue Geometric Deficiencies 1-15
Figure 1-7 I-25 / Broadway Interchange Geometric Deficiencies 1-16
Figure 1-8 I-25 / Santa Fe Drive Geometric Deficiencies 1-17
Figure 1-9 I-25 / Alameda Avenue Geometric Deficiencies 1-18

LIST OF TABLES

Page

Table 1-1 Comparison of Roadway Deficiencies and Current Design Standards 1-19
Table 1-2 Current and Future Traffic at the Consolidated Main Line 1-23
Table 1-3 Current and Future Exposure Factors at the Consolidated Main Line 1-24

1.0 PURPOSE AND NEED

1.1 Project Location and Purpose

The Federal Highway Administration (FHWA), in cooperation with the Colorado Department of Transportation (CDOT), is considering improvements to portions of Interstate 25 (I-25; the Valley Highway) and US 6 (6th Avenue) in south-central Denver. Also being considered are improvements to adjacent portions of Santa Fe Drive and Kalamath Street, including the crossing between these streets and the Consolidated Main Line railroad corridor.

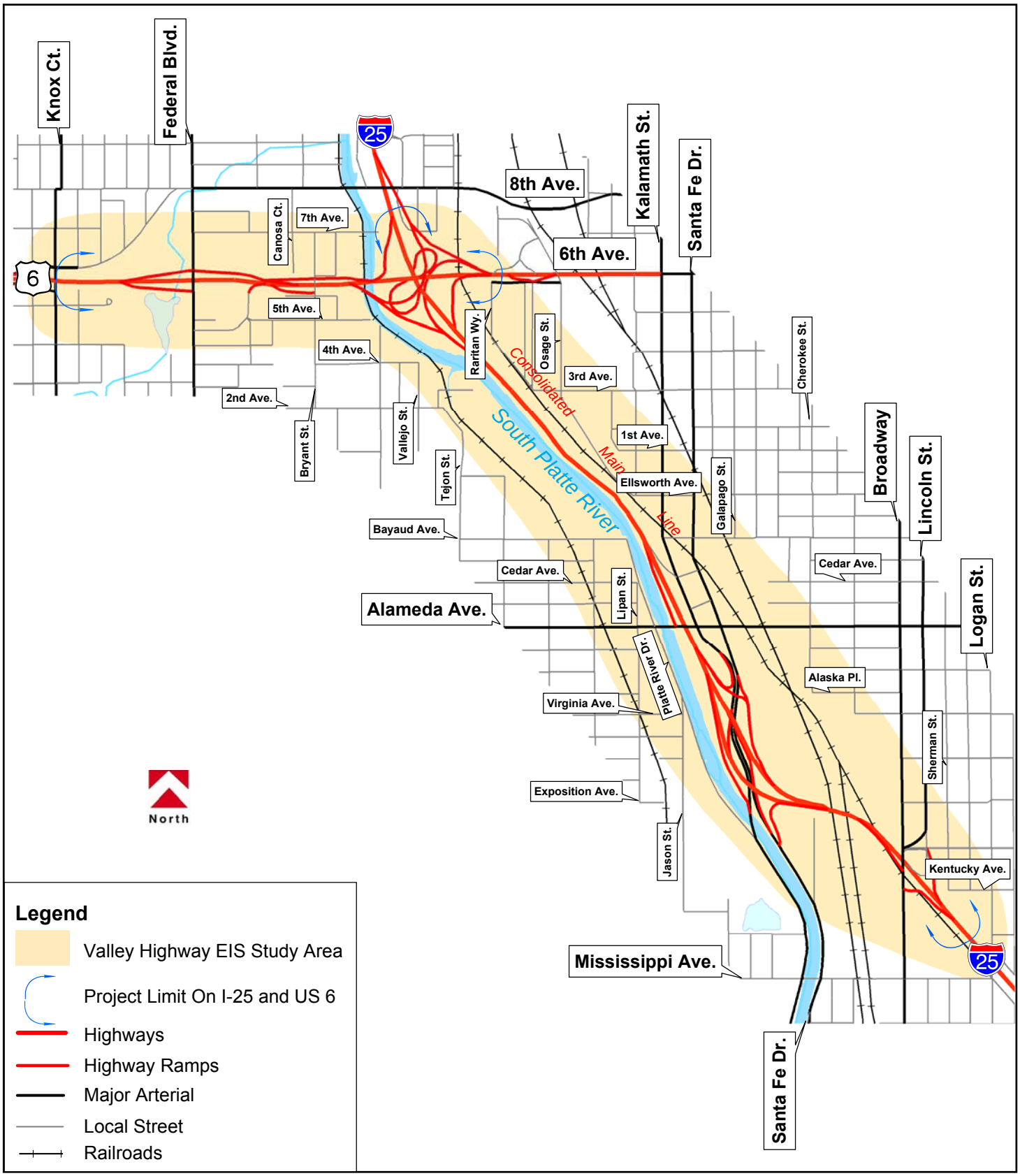
Planning for the freeway now known as I-25 began in 1944 with a preliminary engineering study for a freeway initially named the "Valley Highway." The highway originally extended from 58th Avenue on the north to Colorado Boulevard on the south. Much of the highway followed an alignment along the South Platte River. Construction began in 1948 with the first storm drains placed on the north end of the freeway. With the completion of the Broadway viaduct in 1958, the northern and southern sections were connected.

I-25 and US 6 are vital links in the freeway system serving Metro Denver and Colorado. At a national level, I-25 is designated as congressional "High Priority Corridor" No. 27 within the National Highway System. It is also designated as a Western Trade Transportation Network corridor for movement of national and international goods. At an international level, I-25 is part of a transportation trade corridor known as the Camino Real Corridor. This corridor traverses the nation from arterials in Mexico; along I-10 from El Paso, Texas, to Las Cruces, New Mexico; along I-25 from Las Cruces to Buffalo, Wyoming; and northward through Montana via various routes to the Canadian border.

Figure 1-1 shows the project area in which improvements are being considered. Improvements being considered for I-25, US 6, and the Santa Fe Drive/Kalamath Street crossing of the Consolidated Main Line are referred to collectively in this report as the "Valley Highway Project" or the "proposed action." The Valley Highway Project may also include ancillary improvements to adjacent streets. Specific alternatives are described in detail in **Chapter 2** *Alternatives*.

The ***purpose*** of the Valley Highway Project is to:

- Provide lane continuity and balance on I-25 from Logan Street to US 6, linking with sections of I-25 to the north and south
- Optimize highway system operations while recognizing the constraints on highway expansion identified through the regional transportation planning process
- Improve connectivity between transportation modes
- Improve pedestrian / bicycle mobility across the project corridor
- Increase safety along and across the corridor for motorists, pedestrians, and bicyclists
- Correct roadway deficiencies along I-25 and US 6 to meet current design standards to provide a safer, more efficient, and more reliable transportation system
- Increase safety and reduce congestion and delays related to the at-grade crossing of Santa Fe Drive / Kalamath Street and the Consolidated Main Line



Valley Highway, 02-069, 06/03/2004

0 0.25 0.5 1 Miles

Valley Highway EIS Study Area

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 1-1

This Final Environmental Impact Statement (Final EIS) for the Valley Highway Project describes the alternatives being considered for improvements within the project area, including the Preferred Alternative identified by FHWA and CDOT. The Final EIS has been prepared in accordance with National Environmental Policy Act (NEPA) provisions and corresponding regulations and guidelines of the Council on Environmental Quality and the FHWA, the lead federal agency for this proposed action. Other agencies cooperating in preparation of the Final EIS include the Federal Railroad Administration (FRA), the Federal Transit Administration (FTA), the Regional Transportation District (RTD), and the City and County of Denver.

1.2 Project History and Status

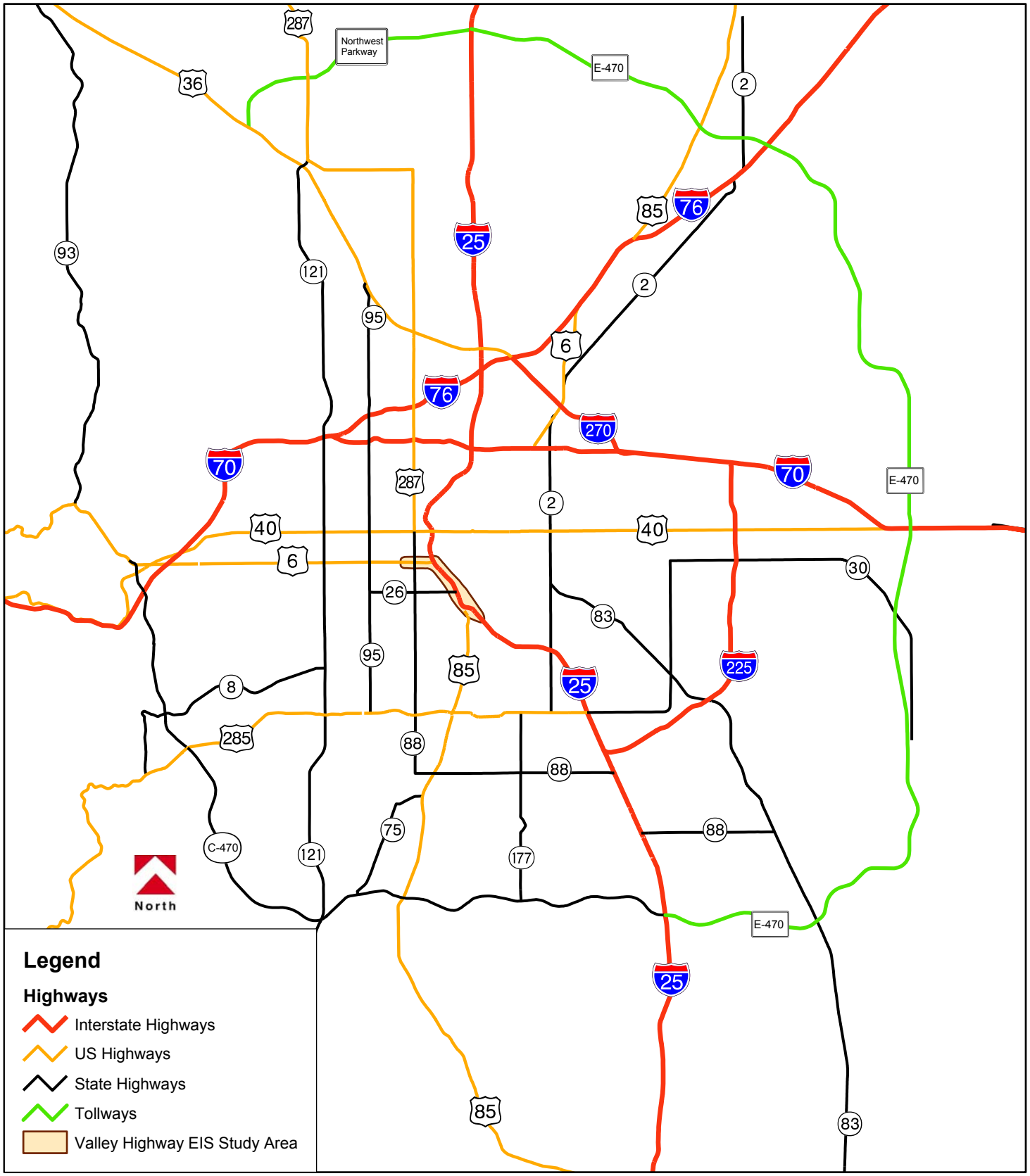
I-25 corridor studies from US 6 in Denver to Lincoln Avenue in Douglas County over the last two decades have examined the condition and operational context of this major interstate facility. **Figure 1-2** shows the Metro Denver regional highway system. The Valley Highway – Logan Street to US 6 segment was identified by CDOT as needing reconstruction of structures, and safety and capacity improvements. The Regional Transportation Plan for 2025 prioritized the Valley Highway Project by inclusion in the plan.

Previous corridor studies have recommended the following:

- *6th Avenue / I-25 Interchange Feasibility Study, January 1985* – recommended improvements to the interchange and 6th and I-25, many of which have been implemented
- *I-25 6th Avenue to Lincoln Avenue Corridor Evaluation Study, April, 1992* – recommended multimodal corridor enhancements including highway widening and high-occupancy vehicle (HOV) elements
- *Southeast Corridor Major Investment Study, July 1997* – recommended multimodal corridor enhancements for I-25 from US 6 south to Douglas County. Subsequent efforts from this study resulted in the Southeast Corridor Environmental Impact Statement, the Transportation Expansion Project (T-REX), and this EIS

The corridor/project development effort for the Valley Highway Project was initiated in 1998. Originally an Environmental Assessment (EA) was recommended to address transportation issues associated with the segment of the I-25 Valley Highway from Logan Street to and including US 6. However, CDOT and FHWA determined that planning and environmental concerns of the adjacent property and business owners and overall concerns and issues raised by the City and County of Denver warranted the requirements of a major action project to be addressed through an EIS. The federal Notice of Intent to prepare this EIS was published on July 23, 2002 in the *Federal Register*.

In 2002, reconstruction of the main structure of I-25 over Broadway began as an emergency measure. This segment was in extremely poor structural condition, which necessitated immediate action. The project was evaluated for environmental impacts, which resulted in issuance of a Categorical Exclusion in June 2000. Ramp connections to the new structure are being evaluated as part of this Final EIS.



Valley Highway, 02-069, 06/03/2004

0 2.5 5 10 Miles

Metro Denver Regional Highways

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 1-2

1.3 Project Needs and Objectives

This section summarizes the need for the project and identifies the objectives that have been established to address the needs. Further detail regarding the need for the project is provided in **Section 1.4**.

The ***need*** for the project arose primarily out of a number of identified roadway deficiencies that result in unsafe conditions. The age, condition, and geometric design of the roadway compromise the safety of the traveling public and require improvements to meet current design and safety standards.

Project objectives have been established based on identified needs and a series of discussions with cooperating agencies, resource agencies, and the public.

Specific project needs and objectives fall into several categories as follows.

System Linkages / Lane Continuity and Balance:

- **Need**: Completion of the T-REX Project and I-25 / Broadway viaduct Replacement Project to the south will result in a discontinuity of travel lanes on I-25 through the project area, with four lanes in each direction to the north and south and three lanes in each direction through a portion of the project area.
- **Objective**: Provide lane continuity and balance on I-25 between the existing and planned roadway sections to the north and south of the project

Transportation Demand and Operations:

- **Need**: The I-25 corridor is currently experiencing pervasive severe congestion, which is expected to continue to worsen.
- **Objective**: Optimize highway system operations as measured in reduced delay of vehicle hours/day, reduced hours of congestion, and/or levels of service

Inter-modal Relationships and Bicycle / Pedestrian Mobility:

- **Need**: The I-25 corridor restricts east-west mobility for pedestrians and bicyclists and limits access to transit facilities.
- **Objective**: Preserve existing or provide improved facilities for automobile, bus, and pedestrian connections. Upgrade bicycle/pedestrian facilities within and across the project corridor to provide improved access to the Platte River Trail, safer facilities at intersections, complete missing links of bicycle/pedestrian facilities, and provide better linkages between transportation modes

Safety:

- **Need**: Accident histories for I-25 and US 6 show greater accident frequency and severity than expected for similar facilities, due to congestion, close interchange spacing, and substandard geometric configuration.
- **Objective**: Increase safety and decrease the likelihood of accidents within the project corridor by improving the geometric design of the roadway system

Roadway Deficiencies:

- **Need**: I-25 and associated interchanges have substandard geometrics and design features and many roadway structures are nearing the end of their useable life.
- **Objective:** Address existing roadway deficiencies, and replace aging structures to provide for improved operation of and reduced maintenance costs for the roadway facilities

Consolidated Main Line Railroad Crossing at Santa Fe Drive and Kalamath Street:

- **Need**: Santa Fe Drive and Kalamath Streets cross the Consolidated Main Line railroad at-grade, causing congestion and safety concerns.
- **Objective**: Reduce system disruptions, and improve safety conditions related to the current at-grade crossing

1.4 Detailed Identification of the Project Needs

Specific project needs are detailed in **Sections 1.4.1** through **1.4.6** for each of the categories identified above.

1.4.1 System Linkages / Lane Continuity and Balance

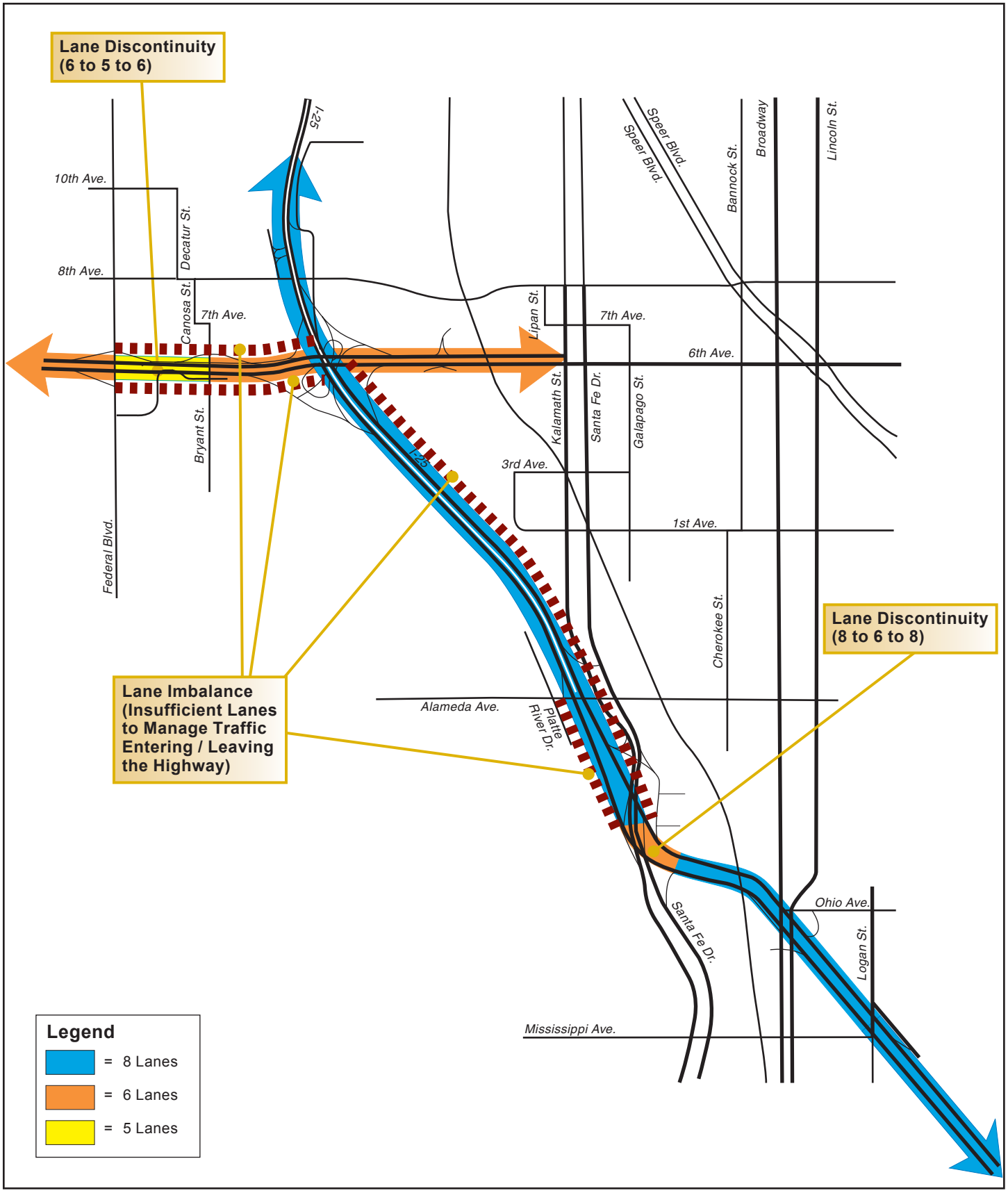
Existing lane configurations on the I-25 mainline in and adjacent to the project (see **Figure 1-3**) include four through-lanes in each direction north of Santa Fe Drive, three lanes in each direction between Santa Fe Drive and Logan Street, and four lanes in each direction currently being constructed south of Logan Street as a part of the T-REX project. Improvements to the Valley Highway are needed to provide a uniform connection between the eight-lane T-REX project to the south and the eight-lane section north of Santa Fe Drive.

The project corridor integrates a combination of overlapping route systems. For example, it serves as a primary connection between Santa Fe Drive, US 6, I-70, and US 36, in addition to carrying its own interstate level volume. Auxiliary lanes are lacking north of Santa Fe Drive to accept and disperse the traffic on these overlapping systems, thereby resulting in a lane imbalance.

I-25 from Broadway to US 6 provides access to a dynamically redeveloping area of the City and County of Denver. It is the interstate system's linkage to regional arterials, providing access to Downtown Denver as well as connections with other state and regional freeway systems. Improvements are needed to address the deficient operational configurations of the remaining interchanges that have not undergone substantial improvements over recent years.

1.4.2 Transportation Demand and Operations

The corridor connects the two largest employment centers in the region, Downtown Denver with approximately 117,000 employees and the Southeast Business District with approximately 130,000 employees in the year 2000. With employment centers at both ends of the corridor, traffic congestion occurs in both directions during the morning and evening rush hours and frequently during the noon hour along many segments of the corridor.



North

Existing Lane Continuity and Balance Deficiencies

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 1-3

The existing traffic volume on the Broadway viaduct is approximately 180,000 vehicles per day. When combined with the traffic to and from Santa Fe Drive, I-25 carries 265,000 vehicles per day just north of Santa Fe Drive. Currently, the peak-hour traffic is 7 percent of the daily traffic volume. This peak-hour traffic volume is maintained throughout much of the day. The heavy truck traffic is 5 percent of the daily traffic volume, and this segment of I-25 provides major access for through freight as well as local and regional distribution.

The Final EIS for the T-REX project forecasted a future demand of 210,000 to 240,000 vehicles per day south of Broadway by 2020. More recent studies indicate that I-25 from Alameda Avenue to US 6 is expected to carry 320,000 vehicles per day by 2025. Detailed analysis of existing and future traffic conditions is presented in **Chapter 3** *Transportation Analysis*.

The 2025 regional transportation planning process identifies the I-25 and Santa Fe Drive corridors as currently experiencing pervasive severe congestion. It further predicts that operating conditions along the project corridor will continue to deteriorate towards 2025.

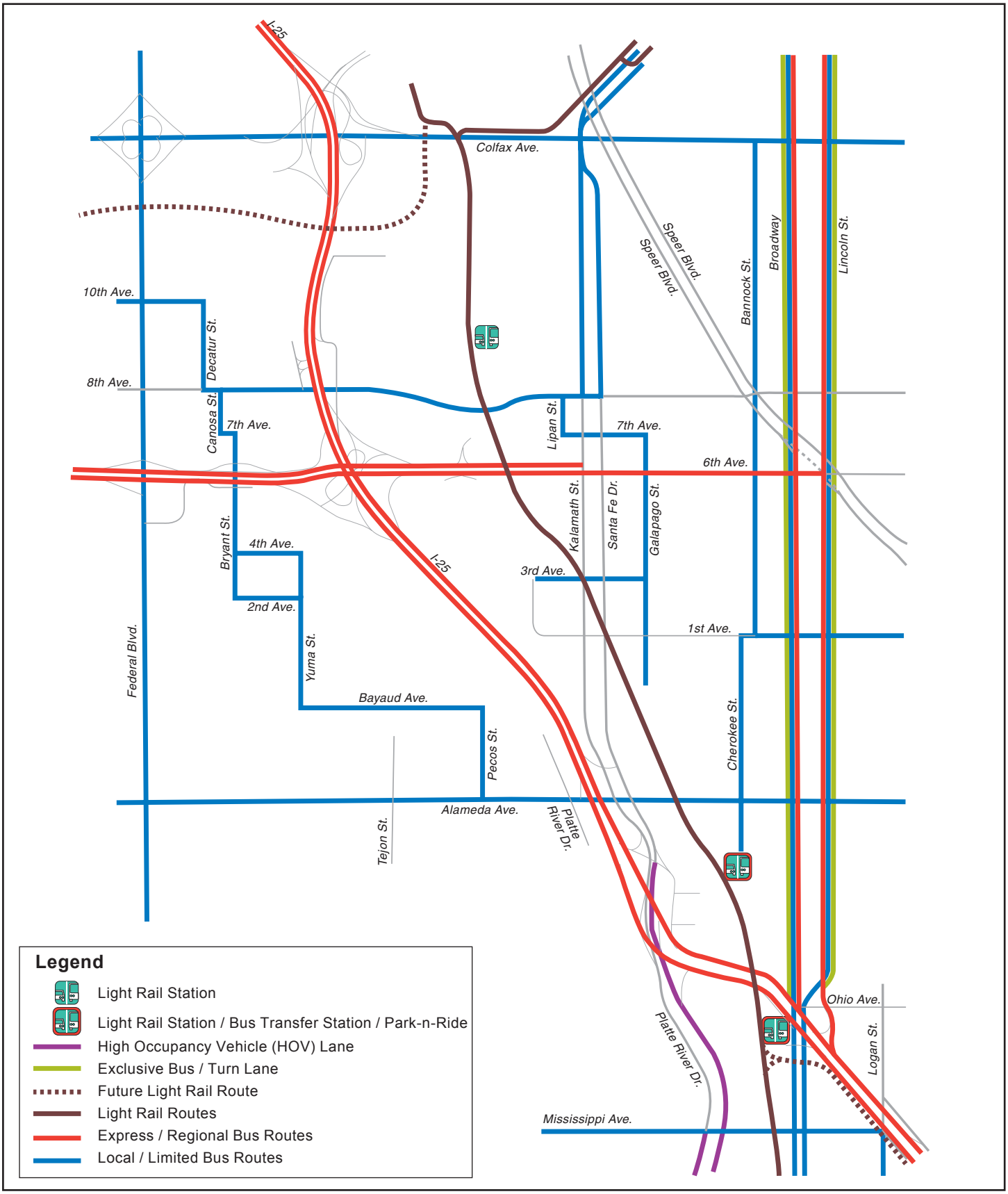
1.4.3 Inter-Modal Relationships and Bicycle/Pedestrian Mobility

A significant number of multimodal transportation facilities converge within the limits of the project corridor, as shown on **Figure 1-4**. These transportation facilities include Light Rail Transit (LRT), bus service, HOV lanes on Santa Fe Drive, and dedicated bus lanes on Broadway (PM peak) and Lincoln Street (AM peak). Local and regional pedestrian and bicycle facilities exist within the corridor as well. The southern terminus of the study area, located near the convergence of Santa Fe Drive, I-25, and Broadway, is one of the region's major junctions of current and future modal activities. Preservation and/or enhancement of these multimodal facilities must be considered with corridor enhancements.

1.4.3.1 LIGHT RAIL TRANSIT

RTD is currently constructing and implementing the southern portion of the LRT component of the MetroVision transit network. LRT is now in operation along Santa Fe Drive from Mineral to downtown Denver via the southerly access along California and Stout Streets or the Central Platte Valley spur connection to Denver Union Station. The 16th Street shuttle provides a distribution of downtown transit ridership from both buses and LRT. The T-REX project is currently constructing the LRT segment along I-25 from the I-25 and Broadway station south to Lincoln Avenue in Douglas County.

The planning process is continuing for development of the regional transit network. RTD's current FasTracks plan includes improvements to the Central Corridor and Central Platte Valley LRT lines to improve access into Downtown Denver. Within the Valley Highway project area, FasTracks includes modification of existing LRT stations to accommodate four-car trains and the construction of two additional tracks between Broadway and Alameda Avenue. The Valley Highway Project will need to consider these planned LRT improvements, such that they are complemented and not precluded.



North

Study Area Transit System

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 1-4

A transit oriented development is in the planning stages for the area in and around the I-25 and Broadway station. Future development footprints and associated local street modifications may require redefining the access at I-25 and Broadway. Coordination between planning efforts in this area is described in **Section 2.5.**

1.4.3.2 RTD PARK -N- RIDE ACCESSIBILITY

Two park-n-Rides exist within the study corridor – the I-25 and Broadway park-n-Ride and the Alameda park-n-Ride. The I-25 and Broadway park-n-Ride is accessed through a bus only entrance at Ohio, north of the interchange, and a full movement bus and auto access at Kentucky and Broadway, south of the interchange. Internal to the park-n-Ride, a ”kiss-n-Ride” area is provided and surface parking is available under, as well as south and north of the I-25 viaduct. Pedestrian accessibility is provided via sidewalks along Broadway, Ohio, and Kentucky. Access and internal circulation is inefficient with numerous modal conflict points. Bus access is limited to inbound only and shared outbound leading to operational difficulties.

Upon completion of the Southeast Corridor LRT as part of T-REX, RTD will modify their regional and local bus service including the I-25 and Broadway transit station. This will require redefinition of the bus access route from/to Broadway and a reconfiguration of available parking layouts for the park-n-Ride portion of the station to adjust for construction of the new Broadway viaduct.

The Alameda park-n-Ride is located south of Alameda along Cherokee Street. It provides a “kiss-n-Ride” location with limited parking availability. The station is accessed via automobile and bus principally through the signalized intersection at Alameda and Cherokee Streets although there is connectivity to Broadway through the shopping complex directly to the east. Pedestrians access the park-n-Ride via sidewalks along Cherokee Street. The limited on-site parking leads to overflow parking on Cherokee Street and illegal parking within the shopping center to the east. Connectivity with the I-25 and Broadway park-n-Ride, just to the south, is restricted by gates and fencing thereby limiting shared parking and station access between the two. This loads the intersection at Alameda and Cherokee or requires cut-through access to Broadway to the east.

1.4.3.3 BUS / HOV LANES

The bus/HOV lane component of the *2025 Regional Transportation Plan* includes the existing bus lanes on Broadway and Lincoln Street between I-25 and Downtown Denver and the bus/HOV lanes on Santa Fe Drive south of I-25.

The existing bus/HOV lanes in the left lanes of Santa Fe Drive are restricted only during peak-hour periods and integrate with general purpose lanes south of the I-25/Broadway area near Santa Fe Drive and Mississippi Avenue. The peak period bus-only lanes along Broadway/Lincoln Street are offered as parking lanes in the evenings along residential stretches.

For the project corridor, the function of the Santa Fe Drive HOV lanes needs appropriate definition at the confluence with the Valley Highway project. The transition to achieve connectivity with the general purpose lanes feeding into I-25 needs to be considered in the

interchange configuration evaluation of Santa Fe Drive with I-25. Buses and high occupancy vehicles also need access to the intermodal facility at Broadway.

1.4.3.4 BICYCLE AND PEDESTRIAN MOBILITY

Pedestrian and bicycle facilities occur sporadically in the project corridor. The highway, South Platte River, and rail corridor act as barriers to east-west mobility through the corridor while reasonable north-south mobility is offered via the Platte River trail and local street systems. Key components of the existing system include:

- The South Platte River Trail: The South Platte River Trail is a vibrant regional trail that offers both commuter and recreational bicycle and pedestrian mobility north and south through the metropolitan area. The trail starts at Chatfield Reservoir in Jefferson and Douglas Counties in the southern metropolitan Denver area and parallels the South Platte River through the City of Denver. Through the project corridor, it is generally adjacent to the South Platte River channel with connections to local streets at Mississippi Avenue and Alameda Avenue. The trail is a major destination for residents from adjacent neighborhoods east and west of the highway.

  Connections to the trail are problematic at Alameda Avenue due to steep grades and tight radius switchback turns. The low clearance under the US 6 bridge at the South Platte River is a challenge to maneuver under and is dark and uninviting.

- East-West Connectivity: East-west connectivity is limited through the project area. Two principal crossings of I-25 exist – Alameda Avenue and US 6. US 6 is a high-speed urban freeway and is not conducive for bicycle and pedestrian use. Alameda Avenue is the only east-west crossing of I-25 that offers bicycle/pedestrian accommodations within the project corridor. Sidewalks are narrow under the existing railroad crossing east of Santa Fe Drive. Crossing the one-way pair arterial streets of Santa Fe Drive and Kalamath Street at grade is difficult and intimidating for bicyclists, and pedestrians. Numerous accidents have occurred at these crossings. Alameda Avenue also serves as access to the Alameda RTD park-n-Ride station east of I-25 and the LRT system.
- At Broadway and I-25, east-west connectivity to the RTD park-n-Ride is a challenge. Ohio Avenue is designated as a neighborhood bike and pedestrian route providing access to the Broadway retail district and the transit station at the Broadway park-n-Ride. Crossing the high speed, unsignalized I-25 off ramp at Ohio Avenue is problematic for pedestrians and bicyclists, while sight distance restrictions at Broadway make the signalized crossing equally as difficult.
- Santa Fe Drive / Kalamath Street Pedestrian Facilities: Sidewalks occur sporadically along Santa Fe Drive and Kalamath Street through the project limits. North of Alameda Avenue 5-foot sidewalks are generally available on one or both sides of Santa Fe Drive and Kalamath Street. South of Alameda Avenue, there are no pedestrian provisions.

1.4.4 Safety

The freeway corridor accident history was evaluated for the three-year period from January 1, 1999 to December 31, 2001, and a *Traffic Safety Report* was prepared (CDOT, 2005). A total of 3415 accidents were reported in the three-year period and eight of them were fatal. A review of accident data reveals that rear-end and sideswipe accidents are predominant both on I-25, US 6, and at the interchanges. Further analysis reveals that this segment of I-25 is experiencing a greater frequency and severity of accidents than would be expected for facilities of this type with this volume of traffic. These accidents can be related to congestion, recurrent and frequent queuing, close interchange spacing, and the substandard geometric characteristics of I-25.

1.4.5 Roadway Deficiencies

The Valley Highway portion of I-25 was planned prior to enactment of the Federal-Aid Interstate Highway Program. Design features were developed using traffic volume projections, geographic constraints, cost considerations, and design criteria of the early 1950s. Consequently, the mainline and ramp configurations by today's standards have substandard geometrics and design features and non-standard interchange configurations that do not meet today's driver expectancy. In addition, several existing roadway structures within the project area are nearing the end of their useable life. The deteriorating condition of the structures, with increasing maintenance and repair requirements, point to the need to replace the structures in the near term.

Additional deficiencies within the project corridor include substandard lane widths, inadequate sight distances, and inadequate shoulder widths, all of which reduce relative levels of safety and restrict the smooth operation of vehicles. Geometric deficiencies at the Broadway interchange include inadequate shoulder widths, sight distance deficiencies, substandard taper lengths, and minimum curve radii. Similar deficiencies exist at the Alameda Avenue and Santa Fe Drive interchanges. Roadway deficiencies are also present at arterial street intersections directly adjacent to the interchanges at Broadway, Alameda Avenue, and Federal Boulevard.

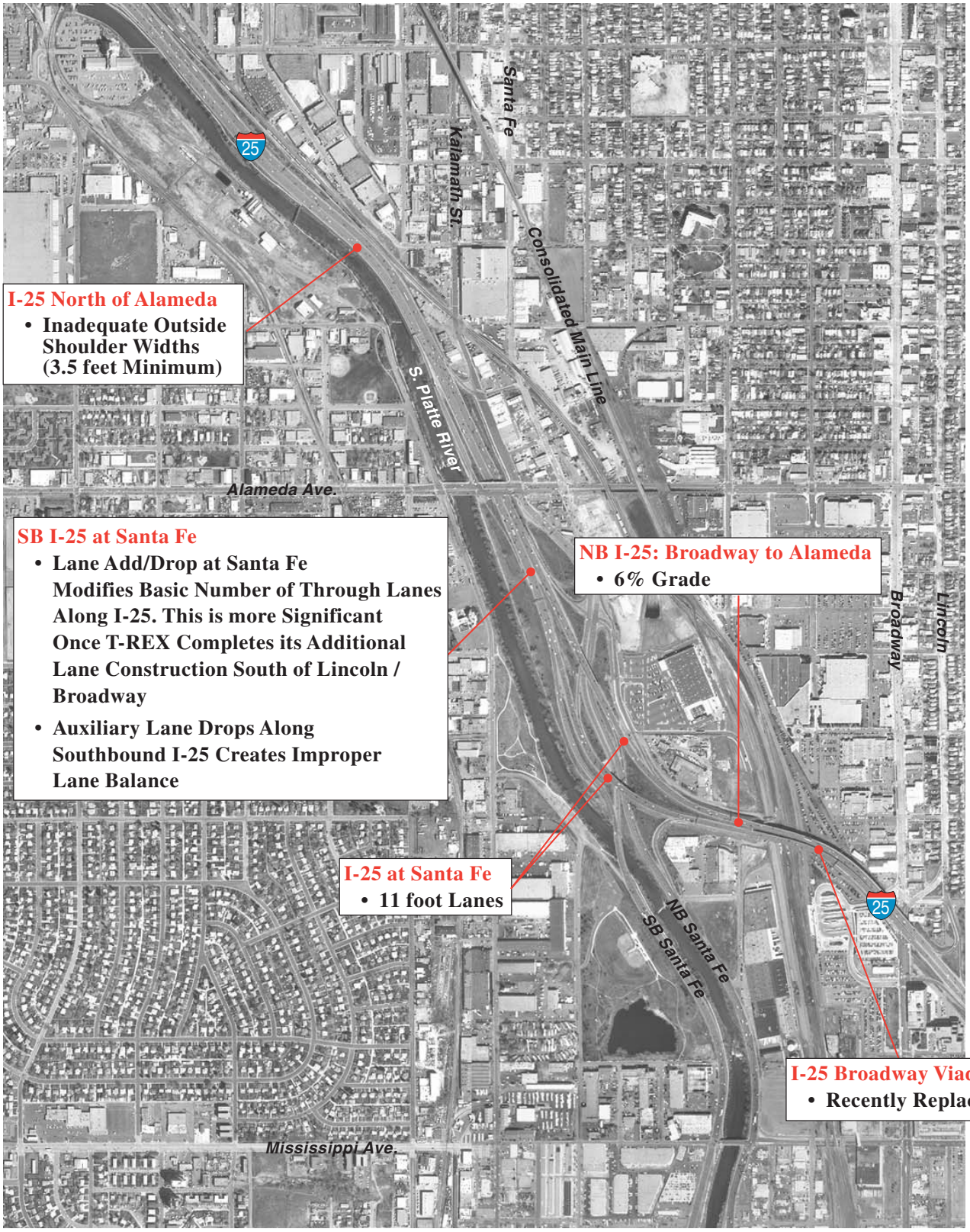
In addition to geometric deficiencies, several other factors contribute to the need to reconfigure the Broadway interchange. These include: integration of LRT from the T-REX project, bus access consideration by RTD, the existing need for enhanced pedestrian connectivity to the RTD park-n-Ride, and land use changes.

Left-hand on- and off-ramps tying to the expressway facility at Santa Fe Drive create merge and weave conditions that exacerbate current capacity and flow problems of the I-25 mainline. The I-25/Santa Fe Drive structures were built in the late 1950s and are showing signs of distress, as evidenced by exposed reinforcing steel and spalling concrete. The structures are currently sufficiency-rated at 38.4 (out of a possible 100) for southbound and 34.9 for northbound. For reference, the existing Broadway viaduct was replaced for similar reasons. Prior to replacement, the Broadway viaduct northbound structure had a sufficiency rating of 23.6 and the southbound structure had a sufficiency rating of 6.

The I-25/Alameda Avenue bridge structure has limitations in that sidewalks across the bridge are narrow and the length limits the ability for adequate acceleration of northbound on-ramps or the ability to provide continuous auxiliary lanes southbound. The sump created on I-25 under the bridge is frequently flooded during major storm events.

Along eastbound and westbound US 6, weave lengths between Federal Boulevard, Bryant Street, and I-25 are severely deficient. These weave lengths would need to be increased to provide safer vehicle movements among these access points. The US 6 bridge over the South Platte River is subject to flood water flows overtopping the bridge during a major (100-year) storm event.

Roadway deficiencies are highlighted on **Figures 1-5** through **1-9. Table 1-1** outlines deficiencies compared to current design standards. These design standards are the minimum standard currently applied as adopted by CDOT in agreement with FHWA.

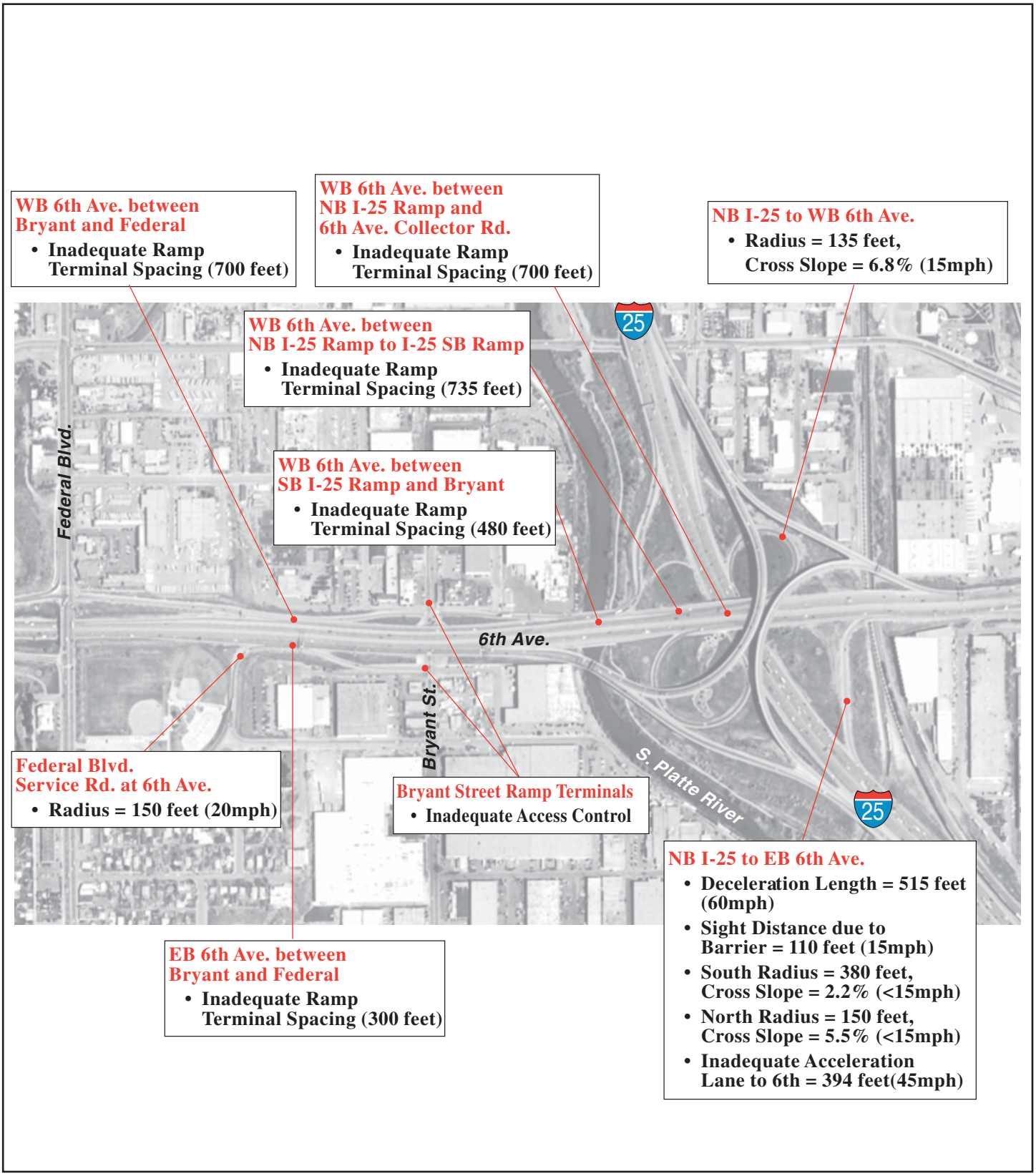


North

Mainline I-25 Geometric Deficiencies

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 1-5

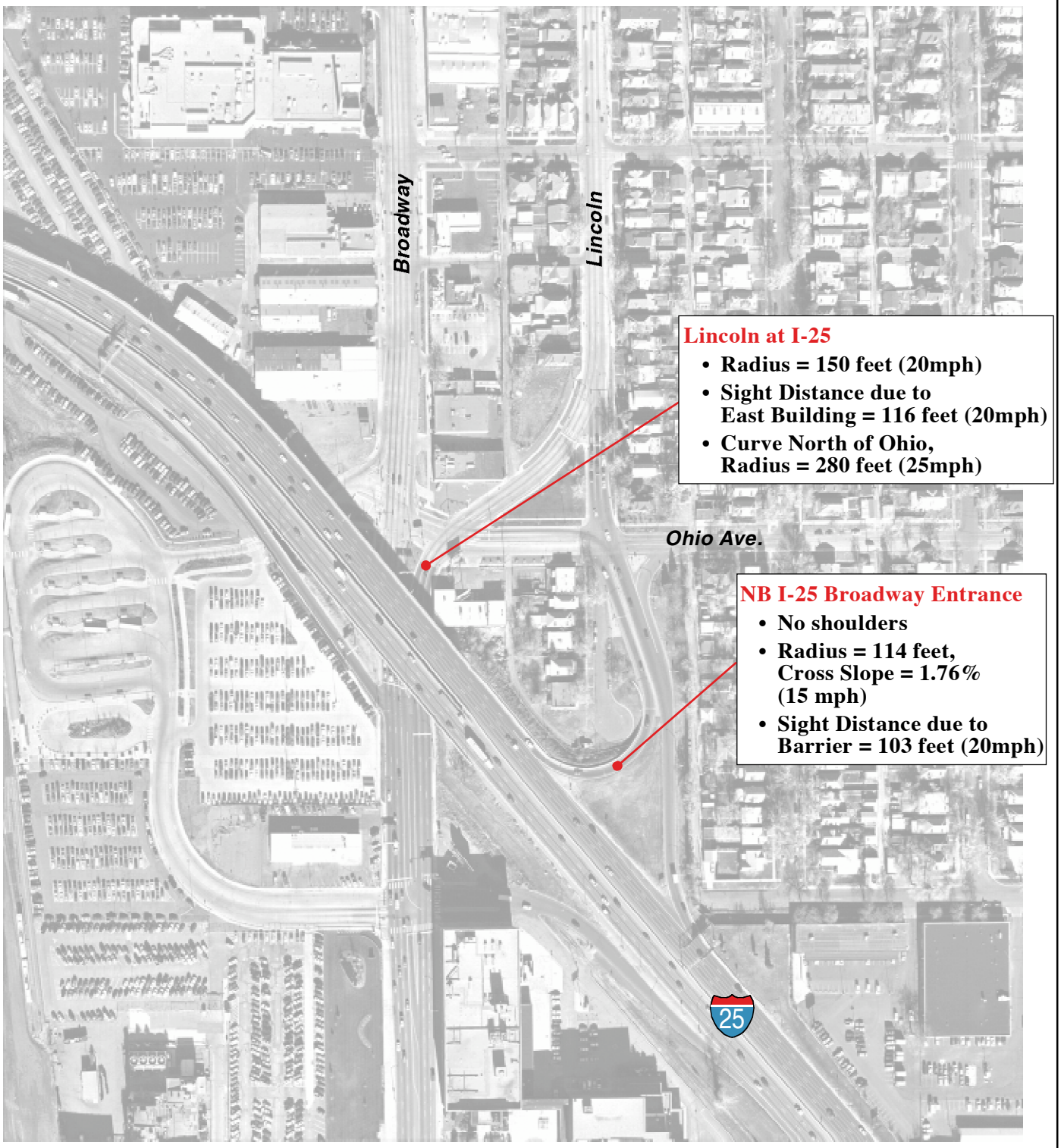


North

I-25 / 6th Avenue Geometric Deficiencies

Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Figure 1-6

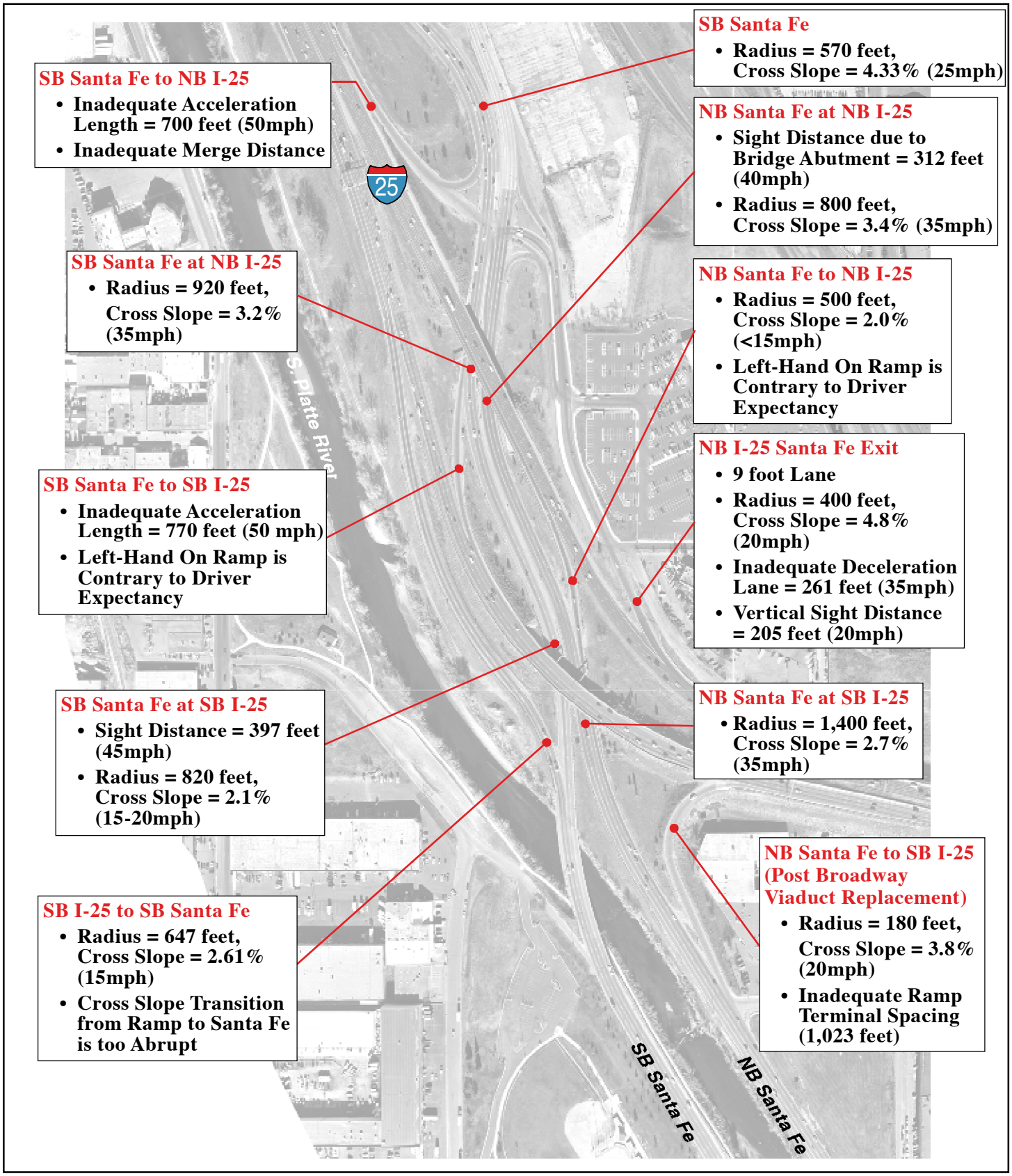


North

I-25 / Broadway Interchange Geometric Deficiencies

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 1-7

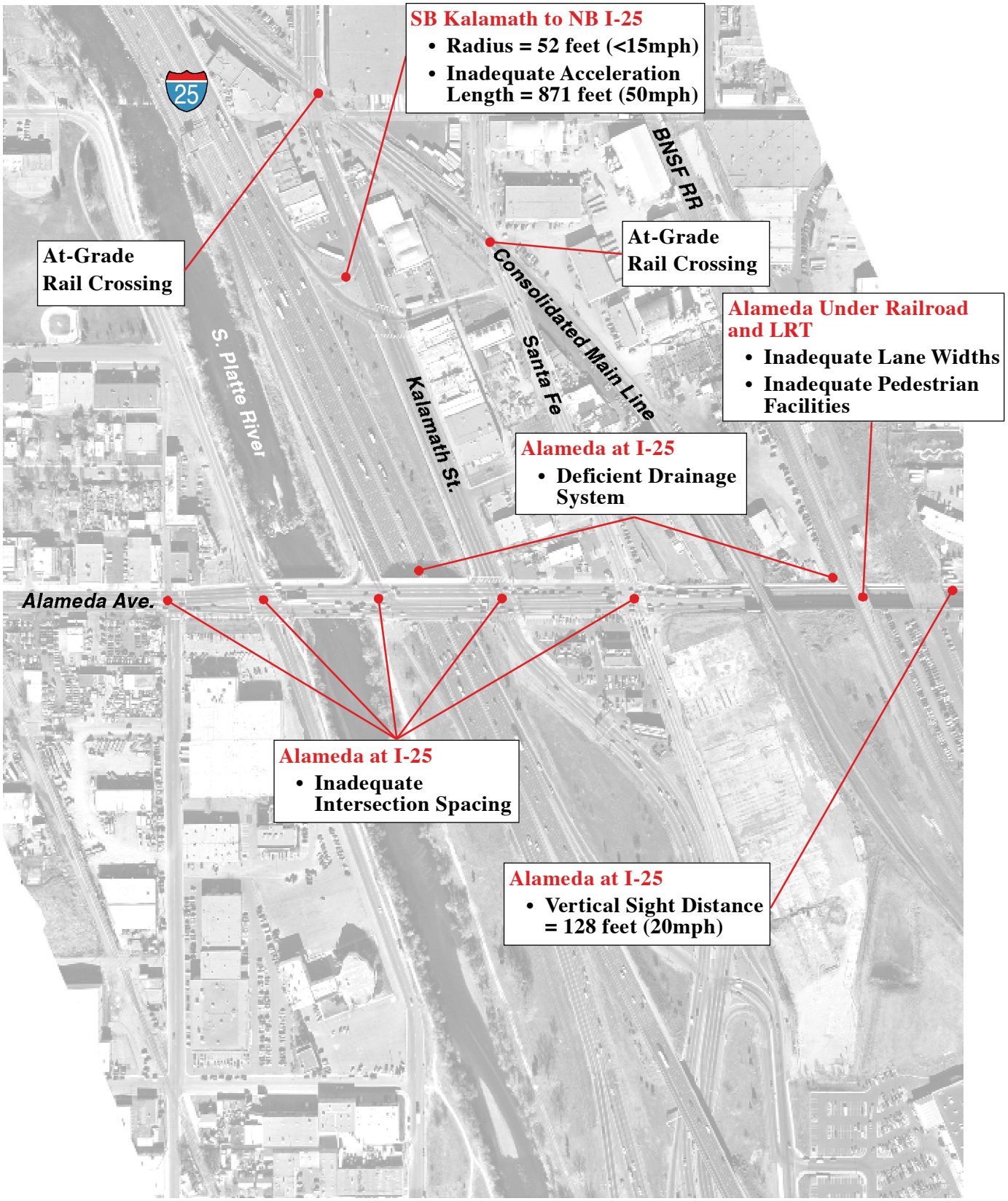


North

I-25 / Santa Fe Drive Geometric Deficiencies

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 1-8



North

I-25 / Alameda Avenue Geometric Deficiencies

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 1-9

Table 1-1 Comparison of Roadway Deficiencies and Current Design Standards

Design Criteria	Existing Facility	Current Criteria	Comment
I-25 Mainline (refer to Figure 1-5):			
Lane Widths	11-foot lanes	12-foot lanes	12 feet lanes provide desirable clearances between larger vehicles. Narrow lanes force drivers to operate their vehicles closer to each other than normally desired, which affects the level of service of highway. The resultant erratic operation has an undesirable effect.
Shoulder Widths	Inside varies from 0–12 feet, Outside varies from 0–10 feet	Inside 10 feet–12 feet Outside 12 feet	Heavily traveled high-speed highways and highways carrying large numbers of trucks, such as I-25, should have useable shoulders at least 10–12 feet so a stopped vehicle on the shoulder clears the edge of traveled way by at least 1–2 feet. Narrow shoulders affect the level of service of highway.
Ramp Terminal Spacing	Washington Street to Lincoln Street – 1455 feet	1600 feet	Lane length between entrance at Washington Street and exit to Lincoln Street is too short for vehicles to accelerate and weave with vehicles on I 25 exiting subsequent off-ramp. Distance is not adequate for these maneuvers.
Basic Number of Lanes	Post T-REX and Broadway Viaduct Project, 4 lanes in each direction south of Santa Fe Drive exit; 3 lanes in each direction through the Santa Fe interchange; 4 lanes in each direction north of Santa Fe Drive to US 36.	4 lanes	A basic number of lanes should be maintained over a significant length along any route of arterial character. This becomes significant with completion of an 8-lane section south of Santa Fe creating a 6-lane bottleneck at Santa Fe.
Lane Balance	Lane Drop / Add at Santa Fe Drive		To achieve efficient traffic operation through and beyond an interchange, there should be a balance of the number of traffic lanes on the highway and on the ramp. This balance is determined through guidance published in the AASHTO guide.
Grade	6 percent on NB from Broadway to Alameda Avenue	4 percent Max	In urban areas where interchanges are closely spaced and frequent speed changes are needed, the use of flat grades is desirable.

Table 1-1 Comparison of Roadway Deficiencies and Current Design Standards (Continued)

Design Criteria	Existing Facility	Current Criteria	Comment
I-25 / US 6 Interchange and US 6 Mainline (refer to Figure 1-6):			
Stopping Sight Distance	NB I-25 to EB US 6 – 110 feet (15 mph)	200 feet (30 mph)	The stopping sight distance is the sum of the distance traversed during the brake reaction time and the distance to brake the vehicle to a stop. If obstructions occur within the distance of lower design speeds, the odds of vehicle accidents increase.
Curve Radius (Horizontal Curves) and Cross Slope	NB I-25 to EB US 6 – 380 feet, 2.2 percent (<15 mph) 150 feet, 5.5 percent (<15 mph) NB I-25 to WB – 135 feet, 6.8 percent (15 mph) Federal Boulevard Service Road 150 feet (20 mph)	30 mph design speed: Min. radius of 250 feet with 8 percent cross slope, or 380 feet with 7.1 percent cross slope, etc.	Design speed through curves is a function of the curve radius and cross slope. AASHTO provides various design elements in tables based on cross slope and design speeds.
Acceleration Lanes	NB I-25 to EB US 6 – 394 feet (45 mph)	546 feet	Inadequate acceleration lanes require vehicles to merge into traffic at a speed less than what vehicles will likely be traveling (design speed).
Ramp Terminal Spacing on US 6	NB I-25 Ramp / US 6 Collector – 700 feet NB I-25 Ramp / SB I-25 Ramp – 735 feet SB I-25 Ramp / Bryant Street – 480 feet Bryant Street / Federal Boulevard – 700 feet Bryant Street / Federal Boulevard – 300 feet	1600 feet 800 feet 1600 feet 1600 feet 1600 feet	The length of the ramp terminal spacing is determined by the type of ramps in the pair and the weaving potential. The 1600 feet distance is required when an entrance ramp is followed by an exit ramp, while 800 feet is required between two entrance ramps. The distances are required to allow for weaving of vehicles.
I-25 / Broadway Interchange (see Figure 1-7):			
Curve Radius (Horizontal Curves) and Cross Slope	Lincoln Street at Ohio Avenue – 150 feet (20 mph) Lincoln Street N. of Ohio Avenue – 280 feet (25 mph) NB I-25 On Ramp – 114 feet, 1.76 percent (15 mph) SB I-25 On-Ramp – 150 feet, 8 percent (20 mph)	Lincoln Street, 40 mph design speed: Min. radius of 565 feet with 4 percent cross slope. Ramps, 30 mph design speed: Min. radius of 250 feet with 8 percent cross slope.	Drivers doing posted speed through curves which do not follow established guidelines, are too tight, or do not have the correct cross-slope and the vehicle may skid toward outside of curve or be unable to maneuver the curve and lose control of the vehicle.
Shoulder Widths	NB I-25 On-Ramp – 0 feet	6 feet outside, 4 feet inside	Ramps are turning roadways and if the shoulders are not at least 10 feet (combined right and left), the roadway width would need to be increased to account for the turning movements.
Stopping Sight Distance	Lincoln Street at I-25 due to East Building – 116 feet (20 mph) NB I-25 On-Ramp – 103 feet (20 mph)	Lincoln Street – 305 feet (40 mph) Ramp – 200 feet (30 mph)	The stopping sight distance is the sum of the distance traversed during the brake reaction time and the distance to brake the vehicle to a stop. If obstructions occur within the distance of lower design speeds, the odds of vehicle accidents increase.

Table 1-1 Comparison of Roadway Deficiencies and Current Design Standards *(continued)*

Design Criteria	Existing Facility	Current Criteria	Comment
I-25 / Santa Fe Drive Interchange (see Figure 1-8):			
Curve Radius (Horizontal Curves) and Cross Slope	NB Santa Fe Drive Ramp to SB I-25 – 185 feet (25 mph) NB Santa Fe Drive at SB I-25 – 1400 feet, 2.7 percent (35 mph) NB Santa Fe Drive at NB I-25 – 800 feet, 3.4 percent (35 mph) NB I-25 Santa Fe Drive Off-Ramp – 400 feet, 4.8 percent (20 mph) NB Santa Fe Drive to NB I-25 – 500 feet, 2.0 percent (<15 mph) SB Santa Fe Drive – 570 feet, 4.3 percent (25 mph) SB Santa Fe Drive at NB I-25 – 920, 3.2 percent (35 mph) SB Santa Fe Drive at SB I-25 – 820 feet, 2.1 percent (20 mph) SB I-25 to SB Santa Fe Drive – 647 feet, 2.6 percent (15 mph)	Santa Fe Drive, 50 mph design speed – Min. radius of 930 feet with 4 percent cross slope. Ramps, 30 mph design speed – Min. radius of 250 feet with 8 percent cross slope.	Drivers doing posted speed through curves which do not follow established guidelines, are too tight, or do not have the correct cross slope may skid toward outside of curve or be unable to maneuver the curve and lose control of the vehicle.
Acceleration Lanes	SB Santa Fe Drive to NB I-25 – 700 feet (50 mph) SB Santa Fe Drive to SB I-25 – 770 feet (50 mph)	1020 feet (60 mph) 910 feet (60 mph)	Inadequate acceleration lanes require vehicles to merge into traffic at a speed less than what vehicles will likely be traveling (design speed).
Deceleration Lanes	NB I-25 Santa Fe Drive Off-Ramp – 261 feet (35 mph)	516 feet (60 mph)	Causes excessive braking or backup onto I-25 because braking will take place earlier than the exit.
Ramp Terminal Spacing	NB Santa Fe Drive Ramp to SB I-25 / Broadway Off-Ramp – 1023 feet	1600 feet	The length of the ramp terminal spacing is determined by the type of ramps in the pair and the weaving potential. The 1600 feet distance is required when an entrance ramp is followed by an exit ramp. Lane length between entrance at Santa Fe and exit to Broadway is too short for vehicles to accelerate and weave with vehicles on I-25 exiting subsequent off-ramp. Distance is not adequate for these maneuvers.
Stopping Sight Distance	NB Santa Fe Drive at NB I-25 Bridge Abutment – 312 feet (40 mph)	570 feet (60 mph)	The stopping sight distance is the sum of the distance traversed during the brake reaction time and the distance to brake the vehicle to a stop. If obstructions occur within the distance of lower design speeds, the odds of vehicle accidents increase.

Table 1-1 Comparison of Roadway Deficiencies and Current Design Standards *(continued)*

Design Criteria	Existing Facility	Current Criteria	Comment
I-25 / Santa Fe Drive Interchange (see Figure 1-8):continued			
Vertical Sight Distance	NB I-25 Santa Fe Drive Off-Ramp – 205 feet (20 mph)	200 feet (30 mph)	Minimum vertical curves are established to make sure that the driver can see an object in enough time to stop. If this object is out of sight due to a curve that is too small, an accident is more likely to occur.
Left-Hand On-Ramp	NB Santa Fe Drive to NB I-25 SB Santa Fe Drive to SB I-25	Right-hand on-ramps	Slower speed traffic from ramps traditionally merges with the slower moving mainline highway lanes on the right. It is therefore contrary to current driver's expectation that they merge with the higher speed left-hand lanes as currently occurs.
Cross Slope	SB I-25 to SB Santa Fe Drive Ramp – not sufficient runout lengths between reverse curves, too abrupt	4 percent with proper runout lengths	Having insufficient runout lengths within reverse curves can cause a roller coaster effect. This, along with merging with Santa Fe traffic at 50 mph, has caused tractor trailers to overturn.
I-25 / Alameda Avenue Interchange (see Figure 1-9):			
Curve Radius (Horizontal Curves)	SB Kalamath Street to NB I-25 – 52 feet (<15 mph)	Ramps, 30 mph design speed – Min. radius of 250 feet with 8 percent cross slope.	Drivers doing posted speed through curves which do not follow established guidelines, are too tight, or do not have the correct cross-slope may skid toward outside of curve or be unable to maneuver the curve and lose control of the vehicle.
Intersection Spacing	310 feet – 360 feet	450 feet-600 feet	Adequate intersection spacing is necessary for the efficient operation of the traffic and provides necessary space for queuing, turning, and lane changes.
Stopping Sight Distance (Vertical Curves)	Alameda Avenue – 128 feet (20 mph)	305 feet (40 mph)	Minimum vertical curves are established to make sure that the driver can see an object in enough time to stop. If this object is out of sight due to a curve that is too small, an accident is more likely to occur.
Lane Widths	Alameda Avenue Under Railroads / LRT – 10 feet	11 feet	11-foot lanes provide desirable clearances between larger vehicles. Narrow lanes force drivers to operate their vehicles closer to each other than normally desired, which affects the level of service of highway. The resultant erratic operation has an undesirable effect on driver comfort and crash rates.
Acceleration Lane	SB Kalamath Street to NB I-25 – 871 feet (50 mph)	1140 feet (60 mph)	Inadequate acceleration lanes require vehicles to merge into traffic at a speed less than what vehicles will likely be traveling (design speed).

AASHTO – American Association of State Highway and Transportation Officials
EB – eastbound
LRT – light rail transit
SB – southbound
mph – miles per hour
NB – northbound
WB – westbound

1.4.6 Consolidated Main Line Railroad Crossing at Santa Fe Drive and Kalamath Street

The one-way arterial street pair of Santa Fe Drive and Kalamath Street crosses the Consolidated Main Line railroad at-grade north of Alameda Avenue. This causes periods of substantial congestion as traffic queues and/or diverts to neighborhood streets while waiting for the train to cross the intersections. In addition, access to the existing northbound I-25 on ramp at Cedar Avenue and Kalamath Street is restricted when trains are present.

The Santa Fe Drive and Kalamath Street one-way couplet crosses the Consolidated Main Line tracks approximately ¼ mile north of Alameda Avenue. Bayaud Avenue connects Santa Fe Drive and Kalamath Street and crosses the main line tracks just east of Kalamath Street. These crossings are protected by signals, bells, and gating. Santa Fe Drive and Kalamath Street are principal north-south oriented arterial streets that carry automobile traffic to/from Downtown Denver to/from points southwest of the metropolitan area. The Consolidated Main Line railroad is the principal north-south freight rail route in and out of Denver. The Burlington Northern and Santa Fe Railroad and the Union Pacific Railroad operate in this corridor, principally transporting coal from the Powder River Basin of Wyoming to customers in Oklahoma and Texas.

There is a history of train and automobile accidents at the crossing. From 1975 to the present there have been seven train/automobile accidents at the Santa Fe Drive crossing – all involving property damage without injury or death. There have been 15 accidents at the Kalamath Street crossing – all involving property damage and three involving injuries with no fatalities.

Current and future traffic on each of these systems are shown in **Table 1-2.**

Table 1-2 Current and Future Traffic at the Consolidated Main Line

System	Current Average Daily Traffic	Projected (2025) Average Daily Traffic
Kalamath Street (vehicles per day)	14,800	22,700
Santa Fe Drive (vehicles per day)	15,000	19,300
Consolidated Main Line (trains)	60	60 [a]

[a] Future train volumes are uncertain. Current traffic has been noted.

The City and County of Denver has long considered this crossing a priority for grade separation. The traffic volumes on Kalamath Street and Santa Fe Drive are among the largest volumes of traffic crossing the Consolidated Main Line railroad in Denver. As a result, these are listed as the highest priority railroad grade-separation projects in the *Denver Citywide Railroad Study and Plan* (City and County of Denver and CRSS Civil Engineers, 1992a).

Exposure factor is a measure used to assess the conflict and resulting safety risk associated with a road crossing a railroad at grade. The exposure factor is computed using the following equation:

Exposure Factor = Average Daily Traffic Volume x Average Daily Number of Trains

The Colorado Public Utilities Commission uses a minimum criteria exposure factor of 75,000, actual or projected, at urban locations to warrant grade separation cost allocation (Colorado Public Utilities Commission, 2003). **Table 1-3** identifies current and future exposure factors at the Consolidated Main Line. This calculation shows that both Kalamath Street and Santa Fe Drive currently have exposure factors that are more than ten times those that warrant consideration of grade separation.

Table 1-3 Current and Future Exposure Factors at the Consolidated Main Line

Crossing	Current Exposure Factor	Future Exposure Factor [1]
Kalamath Street Crossing	888,000	1,362,000
Santa Fe Drive Crossing	900,000	1,158,000

[1] Future exposure factors have assumed current daily train traffic.

The crossing also meets FRA conditions for consideration of a grade separation, with an estimated 310 vehicle-hours of delay based on current conditions, compared with the FRA's threshold of 40 vehicle hours of delay (FRA, 2002).

Effects on traffic operations associated with the Kalamath Street and Santa Fe Drive Consolidated Main Line railroad crossings are summarized below. Additional detail is provided in **Chapter 3** *Transportation Analysis*.

- Vehicle Delay: Based on the current number of train movements and the traffic volumes on Kalamath Street and Santa Fe Drive, there is an estimated 310 vehicle hours of delay per day caused by trains blocking the two roads.
- Queuing Effects: Queues (vehicles waiting) that would form on northbound Santa Fe Drive when the street is blocked by a 95-car coal train crossing during the AM peak period are estimated to extend approximately 1325 feet under current conditions and approximately 1600 feet under forecasted year 2025 conditions. The available storage distance on Santa Fe Drive between the Consolidated Main Line railroad and Alameda Avenue is approximately 880 feet. Therefore, peak period vehicle queues currently exceed the available storage length by more than 400 feet and are projected to exceed available storage by more than 700 feet in the future. Thus, train movements that occur during peak traffic periods have the effect of not only delaying Santa Fe Drive and Kalamath Street traffic, but also of severely impacting operations on Alameda Avenue.
- Other Transportation Modes: In addition to general vehicular effects, other modes of travel are also affected by delays associated with the at-grade railroad crossings. Bicycles and pedestrians experience the same delays and accident exposure as motor vehicles, and bicyclists particularly are affected by the railroad crossing surface. Emergency services vehicles, RTD buses and school buses either experience delays or avoid Kalamath Street and Santa Fe Drive due to the unpredictability of travel times

TABLE OF CONTENTS

Page

2.0 ALTERNATIVES 2-1

2.1 Public and Agency Involvement in Alternatives Development 2-1

2.2 Alternatives Development and Screening Process 2-4

2.3 Alternatives Considered and Eliminated 2-7

2.4 System Alternatives Considered in Detail 2-22

2.5 Future Redevelopment and Transportation Improvements Near I-25 and Broadway ... 2-63

2.6 Preferred Alternative 2-65

LIST OF FIGURES

Page

Figure 2-1 Alternatives Development and Screening Results 2-8
Figure 2-2 No Action Alternative 2-23
Figure 2-3 System Alternative 1 – Maximize Use of Existing Right-of-Way 2-24
Figure 2-4 System Alternative 2 – Maximize Operational Performance / Safety 2-25
Figure 2-5 System Alternative 3 – Maximize Facilitation of Local Objectives 2-26
Figure 2-6 I-25 Common Sections 2-29
Figure 2-7 Common Elements at Broadway 2-30
Figure 2-8 Common Elements at Santa Fe Drive 2-31
Figure 2-9 Common Elements at Alameda Avenue 2-32
Figure 2-10 Common Elements at US 6 / I-25 2-33
Figure 2-11 Arterial Streets Common Sections with System Alternatives 2-34
Figure 2-12 System Alternative 1, I-25 Typical Section, Broadway to Santa Fe Drive 2-38
Figure 2-13 System Alternative 1, US 6 / Federal Boulevard/Bryant Street Improvements 2-39
Figure 2-14 System Alternative 1, US 6 Typical Section, I-25 to Federal Boulevard 2-40
Figure 2-15 System Alternative 1, Broadway Interchange 2-41
Figure 2-16 System Alternative 1, Alameda Avenue Interchange 2-42
Figure 2-17 System Alternative 1 Simulation, Alameda / Santa Fe / Kalamath 2-43
Figure 2-18 System Alternative 1, Santa Fe Drive and Kalamath Street Grade Separation 2-44
Figure 2-19 System Alternative 1, Santa Fe Drive and Kalamath Street Typical Section 2-44
Figure 2-20 System Alternative 1, Broadway Bicycle / Pedestrian Facilities 2-45
Figure 2-21 System Alternative 1, Bayaud Avenue Bicycle / Pedestrian Structure 2-46
Figure 2-22 System Alternative 2, I-25 Typical Section, Broadway to Santa Fe Drive 2-48
Figure 2-23 System Alternative 2, US 6 / Federal Boulevard / Bryant Street Interchange 2-49
Figure 2-24 System Alternative 2, US 6 Typical Section, I-25 to Federal Boulevard 2-49
Figure 2-25 System Alternative 2, Broadway Interchange 2-50
Figure 2-26 System Alternative 2, Santa Fe Drive Interchange 2-51
Figure 2-27 System Alternative 2, Alameda Avenue Interchange 2-52
Figure 2-28 System Alternative 2, Alameda Avenue – Santa Fe Drive to Cherokee Street 2-52
Figure 2-29 System Alternative 2 Simulation, Santa Fe / Kalamath / Alameda 2-53
Figure 2-30 System Alternative 2, Broadway Bike / Pedestrian Facilities 2-54
Figure 2-31 System Alternative 3, US 6/Federal Boulevard / Bryant Street Improvements 2-56
Figure 2-32 System Alternative 3, Broadway Interchange 2-57
Figure 2-33 System Alternative 3, Santa Fe Drive Interchange 2-58
Figure 2-34 System Alternative 3, Alameda Avenue Interchange and Grade Separation 2-59
Figure 2-35 System Alternative 3 Simulation, Santa Fe / Kalamath / Alameda 2-60
Figure 2-36 System Alternative 3, Broadway Bike / Pedestrian Facilities 2-62
Figure 2-37 System Alternative 3, Bayaud Avenue Bike / Pedestrian Structure 2-62

LIST OF FIGURES (CONTINUED)

Page

Figure 2-38 Preferred Alternative 2-66
Figure 2-39 Preferred Alternative – I-25 Typical Sections 2-77
Figure 2-40 Arterial Street Typical Sections with the Preferred Alternative 2-78
Figure 2-41 Preferred Alternative, Broadway Interchange 2-79
Figure 2-42 Preferred Alternative, Broadway Bicycle/Pedestrian Facilities 2-80
Figure 2-43 Preferred Alternative, Santa Fe Drive Interchange 2-81
Figure 2-44 Preferred Alternative, Alameda Avenue Interchange 2-83
Figure 2-45 Preferred Alternative Simulation – Santa Fe/Kalamath/Alameda 2-84
Figure 2-46 Preferred Alternative, Santa Fe Drive and Kalamath Street Grade Separation 2-85
Figure 2-47 Preferred Alternative, Santa Fe Drive and Kalamath Street Typical Section ... 2-86
Figure 2-48 Preferred Alternative, Bayaud Avenue Bicycle/Pedestrian Structure 2-86
Figure 2-49 Preferred Alternative, US 6/I-25 Interchange 2-87
Figure 2-50 Preferred Alternative, US 6/Federal Boulevard/Bryant Street Interchange 2-89
Figure 2-51 Preferred Alternative, US 6 Typical Section, I-25 to Federal Boulevard 2-89

LIST OF TABLES

Page

Table 2-1 Major Public Meetings 2-2
Table 2-2 Transportation Management Alternative Elements Considered 2-9
Table 2-3 Results of Element Screening 2-12
Table 2-4 System Alternatives Initially Considered 2-17
Table 2-5 Element Alternatives Packaged into System Alternatives 2-18
Table 2-6 Results of System Screening 2-18
Table 2-7 Value Engineering Proposals and Recommendations 2-20
Table 2-8 Elements Common to System Alternatives 2-27
Table 2-9 System Alternative 1 Differentiating Elements 2-37
Table 2-10 System Alternative 2 Differentiating Elements 2-47
Table 2-11 System Alternative 3 Differentiating Elements 2-55
Table 2-12 I-25 / Broadway Element Identified for the Preferred Alternative 2-69
Table 2-13 I-25/ Alameda/ Santa Fe/ Kalamath Element Identified for the Preferred Alternative 2-71
Table 2-14 US 6/ Federal/ Bryant Element Identified for the Preferred Alternative 2-74
Table 2-15 Preferred Alternative Refinements 2-75

2.0 ALTERNATIVES

NEPA and related regulations require that a range of reasonable alternatives and a No Action Alternative be presented and evaluated in detail in an EIS. The Council on Environmental Quality has defined reasonable alternatives as those that are practical or feasible from a technical and economic standpoint and achieve the purpose and need for the project. Reasonable alternatives are to be evaluated and decisions made in the overall public interest, taking into consideration the need for safe and efficient transportation; the social, economic, and environmental impacts of the proposed transportation improvement; and national, state, and local environmental protection goals (23CFR Part 771.105(b), 23CFR Part 771.123(c))

The development and assessment of transportation alternatives and their relationship to important social and environmental resources have been conducted in accordance with applicable regulatory frameworks. For many issues, the general approach for managing potential concerns was:

1. Avoidance – adjust the alternative and/or develop new alternatives that do not adversely impact the social or environmental resources

2. Minimization – where complete avoidance is not practical or cost-effective, all practical measures would be employed to minimize the impacts

3. Mitigation – where adverse impacts cannot be avoided or minimized, include in the alternative measures to reduce or eliminate the adverse impacts on social or environmental resources

The alternatives analysis presented in the Draft EIS (CDOT and FHWA, 2005) was designed to bring environmental and social considerations into the early stages of project planning and provide a strong basis for these considerations to be carried though design and implementation.

Building on the Draft EIS alternatives analysis, this Final EIS presents a Preferred Alternative (see **Section 2.6** *Preferred Alternative*) for the Valley Highway project. The Preferred Alternative, which has been identified by CDOT and FHWA, balances transportation improvements to meet the project purpose and need with the environmental and social considerations.

This chapter describes the process that was used to develop, evaluate, and eliminate or advance potential alternatives to meet the purpose and need for this project. The alternatives that were advanced for full consideration in the Draft EIS are presented and CDOT/FHWA's Preferred Alternative is detailed.

2.1 Public and Agency Involvement in Alternatives Development

An extensive public/agency outreach effort began soon after the Notice of Intent to prepare an EIS was published in the *Federal Register* on July 23, 2002. A three-part scoping process was employed early with first the lead agency, second with cooperating and resource agencies, and finally with the public. The goal of these meetings was to solicit comment on the project issues, challenges, and processes.

An extensive public and agency involvement process was used to help guide the development, screening, and refinement of alternatives. The process included work sessions and meetings with advisory groups, neighborhood associations, agencies, individual businesses, business groups, property owners, tenants, developers, and the general public to discuss possible alternatives, alternatives evaluation, right-of-way impacts, refinement of alternatives, and potential mitigation measures. Over 200 meetings have been held to date. Specifics of this outreach effort can be found in **Chapter 6** *Public Involvement*.

2.1.1 Public Involvement

2.1.1.1 Major Public Meetings

Major meetings with the general public have been held at key points in the process to provide input into the alternatives development and screening process. Information about these meetings is summarized in **Table 2-1**.

Table 2-1 Major Public Meetings

Description	Date	Location	Purpose
Public Scoping	September 24, 2002 September 25, 2002 September 26, 2002	Cameron Church Valverde Elementary Del Pueblo Elementary	To introduce the project and EIS process and solicit input from the public on the issues in the corridor
Public Open House	December 12/17, 2002	Lighting Services	To present and solicit input on the conceptual interchange element alternatives and identify other potential alternatives
Public Open House	July 23/29, 2003	Lighting Services	To present and solicit input on the screening of the interchange element alternatives and introduce system alternatives
Public Open House	January 22/28, 2004	Lighting Services	To present and solicit input on the refined system alternatives and environmental impact analysis of the alternatives before production of the Draft EIS
Public Informational Meeting Public Hearing	May 19, 2005 June 2, 2005	Baker Middle School Drury Gymnasium	To present the Draft EIS and allow the opportunity for members of the public to ask questions and provide comments

2.1.1.2 Citizens Working Groups

Through early public and agency input during scoping, five key issues were identified as requiring focused attention:

- Bicycle / Pedestrian Mobility – the ability to move across and through the corridor as a pedestrian or bicyclist
- Construction Impacts – construction-related impacts to the community

- Noise – daily traffic noise impacts and mitigation measures
- South Platte River Corridor – maintaining the recreational and water resource value of the river in the project corridor
- Urban Design / Aesthetics – enhancing the visual appeal of the corridor

Many people volunteered during the public scoping meetings to participate in citizen working groups, each focused on one of the topics above. The groups met in a workshop fashion to identify issues specific to the topic, assist the project team in identifying methods of addressing the issues, and assist with details to be incorporated into the alternatives. To date, each group has met at least twice.

2.1.1.3 Neighborhood and Business Associations

Numerous meetings have been held with organized associations to identify issues of importance to those organizations and discuss how the alternatives addressed those issues. Meetings also have been held with several social service providers and non-profit organizations located near the project.

2.1.1.4 Door-to-Door Business and Property Owners Meetings

Door-to-door business outreach efforts were undertaken to visit with owners and tenants to introduce the project and solicit input. As alternatives and effects were identified, these visits were used to provide early information on potential effects and discuss the options available either through design refinement, alternative access configurations, or purchase and relocation through the CDOT/FHWA acquisition process.

2.1.1.5 Project Web Site

A web site was established to provide public access to information on the project, including alternatives development, screening, and refinement. The web site address is www.valleyhighway.com.

2.1.2 Agency Involvement

2.1.2.1 Cooperating Agencies

The City and County of Denver, RTD, FTA, and FRA joined the project as formal cooperating agencies. Responsibilities of these cooperating agencies include:

- Participate in scoping
- Participate in the EIS process
- Develop / collect information and perform environmental analysis, as appropriate
- Make appropriate staff available to provide input and review

2.1.2.2 POLICY ADVISORY COMMITTEE

This group was formed to provide policy information and input to the project team. The committee, which includes elected officials, and senior staff from the City and County of Denver, RTD, the Denver Regional Council of Governments (DRCOG), CDOT, and FHWA, meets on approximately a quarterly basis. The committee was tasked with the following:

- Provide recommendations concerning the direction of the EIS project
- Provide feedback on the alternatives, management decisions, and public involvement
- Provide a public sounding board to obtain citizen feedback

2.1.2.3 TECHNICAL WORKING GROUP

This group has met on a monthly basis from October 2002 to the present and focuses on planning, engineering, and environmental issues relative to the development, analysis, and refinement of the alternatives. Technical Working Group members are generally senior technical staff from various agencies.

2.1.2.4 RESOURCE AGENCIES

Individual meetings have been held with resource agencies throughout the project, as appropriate.

2.2 Alternatives Development and Screening Process

2.2.1 Alternatives Development

Early activities focused on evaluating existing conditions to identify corridor deficiencies to further define the project need. This information, along with other data derived from the scoping process, was then used to develop alternatives and to prepare the evaluation criteria and measures of effectiveness used to screen alternatives.

Alternatives were developed to achieve the purpose of and need for the project while providing a reasonable range for equivalent evaluation. Chapter 1, Purpose and Need, describes the need for alternatives improvements. The initial range of alternatives considered included:

- **No Action Alternative:** The No Action Alternative includes short-term minor restoration types of activities (safety and maintenance improvements, etc.) that maintain continuing operation of the existing roadway, as well as a pre-existing project to replace the I-25 viaduct over Broadway.
- **Transportation Management Alternative:** The Transportation Management alternative includes those activities that maximize the efficiency of the present system. Possible options include fringe parking, ridesharing, HOV lanes on existing roadways, and traffic signal timing optimization.
- **Mass Transit Alternative:** This alternative could include reasonable and feasible transit options (bus systems, rail, etc.).

- **Roadway Alternatives:** Alternatives were developed focused on highway, interchange, and local street improvements. The alternatives considered these improvements on existing and new alignments. Alternatives were developed in a two step fashion:
  - **Element Alternatives** – Elements are discrete pieces of the corridor. Element Alternatives were developed for I-25 mainline, Broadway/I-25, Santa Fe Drive/I-25, Alameda Avenue/I-25, Santa Fe Drive/Kalamath Street/Consolidated Railroad Grade Separation, 2nd/3rd at I-25, and US 6/Federal Boulevard/Bryant Street.
  - **System Alternatives –** These combine elements for a corridor-wide alternative.

Alternatives were developed conceptually using approved design criteria that emphasize project purpose and need, principal traffic movements, and avoidance of environmentally sensitive resources - specifically water body resources such as the South Platte River, historic properties and structures, hazardous material sites, and parks.

2.2.2 Alternatives Screening

A three-step screening process, as described below, was employed.

2.2.2.1 Purpose and Need Test

Alternatives were developed and assessed relative to their ability to meet the purpose and need for the project and objectives established within that purpose and need. As described in **Chapter 1** Purpose and Need, these objectives are focused on:

- System linkages / lane continuity and balance
- Transportation demand and operations
- Inter-modal connectivity and bicycle / pedestrian mobility
- Safety
- Roadway deficiencies
- Consolidated Main Line railroad crossing of Santa Fe Drive/Kalamath Street

Alternatives that did not address the objectives were eliminated at this stage.

2.2.2.2 Element Screening

Roadway element alternatives were developed and underwent a two-step evaluation and screening process, which included an initial screening for reasonableness and practicability followed by compatibility testing.

Initial Screening for Reasonableness and Practicability – this was a qualitative screening focused on eliminating alternatives that were not reasonable and/or practicable. Alternatives were evaluated relative to each of the other alternatives using three principal measures:

- Environmental: Considerations included key environmental resource impacts to water bodies (South Platte River), parks, noise, hazardous materials, wetlands, and visual impacts.

- Traffic / Safety: Considerations included key traffic operation measures such as full movement accommodations, principal traffic pattern accommodations, maintenance of access, traffic control requirements, out-of-directional travel, and driver expectancy. Safety enhancements through improved geometric design were also evaluated.
- Constructability / Community Values: Considerations included relative construction and maintenance costs, ability to construct the element alternative while maintaining traffic operations, and the opportunity to phase the construction with sensitivity to available funding. Community values considerations included right-of-way impacts, compatibility with local plans, bicycle / pedestrian mobility, and urban aesthetics.

Compatibility Testing of Elements – this was a qualitative/quantitative evaluation of the elements that were advanced from the initial screening. It involved a three step process of evaluation:

Step 1 ***Reassessment of previous screening results based on refined engineering and analysis***: The advanced interchange element alternatives received further engineering definition to better define the footprint of the alternatives and allow for a more detailed evaluation of the impacts of the alternatives. The initial screening matrices were revisited and the results were either validated or revised based on this refined engineering detail.

Step 2 ***A scrutiny of the alternatives responding to specific operational questions posed through the alternatives development process and through discussions with the Technical Working Group***: Six traffic operations questions were posed and evaluated focused on the I-25/Broadway interchange, I-25/Santa Fe Drive interchange, the Alameda Avenue at Santa Fe Drive/Kalamath Street intersection, and US 6/Bryant Street/Federal Boulevard interchanges. The questions were specific to the value of retaining traffic movements, the impacts associated with the removal of or rerouting of traffic moves, and the operational performance of signalized intersections.

Step 3 ***A comparison of the interchange element alternative relative to its compatibility with remaining alternatives at adjacent interchange elements and other transportation investments***: A series of questions were posed and evaluated to test compatibility between element alternatives relative to those remaining at adjacent interchanges and adjacent transportation systems.

Alternatives were evaluated and screened with the review and concurrence of the Technical Working Group. These results were presented and discussed with the public at the public meetings.

2.2.2.3 System Screening

Element alternatives were packaged to create system alternatives for the entire corridor. A qualitative evaluation of these combinations was made principally to ensure that a reasonable range of choices would be advanced for further study in the Draft EIS. This evaluation was performed with assistance from the Technical Working Group.

CDOT and FHWA began a process of identifying and refining a preferred alternative after release of the Draft EIS and completion of the public hearing and public comment period. The Technical Working Group again provided assistance in establishing the details of the Preferred Alternative. The identification, refinement and details of the Preferred Alternative are presented in **Section 2.5 *Preferred Alternative***.

2.3 Alternatives Considered and Eliminated

The alternatives development and screening process, and the results are graphically shown in **Figure 2-1** and discussed in greater detail below.

2.3.1 Purpose and Need Test

2.3.1.1 Transportation Management Alternative

A Transportation Management alternative was developed that included a package of transportation system management, travel demand management, and intelligent transportation system (ITS) actions. These actions would enhance the operation of the existing transportation system or reduce travel demands on the system. This alternative was developed with technical input from CDOT, the City and County of Denver, and DRCOG. **Table 2-2** provides a summary of the elements of the Transportation Management alternative.

In 1992, DRCOG began to develop a congestion management system for the region. Congested corridors throughout the region were identified and analyzed to determine whether travel demand reduction and operational management strategies would be sufficient to alleviate congestion through the year 2015. The congestion management study projected that the southeast corridor would be 15 percent over capacity by 2015. The study further determined that a corridor management action alone would not be sufficient to alleviate the congestion; other capital improvements should be considered including capacity expansion via rapid transit, HOV lanes, or additional general purpose lanes.

Consistent with DRCOG's findings, the Transportation Management alternative for this project was unable by itself, to satisfy the project needs. This finding is consistent with that of the Southeast Corridor Major Investment Study and EIS (which became the T-REX project) that studied I-25 to the south. It was therefore eliminated as a stand alone alternative.

Although the Transportation Management alternative was eliminated from consideration as a primary action, elements of the transportation management set of actions were included with the system alternatives, including the Preferred Alternative. The third column of **Table 2-2** indicates whether or not the action was incorporated into the system alternatives.

ACTION	RESULTS
Develop Range of Alternatives	• No Action Alternative • Transportation Management Alternative • Mass Transit Alternatives • Roadway Alternatives
Perform Purpose and Need Test	• No Action Alternative • Roadway/Transportation Management Alternatives
Develop Roadway/ Transportation Management Element Alternatives	• No Action Alternative • *81* Element Alternatives • *5* I-25 Mainline • *13* Broadway / I-25 • *21* Santa Fe / I-25 • *4* 2nd / 3rd Connector • *10* Alameda / I-25 • *8* 6th / Bryant / Federal • *20* Santa Fe / Kalamath / Railroad
Perform Initial Screening for Reasonableness and Practicability	• No Action Alternative • *23* Element Alternatives • *1* I-25 Mainline • *4* Broadway / I-25 • *7* Santa Fe / I-25 • *2* Alameda / I-25 • *6* 6th / Bryant / Federal • *3* Santa Fe / Kalamath / Railroad
Perform Compatibility Testing	• No Action Alternative • *13* Element Alternatives • *1* I-25 Mainline • *3* Broadway / I-25 • *2* Santa Fe / I-25 • *2* Alameda / I-25 • *3* 6th / Bryant / Federal • *2* Santa Fe / Kalamath / Railroad
Develop Roadway System Alternatives	• No Action Alternative • System Alternatives • Alt 1: Maximize Use of Existing Right-of-Way • Alt 2: Maximize Operational Performance / Safety • Alt 3: Maximize Implementation Flexibility • Alt 4: Maximize Facilitation of Local Objectives
Perform System Screening	• No Action Alternative • System Alternatives • Alt 1: Maximize Use of Existing Right-of-Way • Alt 2: Maximize Operational Performance / Safety • Alt 3: Maximize Facilitation of Local Objectives
Perform Value Engineering Study	• No Action Alternative • Enhanced System Alternatives 1, 2, 3
Evaluate in DEIS	• Preferred Alternative Identified in Final EIS

Alternatives Development and Screening Results

Table 2-2 Transportation Management Alternative Elements Considered

Transportation Management Category	Specific Elements	Incorporate in System Alternatives? (If no, why not)
Improved Bicycle / Pedestrian Crossing of I-25	Construct the Bayaud Avenue crossing included in Denver's Bicycle Master Plan	Yes
	Improved bike/pedestrian accommodations on Alameda Avenue	Yes
Improved Bicycle / Pedestrian Access to Transit Facilities	Improve access between the West Washington Park neighborhood and the Broadway Transit Station	Yes
	Improve access to Alameda Avenue park-n-Ride and between Alameda Avenue/Broadway park-n-Rides consistent with the Baker Neighborhood Plan	Yes
Bus/HOV Lane Enhancements	Extend the existing Santa Fe Drive HOV lanes to connect directly with I-25 or route toward Downtown Denver. Extend Broadway/Lincoln Street bus only lanes south of I-25	No (Does not address the purpose and need goals. Incorporate connections and/or access into alternatives)
Improved Transit Connection between Broadway Transit Station and Downtown Denver	Enhance capacity of bus connection between the Broadway Transit Station and the Uptown / Capitol area of Downtown Denver	No (Does not address the purpose and need goals. Incorporate connections and/or access into alternatives)
Intelligent Transportation System Measures – Freeway (I-25 and US 6)[1]	Network surveillance	Yes
	Freeway control (ramp metering)	Yes
	Traffic information dissemination	Yes
	Incident management system	Yes
Intelligent Transportation System Measures – Arterials[1,2]	Surface street control – signal system improvements	Yes (Incorporation to be coordinated with ongoing Denver and DRCOG efforts)
	Network surveillance – vehicle detectors, video cameras	Yes (Incorporation to be coordinated with ongoing Denver and DRCOG efforts)
	Traffic information dissemination along emphasis corridors	Yes (Incorporation to be coordinated with ongoing Denver and DRCOG efforts)
	Railroad grade crossing – advance train detection	Yes (Incorporation to be coordinated with ongoing Denver and DRCOG efforts)
Transit Routing and Scheduling Improvements	Ongoing bus and LRT routing and scheduling modifications, and modifications to coincide with opening of the Southeast LRT corridor	Yes / No (EIS system alternatives reflect coordination with RTD on Broadway Station access; RTD's transit routing and scheduling are outside the EIS scope)

Table 2-2 Transportation Management Alternative Elements Considered (Continued)

Transportation Management Category	Specific Elements	Incorporate in System Alternatives? (If no, why not)
Spot Intersection Improvements	Valley Highway EIS traffic analysis has identified potential spot intersection improvements at study area intersections	Yes / No (Spot intersection improvements that are directly related to I-25 and US 6 corridor improvements would be incorporated in system alternatives)
Travel Demand Management Measures	Ongoing regional and Denver travel demand management programs	No (Ongoing programs administered by DRCOG and Denver are outside the EIS scope)
	Travel demand management efforts may be developed in conjunction with Cherokee / Gates transit-oriented development plans	No (Travel demand management programs targeted at specific developments are outside of the EIS scope)
	Travel demand management efforts applied during construction that may include Variable Message Sign (VMS) usage for incident management; supplementary VMS displaying alternate routing and LRT parking availability; and community outreach promoting the use of transit alternatives	Yes (Specific strategies will be considered during final design and will be tailored to construction schedules and needs)

Notes:

[1] Intelligent transportation system measures as documented in the *Regional Intelligent Transportation Systems Strategic Plan*, March 2002, DRCOG.

[2] Santa Fe Drive and Federal Boulevard were identified as emphasis corridors in the 2002 DRCOG plan cited above.

2.3.1.2 MASS TRANSIT ALTERNATIVE

RTD, as the regional transit agency, is charged with planning, developing, and operating transit systems within the Denver metropolitan area. RTD operates a number of existing transit systems within the project corridor including regional and local bus service as well as LRT. I-25 and Broadway are at the confluence of principal LRT routes from the southwest and, soon, the southeast (T-REX). These two merge and continue north into the Central Business District (CBD) of Denver. Two principal park-n-Ride facilities at Broadway and I-25 and at Alameda Avenue and Cherokee Street are located within the study limits (see **Figure 1-5** in **Chapter 1**).

Transit in this corridor has received considerable study over the years. In November 2004, metropolitan voters passed a tax initiative called FasTracks. FasTracks will include enhancements to existing stations so they can accommodate four-car trains, partial grade separation of 13th Avenue, and construction of two additional tracks between Broadway and Alameda Avenue and between 10th/Osage Street and the Central Platte Valley (CPV) junction in order to increase operating capacity. Enhancements also include extension of the existing light rail line north from the 30th/Downing station to the 40th Avenue/40th Street station on the East Corridor. FasTracks also will include development of a Downtown circulator system to complement and expand the service area of the 16th Street Mall shuttle and help distribute passengers arriving at Denver Union Station from/to multiple corridors.

The Mass Transit alternative could not, in and of itself, meet the basic purpose and need objectives to enhance safety, enhance facility life, and did not address lane balance and continuity. In addition, vibrant transit systems exist within the corridor and local agencies are pursuing opportunities to enhance the system independent of this study. Access to existing transit facilities and transit improvements identified by other studies or agencies have been integrated into the system alternatives, as appropriate.

2.3.2 Element Alternatives

Discrete pieces of the corridor, called elements, were initially considered and alternatives were developed for these elements. These elements included:

- I-25 mainline from the Broadway viaduct to US 6
- I-25 interchanges with Broadway, Santa Fe Drive, and Alameda Avenue
- US 6 interchanges with Bryant Street and Federal Boulevard
- 2nd / 3rd Avenue overpass of I-25
- Santa Fe Drive / Kalamath Street grade separation with the Consolidated Main Line railroad

2.3.3 Element Screening

Element alternatives were evaluated and screened through a two-step process, which is described in the following sections.

2.3.3.1 Initial Screening for Reasonableness / Practicability

In all, 81 element alternatives were developed, evaluated, and screened through this initial screening methodology. **Table 2-3** provides a summary of the screening results. A more detailed description of the screening process is provided in the *Initial Screening for Reasonableness/Practicability Technical Memorandum* (FHU, 2003a).

A single mainline alternative was advanced at this stage primarily because it best avoided the South Platte River and associated parklands. The 2nd/3rd Avenue overpass alternatives were completely eliminated from further consideration at this stage due to strong opposition from the neighborhoods and the City and County of Denver. The principal concern with these alternatives was with traffic diversion through the neighborhoods.

2.3.3.2 Compatibility Testing

The 23 element alternatives remaining after the initial screening were refined and analyzed and a second element screening (compatibility testing) was conducted. The Technical Working Group again assisted with the methodology and application of the second screening in selecting the 13 element alternatives that were advanced.

A summary of the screening results is provided in **Table 2-3**. Additional details about the second element screening can be found in the *Testing for Compatibility of Elements Technical Memorandum* (FHU, 2005a).

Table 2-3 Results of Element Screening

Element Alternative	Screening Results	Reason for Elimination
I-25 Mainline		
1: Hold Existing I-25 Centerline	Eliminated (Initial Screening)	Other alternatives affect either the South Platte River or the Consolidated Main Line. This affects both.
2: Hold Existing I-25 West Edge	**Advanced**	
3: Hold Existing I-25 East Edge	Eliminated (Initial Screening)	Many South Platte River and other park impacts.
4: Split along South Platte River	Eliminated (Initial Screening)	Many South Platte River and other park impacts. Greater risk to encounter contaminated soil.
5: Tri Level	Eliminated (Initial Screening)	Very difficult viaduct construction, thus greater capital and maintenance costs. Difficult to construct while maintaining existing traffic.
I-25 / Broadway Interchange		
1: Improved Loop	Eliminated (Initial Screening)	Right-of-way Impacts. Out-of-direction travel required. Poor pedestrian access to park-n-Ride along Ohio Avenue.
2: Directional Diamond	Eliminated (Initial Screening)	Right-of-way impacts. Does not improve signal spacing along Broadway.
3: Tight Diamond	**Advanced**	
4: Single-Point Urban Interchange	Eliminated (Initial Screening)	Not compatible with new viaduct construction.
5: Improved Loop with SB On-Ramp Grade Separated	Eliminated (Initial Screening)	NB Broadway to SB I-25 movement not provided. Right-of-way impacts. Alternative 8 has better tunnel location because it allows full movement interchange. Out-of-direction travel required for I-25 NB to SB Broadway movement.
6: Tight Diamond with SB On-Ramp Grade Separated	Eliminated (Initial Screening)	Alternative 8 has better tunnel location because it allows full movement interchange.
7: Partial Cloverleaf	Eliminated (Initial Screening)	Not compatible with local plans for Cherokee Redevelopment and RTD park-n-Ride operations.
8: Directional Diamond with SB On-Ramp Grade Separated	**Advanced**	
9: Tight Half Diamond	Eliminated (Initial Screening)	Does not provide full interstate access.
10: Improved Loop with the NB Off-Ramp and SB On-ramp Grade Separated	Eliminated (Initial Screening)	This alternative is similar to Alternative 5 with the addition of a NB I-25 to NB Lincoln Street tunnel. This tunnel investment did not provide additional operational benefit.
11: Tight Diamond with Improved Loop and Cherokee Street Integration	Eliminated (Compatibility Testing)	Maintains loop ramp and left-turn access to NB I-25 from SB Broadway, which is counter to driver expectation. Loop radius does not meet standards. Poor traffic operations at north ramp terminal.
12: Improved Loop with Minor Movements Eliminated	Eliminated (Initial Screening)	Does not provide full interstate access.
13: Tight Diamond, NB Lincoln Street as is	**Advanced**	

Table 2-3 Results of Element Screening *(Continued)*

Element Alternative	Screening Results	Reason for Elimination
I-25 / Santa Fe Drive Interchange		
1: Left Off / Right On	Eliminated (Initial Screening)	Impacts to parks.
2: Directional Major Movements	Eliminated (Initial Screening)	Impacts to Denver Radium Superfund Site and parks. Right-of-way impacts. Out-of-direction movements. Poor traffic operations at combined Santa Fe Drive/ Kalamath Street/ Alameda Avenue intersection.
3: NE Loop	Eliminated (Initial Screening)	Impacts to Denver Radium Superfund Site, wetlands and parks. Right-of-way impacts. Poor traffic operations at combined Santa Fe Drive/Kalamath Street/Alameda Avenue intersection.
4: Directional Movements With Southbound Santa Fe Drive extension on West side of South Platte River	Eliminated (Initial Screening)	Impacts to parks. Right-of-way impacts. Poor traffic operations at combined Santa Fe Drive/ Kalamath Street/ Alameda Avenue intersection.
5: Moved East, Local access to Alameda Avenue	Eliminated (Initial Screening)	Impacts to Denver Radium Superfund Site and parks. Right-of-way impacts. Out-of-direction movements. Poor traffic operations at combined Santa Fe Drive / Kalamath Street / Alameda Avenue intersection.
6: Divided with Left-Offs / Right-Ons	Eliminated (Initial Screening)	Impacts to Denver Radium Superfund Site and parks. Right-of-way impacts. Inconsistent with land use planning.
7, 8: Minimal Change	Eliminated (Compatibility Testing)	Out-of-direction movements. Difficult weaving on NB Santa Fe Drive.
9: Major Movements, Local Access to Alameda Avenue	Eliminated (Initial Screening)	Impacts to wetlands and South Platte River. Poor traffic operations at combined Santa Fe Drive/ Kalamath Street / Alameda Avenue intersection.
10: Realignment	Eliminated (Initial Screening)	Missing primary interchange movement. Out-of-direction movements.
11: Flyover	Eliminated (Initial Screening)	Missing primary interchange movement. Right-of-way impacts. Impacts to wetlands and parks. Poor traffic operations at combined Santa Fe Drive / Kalamath Street / Alameda Avenue intersection.
12: Half Diamond, Directional I-25	Eliminated (Compatibility Testing)	This alternative is comparable to Alternative 13 with poorer signal operations and additional right-of-way needs.
12A: Half Diamond, Direction I-25 Split	Eliminated (Initial Screening)	Split I-25 alternative was not advanced. Therefore, the interchanges developed for the split alternative were not advanced.
13: Half Single-Point Urban Interchange (SPUI), Directional I-25	**Advanced**	
13A: Half Single-Point Urban Interchange (SPUI), Directional I-25 Split	Eliminated (Initial Screening)	Split I-25 alternative was not advanced. Therefore, the interchanges developed for the split alternative were not advanced.
14: Kalamath Street Flyover, Directional I-25	Eliminated (Initial Screening)	Impacts to Denver Radium Superfund Site, wetlands, and parks. Right-of-way impacts. Out-of-direction movements.
15: Directional with Perpendicular Santa Fe Drive	Eliminated (Compatibility Testing)	Out-of-direction movements. Difficult weaving on NB Santa Fe Drive.

Table 2-3 Results of Element Screening (Continued)

Element Alternative	Screening Results	Reason for Elimination
I-25 / Santa Fe Drive Interchange (continued)		
16: Directional with SW Quadrant Loop	Eliminated (Initial Screening)	Impacts to South Platte River, wetlands, and parks. Does not provide all traffic movements. Substandard ramp design speed on loop.
17: Directional with Split Santa Fe Drive / Kalamath Street	Eliminated (Initial Screening)	More elaborate braiding of structures adds greater cost without additional benefit. Out-of-direction movements. Impacts to Denver Radium Superfund Site and wetlands. Not compatible with current Broadway viaduct construction.
18: Tri-level	Eliminated (Compatibility Testing)	Out-of-direction movements. Difficult weaving on NB Santa Fe Drive.
19: Full SPUI, I-25 Directional	**Advanced**	
20: Full Diamond, I-25 Directional	Eliminated (Compatibility Testing)	This alternative is comparable with Alternative 19 with poorer signal operations and additional Right-of-way needs.
I-25 /Alameda Avenue Interchange		
1: Half Diamond	Eliminated (Compatibility Testing)	The half diamond impacts existing Kalamath Street resulting in a consolidated at-grade intersection of Kalamath Street and Santa Fe Drive with Alameda Avenue. This intersection operates poorly. Alternative 12 is comparable to this one with a grade-separated intersection.
2: Centered Urban	Eliminated (Initial Screening)	High bridge cost.
3: East Side Urban	Eliminated (Initial Screening)	Difficult ramp geometry.
4: West Side Urban	**Advanced**	
5: West Side Urban, West of South Platte River	Eliminated (Initial Screening)	Impacts to wetlands. Extensive construction in South Platte River. High capital costs.
6: Diamond with Kalamath Street Hook Ramp	Eliminated (Initial Screening)	Poor traffic operations at Combined Santa Fe Drive/Kalamath Street/Alameda Avenue intersection. Right-of-way impacts. Non-typical ramp location.
7: Santa Fe Drive / Kalamath Street Connection with Kalamath Street Depressed	Eliminated (Initial Screening)	No direct access from I-25 to Alameda Avenue. Right-of-way impacts.
8: Urban with Split I-25	Eliminated (Initial Screening)	Impacts to wetlands, parks, and contaminated soils. Extensive construction in South Platte River. Impacts to bike / pedestrian mobility. Split I-25 alternative was not advanced. Therefore, the interchanges developed for the split alternative were not advanced.
9: Santa Fe Drive / Kalamath Street Connection with Kalamath Street Realignment	Eliminated (Initial Screening)	Impacts to wetlands and parks. Short weave distance from SB I-25 to EB Alameda Avenue. Impacts to business access.
10: Eliminate Alameda Avenue Interchange	Eliminated (Initial Screening)	Incompatible with local agency, community, and business access goals.
11: Half Diamond, Eliminate Left-on	Eliminated (Compatibility Testing)	This alternative is a variation of Alternative 1: eliminating the left turn onto NB I-25. This can be accommodated in the systems alternatives.
12: Half Diamond with Grade Separated Santa Fe Drive/Kalamath Street/Alameda Avenue	**Advanced**	

Table 2-3 Results of Element Screening (Continued)

Element Alternative	Screening Stage Eliminated	Reason for Elimination
US 6 / Bryant Street / Federal Boulevard		
1: Bryant Street relocated to Decatur Extension	**Advanced**	
2: Completed Diamond at Federal Boulevard, with Bryant Street Relocated to Decatur	Eliminated (Compatibility Testing)	Similar to Alternative 7.
3: Completed Diamond at Federal Boulevard with Bryant Street Extension to 8th Avenue.	Eliminated (Compatibility Testing)	Right-of-way impacts. The existing street network can accommodate the traffic due to Bryant Street interchange closure, so the added cost to extend 8th Avenue is not beneficial.
4: Offset Urban Interchange	Eliminated (Initial Screening)	Inconsistent with driver expectancy with ramp locations. High capital and maintenance costs.
5: SPUI at Federal Boulevard	**Advanced**	
6: Braided Ramps between Federal Boulevard and Bryant Street	Eliminated (Compatibility Testing)	Greater impacts to parks than Alternative 1 while accomplishing the same objectives.
7: Completed Diamond at Federal Boulevard with Ramp Connections to Bryant Street	**Advanced**	
8: SW Quadrant Loop Ramp at Federal Boulevard	Eliminated (Initial Screening)	Impacts to parks and adjacent "Focus Neighborhood." These neighborhoods are generally low-income areas identified by Denver as requiring investments in specific areas such as transportation, parks or security.
9: CD Road, Direct access to Bryant Street from SB I-25	Eliminated (Compatibility Testing)	Right-of-way impacts. High capital costs.
10: CD Road, Direct access to Bryant Street from WB US 6	Eliminated (Compatibility Testing)	Right-of-way impacts. High capital costs.
Santa Fe Drive / Kalamath Street Grade Separation		
1: Underpass on Existing Alignments	**Advanced**	
2: Overpass on Existing Alignments	Eliminated (Initial Screening)	Overpass is unacceptably visually intrusive and costly when considering greater clearance over the railroad then under it.
3: Underpass, Combined Roadway	Eliminated (Initial Screening)	Right-of-way impacts. Difficult bridge construction. Combined Santa Fe Drive / Kalamath Street on this alignment would require a grade-separated Santa Fe Drive/ Kalamath Street / Alameda Avenue to avoid poor operations.
3A: Overpass, Combined Roadway	Eliminated (Initial Screening)	Overpass is unacceptably visually intrusive and costly when considering greater clearance over the railroad then under it. Combined Santa Fe Drive/ Kalamath Street on this alignment would require a grade-separated Santa Fe Drive / Kalamath Street / Alameda Avenue to avoid poor operations.
4: Underpass, Combined adjacent to Santa Fe Drive	Eliminated (Initial Screening)	Similar to Alternative 6; returning to existing Santa Fe Drive / Kalamath Street further south. This variation can be accommodated in the systems alternatives.
4A: Overpass, Combined adjacent to Santa Fe Drive	Eliminated (Initial Screening)	Overpass is unacceptably visually intrusive and costly when considering greater clearance over the railroad then under it. Right-of-way and business impacts.
5: Lower Railroad	Eliminated (Initial Screening)	Major and long reaching constructability issues and high capital cost.

Table 2-3 Results of Element Screening (Continued)

Element Alternative	Screening Stage Eliminated	Reason for Elimination
Santa Fe Drive / Kalamath Street Grade Separation (continued)		
6: Underpass, Combined adjacent to Santa Fe Drive	**Advanced**	
6A: Overpass, Combined adjacent to Santa Fe Drive	Eliminated (Initial Screening)	Overpass is unacceptably visually intrusive and costly when considering greater clearance over the railroad then under it. Business access difficult.
7: Combine Roadway and Lower Railroad	Eliminated (Initial Screening)	Overpass is unacceptably visually intrusive and costly when considering greater clearance over the railroad then under it. Limits I-25 expansion potential. Combined Santa Fe Drive/ Street on this alignment would require a grade-separated Santa Fe Drive / Kalamath Street/Alameda Avenue to avoid poor operations.
8: Overpass, Combined Roadway until LRT	Eliminated (Initial Screening)	Overpass is unacceptably visually intrusive and costly when considering greater clearance over the railroad then under it. Combined Santa Fe Drive/ Kalamath Street on this alignment would require a grade-separated Santa Fe Drive / Kalamath Street / Alameda Avenue to avoid poor operations. Right-of-way impacts.
9: Underpass, Combined Roadway until Ellsworth Boulevard	Eliminated (Initial Screening)	Poor traffic operations at Combined Santa Fe Drive/ Kalamath Street / Alameda Avenue intersection. Right-of-way impacts.
9A: Overpass, Combined Roadway until Ellsworth Boulevard	Eliminated (Initial Screening)	Overpass is unacceptably visually intrusive and costly when considering greater clearance over the railroad then under it. Combined Santa Fe Drive / Kalamath Street on this alignment would require a grade-separated Santa Fe Drive / Kalamath Street / Alameda Avenue to avoid poor operations. Right-of-way impacts.
10: Underpass, Combined Roadway	Eliminated (Initial Screening)	Right-of-way impacts.
10A: Overpass, Combined Roadway	Eliminated (Initial Screening)	Overpass is unacceptably visually intrusive and costly when considering greater clearance over the railroad then under it. Right-of-way impacts.
11: Realign Railroad	Eliminated (Initial Screening)	Overpass is unacceptably visually intrusive and costly when considering greater clearance over the railroad then under it. Railroad relocation limits I-25 expansion. Precludes alternatives at Santa Fe Drive and Alameda Avenue. High capital costs.
12: Underpass, Combined adjacent to Kalamath Street	Eliminated (Compatibility Testing)	Similar to Alternative 6 except for the location of the combined Santa Fe Drive / Kalamath Street roadway. This difference can be accommodated in the systems alternatives.
13: Underpass, Combined adjacent to LRT	Eliminated (Initial Screening)	Right-of-way impacts.
13A: Overpass, Combined adjacent to LRT	Eliminated (Initial Screening)	Overpass is unacceptably visually intrusive and costly when considering greater clearance over the railroad then under it. Right-of-way impacts.
14: Underpass, realign Santa Fe Drive adjacent to LRT.	Eliminated (Initial Screening)	Right-of-way impacts. Santa Fe Drive/ Alameda Avenue intersection has difficult geometry.

Notes:
CD – collector/distributor
EB – eastbound
NB – northbound
SB – southbound
SPUI – single-point urban interchange
WB – westbound

2.3.4 System Alternatives

The 13 element alternatives advanced following compatibility testing were combined into system alternatives. A system alternative is one that includes improvements for the entire corridor. These system alternatives were packaged to achieve specific goals and offer a reasonable range of choices to be analyzed and evaluated in the Draft EIS. **Table 2-4** summarizes the system alternatives initially considered.

Table 2-4 System Alternatives Initially Considered

System Alternative	Description / Goal
No Action Alternative	Includes short-term minor restoration types of activities (e.g., safety and maintenance improvements) that maintain continuing operation of the existing roadway.
System Alternative 1: Maximize Use of Existing Right-of-Way	Utilizes the existing right-of-way to its fullest extent.
System Alternative 2: Maximize Operational Performance / Safety	Includes elements focused on providing enhanced operational and safety benefits.
System Alternative 3: Maximize Implementation Flexibility	Best meets fiscal limitations and the anticipated funding stream. Considerations included relative construction and maintenance costs, ability to construct the elements of the interchanges while maintaining traffic operations, and the opportunity to phase the construction with sensitivity to available funding.
System Alternative 4: Maximize Facilitation of Local Objectives	Combination of roadway improvements that attempt to enhance the local street systems operations as well as best meet local land use and community value goals. This alternative was developed with input of the City and County of Denver, RTD, and the public through citizen workshops and public meetings.

The 13 element alternatives that were advanced for system combinations include:

- I-25 Mainline Alternative 2
- I-25/Broadway Alternatives 3, 8, and 13
- I-25/Santa Fe Drive Alternatives 13 and 19
- I-25/Alameda Avenue Alternatives 4 and 12
- US 6/Bryant Street /Federal Boulevard Alternatives 1, 5, and 7
- Santa Fe Drive/Kalamath Street Grade Separation Alternatives 1 and 6

Table 2-5 shows how the 13 advanced element alternatives were packaged into the four system alternatives based on the goal of the alternative. All of the advanced element alternatives were utilized in the four system alternatives.

Table 2-5 Element Alternatives Packaged into System Alternatives

Element	System Alternative 1	System Alternative 2	System Alternative 3	System Alternative 4
I-25 Mainline Alternative	2	2	2	2
I-25 Broadway Alternative	13	8	13	3
I-25 Santa Fe Drive Alternative	13	19	13	19
I-25 Alameda Avenue Alternative	4	12	4	4
US 6 /Bryant Street / Federal Boulevard Alternative	1	7	7	5
Santa Fe Drive / Kalamath Street Grade Separation Alternative	1	1	1	6

2.3.5 System Screening

A screening of the system alternatives was conducted to refine the system alternatives and identify the alternatives that were appropriate to advance for full evaluation in the Draft EIS.

On further evaluation, Systems 1 and 3 combined similar element choices and, therefore, were very comparable. The only difference in the two alternatives was in the choice made at US 6 / Bryant Street/ Federal Boulevard. When compared to other systems, there was a redundancy of the US 6/Bryant Street/Federal Boulevard element alternatives ensuring that all would be evaluated in the Draft EIS. Therefore, System Alternative 3 was combined with System Alternative 1.

Results of the system screening process are shown in **Table 2-6**.

Table 2-6 Results of System Screening

Name	Description	Advanced?
No Action	Minor Restoration to Existing Facilities	Yes
System Alternative 1	Maximize Use of Existing Right-of-Way	Yes
System Alternative 2	Maximize Operational Performance / Safety	Yes
System Alternative 3	Maximize Implementation Flexibility	No (Combined with System Alternative 1)
System Alternative 4	Maximize Facilitation of Local Objectives	Yes (Renumbered to System Alternative 3)

2.3.6 Value Engineering Analysis and Screening

A value engineering study was conducted in January of 2004. Value engineering analysis identifies the high cost areas of a project during the early design stages. The value engineering study then explores less expensive alternative designs that could be incorporated into the final design drawings and specifications without incurring large costs for redesign or major project delay. These value engineering proposals are evaluated with technical and economic analyses.

This analysis generated sixteen proposals and eleven supplemental recommendations as a result of brainstorming nearly 180 ideas. These proposals and recommendations were presented to a Review Board comprised of FHWA, CDOT, City and County of Denver, and RTD representatives. The reviewers decided upon the status of the value engineering proposals in one of four ways:

1. Accept the proposed alternative as it stands
2. Accept the proposed alternative with modifications
3. Decline the proposed alternative altogether
4. Table the proposed alternative for further study or information gathering

The full list of proposals and their disposition are documented in the *Final Report - Value Engineering* (Solutions Engineering, 2004).

The EIS team further evaluated the proposals and recommendations, and screened out the alternative designs or advanced them into the EIS. A summary of this screening follows in **Table 2-7.**

Table 2-7 Value Engineering Proposals and Recommendations

Proposal No.	Value Engineering Proposal Description	Review Board Comments	EIS Screening Results
Proposals Advanced from Value Engineering Study			
P01-049	Modify tunnel alignment for the proposed Broadway tunnel from SB Broadway to SB I-25 and construct it by the cut and cover method instead of the mined tunnel method, using tangent piles with a concrete box structure.	TABLE To be included in the EIS evaluation.	ADVANCED This alternative is an acceptable alternative to tunneling in System Alternative 2 and should be considered further during preliminary engineering.
P06-010	Use a triple left-turn from SB Broadway to SB I-25 instead of the proposed 2-lane tunnel.	TABLE • To be included in the EIS (this could be considered as an interim solution until funding becomes available) • The merge taper problem needs to be resolved • A pedestrian conflict problem needs to be resolved • There may be a redevelopment incompatibility issue that needs to be resolved	ELIMINATED This alternative was screened for the following reasons: • Width of road is inconsistent with local planning and pedestrian mobility goals. • Merge from three lanes to two lanes on the collector-distributor road is too abrupt.
P01-019	Provide braided ramps for EB US 6 to I-25 and Federal Boulevard to EB US 6 movements to improve the weave in this segment.	ACCEPT WITH MODIFICATION The EIS Project Team will analyze this proposal further to see if it can indeed fit.	ADVANCED System Alternative 2 was revised to reflect the addition of this braided ramp.
P01-016	Shift the mainline alignment of US 6 north of the existing between Federal Boulevard and I-25 to facilitate the construction of the pavement infrastructure and the bridges over I-25 and the South Platte River.	ACCEPT WITH MODIFICATION The alignment shown in the proposal is unacceptable because of wasted land but the idea of shifting the alignment to facilitate construction is viable.	ADVANCED Realignment of US 6 was evaluated during the EIS for constructability and to minimize impacts to parks and is discussed in **Chapter 4** *Environmental Consequences*

Table 2-7 Value Engineering Proposals and Recommendations (continued)

Proposal No	Value Engineering Proposal Description	Review Board Comments	EIS Screening Results
Supplemental Recommendations Advanced from Value Engineering Study			
SR01-003	Rewrite the purpose and need to describe the goals to be achieved rather than the proposed action.	ACCEPT FHWA will do this.	ADVANCED The purpose and need was edited.
SR01-008	Relocate I-25 400 feet to the east to improve the construction phasing of the project.	ACCEPT WITH MODIFICATION The gist of this idea is to examine constructability issues. CDOT will be doing this as part of the EIS.	ADVANCED Constructability of the alternatives has been evaluated in the EIS and is discussed in **Chapter 4** *Environmental Consequences.*
SR01-015	Consider the Highest and Best Use of adjacent properties when considering alternatives.	ACCEPT This recommendation is currently being pursued by City and County of Denver.	ADVANCED Land reuse has been evaluated in the EIS and is discussed in **Chapter 4** *Environmental Consequences.*
SR01-025	The EIS should address the construction phasing of improvements.	ACCEPT See Proposal P01-016, P06-010, and Supplemental Recommendation SR01-008 above.	ADVANCED Constructability of the alternatives has been evaluated in the EIS and is discussed in **Chapter 4** *Environmental Consequences.*
SR01-030	Identify a fourth "system" alternative that emphasizes minimization/avoidance of environmental impacts.	ACCEPT The EIS is in the process of identifying this alternative.	ADVANCED This will be considered in establishing a preferred alternative.
SR01-031	Consider relocating or replacing Section 4(f) properties to optimize the preferred alternative.	ACCEPT See Supplemental Recommendation SR01-015 above.	ADVANCED This will be considered in establishing a preferred alternative.

2.4 System Alternatives Considered in Detail

The following system alternatives were identified for detailed consideration in the Draft EIS, based on the alternatives development and screening process described in **Section 2.3**:

- No Action Alternative (**Figure 2-2**)
- System Alternative 1 – Maximize Use of Existing Right of Way (**Figure 2-3**)
- System Alternative 2 – Maximize Operational Performance / Safety (**Figure 2-4**)
- System Alternative 3 – Maximize Facilitation of Local Objectives (**Figure 2-5**)

Alternatives described in this section were developed to a conceptual level of detail only. Specific detail may change during the design process. After the Draft EIS was made available for public and agency review, a selection process was undertaken to recommend a preferred alternative. The preferred alternative identified through this process consists of various parts of the three system alternatives as described in **Section 2.6** *Preferred Alternative.*

CDOT and FHWA are also considering a phased implementation of the preferred alternative to complement anticipated funding. Impacts associated with the phased implementation are described in **Chapter 7** *Phased Project Implementation*.

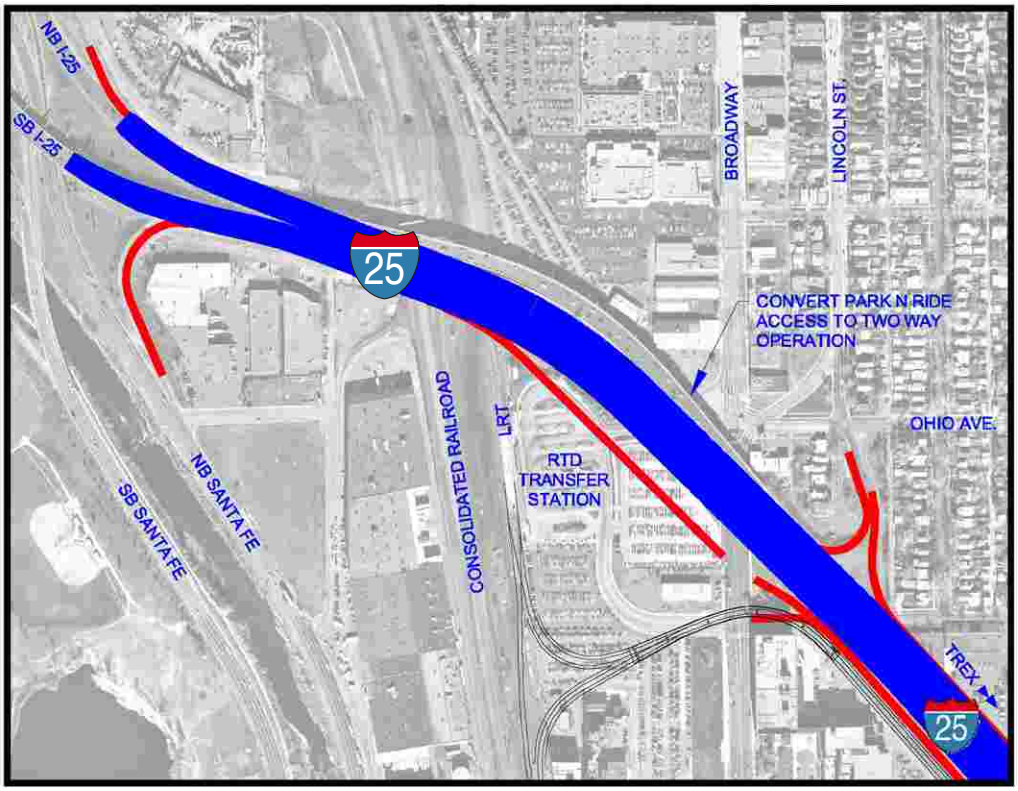
The three system alternatives and the No Action Alternative evaluated in the Draft EIS are described below and further evaluated in **Chapter 3** *Transportation Analysis* and **Chapter 4** *Environmental Consequences*. The system alternatives are presented in greater detail in *Concept Plan for the Valley Highway EIS* (FHU 2005b).

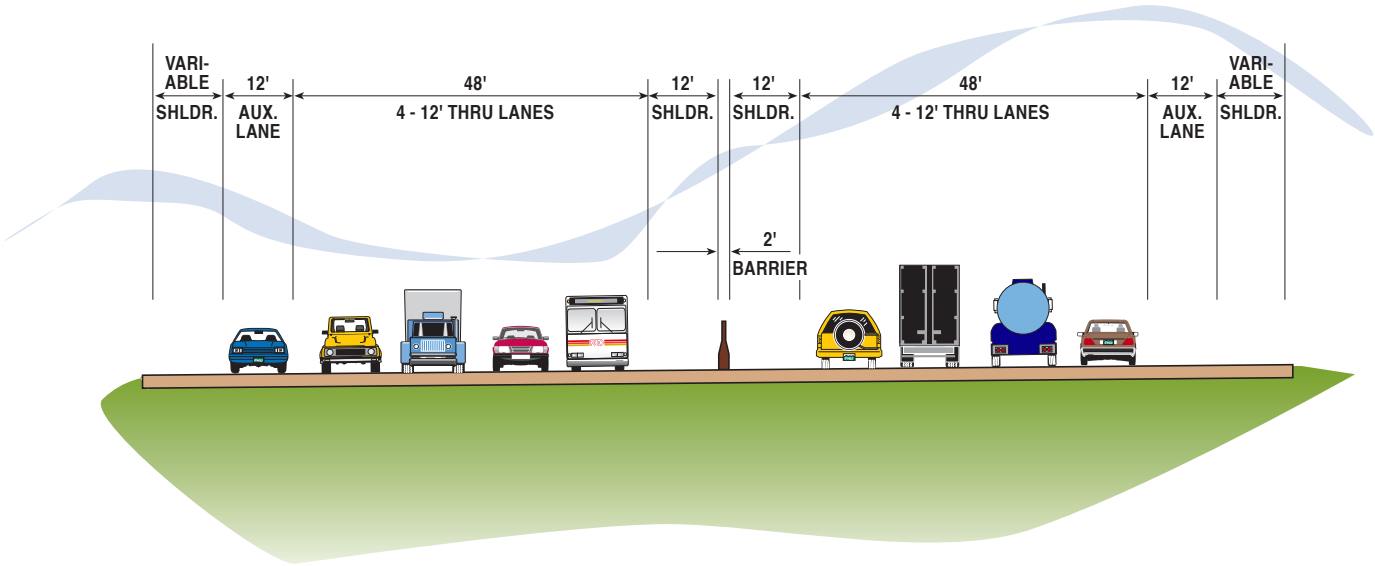
2.4.1 No Action Alternative

The No Action Alternative includes only those projects that have committed funds for improvements. These improvements would be made whether or not any other improvements are made to the Valley Highway corridor. This alternative is fully assessed as an alternative and is used as a baseline comparison for environmental analysis purposes. Committed projects included in the No Action Alternative are:

- T-REX - Completion of the T-REX highway and light rail transit improvements on I-25 from Broadway south and on I-225 from I-25 to Parker Road
- Broadway Viaduct Reconstruction - Reconstruction of the I-25 viaduct structures over Broadway and the Consolidated Main Line railroad tracks
- Transportation Management elements

Figure 2-2 shows the No Action Alternative. The No Action Alternative would not address the purpose and need for the proposed action but is being carried through the analysis in accordance with NEPA requirements.





No Action Alternative

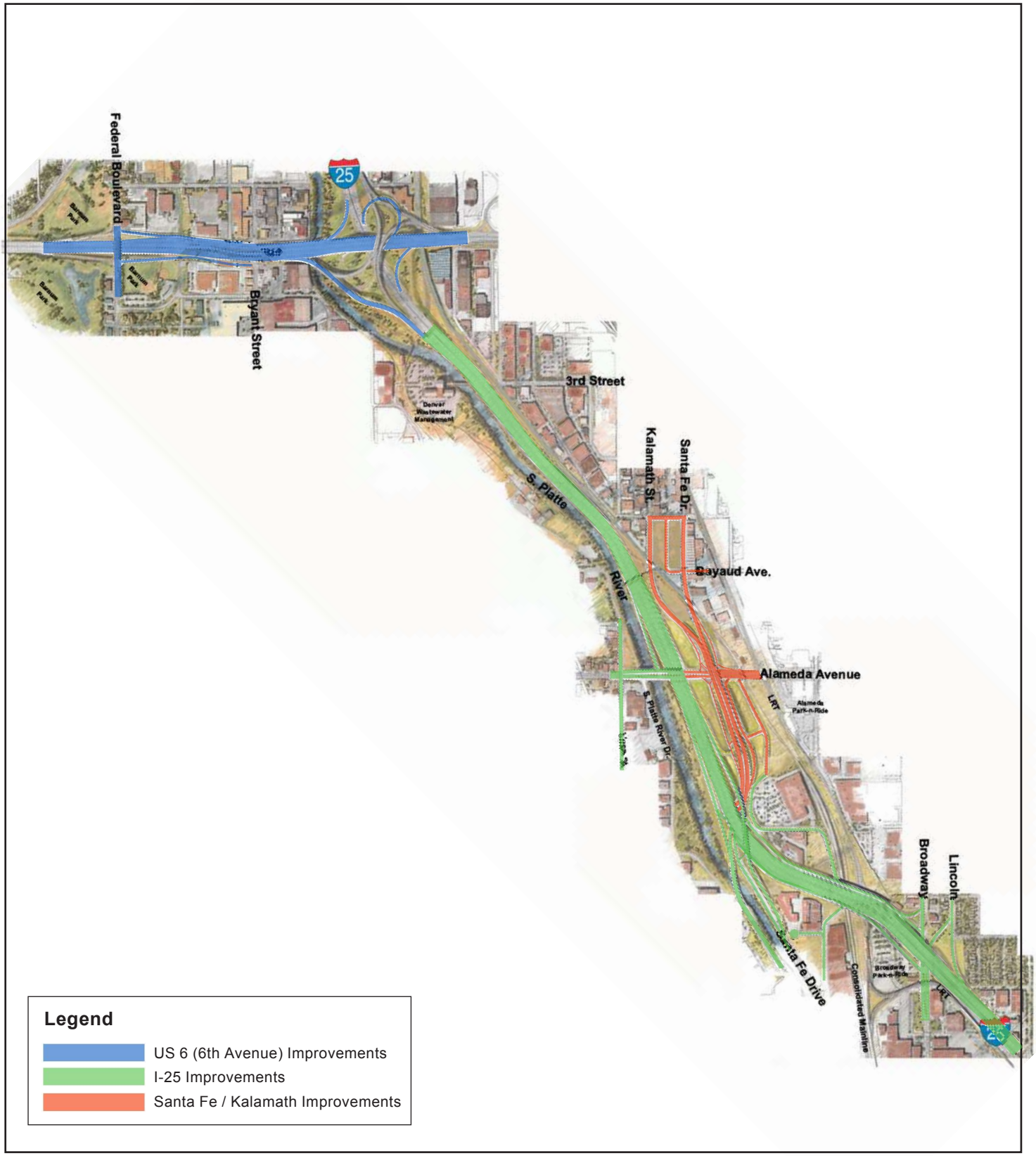
Figure 2-2

North

System Alternative 1
Maximize Use of Existing Right-of-Way

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 2-3

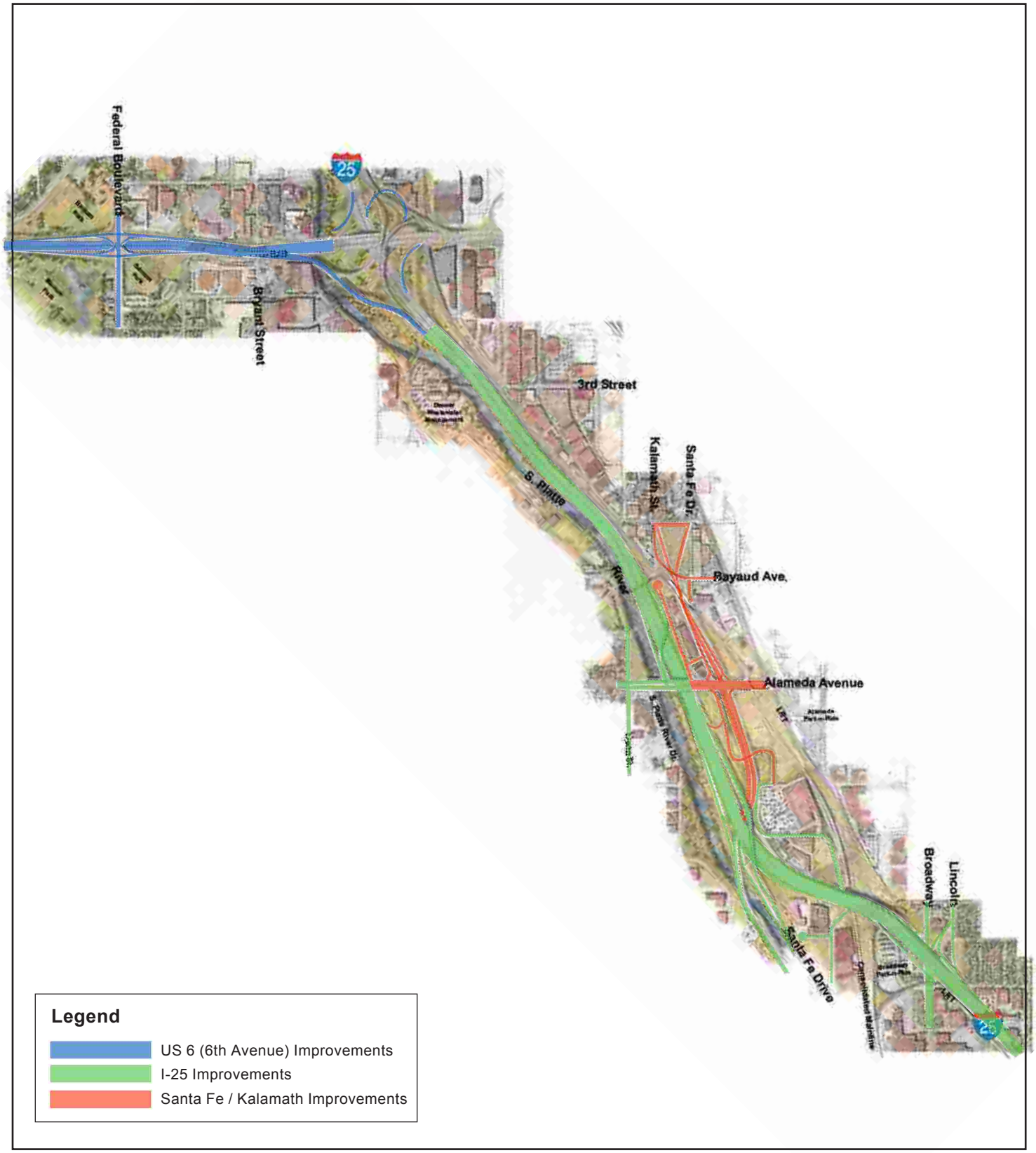


North

System Alternative 2
Maximize Operational Performance / Safety

Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Figure 2-4



North

System Alternative 3
Maximize Facilitation of Local Objectives

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 2-5

2.4.2 Elements Common to the System Alternatives

The three system alternatives share elements that are consistent in all three. **Table 2-8** summaries these common elements while this section describes them in greater detail.

Table 2-8 Elements Common to System Alternatives

Element	Common Features
I-25 Mainline	• Roadway alignment • Wider (12-feet) shoulders on left and right side • Additional lane in each direction between Logan Street and Santa Fe Drive • Continuous auxiliary lane northbound from Santa Fe Drive to US 6 • Water quality enhancements using ponds and controlled outlets • Continuous auxiliary lane southbound from US 6 to Santa Fe Drive
US 6	• Improved vertical profile • Replacement of US 6 bridge over the South Platte River and over I-25, and the Federal Boulevard bridge over US 6 and Lowell. • Replacement of the US 6 bridge over the South Platte River and Bayaud Avenue
Broadway Interchange	• Northside ramps
Santa Fe Drive Interchange	• Northbound Santa Fe to northbound I-25 flyover ramp • Southbound I-25 to southbound Santa Fe Drive ramp • South side ramps
Alameda Avenue Interchange	• Southbound I-25 off-ramp • Intersections at Alameda Avenue / Lipan Street and Alameda Avenue / South Platte River Drive • South Platte River Drive realignment
US 6 and I-25 Interchange	• Ramps in all four quadrants of the interchange
Arterial Streets	• Typical roadway sections for Broadway / Lincoln Street, US 85 / Santa Fe Drive, Alameda Avenue, and Federal Boulevard
Transportation Management	• Intelligent transportation system management measures on I-25, US 6 and arterial streets • Maintenance of bus access to transit stations • Intersection improvements
Pedestrian and Bicycle Facilities	• Enhancements to the South Platte River Trail from Alameda Avenue north • Improved connectivity to the Broadway park-n-Ride • North-south connectivity between the Alameda Avenue park-n-Ride and the Broadway park-n-Ride • Improved facilities along Alameda Avenue • Improved facilities along Santa Fe Drive from Alameda Avenue to south of I-25 • Pedestrian / bicycle structure crossing along Bayaud Avenue

2.4.2.1 I-25 MAINLINE

Alignment

The three system alternatives would include the same I-25 alignment, generally following the current highway alignment. I-25 would match the new Broadway viaduct at its northern edge, split the middle of the two existing bridges at Santa Fe Drive, and offset to the east north of Alameda Avenue. North of Alameda Avenue, the Consolidated Main Line railroad tracks would be realigned to the east possibly up to 65 feet. The Consolidated Main Line is the section of track through Denver on which the Burlington Northern and Santa Fe Railroad and Union Pacific Railroad share operations.

This alignment would provide the following benefits:

- Matches the Broadway viaduct and T-REX currently in construction
- Facilitates reconstruction and widening of I-25 in and around the Santa Fe Drive interchange
- Avoids the South Platte River north of Alameda Avenue by holding the western edge of the existing mainline and expanding to the east
- Preserves or upgrades the South Platte River trail that is adjacent to the river and/or the highway (see **Figure 2-6**).

Typical Section

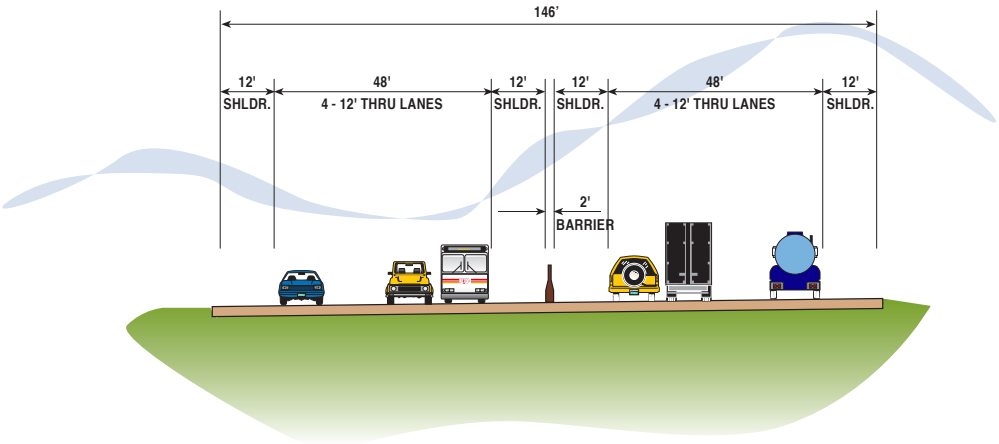
One additional highway lane in each direction would be added to I-25 between Broadway and Santa Fe Drive and one additional lane would be provided northbound between Santa Fe Drive and US 6.

The existing auxiliary lane between US 6 and Alameda Avenue on southbound I-25 will be extended to Santa Fe Drive with all alternatives. Wider (12-feet) inside and outside shoulders would be provided. This would provide the following benefits:

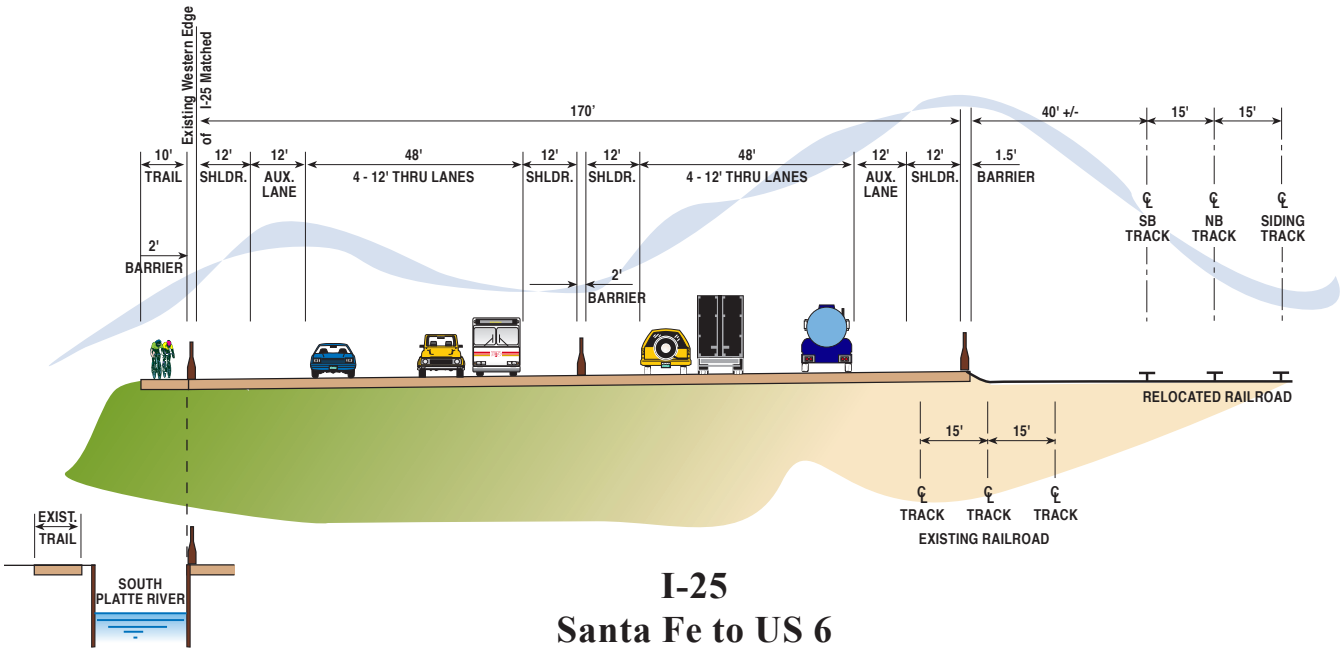
- Alleviates the bottleneck of three lanes in each direction between Broadway and Santa Fe Drive created once T-REX is complete
- Addresses the lane balance issue between Santa Fe Drive and US 6
- Provides a safety zone for stranded motorists
- Offers space for emergency vehicles and incident management needs

Typical sections of the new roadway are provided in **Figure 2-6**.

Water quality improvements would be part of each of the system alternatives, which include collection of roadway rainfall runoff in storm sewer pipes directed to water quality ponds before discharge into the South Platte River. See **Section 4.9** for more information.



I-25
Broadway to Santa Fe



I-25
Santa Fe to US 6

I-25 Common Sections

Figure 2-6

2.4.2.2 US 6

The vertical profile for US 6 would be modified in all system alternatives to provide a larger opening over the South Platte River. This would provide for improved river hydrology and offer an additional benefit to South Platte River Trail users. Bridges would be replaced/constructed in all alternatives at I-25 and the South Platte River, Bayaud Avenue (new pedestrian/bicycle bridges), Federal Boulevard and Lowell Boulevard.

2.4.2.3 BROADWAY INTERCHANGE

The north-side ramp connections (from/to the north) would be the same in each alternative (see **Figure 2-7**). This would replace the substandard, and difficult to find, current loop ramp in the northeast quadrant.

Bus entrance access to the I-25 and Broadway RTD park-n-Ride would be preserved with all alternatives but would be complicated by the new ramp in the northeast quadrant. Traffic signal timing and bus preemption may be necessary to preserves operational goals.

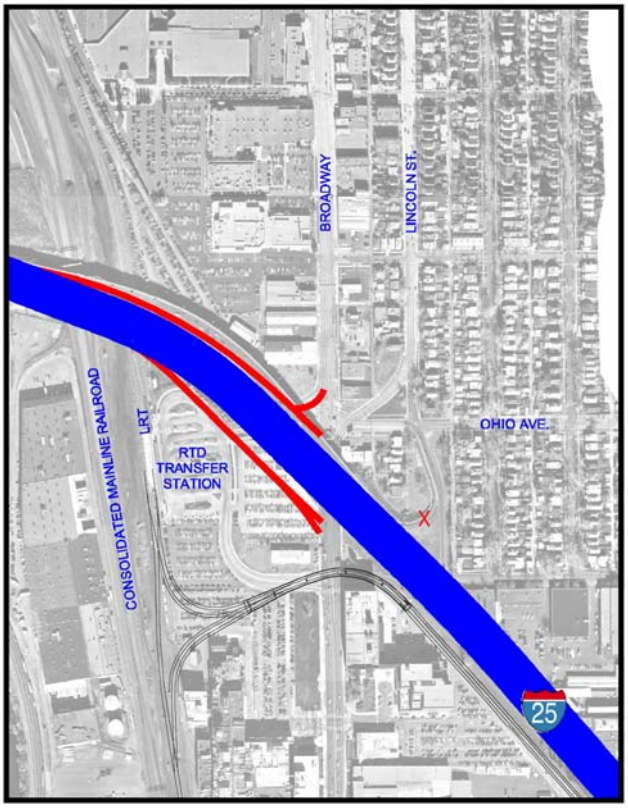


Figure 2-7 Common Elements at Broadway

2.4.2.4 SANTA FE DRIVE INTERCHANGE

The northbound Santa Fe Drive to northbound I-25 ramp would be constructed as a two-lane wide directional flyover ramp merging on the right side of I-25 (see **Figure 2-8**). This would achieve a current standard to have slow speed ramp traffic merge on the right side of the highway. The return move, southbound I-25 to southbound Santa Fe Drive, would also be two lanes wide.

The south-side ramp connections (from/to the south) would be constructed as a partial single-point urban interchange. This would replace the current southbound left side on-ramp with a right side on-ramp, in accordance with current standards. This would provide a more compact interchange design with a single signalized intersection.

Access to commercial properties east of the highway will be via a consolidated connection generally located midway between I-25 and Alameda Avenue. Variations on this access are discussed in **Section 2.4.3** *Differentiating Elements of the System Alternatives*.

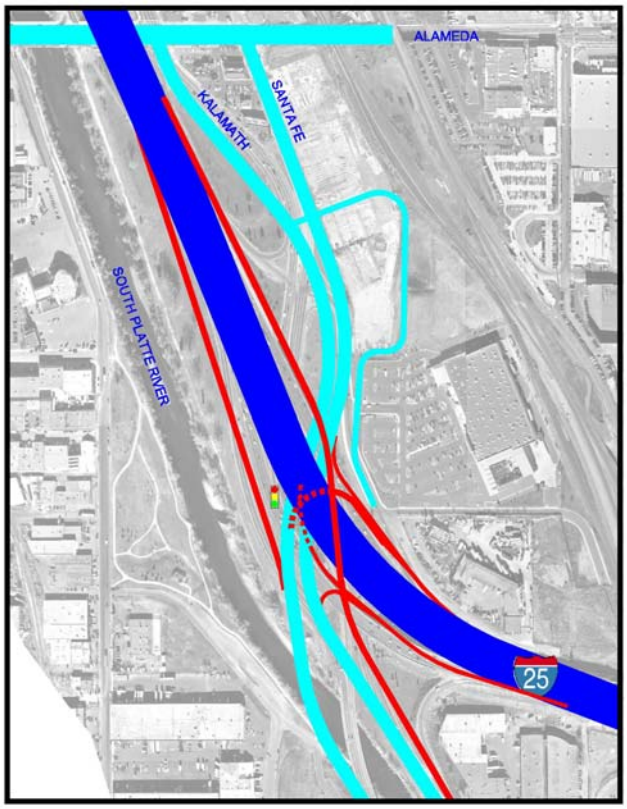


Figure 2-8 Common Elements at Santa Fe Drive

2.4.2.5 ALAMEDA AVENUE INTERCHANGE

The southbound off-ramp to Alameda Avenue would be the same in all alternatives. This is similar to how it operates today (see **Figure 2-9**).

The intersections of Alameda Avenue/Platte River Drive and Alameda Avenue/Lipan Street would be similarly reconfigured in all system alternatives. The intersection of Alameda Avenue and South Platte River Drive would be converted to right-in/right-out on the south side of Alameda. On the north side of Alameda Avenue, South Platte River Drive would be realigned to follow Lipan Street. This would result in construction of a wider road north of Alameda Avenue, improvements to the intersection and traffic signal at Lipan Street and Alameda Avenue, and enhancements to Lipan Street and Virginia Avenue south of Alameda Avenue.

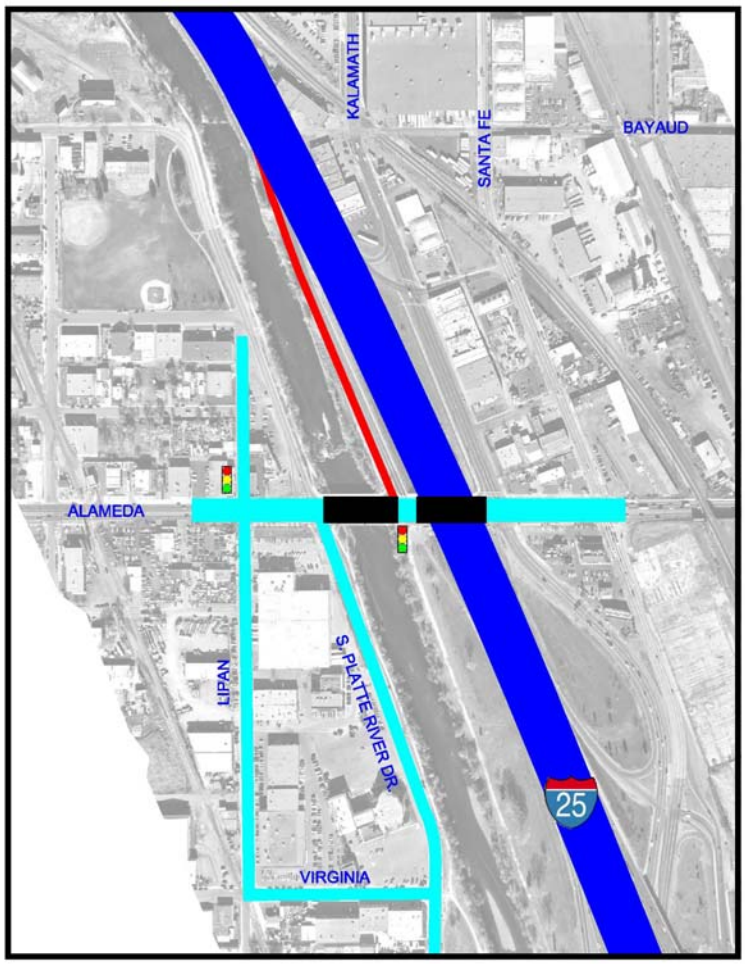


Figure 2-9 Common Elements at Alameda Avenue

2.4.2.6 US 6 AND I-25 INTERCHANGE

The southeast quadrant ramp would be reconfigured to provide a uniform radius to improve safety and operational speeds (see **Figure 2-10**). The loop ramp in the northeast quadrant would be enlarged and a second lane would be provided to accommodate traffic needs and provide for improved operational speeds. Both of these ramps would be accessed by a collector-distributor road. The collector-distributor road would allow for ramp deceleration and turning to occur without impacting the mainline highway.

The northwest quadrant would be reconfigured to provide a second lane to accommodate the traffic needs. The southwest quadrant ramp would include extending an additional lane to the south of the ramp's connection with I-25 (as represented by a dashed line on **Figure 2-10)** to better manage the merging of traffic from east and westbound US 6 to southbound I-25.

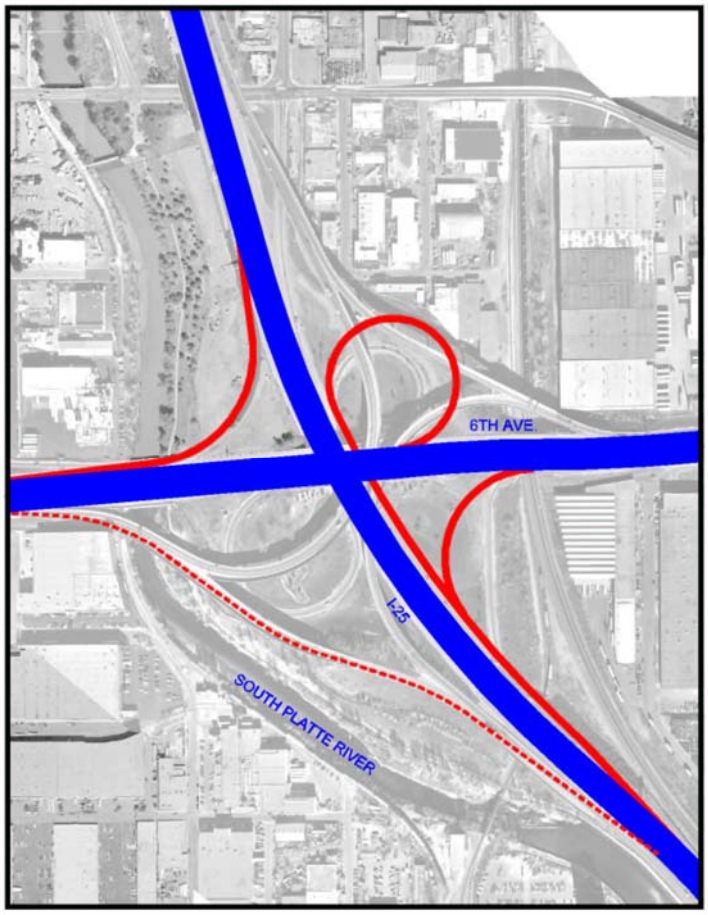
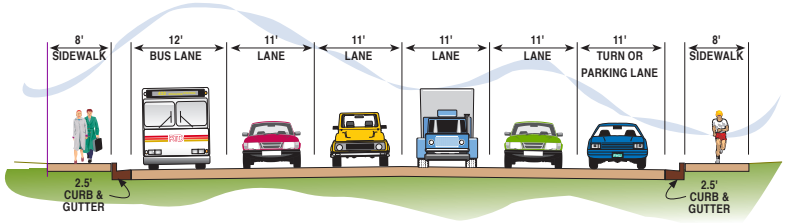


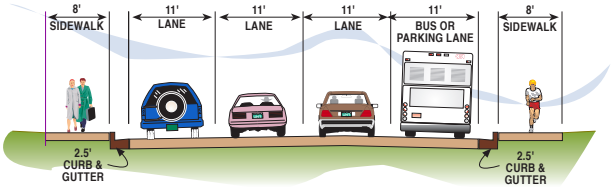
Figure 2-10 Common Elements at US 6 / I-25

2.4.2.7 ARTERIAL STREETS

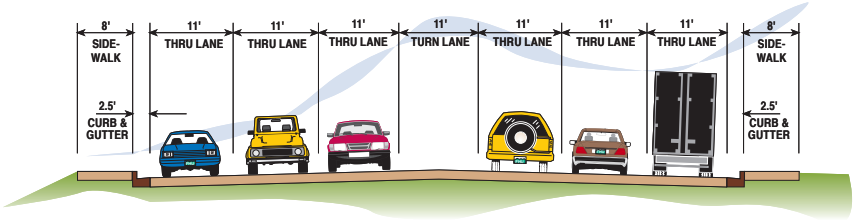
Figure 2-11 illustrates some common typical sections that would be provided for arterial streets in the project corridor.



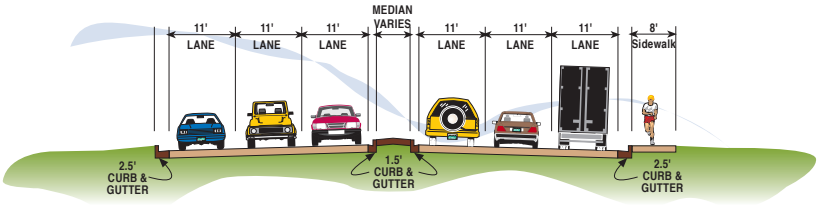
BROADWAY SECTION



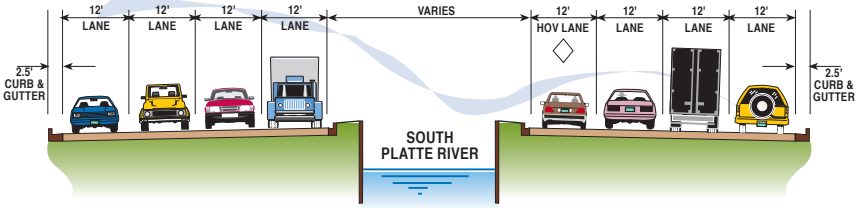
LINCOLN SECTION



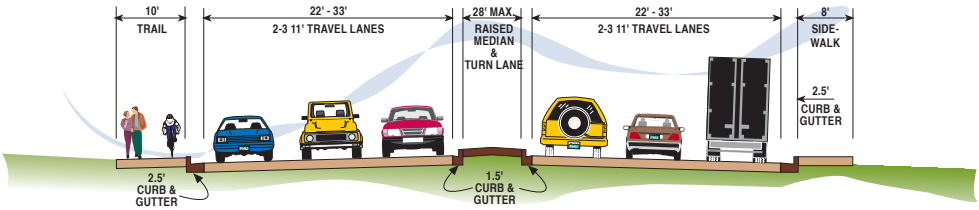
BROADWAY SOUTH OF I-25
TENNESSEE TO I-25



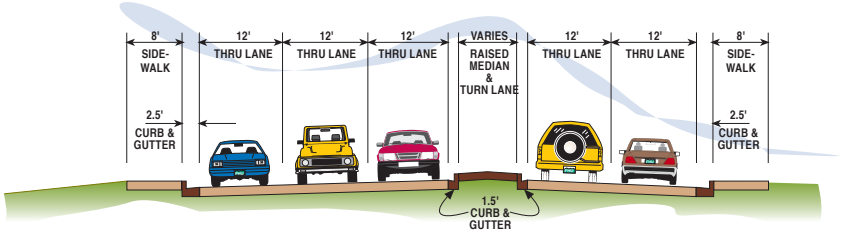
US 85 / SANTA FE SECTION
NORTH OF I-25



US 85 / SANTA FE SECTION
SOUTH OF I-25



ALAMEDA SECTION



FEDERAL SECTION

Arterial Streets Common Sections with System Build Alternatives

Figure 2-11

2.4.2.8 TRANSPORTATION MANAGEMENT

The following elements of the Transportation Management Alternative (see **Section 2.3.1.1**) would be incorporated in each of the system alternatives:

- ITS management measures on I-25 and US6 freeway sections in conjunction with regional ITS programs, including network surveillance, ramp metering, traffic dissemination, and incident management measures
- ITS management measures on study area arterial streets, in conjunction with Denver, DRCOG and CDOT programs, including signal system improvements, network surveillance, traffic information dissemination, and railroad grade crossing improvements
- Maintenance of efficient bus access to the I-25 and Broadway Transit Station
- Spot intersection improvements at intersections that are directly related to I-25 and US 6 corridor improvements, including I-25 / Broadway, I-25 / Santa Fe Drive, I-25 / Alameda Avenue, US 6 / Bryant Street, and US 6 / Federal Boulevard ramp terminal intersections; and Alameda Avenue / Santa Fe Drive, Alameda Avenue / Kalamath Street, Alameda Avenue / South Platte River Drive and Alameda Avenue / Lipan Street intersections

2.4.2.9 PEDESTRIAN AND BICYCLE FACILITIES

Pedestrian and bicycle mobility within the corridor was identified as a project need. The City and County of Denver has previously identified key corridors for pedestrian and bicycle mobility and adopted standards for these facilities. These are formalized in the *Draft City and County of Denver Pedestrian Master Plan* (CCD, 2002b) and the *Denver Bicycle Master Plan Update 2001*(CCD, 2002a). Key components of the plan applicable to this corridor are as follows:

South Platte River Trail

The South Platte River Trail is a vibrant regional trail that offers both commuter and recreational bicycle and pedestrian mobility north and south through the metropolitan area. The trail starts at Chatfield Reservoir in Douglas County in the southern metropolitan Denver area and parallels the South Platte River through the City of Denver. Through the project corridor, it is generally follows the South Platte River with connections to local streets at Mississippi and Alameda Avenue. The trail is a major destination for residents from adjacent neighborhoods east and west of the highway.

Common improvements to the trail associated with this project would include:

- Enhanced connectivity to the trail at Alameda Avenue
- Upgraded trail section parallel to I-25 between 2nd and 3rd Avenue to include widening and shoulder enhancements and screening to shield the trail from I-25
- Improved horizontal and vertical clearance at the US 6 underpass
- Improved horizontal and vertical clearance at the Santa Fe Drive bridge over the South Platte River south of I-25

East-West Connectivity

Two principal east-west bicycle/pedestrian corridors were identified for enhancement within the project corridor – along Ohio Avenue at Broadway and along Alameda Avenue. Ohio Avenue is designated as a neighborhood bike and pedestrian route providing access to the Broadway retail district and the transit station at the I-25 and Broadway park-n-Ride. Alameda Avenue is the only east-west crossing of I-25 that offers bicycle/pedestrians accommodations within the project corridor.

Common improvements to bicycle/pedestrian facilities along Broadway associated with the project would include:

- Bicycle and pedestrian movements would be improved with wider sidewalks and signals along Ohio Avenue, Lincoln Street, and Broadway. The alignments would be slightly different and are discussed further in the specific alternatives.
- Pedestrian overpasses and underpasses were considered by the Citizen Working Group but eliminated from further consideration because of the out-of-direction travel required, the visual obtrusiveness of the structures, and potential security risks.

Common improvements to bicycle/pedestrian facilities along Alameda Avenue associated with the project would include:

- Eight-foot (8-ft) attached sidewalks would be incorporated along the north and south sides of Alameda Avenue. System Alternative 1 would provide a subtle variation on this and is discussed below.
- A pedestrian / bicycle grade separated crossing of I-25, the South Platte River, Santa Fe Drive, Kalamath Street, and the Consolidated Main Line would be incorporated to complement the current City master plan. The alignment generally would follow an extension of Bayaud Avenue north of Alameda Avenue. The details would vary subtly with each alternative and are discussed further in the specific alternatives.

Santa Fe Drive / Kalamath Street Pedestrian Facilities

Sidewalks exist sporadically along Santa Fe Drive and Kalamath Street through the project limits. Enhanced pedestrian connectivity along Santa Fe Drive and Kalamath Street would be provided within the system alternatives. The common improvements include:

- Eight-foot (8-ft) attached sidewalks would be included with the grade separation options with the railroad along Santa Fe Drive and Kalamath Street north of Alameda Avenue
- Eight-foot (8-ft) attached sidewalks would be added on the east side of Santa Fe Drive for pedestrian access to Home Depot and the Warehouse District / Cherokee Redevelopment south of I-25

2.4.3 Differentiating Elements of the System Alternatives

2.4.3.1 System Alternative 1

The overall goal of System Alternative 1 is to maximize the use of existing right-of-way while achieving the purpose and need of the project. To achieve this goal, element alternatives that provided the narrowest roadway width or/and had the least footprint, or were closest to the current configurations were included. This section describes the differentiating features of System Alternative 1, while **Table 2-9** offers a summary of these features.

Table 2-9 System Alternative 1 Differentiating Elements

Element	Differentiating Features
I-25 Mainline	• Continuous auxiliary lane between Broadway and Santa Fe Drive in both directions between ramps
US 6	• Shifted Bryant Street interchange to align at Decatur Street • Traffic signal and restriping improvements on 7th Avenue.
Broadway Interchange	• Northeast quadrant ramp and Ohio Avenue as it exists today • Southeast quadrant ramp as in No Action Alternative
Alameda Avenue Interchange	• Complete partial offset urban interchange • Santa Fe Drive and Kalamath Street intersect Alameda Avenue as they do today as at-grade signalized intersections
Santa Fe Drive/Kalamath Street/Consolidated Main Line Railroad Crossing	• Santa Fe Drive and Kalamath Street go under the railroad on their current alignments
Pedestrian and Bicycle Facilities	• On street bicycle lanes along Ohio Avenue at Broadway and along the bus entrance road into the park-n-Ride • Upgrade traffic signal actuation • Enhanced refuges for intermediate crossings of Broadway
Opinion of Probable Cost *	$280 million

* System Alternative costs reflect differentiating and common elements combined.

I-25 Mainline

I-25 between Broadway and Santa Fe Drive would have an additional continuous lane in each direction to provide for traffic weaving between each interchange (see **Figure 2-12**). The distance between ramps would be 600 feet southbound and 900 feet northbound. Both fall short of the desirable distance standard (1600 feet). Operational analysis of this weave is discussed in **Chapter 3** *Transportation Analysis.*

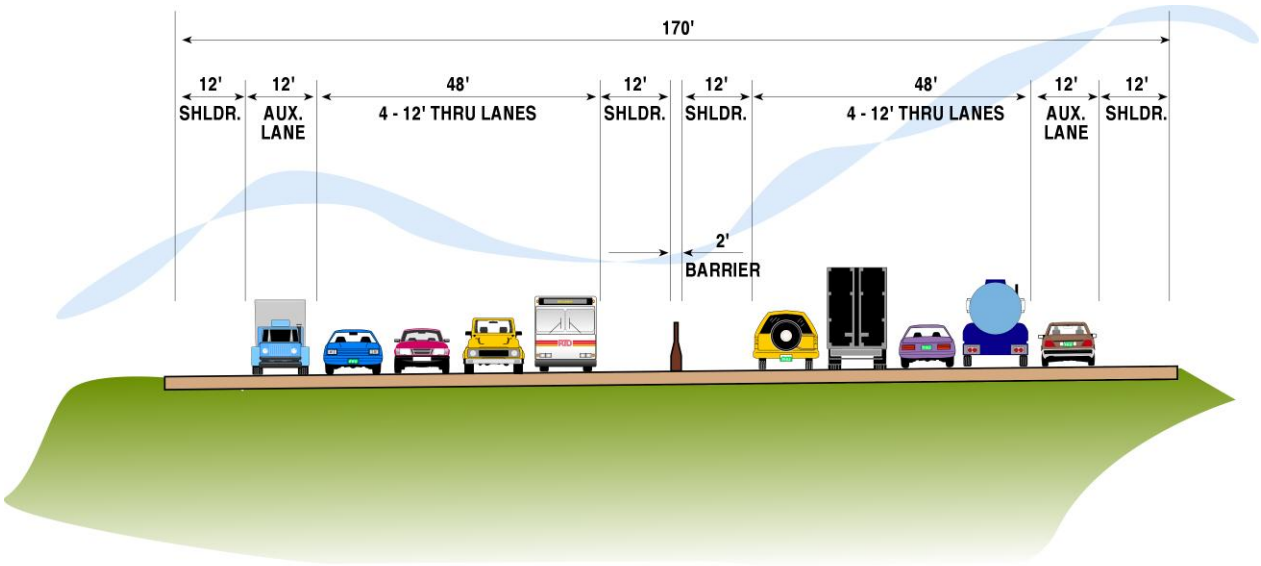


Figure 2-12 System Alternative 1, I-25 Typical Section, Broadway to Santa Fe Drive

US 6 / Federal Boulevard / Bryant Street

This alternative would shift the Bryant Street interchange to align with Decatur Street and eliminate the short weave length eastbound on US 6 between Federal Boulevard and Bryant Street (see **Figure 2-13**). The distance between the southbound I-25 ramp to westbound US 6 and the off-ramp to Decatur would be longer than the existing distance to the Bryant Street off-ramp. This alternative would preserve the east-side connections to US 6 from the warehouse district in and around Bryant Street. A traffic signal would be added to Federal Boulevard at 5th Avenue. Federal Boulevard would be widened to accommodate double (2) left-turn lanes for northbound Federal Boulevard to westbound US 6. **Figure 2-14** presents the typical US 6 section for System Alternative 1.

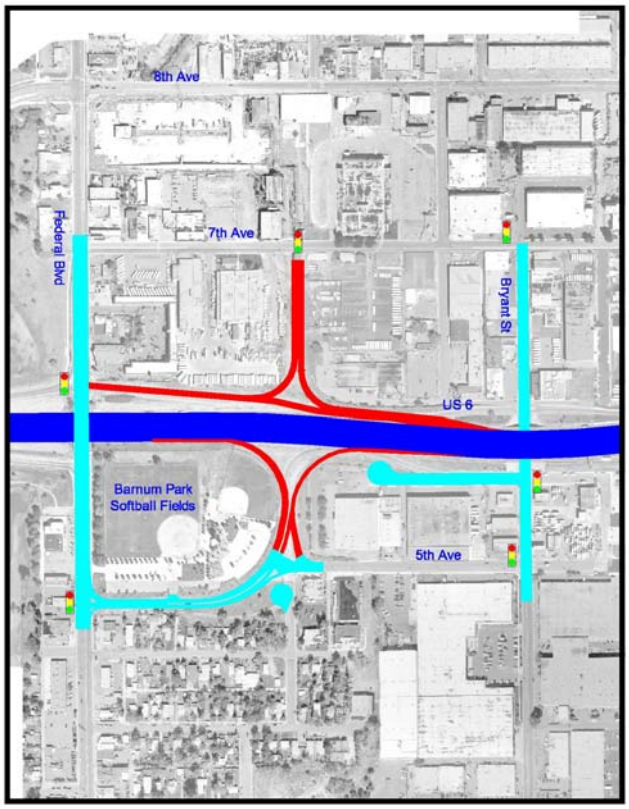


Figure 2-13 System Alternative 1, US 6 / Federal Boulevard / Bryant Street Improvements

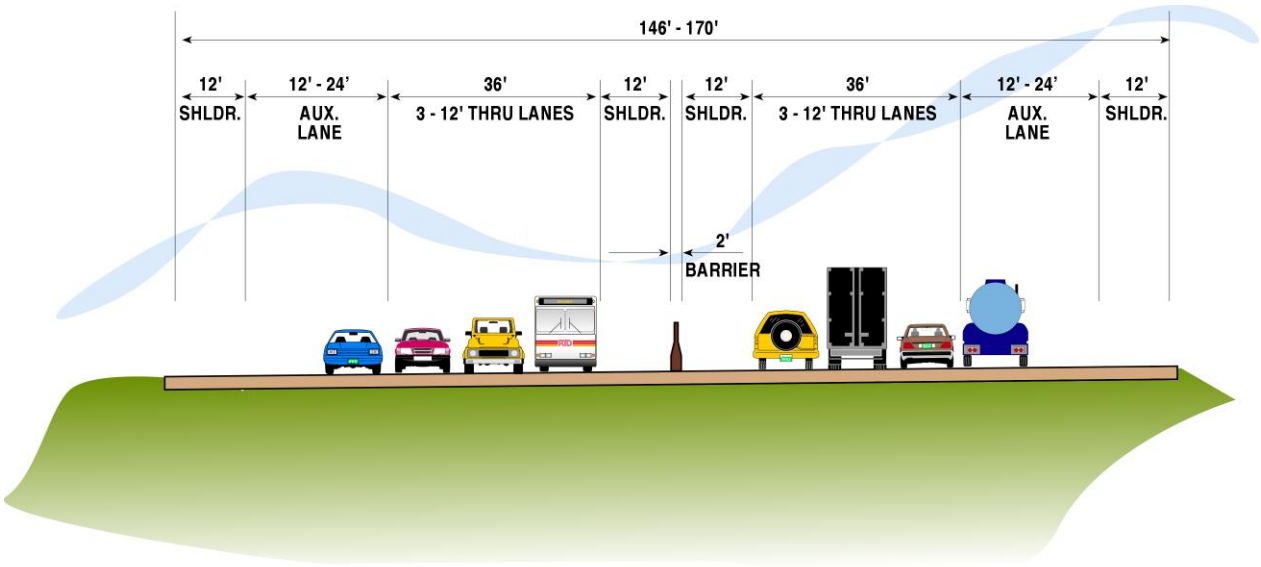


Figure 2-14 System Alternative 1, US 6 Typical Section, I-25 to Federal Boulevard

Broadway Interchange

The Broadway interchange in this alternative would be very similar to the existing interchange (see **Figure 2-15**). The Ohio Avenue access would remain as it is today, although the loop ramp in the northeast quadrant would move to the west side of Broadway, as described in the common elements section of this document. A pedestrian-actuated traffic signal would be added at Ohio Avenue and the northbound I-25 off-ramp. The southbound I-25 on-ramp access for southbound Broadway traffic would be realigned to match the southbound I-25 off-ramp. Northbound Broadway and RTD park-n-Ride traffic destined for southbound I-25 would do so using the current ramp aligned at Kentucky. The northbound Broadway to Lincoln Street curve would be flattened to achieve the desired 35 mph curvature and to improve visibility at the intersection.

See further discussion on this interchange in **Section 2.5** *Future Redevelopment and Transportation Improvements Near I-25 and Broadway.*

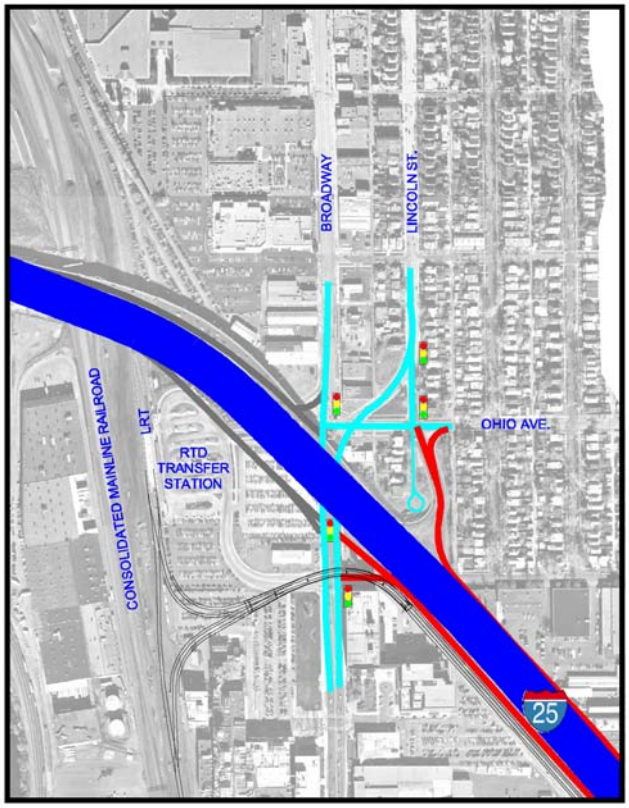


Figure 2-15 System Alternative 1, Broadway Interchange

Santa Fe Drive Interchange

The common element interchange, as described in the previous section **(Section 2.4.2.4)**, would be applied in this alternative. Access to businesses east of Santa Fe Drive would be accommodated through a consolidated at-grade signalized intersection generally equidistant from Alameda Avenue and I-25 (see **Figure 2-8**).

Alameda Avenue Interchange

A partial offset urban interchange would be constructed at Alameda Avenue in this system alternative (see **Figure 2-16**). In this configuration, both the southbound I-25 off-ramp and northbound I-25 on-ramp would intersect Alameda Avenue at the same traffic signalized intersection; in this case on the west side of I-25. This interchange would offer some real benefits in that it only has one signalized intersection and can be kept close to the highway to avoid impacts on adjacent properties.

The offset to the west would offer some additional benefits in that it avoids Kalamath Street and the existing businesses on the east side of I-25 between Kalamath Street and Santa Fe Drive, allowing the intersections of Alameda Avenue and Santa Fe Drive/Kalamath Street to remain in their current configurations. This alternative would not require the replacement of Alameda Avenue from Santa Fe Drive to Cherokee Street and the associated retaining walls and bridges through this reach. A simulation of the interchange is shown in **Figure 2-17**.

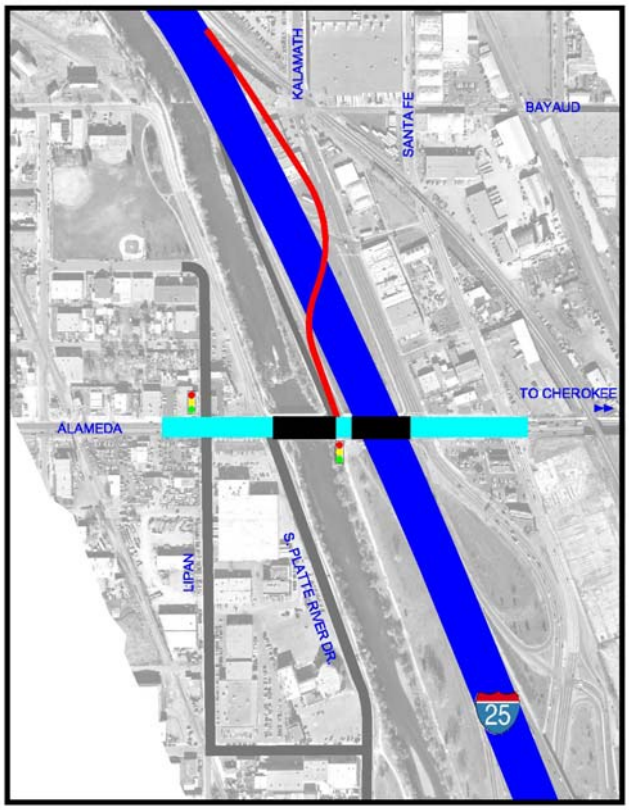
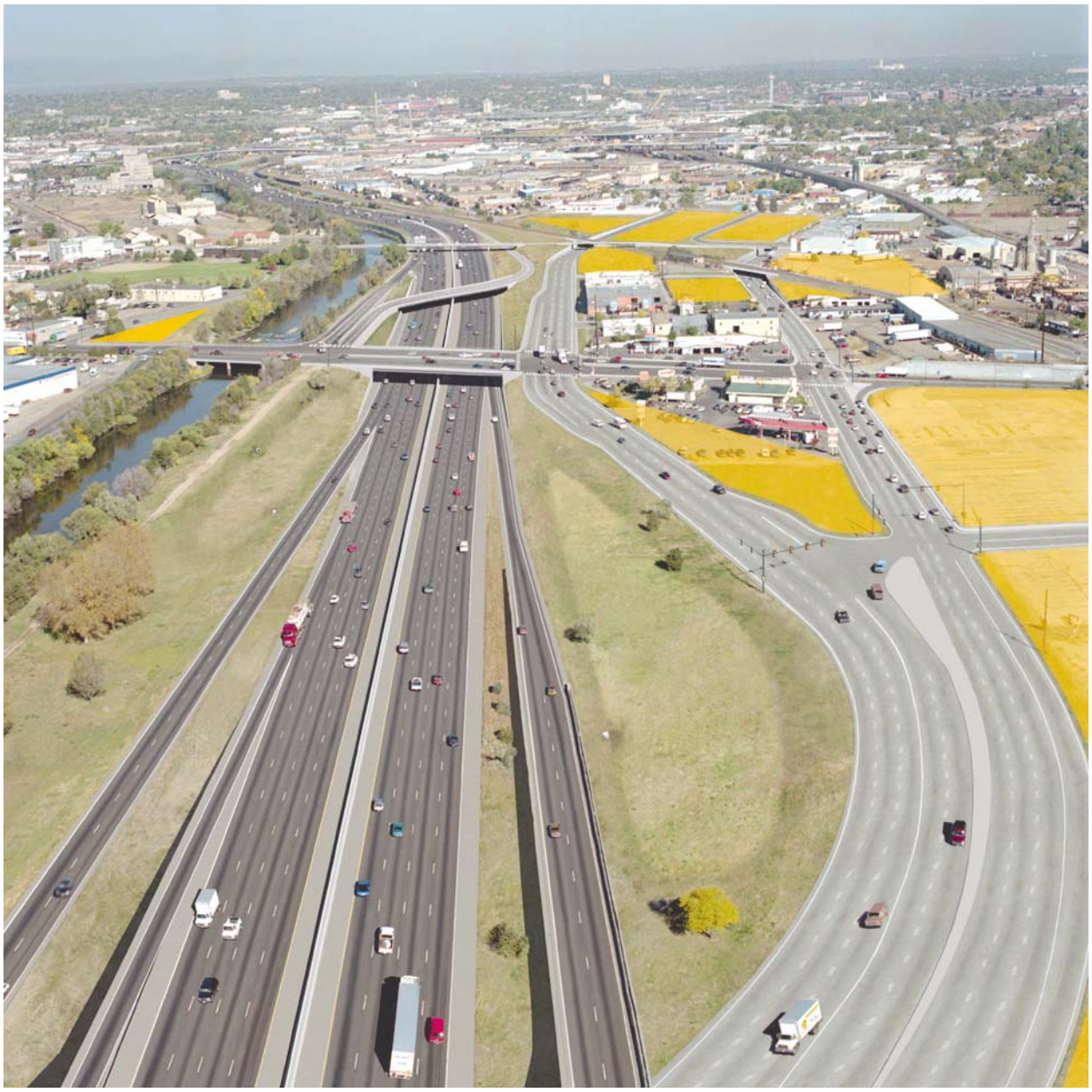


Figure 2-16 System Alternative 1, Alameda Avenue Interchange



Legend

See Section 4.1 for Land Use Concept

North

System Alternative 1 Simulation
Santa Fe / Kalamath / Alameda

Figure 2-17

Santa Fe Drive / Kalamath Street / Consolidated Main Line Railroad Crossing

In this alternative, Santa Fe Drive and Kalamath Street would go under the Consolidated Main Line railroad and generally follow the existing street alignments (see **Figure 2-18**). To accomplish this and preserve as many of the businesses as possible, retaining walls would parallel the roads. Sidewalks would be integrated into the design. (see **Figure 2-19**).

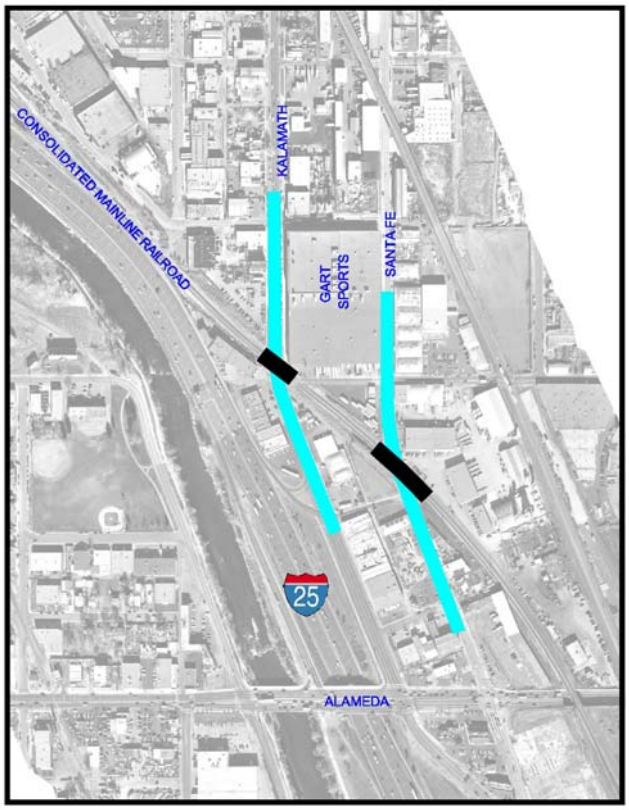


Figure 2-18 System Alternative 1, Santa Fe Drive and Kalamath Street Grade Separation

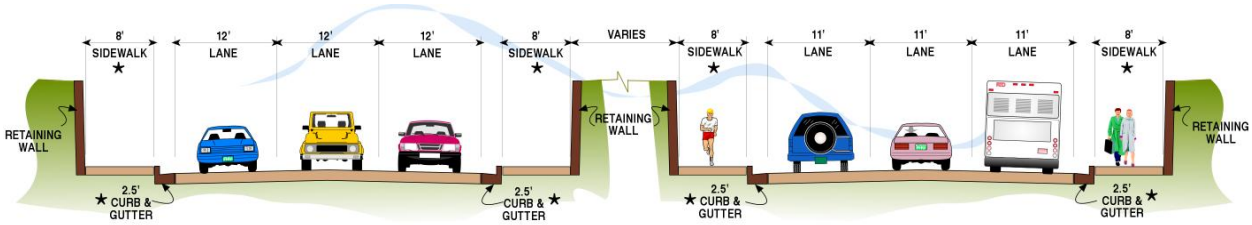


Figure 2-19 System Alternative 1, Santa Fe Drive and Kalamath Street Typical Section

*Subject to refinement in final design.

Pedestrian and Bicycle Facilities

Broadway

Pedestrian improvements would include upgrading sidewalks to full City standard widths and offsets, integrating Americans with Disabilities Act (ADA) compliant crossings, and upgrading traffic signal actuation and timing to current technologies and standards. An actuated traffic signal would be installed at Ohio Avenue and the northbound I-25 off-ramp with advanced warning along the ramp. Bicycle improvements would include on-street bikepaths along Ohio Avenue from Lincoln Street to Broadway and along the bus entrance road into the RTD park-n-Ride (see **Figure 2-20**).

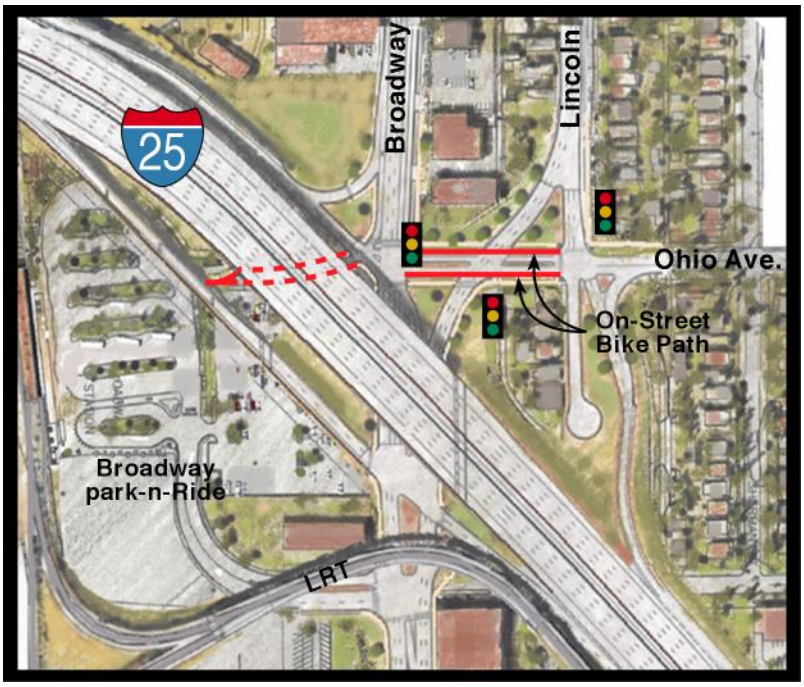


Figure 2-20 System Alternative 1, Broadway Bicycle / Pedestrian Facilities

Alameda Avenue

Pedestrian and bicycle improvements would include the bike path and sidewalk on either side of Alameda Avenue as described in the common elements section, ADA-compliant crossings, and upgraded traffic signal pedestrian actuation. This alternative would defer pedestrian and bicycle improvements along Alameda Avenue between Santa Fe Drive and Cherokee Street to the City and County of Denver as a separate or concurrent project. The Citizen Working Group recommended the introduction of a westbound right-turn lane at Santa Fe Drive to offer some refuge for pedestrians and bicyclists crossing on the northern leg of this intersection. Improved crossing safety for pedestrians and bicyclists will be integrated into subsequent design efforts.

Santa Fe Drive / Kalamath Street

Eight-foot (8-ft) attached sidewalks would be integrated on both sides of Santa Fe Drive and Kalamath Street north of Alameda Avenue to Ellsworth Boulevard. South of Alameda Avenue, an 8-ft attached sidewalk will follow the new access road adjacent to the Home Depot and cross under I-25 at the Broadway viaduct east of Santa Fe Drive.

Bayaud Avenue Bicycle / Pedestrian Structure

A pedestrian/bicycle structure would be incorporated into this alternative along Bayaud Avenue (see **Figure 2-21**). This alignment would be consistent with the City's master plan (CCD, 2002b) for this crossing. The structure would be lengthy (approximately 1700 feet), starting between the light rail crossing and Santa Fe Drive along Bayaud Avenue going over Santa Fe Drive, the Consolidated Main Line railroad, Kalamath Street, I-25, and the South Platte River.

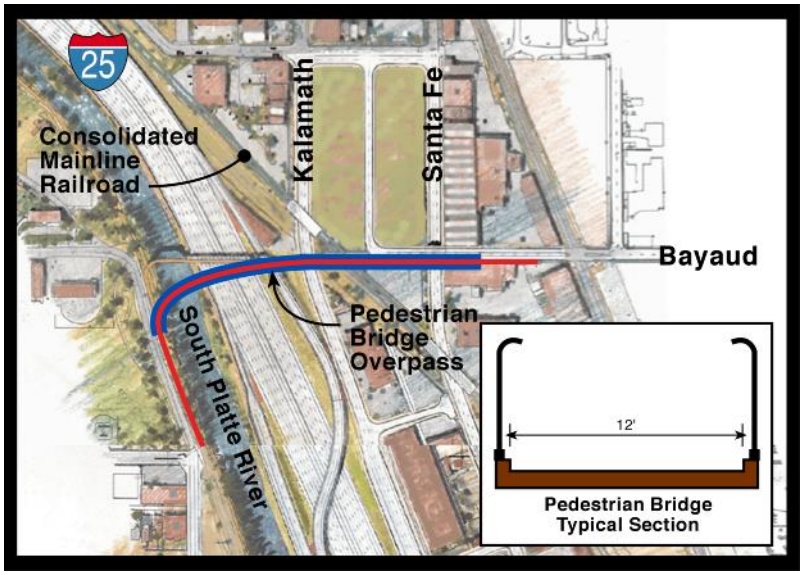


Figure 2-21 System Alternative 1, Bayaud Avenue Bicycle / Pedestrian Structure

System Alternative 1 Opinion of Probable Cost

The approximate capital cost for System Alternative 1, including all common and differentiating elements, would be $278 million in year 2004 dollars.

2.4.3.2 SYSTEM ALTERNATIVE 2

The goal of System Alternative 2 is to maximize operations and safety benefits while achieving the purpose and need of the project. To achieve this goal, element alternatives were deemed best that provided the most direct travel route, best avoided friction between traffic streams, or reduced traffic signals. This section describes the differentiating features of System Alternative 2, while **Table 2-10** offers a summary of these features.

Table 2-10 System Alternative 2 Differentiating Elements

Element	Differentiating Features
I-25 Mainline	• Continuous collector-distributor lanes between Broadway and Santa Fe Drive in both directions
US 6	• Completed Federal Boulevard diamond interchange with west-side ramps to/from Bryant Street • Braided Federal Boulevard to eastbound US 6 ramp with collector-distributor road • Redirected westbound US 6 off-ramp to Bryant Street to Federal Boulevard • Continuous collector-distributor lanes between Federal Boulevard and I-25 in both directions
Broadway Interchange	• Southbound to southbound I-25 grade-separated structure • More direct northbound I-25 to northbound Lincoln/Broadway ramp • Out-of-direction northbound I-25 to southbound Broadway route using Exposition Avenue • Southeast ramp as in No Action Alternative
Santa Fe Drive Interchange	• Add southbound I-25 to northbound Santa Fe Drive movement
Alameda Avenue Interchange	• Complete partial diamond urban interchange • Santa Fe Drive and Kalamath Street combine and go over Alameda Avenue; connections to Alameda Avenue are via a Single-Point Urban interchange • Alameda Avenue is upgraded between Santa Fe Drive and Cherokee Street
Santa Fe Drive/ Kalamath Street/ Consolidated Main Line Railroad Crossing	• Santa Fe Drive and Kalamath Street go under the railroad on their current alignments
Pedestrian and Bicycle Facilities	• Upgrade traffic signal actuation • Enhanced refuges for intermediate crossings of Broadway
Opinion of Probable Cost*	$470 million

* System Alternative costs reflect differentiating and common elements combined.

I-25 Improvements

I-25 between Broadway and Santa Fe Drive would have a collector-distributor road to manage the exiting and entering traffic between Broadway and Santa Fe Drive (see **Figure 2-22**). Collector-distributor roads are barrier-separated roads that would parallel the highway wherein the traffic leaving the highway and that entering the highway can mix independent of the highway. The distance between ramps would be 850 feet on the northbound collector-distributor road and 900 feet on the southbound collector-distributor road. The desirable design standard is 1000 feet. Both would fall short of providing the desirable distance. Operational analysis of this weave is discussed in **Chapter 3** *Transportation Analysis*.

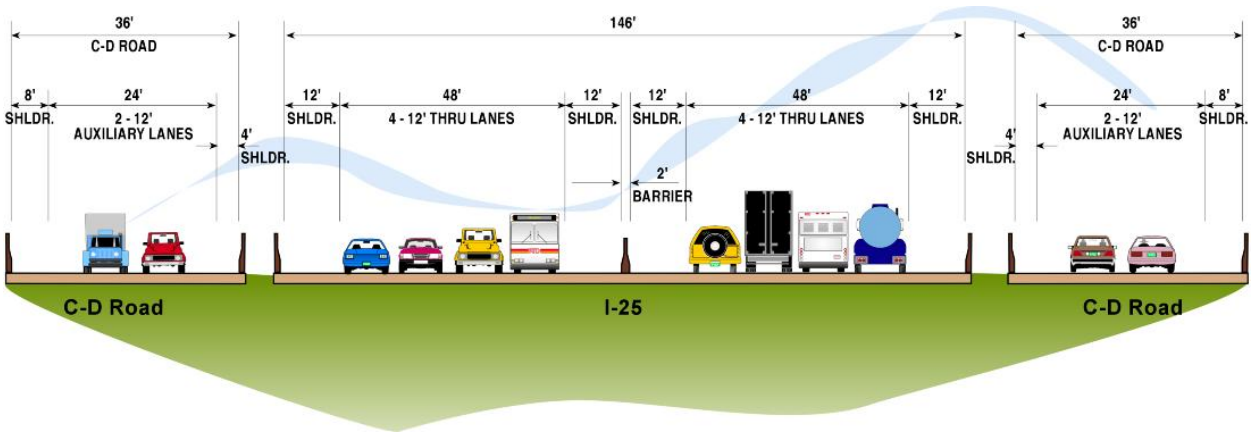


Figure 2-22 System Alternative 2, I-25 Typical Section, Broadway to Santa Fe Drive

US 6 / Federal Boulevard / Bryant Street

This alternative would reconstruct the Federal Boulevard interchange as a standard diamond interchange with ramps in all four quadrants and traffic signals at the ends of the ramps at Federal Boulevard (see **Figure 2-23**). Access to and from Bryant Street would be accommodated through connections to the eastside Federal Boulevard ramps. The existing westbound off-ramp to Bryant Street would be eliminated with this alternative. Traffic wanting to make that move would exit at Federal Boulevard and either take 5th, 7th, or 8th Avenues. Federal Boulevard would be widened to accommodate double left-turn lanes at the intersections with the US 6 on- and off-ramps. A braided eastbound on-ramp would be provided that allows traffic continuing east on US 6 to avoid mixing with traffic destined for I-25.

Traffic on US 6 between I-25 and Federal Boulevard would be managed with collector-distributor roads, as in the I-25 segment discussed above (see **Figure 2-24**). Access to the highway would no longer come from 5th Avenue, so it could be converted to a local street. Federal Boulevard would be widened to accommodate double (2) left-turn lanes at the intersections with US 6 on- and off-ramps.

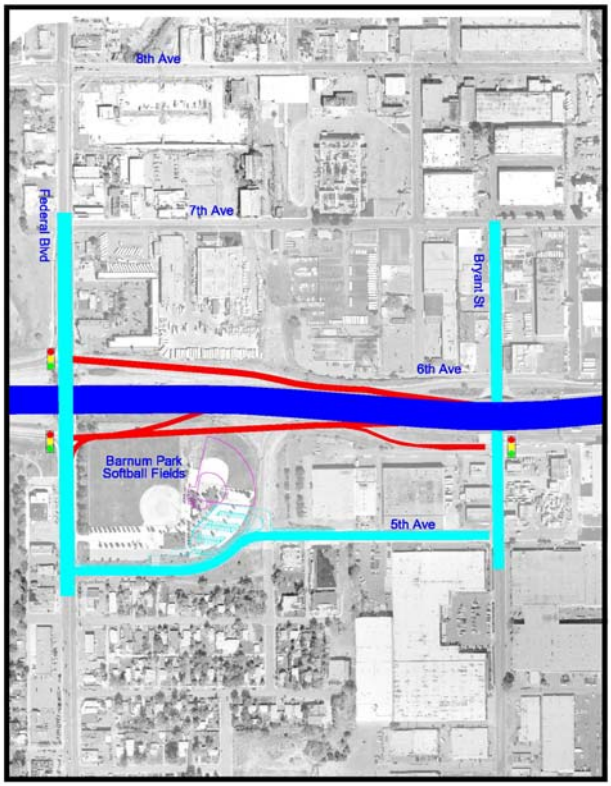


Figure 2-23 System Alternative 2, US 6 / Federal Boulevard / Bryant Street Interchange

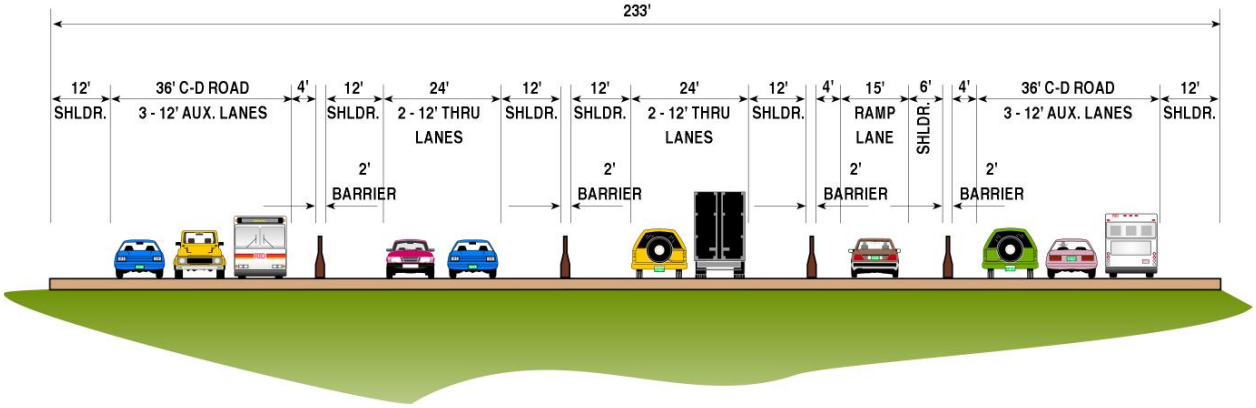


Figure 2-24 System Alternative 2, US 6 Typical Section, I-25 to Federal Boulevard

Broadway Interchange

The Broadway interchange in this alternative would have enhanced operations as the goal. Northbound I-25 to northbound Lincoln Street and the return movement southbound Broadway to southbound I-25 are the two largest traffic movements in the interchange. This alternative would focus directly on those movements. The existing serpentine northbound off-ramp would be smoothed to more directly align with Lincoln Street (see **Figure 2-25**).

The southbound move would be accommodated by a grade separation avoiding the signalized left turn as it is today. Initial alternative development for grade-separation alternatives focused on a tunnel carrying traffic from southbound Broadway to southbound I-25. However, on-going investigations have confirmed that construction of the tunnel will be technically challenging and costly. Other grade-separation alternatives, such as a flyover, may be possible. The City of Denver and adjacent developers are actively working on redevelopment plans and environmental remediation of the area that may make the tunnel option viable in the future. The south side of the interchange would remain unchanged. Kentucky Street access to southbound I-25 for the park-n-Ride and northbound Broadway would be accommodated through the signal as it is today. Further discussion on this interchange can be found in **Section 2.5** *Future Redevelopment and Transportation Improvements Near I-25 and Broadway.*

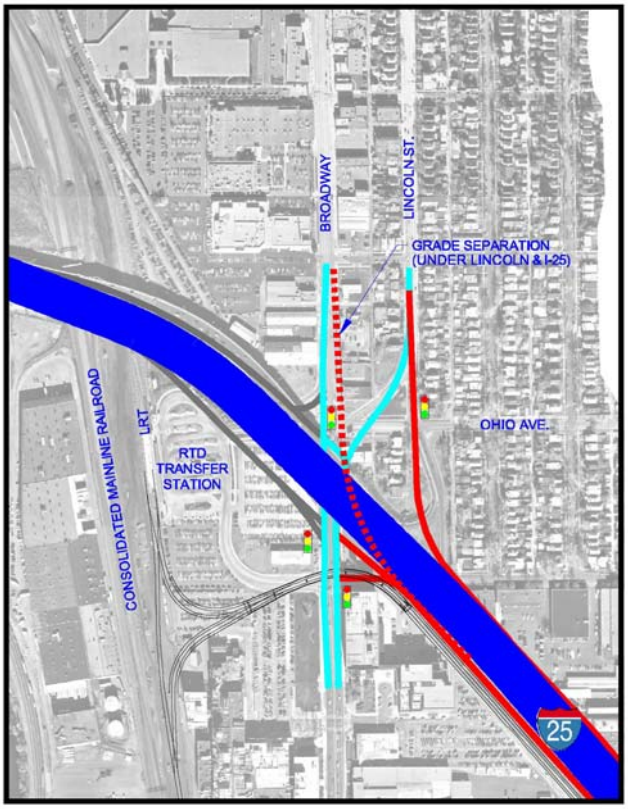


Figure 2-25 System Alternative 2, Broadway Interchange

Santa Fe Drive Interchange

This alternative would include the common elements previously discussed, along with completion of the north-side interchange ramps (see **Figure 2-26**). Businesses to the east of Santa Fe Drive are accessed in two locations. A right in-out access is provided along Alameda Avenue, east of Santa Fe Drive and a full movement access is provided along Santa Fe Drive between Alameda Avenue and I-25. This crossing of Santa Fe Drive to access the development would be grade separated from Santa Fe.

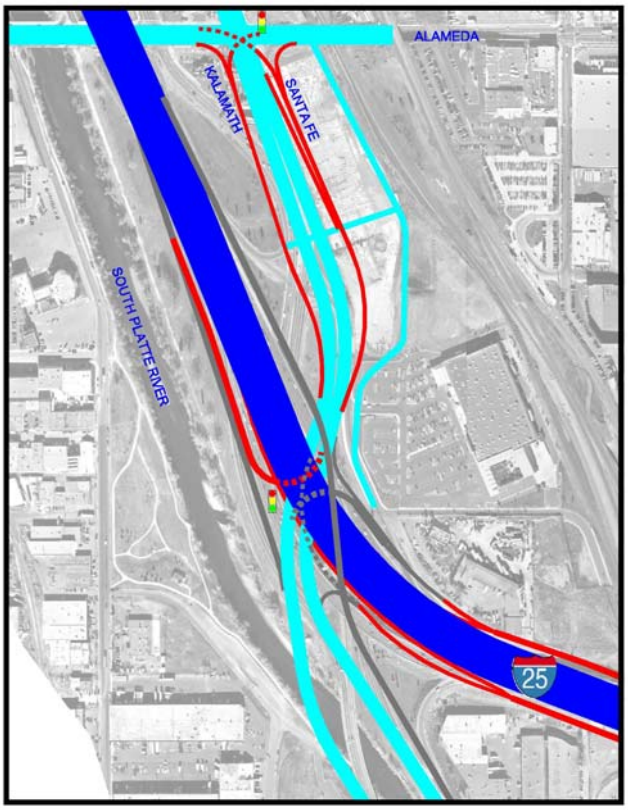


Figure 2-26 System Alternative 2, Santa Fe Drive Interchange

Alameda Avenue Interchange

A partial diamond interchange would be provided at Alameda Avenue and I-25 with this alternative (see **Figure 2-27**). In this configuration, ramps from and to the north would occur on either side of the interchange in a more traditional fashion. The east-side ramp would require a realignment of Kalamath Street to the east to make space for the ramp. The City and County of Denver requested that a partial single-point urban interchange alternative to the partial diamond be considered in this alternative as well. Similar impacts would occur while there is a potential operational benefit.

The realignment of Kalamath Street to the east would require combining it with Santa Fe Drive. To avoid the traffic operation problems of such a large intersection, a grade separation would be constructed at Alameda Avenue (see **Figure 2-28**). In this alternative, Santa Fe Drive/Kalamath Street would go over Alameda Avenue and connections to Alameda Avenue would be made via ramps in each quadrant through a single signalized intersection. This is commonly called a single-point urban interchange. A simulation of this interchange is shown in **Figure 2-29**. With this alternative, Alameda Avenue would be improved from Cherokee Street to west of Lipan Street applying the desirable typical section. The desirable section is shown in **Figure 2-28** from Cherokee Street to Santa Fe Drive. **Figure 2-11** depicts the section from Santa Fe Drive to Lipan Street. The existing retaining walls and bridges for the consolidated mainline railroad and light rail transit would be replaced.

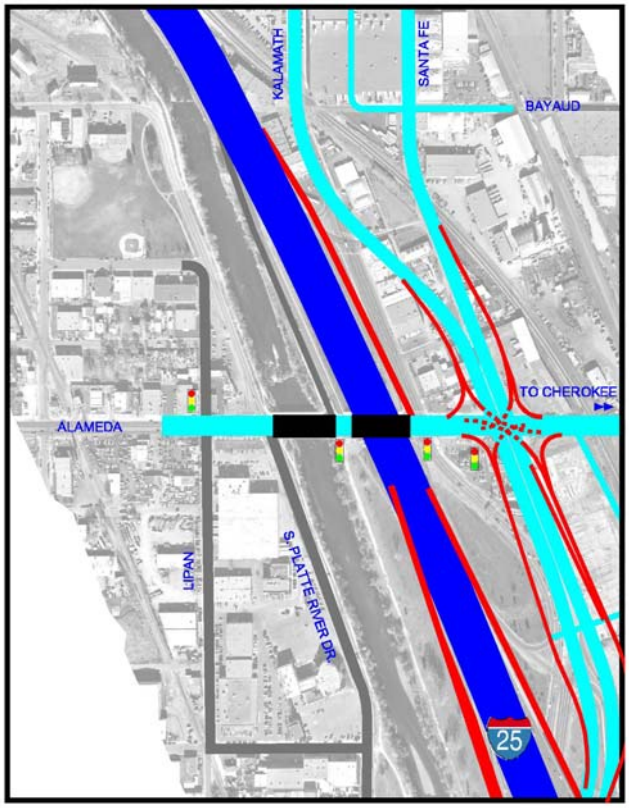


Figure 2-27 System Alternative 2, Alameda Avenue Interchange

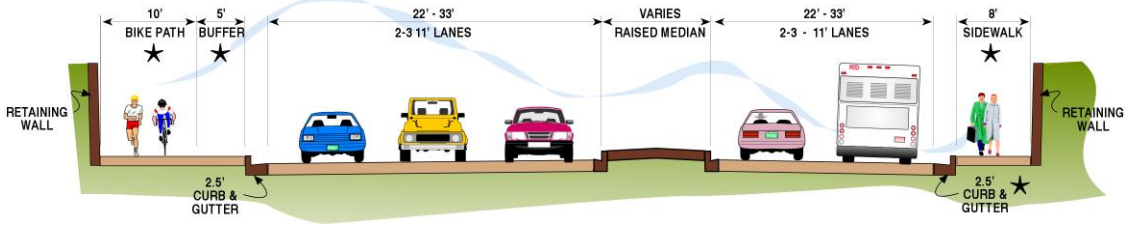
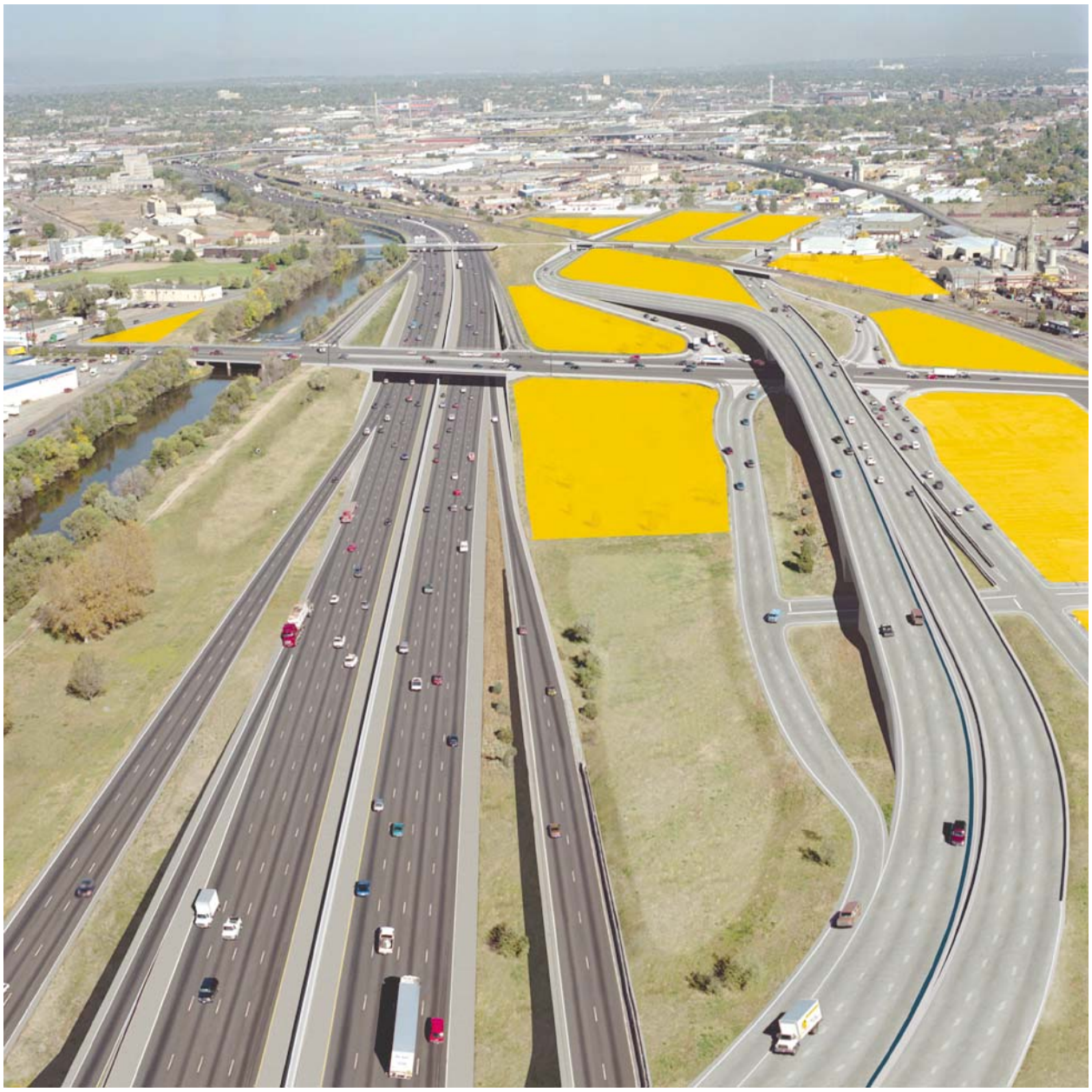


Figure 2-28 System Alternative 2, Alameda Avenue – Santa Fe Drive to Cherokee Street

*Subject to final refinement in final design.



Legend

See Section 4.1 for Land Use Concept

North

System Alternative 2 Simulation
Santa Fe / Kalamath / Alameda

Santa Fe Drive / Kalamath Street / Consolidated Main Line Railroad Crossing

In this alternative, Santa Fe Drive and Kalamath Street would go under the Consolidated Main Line railroad and generally follow the existing street alignments similar to System Alternative 1.

Pedestrian and Bicycle Facilities

Broadway

Pedestrian improvements would include upgrading sidewalks to full City standard widths and offsets, integrating ADA-compliant crossings, and upgrading traffic signal actuation and timing to current technologies and standards. Pedestrian/bicycle traffic from West Washington Park along Ohio Avenue would cross the ramp and Broadway via two signals (see **Figure 2-30**). Details of this crossing and the associated traffic signal design will require further scrutiny in subsequent design efforts.

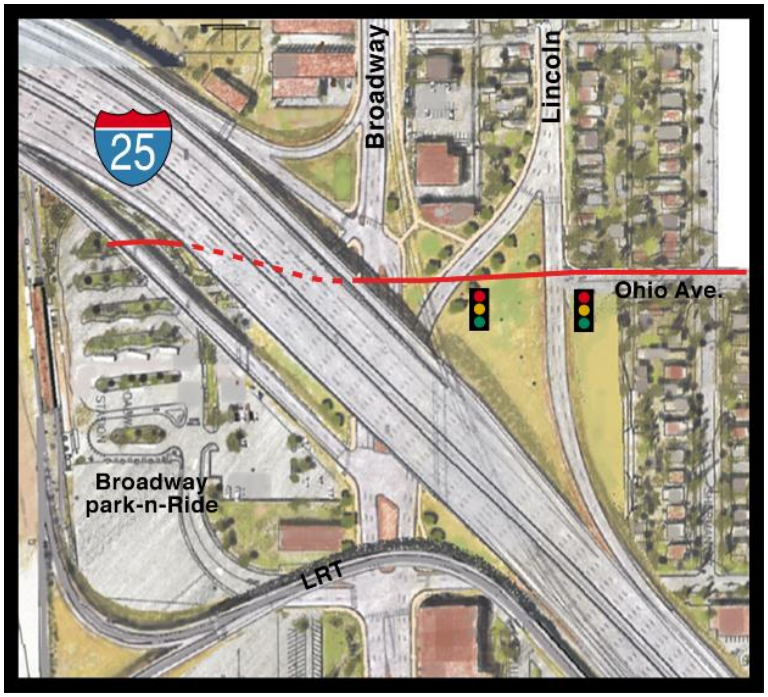


Figure 2-30 System Alternative 2, Broadway Bike / Pedestrian Facilities

Alameda Avenue

Pedestrian and bicycle improvements would include the sidewalk on either side of Alameda Avenue as described in the common elements section, ADA-compliant crossings, and upgraded traffic signal actuation. The grade separation at Alameda Avenue would remove a significant amount of traffic that could conflict with pedestrian and bicycles through the intersection. Intersections would be designed in an attempt to minimize the pedestrian crossing distances at intersecting ramps. This alternative would include bicycle and pedestrian improvements between Santa Fe Drive and Cherokee Street (see **Figures 2-27** and **2-28**).

Santa Fe Drive / Kalamath Street

Sidewalks would be accommodated on Santa Fe Drive and Kalamath Street north and south of Alameda Avenue similar to System Alternative 1.

Bayaud Avenue Bicycle / Pedestrian Structure

A pedestrian / bicycle structure consistent with System Alternative 1 is proposed along Bayaud Avenue with this alternative.

System Alternative 2 Opinion of Probable Cost

The approximate capital cost for System Alternative 2 in year 2004 dollars would be $470 million.

2.4.3.3 SYSTEM ALTERNATIVE 3

The goal of System Alternative 3 is to maximize public and local agency objectives, while achieving the purpose and need of the project. This alternative, to be evaluated through the EIS process, was developed with input from the City and County of Denver and the community and focused on elements that could enhance the local street systems operations as well as meeting land use and community value goals. This section describes the differentiating features of System Alternative 3, while **Table 2-11** offers a summary of these features.

Table 2-11 System Alternative 3 Differentiating Elements

Element	Differentiating Features
I-25 Mainline	• Continuous auxiliary lane between Broadway and Santa Fe Drive in both directions between ramps
US 6	• Reconstruct the Federal Boulevard interchange as a single-point urban interchange • Redirected Bryant Street on-off-ramps to Federal Boulevard • Continuous auxiliary lanes between Federal Boulevard and I-25
Broadway Interchange	• Tight diamond interchange constructed with ramps close to I-25 • Convert Kentucky Avenue to a right-in/right-out non-signalized intersection at Broadway • Extend Exposition Avenue to the west of Broadway to provide park-n-Ride access.
Alameda Avenue Interchange	• Complete offset partial single-point urban interchange • Limited left turns on Alameda Avenue – replaced by a series of right turns • Santa Fe Drive and Kalamath Street combine and go under Alameda Avenue; connections to Alameda Avenue are via a single-point urban interchange • Alameda Avenue is upgraded between Santa Fe Drive and Cherokee Street
Santa Fe Drive / Kalamath Street / CML Crossing	• Santa Fe Drive and Kalamath Street go under the railroad on a combined alignment
Pedestrian and Bicycle Facilities	• Potential enhanced Exposition Avenue pedestrian/bicycle access to the park-n-Ride at Broadway. • Upgrade traffic signal actuation • ADA-compliant crossings • Enhanced refuges for intermediate crossings of Broadway • Bayaud Avenue bicycle/pedestrian overpass structure of Santa Fe Drive, Kalamath Street, I-25, and the South Platte River
Opinion of Probable Cost	$350 million

* System Alternative costs reflect differentiating and common elements combined.

I-25 Improvements

I-25 would be similar to System Alternative 1.

US 6 / Federal Boulevard / Bryant Street

This alternative would reconstruct the Federal Boulevard interchange into a single-point urban interchange with ramps in all four quadrants and a single traffic signal at Federal Boulevard (see **Figure 2-31**). Access to and from Bryant Street would be accommodated exclusively through the Federal Boulevard interchange. The US 6 typical section is similar to System Alternative 1.

Federal Boulevard will be widened to accommodate turning lanes at the interchange and a new signal will be provided at 5th Avenue and Federal Boulevard.

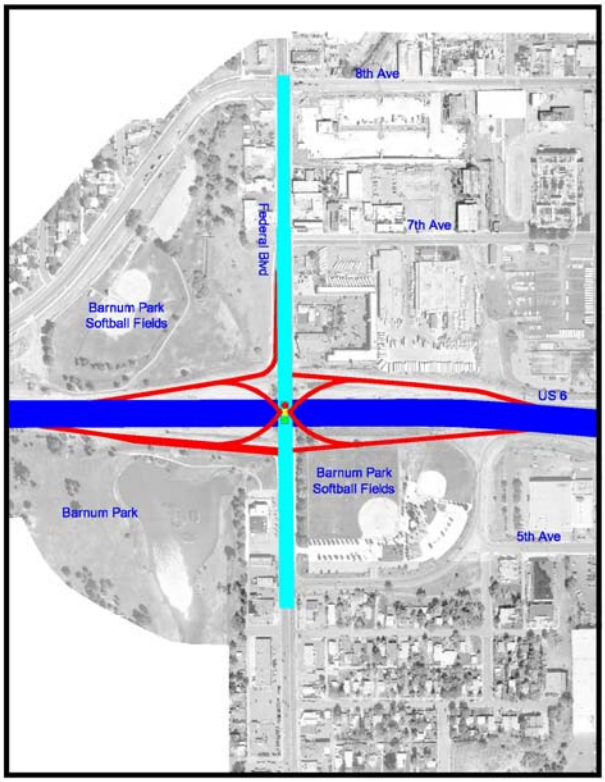


Figure 2-31 System Alternative 3, US 6 / Federal Boulevard / Bryant Street Improvements

Broadway Interchange

The Broadway interchange in this alternative would be highly compressed with ramps pulled in closely to I-25 as a “tight diamond” interchange (see **Figure 2-32**). The northbound off-ramp to northbound Lincoln Street would require three right turn lanes and would be traffic signal controlled. A cul-de-sac would be provided for the existing residential properties south of Ohio Avenue on Lincoln Street that remain with this alternative. Ohio Avenue would access Lincoln Street via this cul-de-sac. Kentucky Avenue, south of I-25 would be converted to a right-in, right-out access only. Alternate access to the Broadway park-n-Ride would come from an extension of Exposition Avenue. The use of Exposition Avenue east of Broadway would require the elimination of parking or widening of the street. Residents in the West Washington Park neighborhood, as well as City of Denver staff, have expressed concern with potential increased traffic into the neighborhood associated with an enhanced Exposition Avenue connection. See further discussion on this interchange in **Section 2.5** *Future Redevelopment and Transportation Improvements Near I-25 and Broadway.* Park-n-Ride access would be provided through a full movement intersection at Exposition/Broadway, bus only in access at the northbound on-ramp and Broadway, and Right in/Right out access at Kentucky.

Figure 2-32 System Alternative 3, Broadway Interchange

Santa Fe Drive Interchange

This alternative would include the common elements previously discussed as well as completion of the north-side interchange ramps (see **Figure 2-33**).

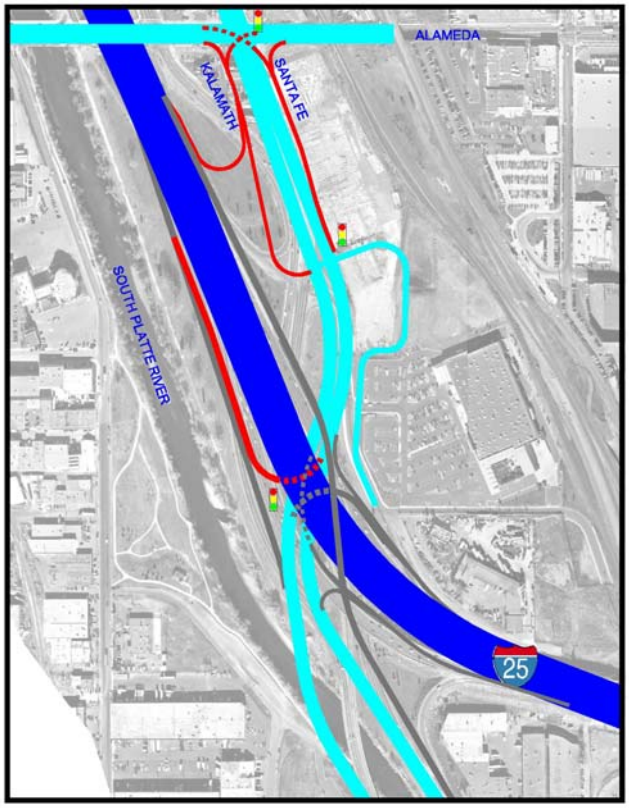


Figure 2-33 System Alternative 3, Santa Fe Drive Interchange

Alameda Avenue Interchange

The west-side offset urban interchange, as presented in System Alternative 1, would also be included in this alternative (see **Figure 2-34**). The single-point urban interchange at Santa Fe Drive/Kalamath Street/Alameda Avenue would also be included with a notable difference that Santa Fe Drive/Kalamath Street would go under Alameda Avenue in this option. Kalamath Street, north of Byers Place to the railroad tracks may be converted to a cul-de-sac providing for only local access.

Left-turn lanes on Alameda Avenue would be curtailed and replaced with right turns and right-in/right-out intersections to improve Alameda Avenue traffic operations. As an example, eastbound Alameda Avenue travelers wanting to go north on I-25 would bypass the offset interchange ramps and make a right at Santa Fe Drive and right onto northbound I-25 just south of Alameda Avenue. A simulation of this interchange is shown in **Figure 2-35**.

With this alternative, Alameda Avenue would be improved from Cherokee Street to west of Lipan Street, applying the desirable typical section as in System Alternative 2. The retaining walls and bridges for the Consolidated Mainline Railroad and Light Rail transit would be replaced.

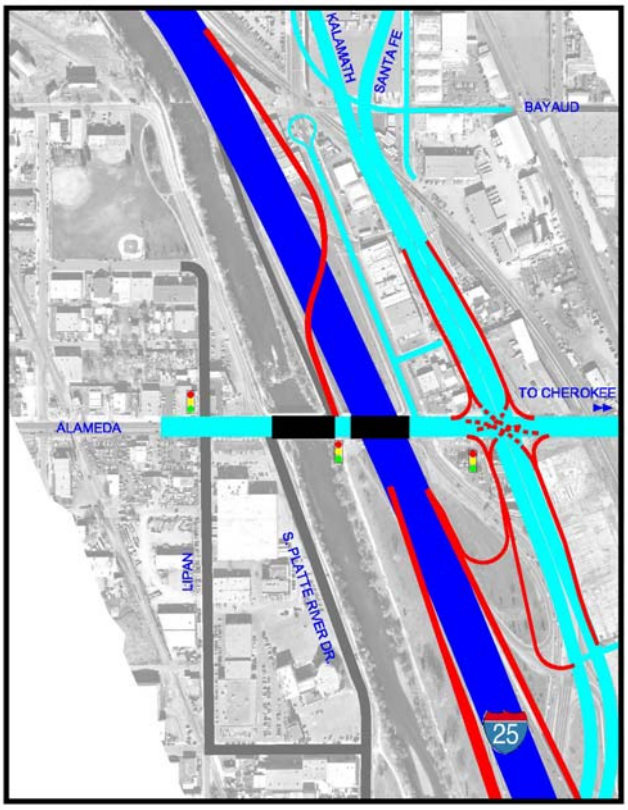
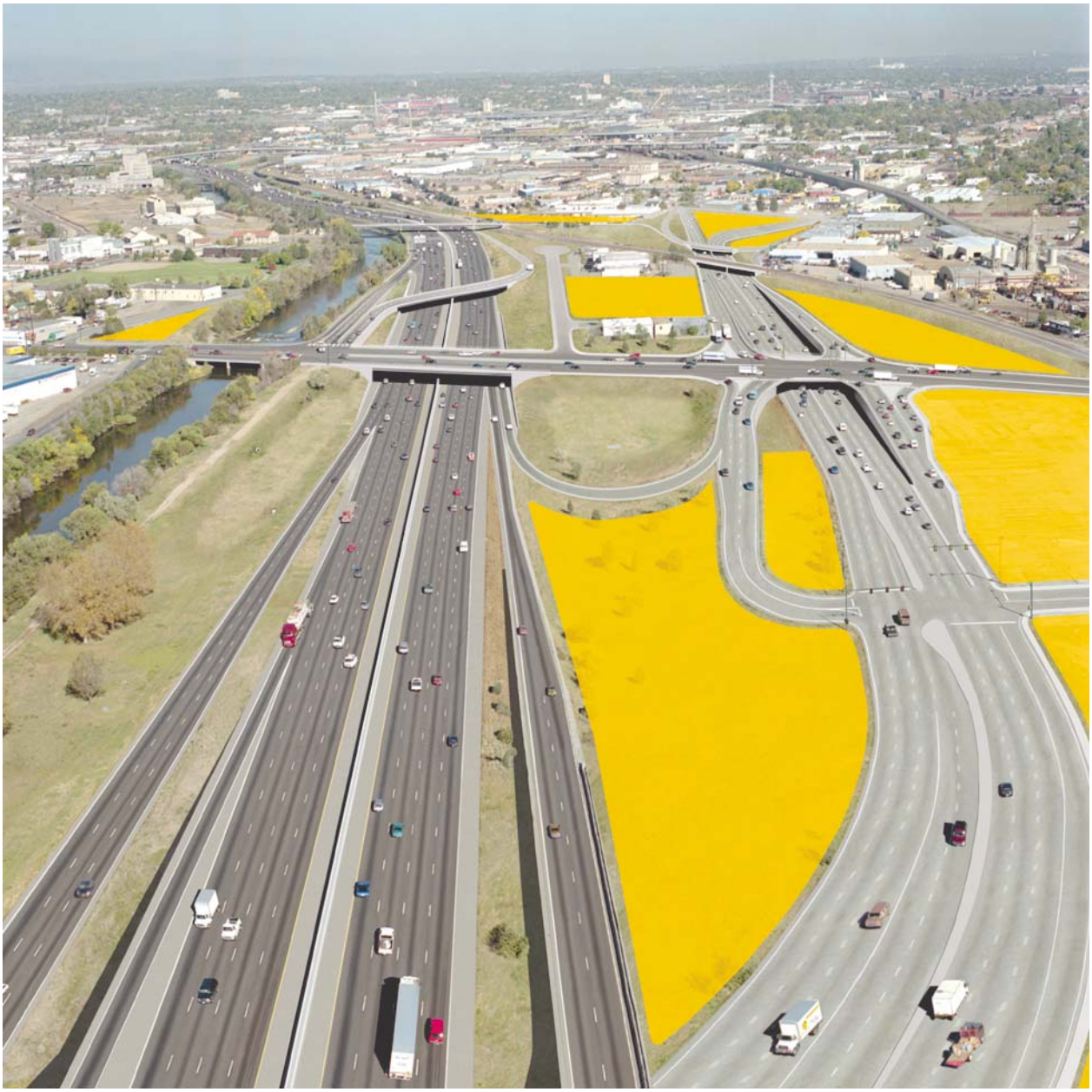


Figure 2-34 System Alternative 3, Alameda Avenue Interchange and Grade Separation



Legend

See Section 4.1 for Land Use Concept

North

System Alternative 3 Simulation
Santa Fe / Kalamath / Alameda

Santa Fe Drive / Kalamath Street / Consolidated Main Line Railroad Crossing

In this alternative, Santa Fe Drive and Kalamath Street would go under the Consolidated Main Line railroad in a single combined underpass (see **Figure 2-35**).

Pedestrian and Bicycle Facilities

Broadway

Pedestrian improvements would include upgrading sidewalks to full City standard widths and offsets, integrating ADA-compliant crossings, and upgrading traffic signal actuation and timing to current technologies and standards. Pedestrian/bicycle traffic from West Washington Park along Ohio Avenue would be routed to the traffic signal at the intersection of the ramp and Lincoln Street, cross with the aid of pedestrian signals, and continue across Broadway (see **Figure 2-36**). The alternative would more directly eliminate the high-speed off-ramp conflict that exists today with pedestrians and bicyclists at Ohio Avenue.

Alameda Avenue

Pedestrian movements along Alameda Avenue would operate similar to System Alternative 2. with ten-foot sidewalks on both sides.

Santa Fe Drive/ Kalamath Street Grade Separation

Eight-foot (8-ft) attached sidewalks would be integrated on both sides of Santa Fe Drive and Kalamath Street north of Alameda Avenue to Ellsworth Boulevard.

Bayaud Avenue Bicycle / Pedestrian Structure

A pedestrian/bicycle structure would be incorporated into this alternative along Bayaud Avenue (see **Figure 2-37**). This alignment is consistent with the City's master plan (CCD, 2002b) for this crossing. This alternative would take a circuitous route to cross Santa Fe Drive/Kalamath Street and the Consolidated Main Line railroad, although on a bit of a different alignment than presented in System Alternative 2.

System Alternative 3 Opinion of Probable Cost

The approximate capital cost for System Alternative 3 in year 2004 dollars would be $350 million.

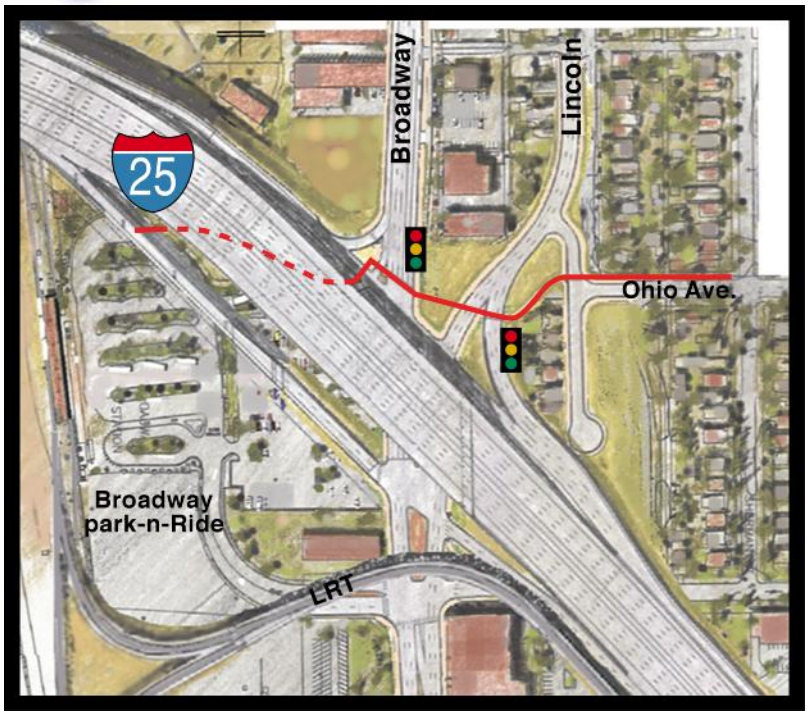


Figure 2-36 System Alternative 3, Broadway Bike / Pedestrian Facilities

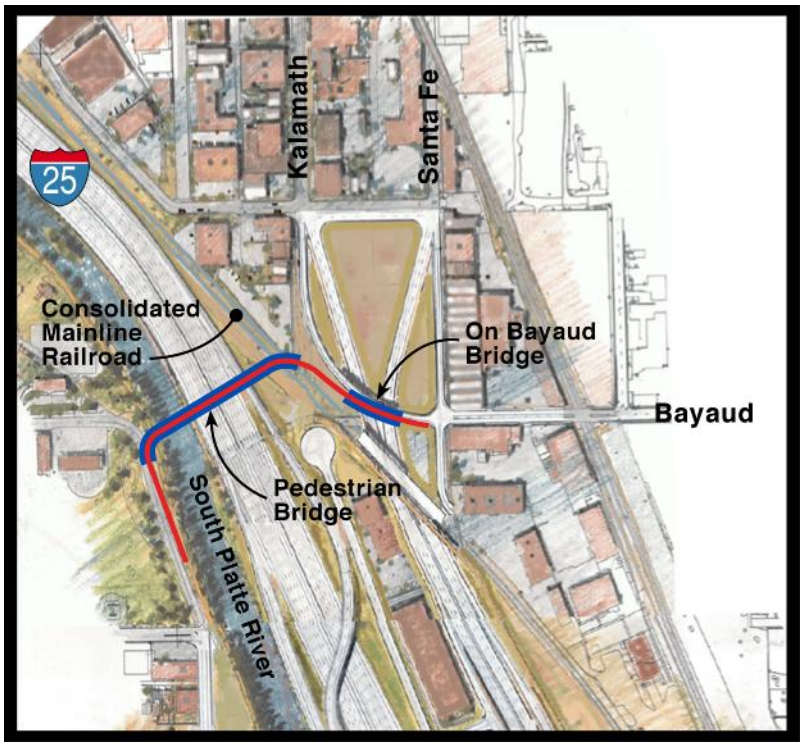


Figure 2-37 System Alternative 3, Bayaud Avenue Bike / Pedestrian Structure

2.5 Future Redevelopment and Transportation Improvements Near I-25 and Broadway

2.5.1 Redevelopment Plans

Land use south of I-25 adjacent to the interchange at Broadway is undergoing substantial change. The redevelopment of the old Gates Rubber factory will change existing land uses, density, traffic volumes and patterns, access configurations, and pedestrian routing. The site is currently undergoing planning and approval for this redevelopment with the City and County of Denver RTD, and other regulatory agencies.

2.5.1.1 CHEROKEE / GATES REDEVELOPMENT

Late in 2001, Gates Rubber Company sold approximately 50 acres of their property for redevelopment on the west side of Broadway to Cherokee Denver, LLC, leaving Gates with approximately 28 acres of property on the east side of Broadway.

Cherokee Denver applied for and received Transit Mixed Use (TMU) 30 rezoning from the City and County of Denver in the summer of 2003. The TMU-30 zoning provides for urban development proximate to a mass transit railway system station to promote a mix, arrangement, and intensity of uses that support transit ridership and use of other transportation modes, especially walking. Cherokee Denver has partnered with the City and County of Denver and RTD to integrate the Gates Redevelopment with the park-n-Ride and other City held right-of-way for a more complete transit oriented development.

Since the Denver Urban Renewal Authority has developed the Cherokee Urban Redevelopment Plan, the site is now eligible for public funds in support of the redevelopment. Implementation of this plan is proceeding with recent approval of the General Development Plan from Cherokee Denver.

2.5.1.2 GATES EAST CAMPUS REDEVELOPMENT

Gates moved its world headquarters to downtown Denver from the remaining property east of Broadway (the East Campus) in the fall of 2003 and offered the East Campus for sale to a master developer. The property has been purchased for development by Lionstone Group, and has been rezoned to a combination of Transit Mixed Use (TMU-30), Residential Mixed Use (RMU-20 and RMU-30), and Multi-use dwellings (R-2) zoning.

2.5.2 Land Use and Traffic

According to the Cherokee Transportation Impact Study (Matrix Design Group and Fehr & Peers, 2005), the combined redevelopment could include more than 8,000,000 square feet of commercial and residential development, equating to approximately 67,000 trips per day. This represents a substantial traffic loading on the adjacent local street system.

2.5.3 Gates / Cherokee Transportation Alternatives Considered and Status

The City and County of Denver, CDOT, FHWA, RTD the developers, and the project team have coordinated efforts to define the impacts to and modifications of the local transportation network associated with the combined redevelopment of the Gates site. It appears likely that the City street system will be modified in some fashion to address these impacts, but a preferred alternative has not yet emerged. Discussions have included widening of Broadway, extension of the one-way-pair of Broadway and Lincoln Street either on the current alignment or by realignment to an Acoma Street alignment, improvements to Santa Fe Drive, and refinement of the redevelopment plan to reduce or redistribute the traffic.

The City and County of Denver and the developers are proceeding with analysis to define a plan of action to address these concerns. The Valley Highway EIS has taken the following actions to incorporate the redevelopment and to provide flexibility as further detail is developed:

- Develop a traffic model that recognizes the land use changes
- Evaluate the impacts of the development on I-25 and associated interchange ramp connections at Broadway and Santa Fe Drive
- Develop alternatives at the interchanges with Broadway and Santa Fe Drive that offer the greatest flexibility for modification as the local street system and access modifications are implemented
- Avoid direct impacts to the properties in order to preserve options

The FHWA, CDOT, and City and County of Denver have reached an agreement, in principal, that allow the Valley Highway EIS to proceed consistent with its purpose and need but does not preclude opportunities for changes to the local street system and associated interchange reconfigurations as development plans advance. The understanding includes:

- CDOT will continue with the Valley Highway EIS with its current Purpose and Need
- CDOT will work with City and County of Denver to make the EIS and any future work in the area flexible and not prelude any major options in the Broadway Area
- The Broadway interchange carried forth in the EIS will be configured to operate at future no action levels
- CDOT will support future City and County of Denver efforts to enhance Broadway transportation after more specific plans are adopted by the City and County of Denver, developers, and Colorado Department or Public Health and Environment

In 2005, the City and County of Denver began a NEPA study to examine alternatives for transportation improvements along Broadway in this area. This study is looking at alternatives to improve north-south travel along the Broadway corridor between Louisiana Avenue and Exposition Avenue. As part of their process, the City and County of Denver study may look at additional options for the I-25/Broadway interchange that may be more compatible with improvements that may be identified for Broadway through that study.

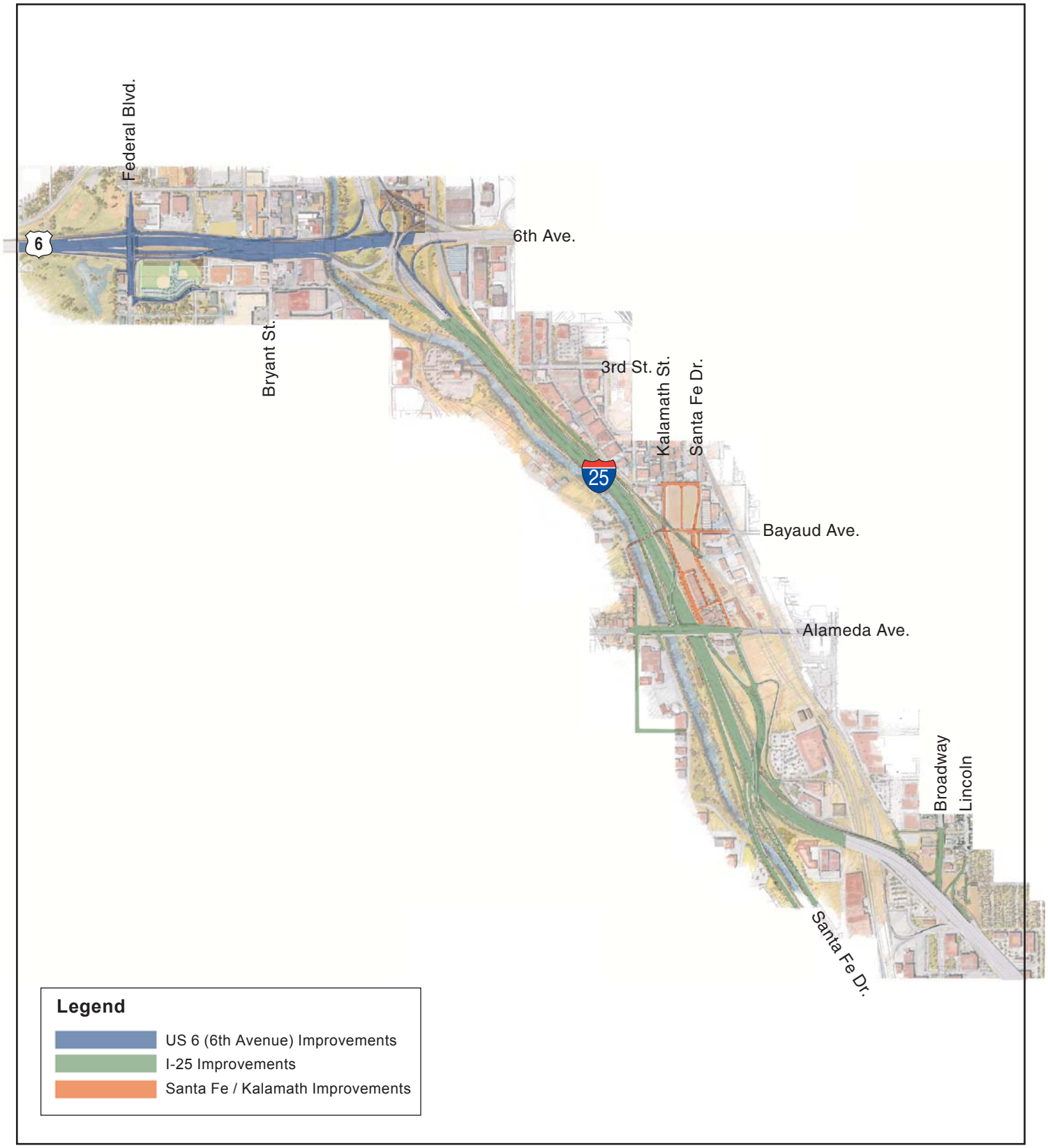
2.6 Preferred Alternative

CDOT and FHWA have identified a Preferred Alternative for the Valley Highway Project that combines elements of the three system alternates that were analyzed in the Draft EIS. The Preferred Alternative does not represent a new alternative, but rather a refinement based on the analysis contained in the Draft EIS and comments received from the public and agencies.
The Preferred Alternative is illustrated in **Figure 2-38** and includes the following major elements:

- **I-25 Mainline**: Widening of I-25 to provide a consistent section with four through lanes plus auxiliary lanes in each direction through the project area (these improvements were common to System Alternatives 1, 2, and 3 in the Draft EIS)
- **I-25/Broadway**: Tight diamond interchange (these improvements were included in System Alternative 3 in the Draft EIS)
- **I-25/Sante Fe Drive**: Single point urban interchange with a flyover ramp for northbound Santa Fe Drive to northbound I-25 (these improvements were common to System Alternatives 1, 2, and 3 in the Draft EIS)
- **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 (these improvements were included in System Alternative 1 in the Draft EIS)
- **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 through the project area (these improvements were included in System Alternative 2 in the Draft EIS)

The remainder of this section is organized as follows:

- **Section 2.6.1** describes the criteria used to identify the elements of the Preferred Alternative
- **Section 2.6.2** describes refinements made to the Preferred Alternative after identification of the major elements
- **Section 2.6.3** provides a detailed description of all elements of the Preferred Alternative



North

Preferred Alternative

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 2-38

2.6.1 Identification of the Preferred Alternative

After the Draft EIS public hearing and comment period was completed, CDOT and FHWA began an evaluation process to identify the Preferred Alternative. As expressed in the Draft EIS, CDOT and FHWA anticipated that the Preferred Alternative (identified in this Final EIS) would be one of the system alternatives (System Alternatives 1, 2, and 3) presented in the Draft EIS, or a combination of elements of two or more of the system alternatives.

As described in the Draft EIS (**Section 4.21.3** *Interchangeability of Elements within System Alternatives*), the elements (interchange and mainline configurations) are generally interchangeable between system alternatives, and therefore could be analyzed and selected independently. The Draft EIS **Section 4.21.3** *Interchangeability of Elements within System Alternatives* also contained a series of tables comparing the elements of the system alternatives.

CDOT and FHWA have identified the Preferred Alternative as meeting the project purpose and need, as well as providing a balance between transportation improvements and social/environmental considerations. In identifying the Preferred Alternative, CDOT and FHWA considered the following:

- The detailed analysis of alternatives and comparison of elements presented in the Draft EIS
- Public and agency comments regarding the alternatives
- A set of factors relevant to transportation decision-making within the NEPA framework

The decision factors considered for the selection of the Preferred Alternative by CDOT and FHWA included identifying the alternatives that would:

- best meet the project purpose and need
- be feasible to build
- not restrict consideration of alternatives for other reasonably foreseeable transportation improvements
- best meet the long-term vision
- meet the needs or objectives of social, economic and environmental concerns
- be the Environmentally Preferable Alternative in accordance with CEQ
- be the Least Environmentally Damaging Practicable Alternative in accordance with Clean Water Act Guidelines [404(b)(1)]
- best avoid and/or minimize harm to Section 4(f) properties
- have public acceptance
- be affordable or able to be financed over an acceptable period of time

The identification of the Preferred Alternative elements for I-25/Broadway, I-25/Alameda/Santa Fe/Kalamath, US 6 are described separately below.

2.6.1.1 IDENTIFICATION OF PREFERRED ALTERNATIVE ELEMENT FOR I-25/BROADWAY

As described above, a tight diamond interchange (which was included in System Alternative 3 in the Draft EIS) was identified to be included in the Preferred Alternative at I-25/ Broadway. This configuration was chosen for the following primary reasons:

- meets the purpose and need
- is feasible to build
- does not have unacceptable environmental impacts
- shows public acceptability
- is cost effective
- less surface street delay than No Action and the tight diamond with northbound Lincoln as is (System Alternative 1); similar to the diamond with southbound on-ramp grade separated (System Alternative 2) in this regard

Table 2-12 highlights the element selected for I-25 / Broadway using the comparison table that was presented in the Draft EIS.

Table 2-12 I-25 / Broadway Element Identified for the Preferred Alternative

	No Action	Tight Diamond with NB Lincoln as is (System Alternative 1)	Diamond with SB On-ramp Grade Separated (System Alternative 2)	Preferred Alternative Tight Diamond (System Alternative 3)
How well does this element alternative address the purpose and need goals?				
Lane Continuity and Balance	Lane continuity and balance not addressed	Provides lane continuity and balance on I-25	Provides lane continuity and balance on I-25	Provides lane continuity and balance on I-25
Transportation Demand and Operations	Total peak hour surface street delay = 788 vehicle-hours	Total peak hour surface street delay = 763 vehicle-hours	Total peak hour surface street delay = 525 vehicle-hours	Total peak hour surface street delay = 570 vehicle-hours
Inter-modal Relationships and Bicycle/Pedestrian Mobility	Dual-directional RTD access at Ohio and Kentucky Bicycle and pedestrian mobility provided via current facilities	RTD bus-only entrance at Ohio; dual-directional RTD access at Kentucky Bicycle and pedestrian mobility enhanced along Ohio by signalization, on-street bike lanes, improved sight distance, and refuges at intersections	RTD bus-only entrance at Ohio; dual-directional RTD access at Kentucky; NB I-25 traffic access to park-n-Ride via Exposition Bicycle and pedestrian mobility enhanced with improved sight distance at Broadway, less traffic at the Ohio/Broadway intersection, and refuges at intersections	Dual-directional RTD access at Exposition; bus-only RTD access at Ohio; right-in, right-out RTD access at Kentucky Bicycle and pedestrian mobility enhanced with consolidated ramp and Broadway intersection, improved sight distance at Broadway, and refuges at intersections
Safety	No safety improvements provided	20 year potential accident reduction of 330-400 total accidents; 70-100 less injury accidents	20 year potential accident reduction of 400-480 total accidents; 80-120 less injury accidents	20 year potential accident reduction of 330-400 total accidents; 70-100 less injury accidents
Roadway Deficiencies	Does not address NB Broadway geometric deficiencies or the NB I-25 on ramp tight radius	NB Broadway geometry and sight distance improved; NB loop ramp replaced with diamond ramp	NB Broadway geometry and sight distance improved; NB loop ramp replaced with diamond ramp	NB Broadway geometry and sight distance improved; NB loop ramp replaced with diamond ramp
Consolidated Main Line Crossing	NA	NA	NA	NA
Is this element alternative compatible with other planned transportation projects?				
South Broadway NEPA Study	Compatible with a full range of alternatives	Likely to be compatible with full range of alternatives	May not be compatible with full range of alternatives	May not be compatible with full range of alternatives
What are the key differentiating environmental impacts of the element alternative?*				
Right-of-Way and Displacements	No impacts	Displacement of 3 businesses	Displacement of 9 residences and 7 businesses	Displacement of 3 residences and 3 businesses
Parks and Recreation	No impacts to existing parks	No impacts to existing parks	No impacts to existing parks; land available for possible city park	No impacts to existing parks; land available for possible city park
Noise and Vibration	I-25 mainline and ramp traffic would cause 13 residences to exceed noise abatement criteria	I-25 mainline and ramp traffic would cause 13 residences to exceed noise abatement criteria	I-25 mainline and ramp traffic would cause 4 residences to exceed noise abatement criteria (9 residences displaced)	I-25 mainline and ramp traffic would cause 10 residences to exceed noise abatement criteria (3 residences displaced)
Historic Preservation	No impacts	No impacts; historic properties avoided	No impacts; historic properties avoided	No impacts; historic properties avoided
Hazardous Waste	No impact	Shallow excavations could encounter soil contamination	Tunnel would encounter contaminated soil and groundwater in area of on-going remediation; long-term treatment of seepage required	Shallow excavations could encounter soil contamination
What is the relative cost of the element alternative?				
Probable Cost	**0**	**$13 million**	**$141 million**	**$13 million**

2.6.1.2 IDENTIFICATION OF PREFERRED ALTERNATIVE ELEMENT FOR I-25/ ALAMEDA/SANTA FE/KALAMATH

As described above, an offset urban interchange at I-25/Alameda and railroad grade separation of Santa Fe Drive and Kalamath Streets along their existing alignments (which was included in System Alternative 1 in the Draft EIS) were identified to be included in the Preferred Alternative. This configuration was chosen for the following primary reasons:

- meets the purpose and need
- is feasible to build
- minimizes business displacements
- best avoids historic properties
- is cost effective

Table 2-13 highlights the element selected for this option using the comparison table that was presented in the Draft EIS.

Table 2-13 I-25/ Alameda/ Santa Fe/ Kalamath Element Identified for the Preferred Alternative

	No Action	Preferred Alternative Offset Urban/ Railroad Grade Separation on Existing Alignments (System Alternative1)	Half Diamond/ Santa Fe/Kalamath over Alameda /Railroad Grade Separation on Existing Alignments (System Alternative 2)	Offset Urban/ Santa Fe/Kalamath under Alameda/ Railroad Grade Separation on Existing Alignments (System Alternative 3)
How well does this element alternative address the purpose and need goals?				
Lane Continuity and Balance	Does not address lane continuity and balance	Provides lane continuity and balance on I-25	Provides lane continuity and balance on I-25	Provides lane continuity and balance on I-25
Transportation Demand and Operations	Total peak hour surface street delay = 641 vehicle-hours	Total peak hour surface street delay = 464 vehicle-hours	Total peak hour surface street delay = 331 vehicle-hours	Total peak hour surface street delay = 293 vehicle-hours
Inter-modal Relationships and Bicycle/Pedestrian Mobility	Bicycle and pedestrian mobility provided via current facilities	10-ft north side sidewalk and 8-ft south side sidewalk on Alameda from Lipan to Santa Fe; existing north side sidewalk remains between Santa Fe and Cherokee Grade separated pedestrian/bicycle structure at Bayaud	10-ft north side sidewalk and 8-ft south side sidewalk on Alameda from Lipan to Cherokee Grade separation of Santa Fe/Kalamath and Alameda reduces conflicts between vehicles and pedestrians/bicyclists Grade separated pedestrian/bicycle structure at Bayaud	10-ft north side and south side sidewalks on Alameda from Lipan to Cherokee Grade separation of Santa Fe/Kalamath and Alameda reduces conflicts between vehicles and pedestrians/bicyclists Grade separated pedestrian/bicycle structure at Bayaud
Safety	No safety improvements provided	20 year potential accident reduction of 60-90 total accidents; 10-30 less injury accidents at the interchange ramps	20 year potential accident reduction of 60-90 total accidents; 10-30 less injury accidents at the interchange ramps 20 year estimated accident reduction of 520-640 total accidents; 120-160 less injury accidents at Alameda and Santa Fe/Kalamath intersections	20 year potential accident reduction of 60-90 total accidents; 10-30 less injury accidents at the interchange ramps 20 year estimated accident reduction of 520-640 total accidents; 120-160 less injury accidents at Alameda and Santa Fe/Kalamath intersections
Roadway Deficiencies	Does not address geometric deficiencies	Standard 11-ft lanes provided between Lipan and Santa Fe on Alameda Alameda sump drainage improved	Standard 11-ft lanes between Lipan and Cherokee on Alameda Third approach lane and right turn lane at EB approach to Santa Fe/ Kalamath Alameda sump drainage improved	Standard 11-ft lanes between Lipan and Cherokee on Alameda Third approach lane and right turn lane at WB approach to Santa Fe/ Kalamath Third through lane on EB Alameda from Santa Fe to Cherokee Alameda sump drainage improved
Consolidated Main Line Crossing	No improvement in at-grade crossing	Grade separation of Consolidated Main Line with Santa Fe/Kalamath	Grade separation of Consolidated Main Line with Santa Fe/Kalamath	Grade separation of Consolidated Main Line with Santa Fe/Kalamath

Table 2-13 *I-25/ Alameda/ Santa Fe/ Kalamath Element Identified for the Preferred Alternative (continued)*

	No Action	Preferred Alternative Offset Urban/ Railroad Grade Separation on Existing Alignments (System Alternative 1)	Half Diamond/ Santa Fe/Kalamath over Alameda /Railroad Grade Separation on Existing Alignments (System Alternative 2)	Offset Urban/Santa Fe/Kalamath under Alameda/ Railroad Grade Separation on Existing Alignments (System Alternative 3)
Is this element alternative compatible with other planned transportation projects?				
No other projects planned	NA	NA	NA	NA
What are the key differentiating environmental impacts of the element alternative?*				
Right-of-Way and Displacements	No impacts	Displacement of 13 businesses	Displacement of 31 businesses	Displacement of 23 businesses
Aesthetics and Urban Design	Existing aging structures remain	Replacement of aging structures will improve aesthetics	Replacement of aging structures will improve aesthetics	Replacement of aging structures will improve aesthetics
Noise and Vibration	4 residences exceed noise abatement criteria, primarily due to Santa Fe and Kalamath traffic	4 residences exceed noise abatement criteria, primarily due to Santa Fe and Kalamath traffic; grade separation reduces train horns	4 residences exceed noise abatement criteria, primarily due to Santa Fe and Kalamath traffic; grade separation reduces train horns	4 residences exceed noise abatement criteria, primarily due to Santa Fe and Kalamath traffic; grade separation reduces train horns
Historic Preservation	No impacts	No impacts	Replacement of 3 historic bridges and 1 historic underpass structure	Replacement of 3 historic bridges and 1 historic underpass structure
Floodplains and Flooding	Continued flooding at I-25 and Alameda	Encroachment into floodplain from southbound I-25 off-ramp to Alameda	Encroachment into floodplain from southbound I-25 off-ramp to Alameda	Encroachment into floodplain from southbound I-25 off-ramp at to Alameda Pumping system required for drainage of underpass of Santa Fe/Kalamath beneath Alameda
Wetlands	No impacts	0.070 acres of wetland impacted	0.077 acres of wetland impacted	0.037 acres of wetland impacted
Hazardous Waste	No impacts	Groundwater and/or soil contamination may be encountered during excavation	Groundwater and/or soil contamination may be encountered during excavation	Groundwater and soil contamination would be encountered during excavation for grade separation; long-term treatment of seepage may be required
What is the relative cost of the element alternative?				
Probable Cost	0	$81 million	$135 million	$147 million

2.6.1.3 IDENTIFICATION OF PREFERRED ALTERNATIVE ELEMENT FOR US 6

As described above, the following element improvements identified to be included in the Preferred Alternative for 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 through the project area

These improvements, which were included in System Alternative 2 in the Draft EIS, were identified for the Preferred Alternative for the following primary reasons:

- meets the purpose and need
- is feasible to build
- provides a standard interchange configuration
- is cost effective
- provides substantial operations and safety benefits on US 6 over other alternatives
- structure does not preclude lane addition on Federal if approved as separate action

Table 2-14 highlights the element selected for US 6 using the comparison table that was presented in the Draft EIS.

Table 2-14 US 6/ Federal/ Bryant Element Identified for the Preferred Alternative

	No Action	Bryant Relocation to Decatur Street (System Alternative 1)	Preferred Alternative Diamond at Federal (System Alternative 2)	Single Point Urban at Federal (System Alternative 3)
How well does this element alternative address the purpose and need goals?				
Lane Continuity and Balance	Does not address lane continuity and balance	3 through lanes and two auxiliary lanes provided	2 through lanes and 3 auxiliary lanes on collector-distributor road provided	3 through lanes and two auxiliary lanes provided
Transportation Demand and Operations	Total peak hour surface street delay = 572 vehicle-hours Total peak hour freeway delay = 2,400 vehicle-hours	Total peak hour surface street delay = 285 vehicle-hours Total peak hour freeway delay = 1,809 vehicle-hours	Total peak hour surface street delay = 285 vehicle-hours Total peak hour freeway delay = 1,537 vehicle-hours	Total peak hour surface street delay = 299 vehicle-hours Total peak hour freeway delay = 2,041 vehicle-hours
Inter-modal Relationships and Bicycle/Pedestrian Mobility	NA	NA	NA	NA
Safety	No safety improvements provided	20 year potential accident reduction of 300-380 total accidents; 60-100 less injury accidents	20 year potential accident reduction of 1,550-1,750 total accidents; 340-420 less injury accidents	20 year potential accident reduction of 1,050-1,190 total accidents; 230-290 less injury accidents
Roadway Deficiencies	Does not address geometric deficiencies	Improved ramp terminal spacing achieved through rerouting of Bryant access to Decatur Street; mainline weaves remain	Improved ramp terminal spacing achieved through rerouting of Bryant access to Federal; weaves managed through collector-distributor road	Improved ramp terminal spacing achieved through rerouting of Bryant access to Federal; mainline weaves remain
Consolidated Main Line Crossing	NA	NA	NA	NA
Is this element alternative compatible with other planned transportation projects?				
Federal Corridor Study	Compatible with a full range of alternatives	Compatible with a full range of alternatives	Compatible with a full range of alternatives	Compatible with a full range of alternatives; structure modification more difficult than other alternatives
What are the key differentiating environmental impacts of the element alternative?*				
Right-of-Way and Displacements	No impacts	Displacement of 1 business (partial)	Displacement of 6 businesses	Displacement of 5 businesses
Parks and Recreation	No impacts	Requires use of small parts of Barnum, Barnum North and Barnum East parks	Requires substantial reconfiguration of Barnum East and small parts of Barnum and Barnum North parks	Requires use of small parts of Barnum, Barnum North and Barnum East parks
Aesthetics and Urban Design	Existing aging structures remain	Replacement of aging structures will improve aesthetics	Replacement of aging structures will improve aesthetics	Replacement of aging structures will improve aesthetics
Noise and Vibration	US 6 mainline and ramp traffic cause 8 residences to exceed noise abatement criteria	US 6 mainline and ramp traffic cause 8 residences to exceed noise abatement criteria	US 6 mainline and ramp traffic cause 3 residences to exceed noise abatement criteria	US 6 mainline and ramp traffic cause 3 residences to exceed noise abatement criteria
Floodplains	No impacts	US 6 bridge over South Platte raised above floodplain	US 6 bridge over South Platte raised above floodplain	US 6 bridge over South Platte raised above floodplain
Hazardous Waste	No impacts	Contaminated groundwater and/or soil may be encountered	Contaminated groundwater and/or soil may be encountered	Contaminated groundwater and/or soil may be encountered
What is the relative cost of the element alternative?				
Probable Cost	0	$87 million	$98 million	$93 million

2.6.2 Refinement of the Preferred Alternative

Following identification of the elements of the Preferred Alternative, CDOT and FHWA reviewed the elements in light of the comments that had been received on the Draft EIS to establish whether any refinements should be made to the elements to address specific concerns. This resulted in a number of refinements being made to the Preferred Alternative. These are identified in **Table 2-15**, along with the reason for the refinement.

Table 2-15 Preferred Alternative Refinements

Location	Refinement to Preferred Alternative	Reason for Refinement
I-25/Broadway	Retain signal and full movement operation at Broadway and Kentucky Avenue (instead of right-in right-out access)	Improved access to RTD station and park-n-Ride; avoids introduction of buses onto Exposition between Broadway and Lincoln St.
I-25/Alameda	Add auxiliary lane on westbound Alameda Avenue from Kalamath Street to northbound I-25 ramp	Improved operations
I-25/Alameda	Add auxiliary right turn lane on northbound Lipan Street at Alameda Avenue	Improved operations
Santa Fe/ Kalamath/ CML	Alignment refinements to Santa Fe Drive at CML and refinement of the bicycle/pedestrian bridge connection	To enhance constructability and local business access
US 6/Federal	Reposition braided ramp entrance to south side of combined ramp	Improved operations realized through easier weaving; ease of signing; and improved driver expectancy
US 6/Federal	Reconfiguration/reconstruction of Barnum East Park with the acquisition of additional property	To maintain and enhance park function to minimizes harm to the park

These refinements have been included in the Preferred Alternative as presented and analyzed in the remainder of this Final EIS.

2.6.3 Description of the Preferred Alternative

This section presents a detailed description of the Preferred Alternative, with the refinements identified above. The Preferred Alternative balances transportation improvements meeting the project purpose and need with social and environmental considerations. Relative to the decision factors identified in **Section 2.6.1**, CDOT and FHWA have concluded that the Preferred Alternative:

- meet the project purpose and need
- is feasible to build
- does not restrict consideration of alternatives for other reasonably foreseeable transportation improvements
- meets the long-term vision
- meets the needs or objectives of social, economic and environmental concerns
- is the Environmentally Preferable Alternative in accordance with CEQ
- is the Least Environmentally Damaging Practicable Alternative in accordance with Clean Water Act Guidelines [404(b)(1)]
- best avoids and/or minimize harm to Section 4(f) properties
- has public acceptance

As with the other system alternatives analyzed, the funding is not currently identified in the 2030 Regional Transportation Plan to fully fund the Preferred Alternative. For this reason, CDOT and FHWA plan to implement the Preferred Alternative in phases, as described in **Chapter 7** *Phased Project Implementation*.

2.6.3.1 I-25 MAINLINE – PREFERRED ALTERNATIVE

The Preferred Alternative would generally follow the current I-25 highway alignment. I-25 would match the new Broadway viaduct at its northern edge, split the middle of the two existing bridges at Santa Fe Drive, and offset to the east north of Alameda Avenue. North of Alameda Avenue, the Consolidated Main Line railroad tracks would be realigned to the east possibly up to 65 feet. The Consolidated Main Line is the section of track through Denver on which the Burlington Northern and Santa Fe Railroad and Union Pacific Railroad share operations. This alignment would provide the following benefits:

- Matches the Broadway viaduct and T-REX currently in construction
- Facilitates reconstruction and widening of I-25 in and around the Santa Fe Drive interchange
- Avoids the South Platte River north of Alameda Avenue by holding the western edge of the existing mainline and expanding to the east
- Preserves or upgrades the South Platte River trail that is adjacent to the river and/or the highway

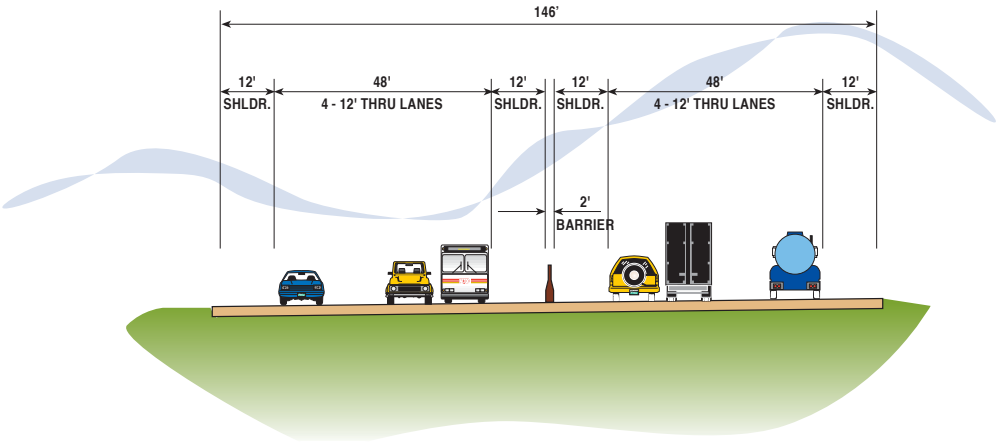
The Preferred Alternative would result in four through lanes plus auxiliary lanes in each direction through the project area. The existing auxiliary lane between US 6 and Alameda Avenue on southbound I-25 would be extended to Santa Fe Drive. Wider (12-feet) inside and outside shoulders would be provided. This would provide the following benefits:

- Alleviates the bottleneck of three lanes in each direction between Broadway and Santa Fe Drive created once T-REX is complete
- Addresses the lane balance issue between Santa Fe Drive and US 6
- Provides a safety zone for stranded motorists
- Offers space for emergency vehicles and incident management needs

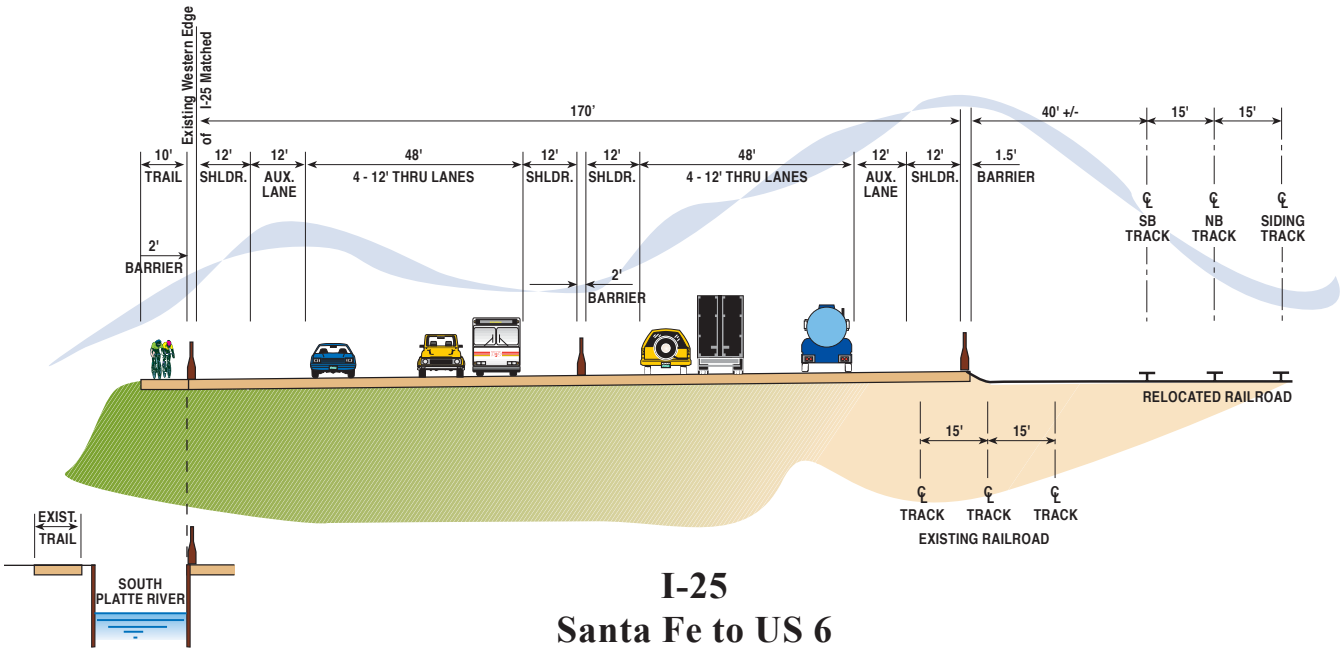
Typical sections of the new roadway are provided in **Figure 2-39**. Water quality improvements are included in the Preferred Alternatives, which include collection of roadway rainfall runoff in storm sewer pipes directed to water quality ponds before discharge into the South Platte River. See **Section 4.9** for more information.

2.6.3.2 2.6.3.2 ARTERIAL STREETS – PREFERRED ALTERNATIVE

Figure 2-40 illustrates some common typical sections that would be provided for arterial streets in the project corridor with the Preferred Alternative.



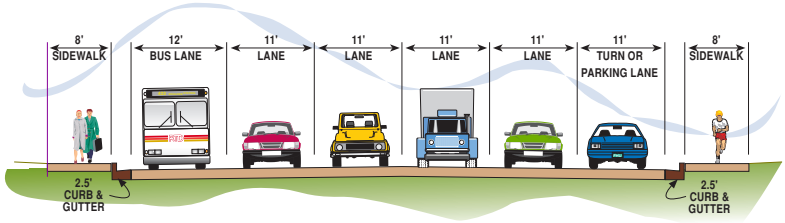
I-25
Broadway to Santa Fe



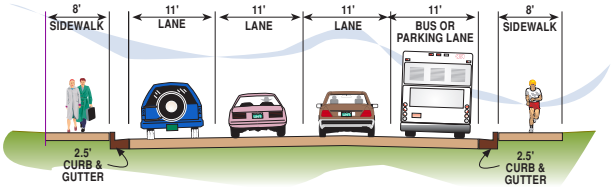
I-25
Santa Fe to US 6

Preferred Alternative
I-25 Typical Sections

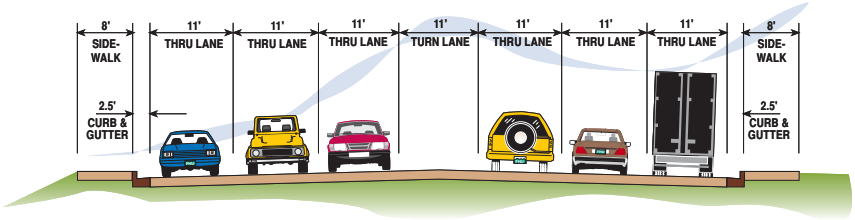
Figure 2-39



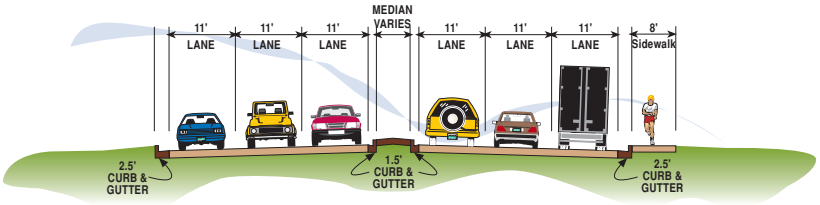
BROADWAY SECTION



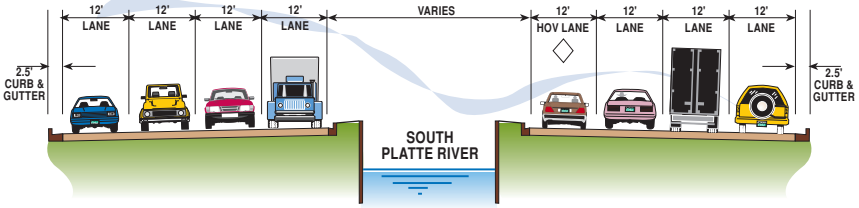
LINCOLN SECTION



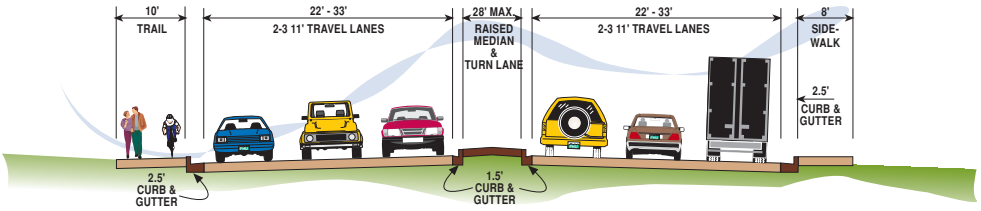
BROADWAY SOUTH OF I-25
TENNESSEE TO I-25



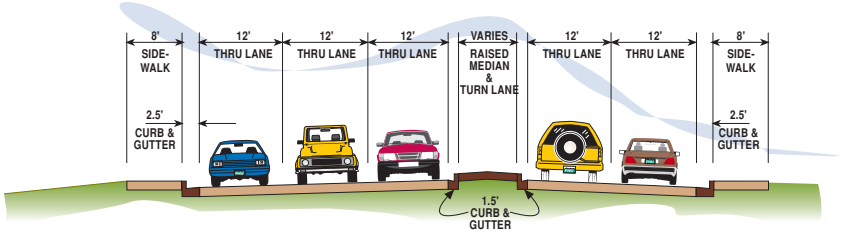
US 85 / SANTA FE SECTION
NORTH OF I-25



US 85 / SANTA FE SECTION
SOUTH OF I-25



ALAMEDA SECTION



FEDERAL SECTION

Arterial Street Typical Sections with the Preferred Alternative

Figure 2-40

2.6.3.3 BROADWAY INTERCHANGE – PREFERRED ALTERNATIVE

The Broadway interchange in the Preferred Alternative would be highly compressed with ramps pulled in closely to I-25 as a "tight diamond" interchange (see **Figure 2-41**). The northbound off-ramp to northbound Lincoln Street would require three right turn lanes and would be traffic signal controlled. A cul-de-sac would be provided for the existing residential properties south of Ohio Avenue on Lincoln Street that remain with this alternative. Ohio Avenue would access Lincoln Street via this cul-de-sac.

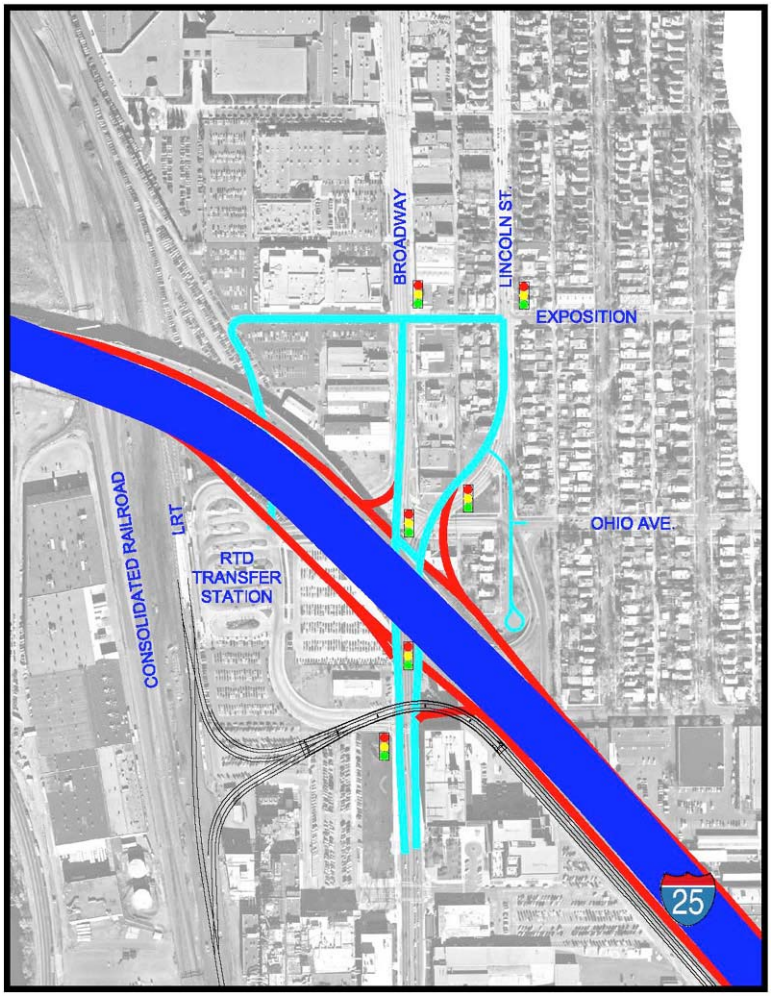


Figure 2-41 Preferred Alternative, Broadway Interchange

Pedestrian improvements would include upgrading sidewalks to full City standard widths and offsets, integrating ADA-compliant crossings, and upgrading traffic signal actuation and timing to current technologies and standards. Pedestrian/bicycle traffic from West Washington Park along Ohio Avenue would be routed to the traffic signal at the intersection of the ramp and Lincoln Street, cross with the aid of pedestrian signals, and continue across Broadway (see **Figure 2-42**). The Preferred Alternative would eliminate the high-speed off-ramp conflict that exists today with pedestrians and bicyclists at Ohio Avenue.

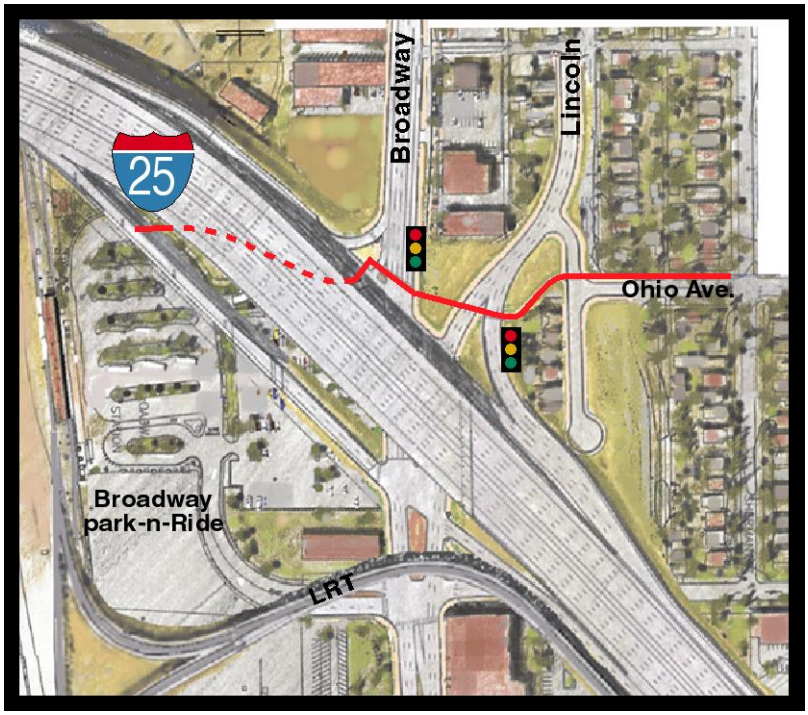


Figure 2-42 Preferred Alternative, Broadway Bicycle/Pedestrian Facilities

2.6.3.4 SANTA FE DRIVE INTERCHANGE – PREFERRED ALTERNATIVE

With the Preferred Alternative, the northbound Santa Fe Drive to northbound I-25 ramp would be constructed as a two-lane wide directional flyover ramp merging on the right side of I-25 (see **Figure 2-43**). This would achieve a current standard to have slow speed ramp traffic merge on the right side of the highway. The return move, southbound I-25 to southbound Santa Fe Drive, would also be two lanes wide.

The south-side ramp connections (from/to the south) would be constructed as a partial single-point urban interchange. This would replace the current southbound left side on-ramp with a right side on-ramp, in accordance with current standards. This would provide a more compact interchange design with a single signalized intersection. Access to commercial properties east of the highway would be via a consolidated connection located midway between I-25 and Alameda Avenue.

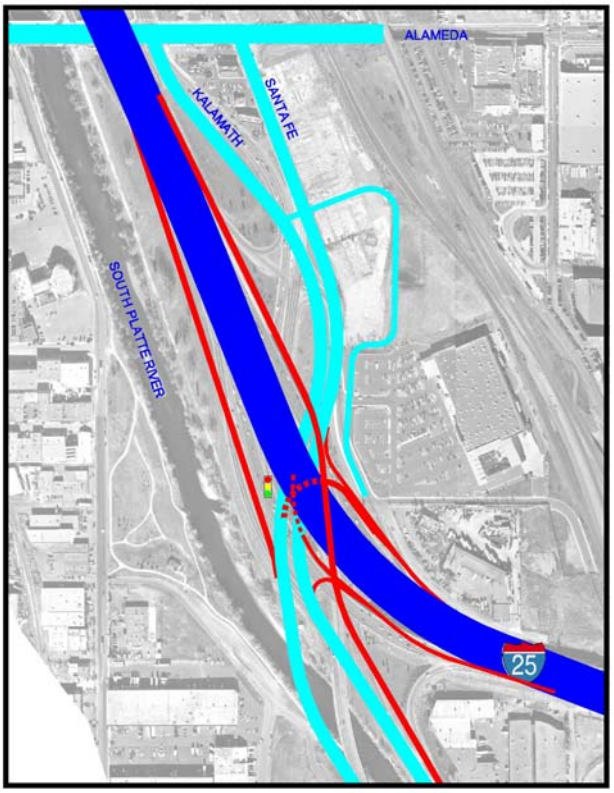


Figure 2-43 Preferred Alternative, Santa Fe Drive Interchange

2.6.3.5 ALAMEDA AVENUE INTERCHANGE – PREFERRED ALTERNATIVE

With the Preferred Alternative, a partial offset urban interchange would be constructed at Alameda Avenue (see **Figure 2-44**). In this configuration, both the southbound I-25 off-ramp and northbound I-25 on-ramp would intersect Alameda Avenue at the same signalized intersection; on the west side of I-25. This interchange would offer benefits in that it only has one signalized intersection and can be kept close to the highway to avoid impacts on adjacent properties.

The offset to the west would offer some additional benefits in that it avoids Kalamath Street and the existing businesses on the east side of I-25 between Kalamath Street and Santa Fe Drive, allowing the intersections of Alameda Avenue and Santa Fe Drive/Kalamath Street to remain in their current configurations. The Preferred Alternative would not require the replacement of Alameda Avenue from Santa Fe Drive to Cherokee Street and the associated retaining walls and bridges through this reach. A simulation of the interchange is shown in **Figure 2-45**.

The intersections of Alameda Avenue and South Platte River Drive, and Alameda Avenue and Lipan Street would be reconfigured in the Preferred Alternative. South Platte River Drive would be converted to a right in/right out south of Alameda Avenue and realigned to follow Lipan Street north of Alameda Avenue. This would result in construction of a wider road north of Alameda Avenue, improvements to the intersection and traffic signal at Lipan Street and Alameda Avenue, and enhancements to Lipan Street and Virginia Avenue south of Alameda Avenue.

Pedestrian and bicycle improvements would include the bike path and sidewalk on either side of Alameda Avenue, ADA-compliant crossings, and upgraded traffic signal pedestrian actuation.

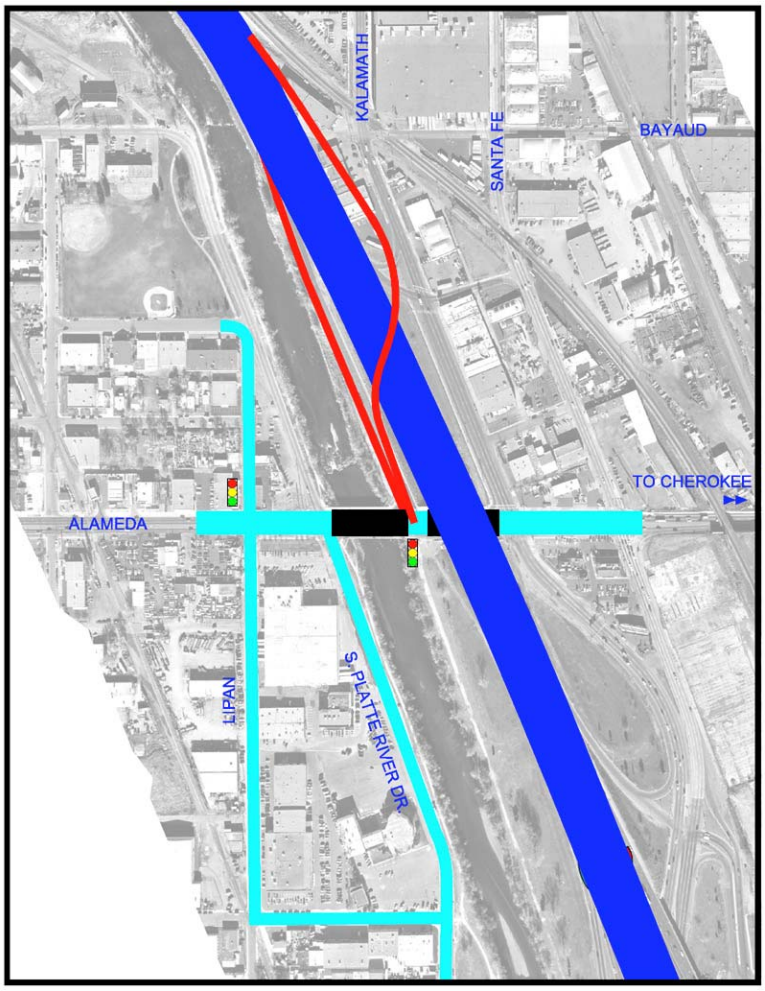
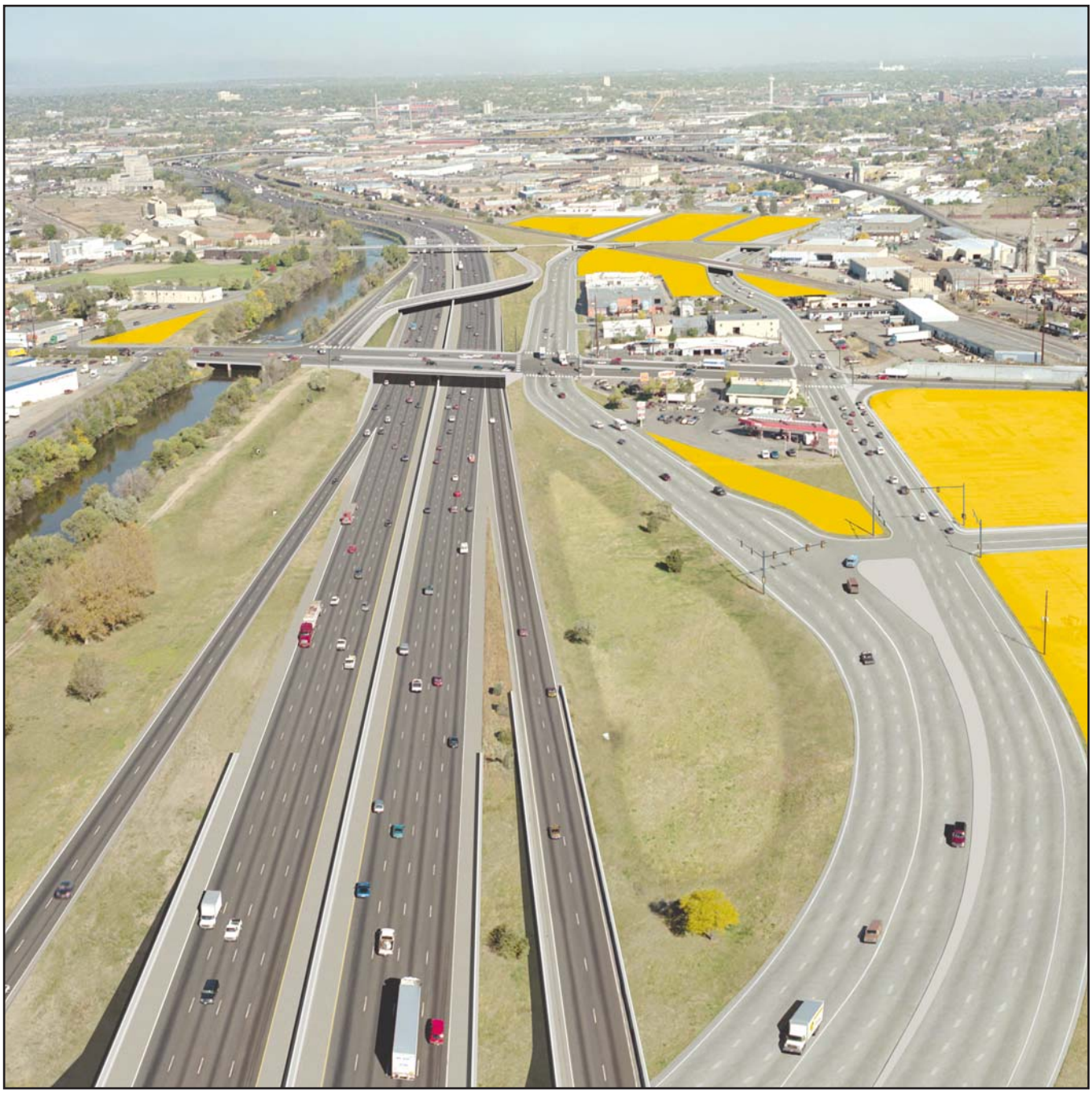


Figure 2-44 Preferred Alternative, Alameda Avenue Interchange



Legend

See Section 4.1 for Land Use Concept

North

Preferred Alternative Simulation
Santa Fe / Kalamath / Alameda

2.6.3.6 SANTA FE/KALAMATH/CML GRADE SEPARATION – PREFERRED ALTERNATIVE

In the Preferred Alternative, Santa Fe Drive and Kalamath Street would go under the Consolidated Main Line railroad and generally follow the existing street alignments (see **Figure 2-46**). To accomplish this and preserve as many of the businesses as possible, the alignment of Santa Fe Drive would be shifted slightly and retaining walls would parallel the roads. Sidewalks would be integrated into the design. (see **Figure 2-47**).

A pedestrian/bicycle structure would be incorporated into the Preferred Alternative along Bayaud Avenue (see **Figure 2-48**). This alignment would be consistent with the City's master plan (CCD, 2002b) for this crossing. The structure would be lengthy (approximately 1700 feet), starting between the light rail crossing and Santa Fe Drive along Bayaud Avenue going over Santa Fe Drive, the Consolidated Main Line railroad, Kalamath Street, I-25, and the South Platte River.

Eight-foot wide attached sidewalks would be integrated on both sides of Santa Fe Drive and Kalamath Street north of Alameda Avenue to Ellsworth Boulevard. South of Alameda Avenue, an 8-foot attached sidewalk would follow the new access road adjacent to the Home Depot and cross under I-25 at the Broadway viaduct east of Santa Fe Drive.

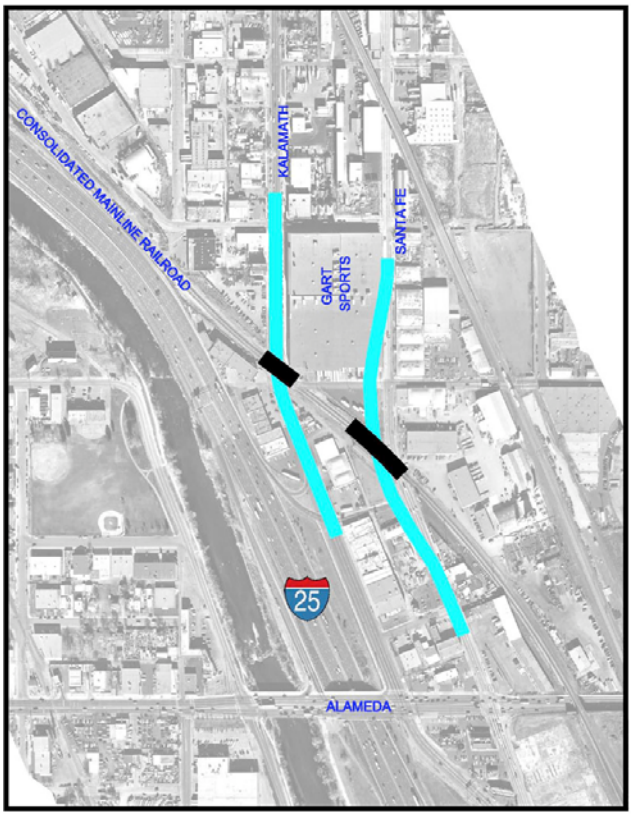


Figure 2-46 Preferred Alternative, Santa Fe Drive and Kalamath Street Grade Separation

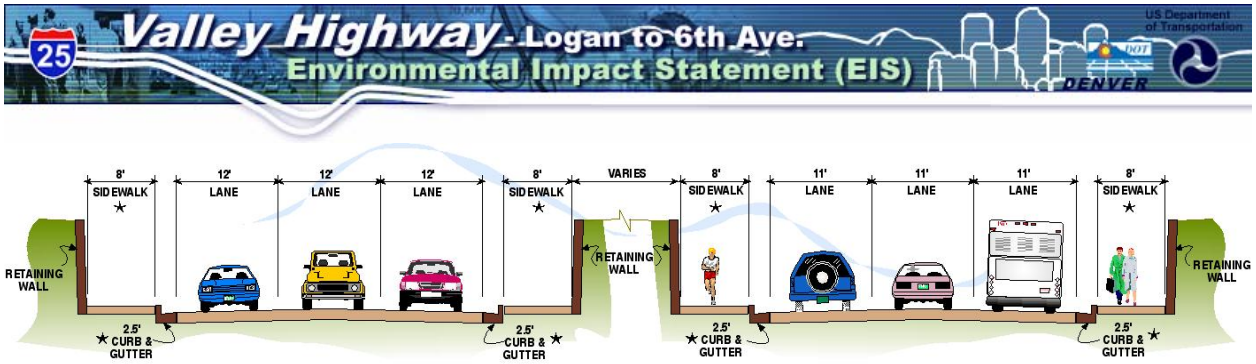


Figure 2-47 Preferred Alternative, Santa Fe Drive and Kalamath Street Typical Section

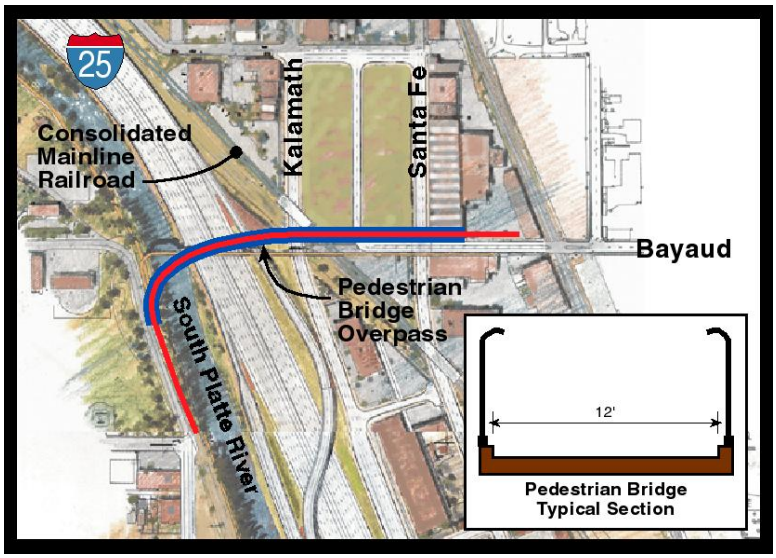


Figure 2-48 Preferred Alternative, Bayaud Avenue Bicycle/Pedestrian Structure

2.6.3.7 I-25/US 6 INTERCHANGE AND – PREFERRED ALTERNATIVE

With the Preferred Alternative, the southeast quadrant ramp would be reconfigured to provide a uniform radius to improve safety and operational speeds (see **Figure 2-49**). The loop ramp in the northeast quadrant would be enlarged and a second lane would be provided to accommodate traffic needs and provide for improved operational speeds. Both of these ramps would be accessed by a collector-distributor road. The collector-distributor road would allow for ramp deceleration and turning to occur without impacting the mainline highway.

The northwest quadrant would be reconfigured to provide a second lane to accommodate the traffic needs. The southwest quadrant ramp would include extending an additional lane to the south of the ramp's connection with I-25 (as represented by a dashed line on **Figure 2-49**) to better manage the merging of traffic from east and westbound US 6 to southbound I-25.

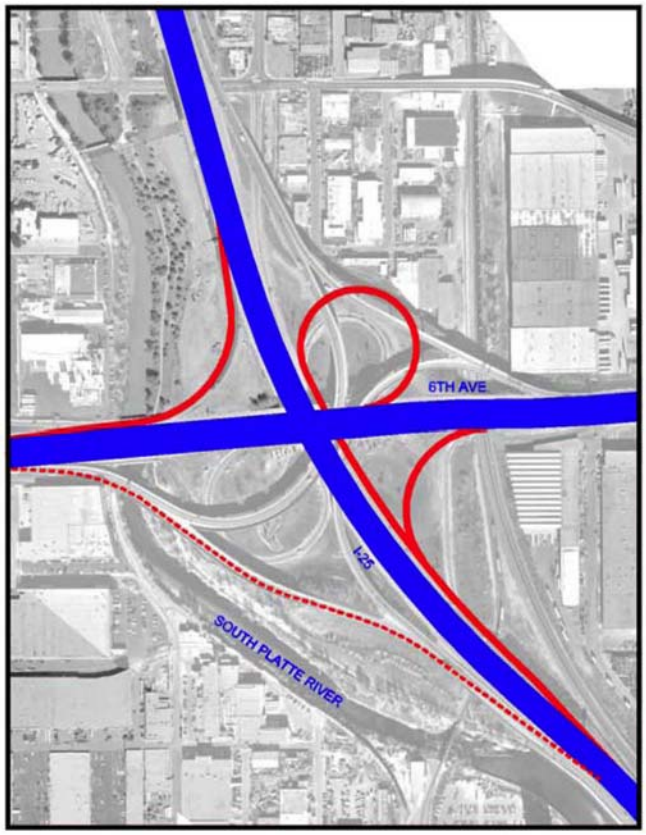


Figure 2-49 Preferred Alternative, US 6/I-25 Interchange

2.6.3.8 US 6/Federal Boulevard Interchange and Mainline– Preferred Alternative

The Preferred Alternative would reconstruct the Federal Boulevard interchange as a standard diamond interchange with ramps in all four quadrants and traffic signals at the ends of the ramps at Federal Boulevard (see **Figure 2-50**). Access to and from Bryant Street would be accommodated through connections to the eastside Federal Boulevard ramps. The existing westbound off-ramp to Bryant Street would be eliminated. Traffic wanting to make that move would exit at Federal Boulevard and either take 5th, 7th, or 8th Avenues. Federal Boulevard would be widened to accommodate double left-turn lanes at the intersections with the US 6 on- and off-ramps. A braided eastbound on-ramp would be provided that would allow traffic continuing east on US 6 to avoid mixing with traffic destined for I-25.

Traffic on US 6 between I-25 and Federal Boulevard would be managed with collector-distributor roads (see **Figure 2-51**). Access to the highway would no longer come from 5th Avenue, therefore, converting it to a local street use. Federal Boulevard would be widened to accommodate double left-turn lanes at the intersections with US 6 on- and off-ramps.

The vertical profile for US 6 would be modified in the Preferred Alternative to provide a larger opening over the South Platte River. This would provide for improved river hydrology and offer an additional benefit to South Platte River Trail users. Bridges would be replaced/constructed at I-25 and the South Platte River, Bayaud Avenue (new pedestrian/bicycle bridges), Federal Boulevard and Lowell Boulevard.

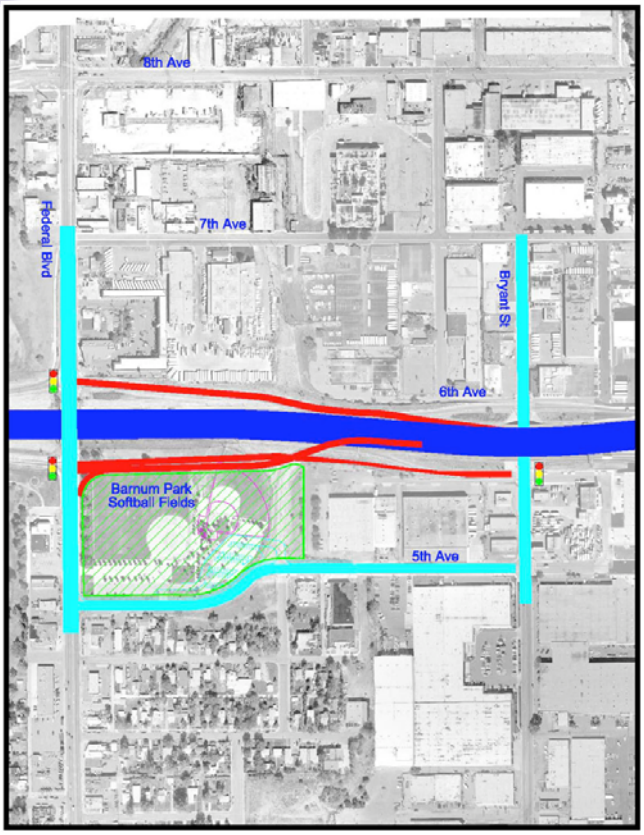


Figure 2-50 Preferred Alternative, US 6/Federal Boulevard/Bryant Street Interchange

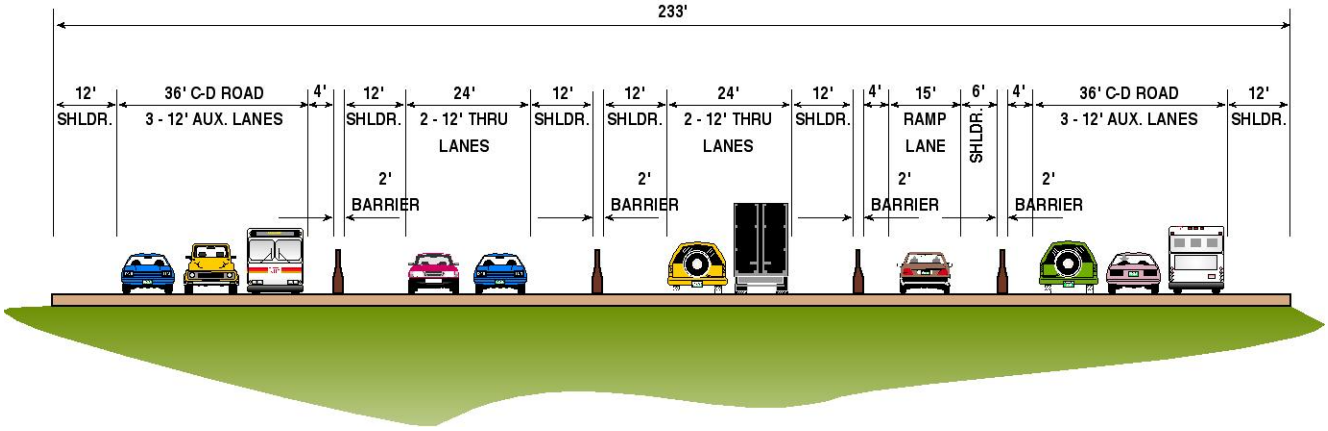


Figure 2-51 Preferred Alternative, US 6 Typical Section, I-25 to Federal Boulevard

2.6.3.9 SOUTH PLATTE RIVER TRAIL – PREFERRED ALTERNATIVE

The South Platte River Trail is a vibrant regional trail that offers both commuter and recreational bicycle and pedestrian mobility north and south through the metropolitan area. The trail starts at Chatfield Reservoir in Douglas County in the southern metropolitan Denver area and parallels the South Platte River through the City of Denver. Through the project corridor, it is generally follows the South Platte River with connections to local streets at Mississippi and Alameda Avenue. The trail is a major destination for residents from adjacent neighborhoods east and west of the highway.

The Preferred Alternative would include the following improvements to the trail:

- Enhanced connectivity to the trail at Alameda Avenue
- Upgraded trail section parallel to I-25 between 2nd and 3rd Avenue to include widening and shoulder enhancements and screening to shield the trail from I-25
- Improved horizontal and vertical clearance at the US 6 underpass
- Improved horizontal and vertical clearance at the Santa Fe Drive bridge over the South Platte River south of I-25

2.6.3.10 PREFERRED ALTERNATIVE OPINION OF PROBABLE COST

The approximate capital cost of the Preferred Alternative would be $294 million in year 2004 dollars

TABLE OF CONTENTS

Page

3.0 TRANSPORTATION ANALYSIS 3-1

3.1 Existing Roadway and Traffic Conditions 3-1

3.2 Compatibility with Transportation Plans and Programmed Projects 3-8

3.3 Future Travel Demand 3-9

3.4 Freeway and Street Safety 3-33

3.5 Transit / HOV Access 3-34

3.6 Pedestrian and Bicycle Facilities 3-35

3.7 Freight and Rail Operations 3-37

LIST OF FIGURES

Page

Figure 3-1 Traffic Analysis Study Area 3-2
Figure 3-2 System Traffic Movements, Existing Conditions 3-4
Figure 3-3 Existing Conditions: Logan Street to Alameda Avenue, Levels of Service and Lane Geometry 3-6
Figure 3-4 Existing Conditions: US 6 Area, Levels of Service and Lane Geometry 3-7
Figure 3-5 System Traffic Movements, Year 2025 Forecasts 3-11
Figure 3-6 No Action Alternative: Logan Street to Alameda Avenue, 2025 Levels of Service and Lane Geometry 3-13
Figure 3-7 No Action Alternative: US 6 Area, 2025 Levels of Service and Lane Geometry 3-14
Figure 3-8 System Alternative 1: Logan Street to Alameda Avenue 2025 AM/PM Peak Hour Levels of Service and Lane Geometry 3-16
Figure 3-9 System Alternative 1: US 6 2025 AM/PM Peak Hour Levels of Service and Lane Geometry 3-17
Figure 3-10 System Alternative 2: Logan Street to Alameda Avenue 2025 AM/PM Peak Hour Level of Service and Lane Geometry 3-18
Figure 3-11 System Alternative 2: US 6 2025 AM/PM Peak Hour Levels of Service and Lane Geometry 3-19
Figure 3-12 System Alternative 3: Logan Street to Alameda Avenue 2025 AM/PM Peak Hour Levels of Service and Lane Geometry 3-20
Figure 3-13 System Alternative 3: US 6 2025 AM/PM Peak Hour Levels of Service and Lane Geometry 3-21
Figure 3-14 Preferred Alternative: Logan Street to Alameda Avenue 2025 AM/PM Hour Levels of Service and Lane Geometry 3-22
Figure 3-15 Preferred Alternative: US 6 2025 AM/PM Peak Hour Levels of Service and Lane Geometry 3-23
Figure 3-16 CORSIM Network 2025 Delay Comparisons 3-26
Figure 3-17 Surface Street Subnetwork Delay Comparisons 3-29

LIST OF TABLES

Page

Table 3-1 System Alternative Treatment of Bryant Street Access....3-10
Table 3-2 Existing and 2025 No Action Daily Hours of Delay....3-15
Table 3-3 Daily Hours of Congestion at Signalized Intersections....3-24
Table 3-4 Daily Hours of Congestion along I-25 Freeway Sections....3-25
Table 3-5 Peak Hour Travel Rate Index Comparison....3-27
Table 3-6 Relative Operational Performance of System Alternatives....3-33
Table 3-7 Relative Safety Performance of System Alternatives....3-34

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3.0 TRANSPORTATION ANALYSIS

This chapter presents the improvements and impacts of the No Action Alternative and system alternatives (System Alternatives 1, 2, 3, and the Preferred Alternative) on traffic safety, transit service, surface street and freeway circulation, freight and rail service, and pedestrian/bicycle facilities.

Traffic forecasts presented and evaluated in this chapter are Year 2025 forecasts and are based upon the DRCOG 2025 regional travel demand forecasting model with modifications discussed in this chapter. Comparison between these forecasts and those based on the newer DRCOG 2030 model show that forecasted traffic levels are similar, so that the 2025 forecasts used as a basis of analysis for this EIS remain valid.

3.1 Existing Roadway and Traffic Conditions

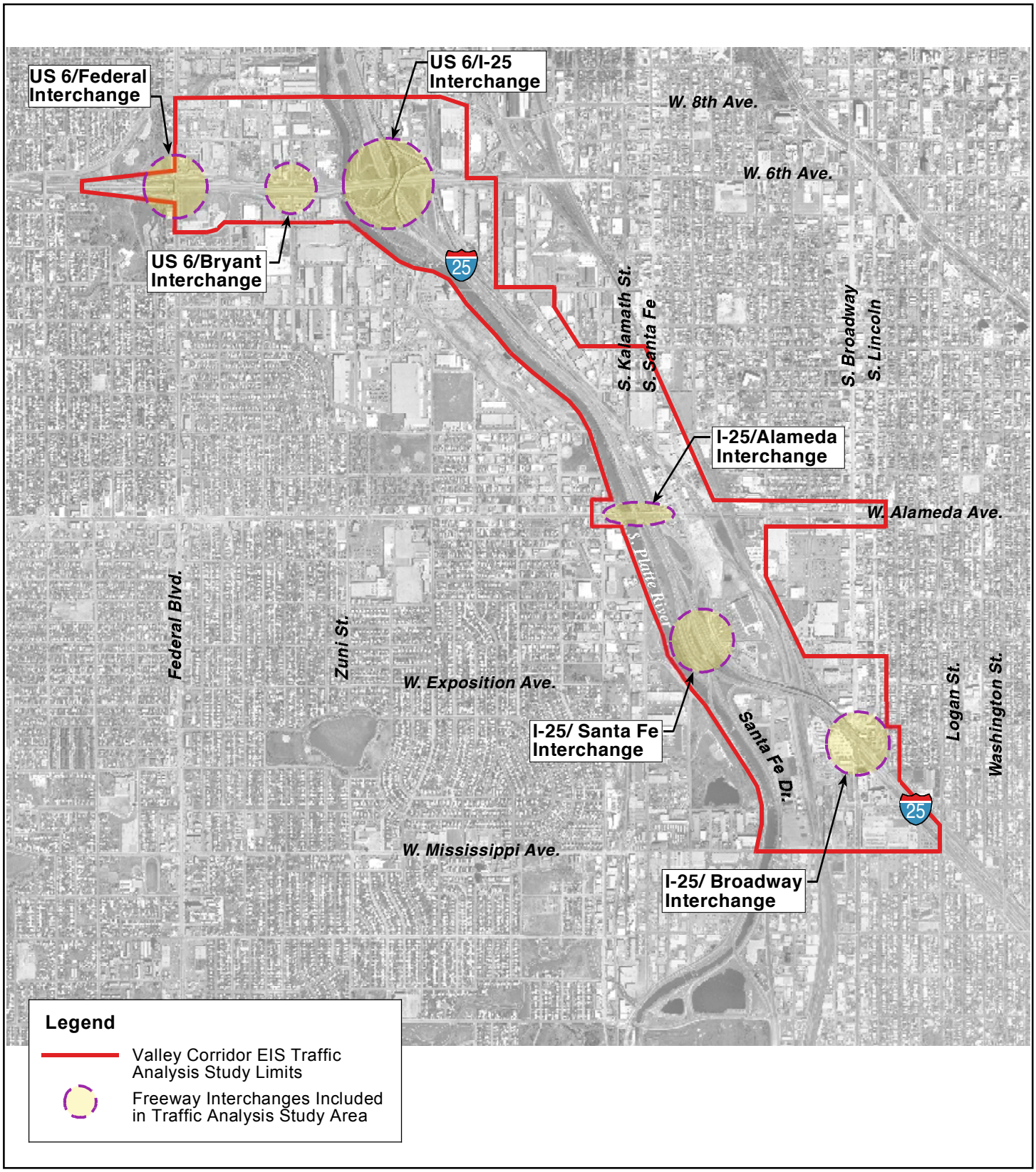
3.1.1 Transportation Network

3.1.1.1 ROADWAY NETWORK

The traffic analysis study area is depicted on **Figure 3-1**. Based on regional planning categories, roadways within the study area include:

- Freeways: Freeways provide for interregional travel and carry the greatest proportion of regional trips. Access is restricted to grade-separated interchanges. Freeways within the study area include I-25, a freeway which serves as the principal north-south traffic carrier through the center of the Denver metropolitan area, and US 6 (6th Avenue), which runs east-west through the northern part of the study corridor.
- Major Regional Arterial: Major regional arterials carry a substantial number of regional trips in support of the freeway network while serving limited local access. Santa Fe Drive south of I-25 is a major regional arterial within the study area.
- Principal Arterials: Principal arterials carry regional trips while serving local access. Principal arterials within the study area include Broadway, Lincoln Street, Federal Boulevard, Santa Fe Drive and Kalamath Street north of I-25, and Alameda Avenue.
- Minor Arterials: Minor arterials both serve through traffic and facilitate local access. Mississippi Avenue is a minor arterial within the study area.

In addition to facilitating vehicular travel, the arterial roadways serve pedestrian, bicycle, and transit modes. The characteristics of these modes of travel within the study area are discussed below.



North

Traffic Analysis Study Area

Figure 3-1

3.1.1.2 PEDESTRIAN / BICYCLE MOBILITY

The quality of pedestrian and bicycle facilities within the project corridor is mixed. I-25, the Consolidated Main Line railroad, and the South Platte River act as barriers to east-west pedestrian and bicycle mobility through the corridor. North-south mobility is provided via the South Platte River trail and local street systems. The project corridor street system has a mix of adequate sidewalk and other pedestrian and bicycle amenities and multiple limitation to pedestrian and bicycle mobility, including gaps in sidewalk continuity, busy at-grade intersections, and narrow sidewalks.

More detailed information regarding pedestrian and bicycle mobility is provided in **Chapter 1** *Purpose and Need* and **Chapter 2** *Alternatives*.

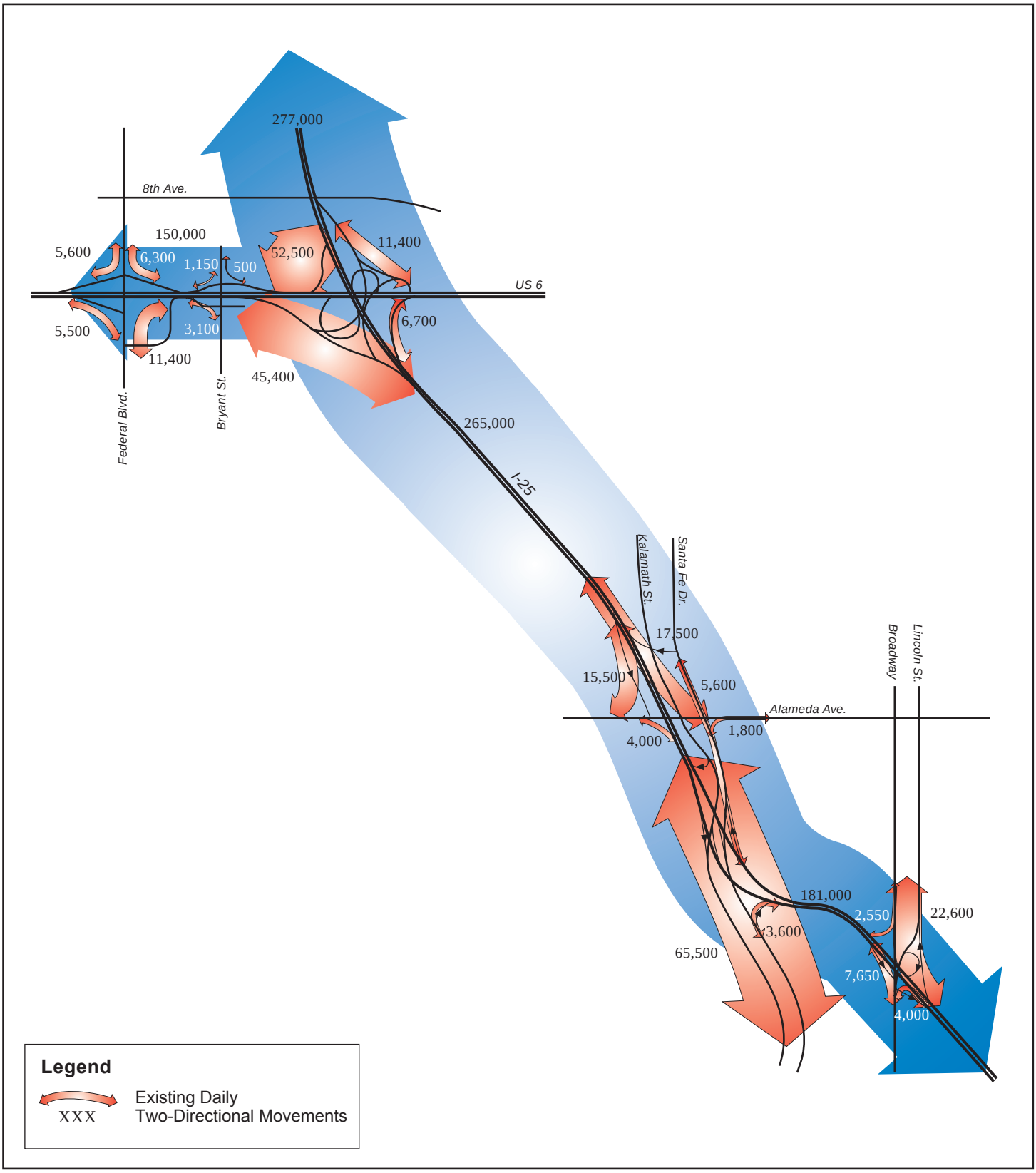
3.1.1.3 TRANSIT ROUTES

There is an existing network of regional, express, and local bus routes that serve the study area. The right side lanes of Broadway and Lincoln Street, between I-25 and Downtown Denver, are designated for buses and right-turning vehicles only during peak periods. RTD is now operating LRT along Santa Fe Drive from Mineral to downtown Denver and is currently constructing and implementing the Southeast Corridor of the LRT network. RTD plans to modify some bus routes and schedules to complement Southeast Corridor LRT completion in November 2006. This will include revised feeder bus routes, headways, and LRT station access/circulation. Additional changes to RTD's operations are likely in the future in conjunction with FasTracks implementation and other transit system improvements that may be implemented over time. More information about the bus and LRT network is provided in **Chapter 1** *Purpose and Need*.

3.1.2 Existing Travel Demand

Existing traffic volumes were assembled from counts obtained by Counter Measures Inc., between 1999 and 2001, before the beginning of the T-REX project. Peak-hour traffic counts were conducted along mainline I-25 south of the Broadway interchange in June 1999. These mainline freeway traffic counts were factored to daily volumes based on a peak-hour percentage of approximately 7 percent. Daily surface street traffic counts indicate that several roadways within the study area exhibit vehicle flows in excess of 30,000 vehicles per day, including Lincoln Street, Broadway, Alameda Avenue, Santa Fe/Kalamath, US 6, Federal Boulevard, and 8th Avenue.

Figure 3-2 depicts existing two-way daily traffic movements. Wider arrows indicate a greater traffic volume. Daily traffic volumes on I-25 are approximately 265,000 vehicles per day north of the Santa Fe Drive interchange and range from 170,000 to 200,000 vehicles per day south of the Santa Fe Drive Interchange. North of US 6, mainline I-25 exhibits daily flows in excess of 275,000 vehicles per day. Peak-hour volumes show that mainline I-25 traffic is relatively balanced by direction through the study area. Percentages of traffic occurring in the peak hour are approximately 7 percent of daily traffic, and traffic flows remain heavy over long periods of the day. Traffic movements connecting US 6 west with I-25 north and south exceed 40,000 vehicles per day, as does the connection between Santa Fe Drive to the south and I-25 to the north.



North

System Traffic Movements
Existing Conditions

Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Figure 3-2

3.1.3 Existing Traffic Operations

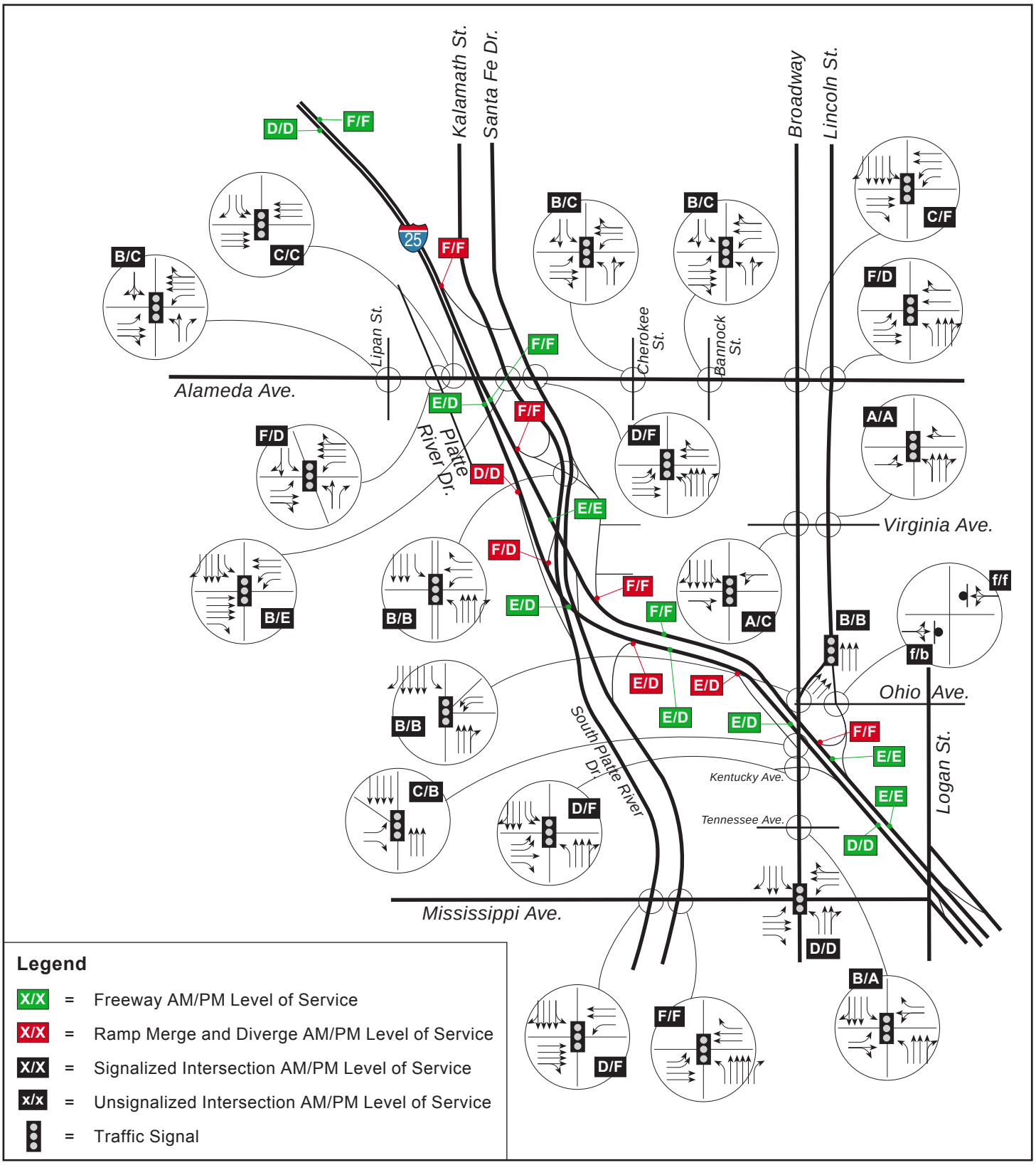
Analysis of traffic operations in the study area used methods documented in the Transportation Research Board's *Highway Capacity Manual, 2000 Edition*. The result of such an analysis is a level-of-service (LOS) rating, which is a qualitative assessment of the traffic flow for a given roadway facility. LOS is described by a letter designation ranging from "A" to "F" with LOS A representing essentially uninterrupted flow, and LOS F representing a breakdown of traffic flow with excessive congestion and delay. For analysis of a signalized intersection, a LOS rating is calculated for the intersection as a whole.

LOS analysis of an unsignalized intersection yields an LOS rating for each critical vehicle movement. A LOS rating may also be calculated for mainline, merge, diverge, or weaving sections along a major freeway. Freeway and unsignalized intersection LOS were calculated using highway capacity software. The Synchro software analysis package and methodology was used to calculate LOS ratings for signalized intersections throughout the study area. Results of the LOS analysis of existing conditions in the study area are shown on **Figure 3-3** (Logan Street to Alameda Avenue) and **Figure 3-4** (US 6 Area).

For the purposes of this analysis, LOS F operations are considered congested. Signalized LOS analyses of 27 intersections were performed based on existing peak-hour conditions. Of these, five were shown to operate at LOS F during either the AM or PM peak hour (see **Figure 3-3**). Congested locations within the traffic analysis study area include the Alameda Avenue intersections with Broadway and Lincoln Avenue and the Mississippi Avenue intersections with Santa Fe Drive and South Platte River Drive.

Results of operational analyses along the I-25 and US 6 freeways indicate that northbound traffic on I-25 exhibits poorer operational conditions than traffic in the southbound direction. Congested operating conditions along mainline I-25 create difficulty for ramp merge and diverge movements. Operational results for ramp sections reflect poor mainline traffic operations. Weaving sections along US 6 west of I-25 operate at LOS E/F during the peak hours (see **Figure 3-4**).

Existing traffic operations were also evaluated using the Corridor Simulation (CORSIM) traffic microsimulation tool. CORSIM is a tool within the Traffic Software Integrated System (TSIS) suite of software created by the FHWA. Microsimulation enables the user to input a roadway network consisting of freeways and surface streets and simulate the flow of individual vehicles through the network. Network measures-of-effectiveness, such as vehicle delay, travel time, and average speed, may be gathered and summarized. Results of the CORSIM analysis of existing conditions are presented in comparison with the No Action Alternative in **Section 3.3.2** *Traffic Operations*.

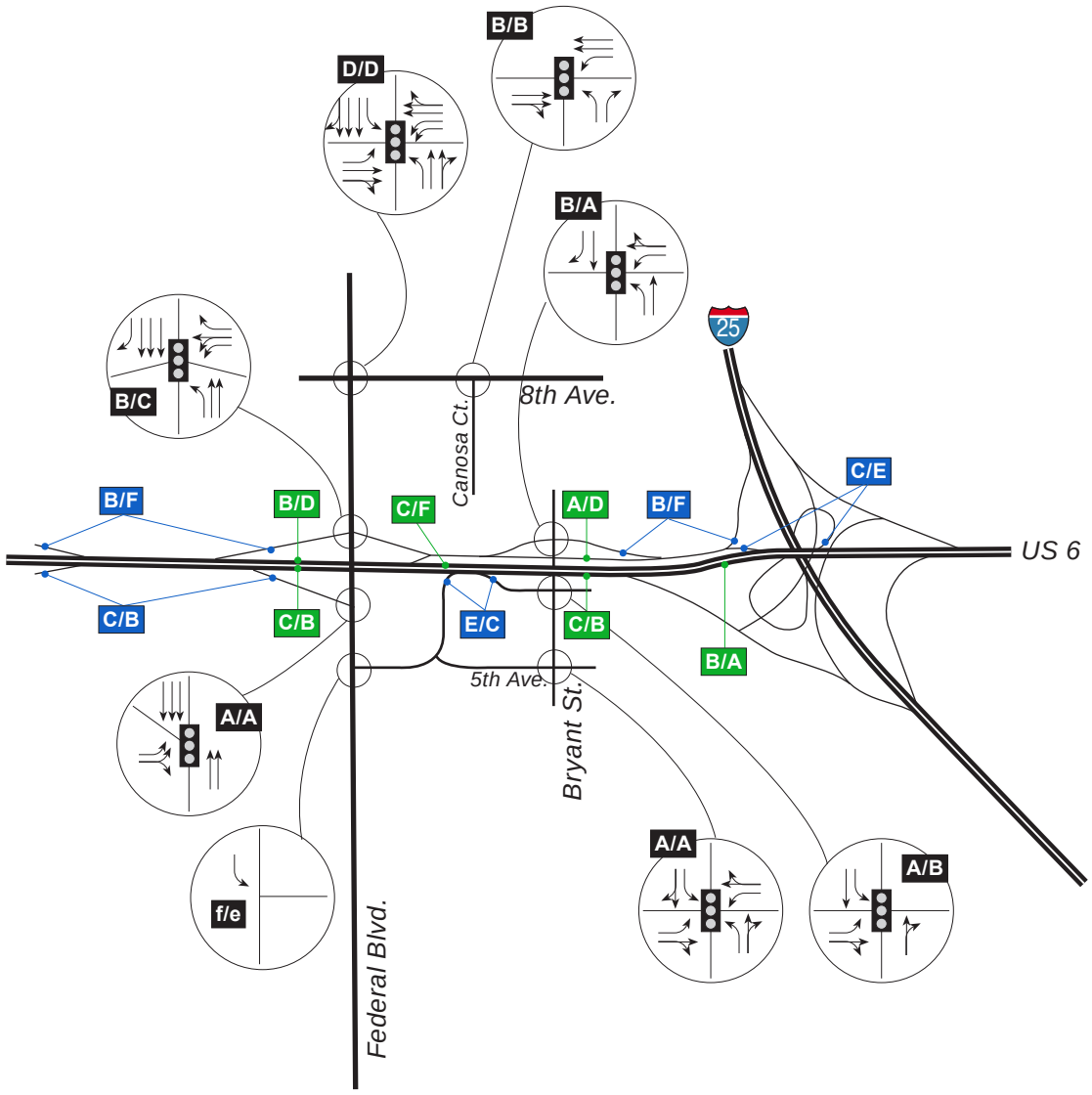


Existing Conditions: Logan Street to Alameda Avenue Levels of Service and Lane Geometry

North

Valley Highway Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 3-3



Legend

X/X	=	Freeway AM/PM Level of Service
X/X	=	Weaving Section AM/PM Level of Service
X/X	=	Signalized Intersection AM/PM Level of Service
x/x	=	Unsignalized Intersection AM/PM Level of Service
	=	Traffic Signal

North

Existing Conditions: US 6 Area Levels of Service and Lane Geometry

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 3-4

3.1.3.1 EXISTING TRAFFIC SAFETY

The Transportation Equity Act for the 21st Century requires explicit consideration of safety in the transportation planning process. A detailed safety evaluation of the Valley Highway study corridor was undertaken and is included in the *Traffic Safety Report* and addendum (CDOT, 2005; CDOT, 2006a). The analysis employed the concepts of Level of Service of Safety (LOSS) and pattern recognition to test the frequency and severity of crashes throughout the corridor. The LOSS formulation categorizes four levels of "potential for accident reduction," I through IV. Level IV indicates an accident history significantly greater than expected for a given roadway type, thus possessing a high potential for accident reduction. Level I indicates a better than expected safety performance and thus a low potential for accident reduction.

LOSS analysis shows that all portions of I-25 in the study area are performing at LOSS IV both from the frequency as well as severity perspective. US 6 is performing at LOSS III for both frequency and severity. These results suggest a high potential for accident reduction in the study area. Safety problems on I-25 and US 6 can be related to congestion, recurrent and frequent queuing, close interchange spacing, and geometric characteristics of the existing alignment of I-25. Enhancements that provide better geometrics and improved traffic operations, including improved lane balance, ramp metering, full shoulders, and improved ramp spacing, have the potential to significantly improve safety performance. Most of the safety problems on interchange ramps may be attributed to congestion and backups on mainline I-25 and US 6 that result in rear end and sideswipe same-direction accidents.

3.2 Compatibility with Transportation Plans and Programmed Projects

The system alternatives developed for this EIS are generally compatible with area transportation plans and projects. Several such plans or projects are cited below.

- Transportation Expansion Project (T-REX project): The Broadway viaduct forms the north terminus of this major roadway expansion project, which will widen I-25 to accommodate an eight-lane section south of Broadway. The system alternatives will continue this eight-lane section through the study area.
- Regional Transportation Plans: Improvements to be implemented for the Valley Highway project will be consistent with an adopted, conforming regional transportation plan (RTP) before a Record of Decision is issued. Improvements identified in this Final EIS are planned to be implemented in phases. CDOT has recently submitted to DRCOG amendments to the 2030 RTP. These amendments will place Phase 1 in the fiscally-constrained element of the RTP and place the entire Preferred Alternative in the Metro Vision (fiscally unconstrained) Plan. Improvements in specific subsequent phases will need to be included in a conforming RTP in order for a Record of Decision for that phase to be issued.
- Planned Roadway Improvement Projects: The proposed widening of Federal Boulevard to six lanes between Alameda Avenue and US 6 and the completion of the Broadway viaduct were included in the traffic modeling of future conditions in the study area.
- *Blueprint Denver* (CCD, 2002c): The transportation component of *Blueprint Denver* emphasizes the need to manage the effectiveness of Denver's roadway network, first by investing in operational and reconstruction improvements. The Valley Highway EIS system alternatives, including the Preferred Alternative, are consistent with that goal by proposing improvements that improve vehicular travel conditions along both freeways and surface

streets throughout the study area. Pedestrian accommodations in *Blueprint Denver* and the *Pedestrian Master Plan* are also reflected in the system alternatives.

- *Denver Bicycle Master Plan Update 2001*(CCD, 2002a): Several improvements identified in the *Denver Bicycle Master Plan* are reflected in the Valley Highway system alternatives:
  - The Bayaud Avenue connection across I-25 is incorporated within each of the system alternatives
  - The system alternatives incorporate improvements to the South Platte River Trail, including enhanced connectivity to the South Platte River trail at Alameda Avenue and improved horizontal and vertical clearances at the US 6 and Santa Fe Drive South Platte River Trail structures
- *Federal Boulevard Corridor Plan and Federal Boulevard EA:* A conceptual corridor plan was previously prepared by the City and County of Denver. An Environmental Assessment is currently being prepared by CDOT for Federal Boulevard from Alameda Avenue to 5th Avenue. The improvements identified in this Final EIS will not preclude other improvements envisioned for the corridor. For example, the Federal Boulevard interchange and bridge would allow future widening with minimal reconstruction.

3.3 Future Travel Demand

DRCOG, as the metropolitan planning organization for Denver, is responsible for developing regional transportation plans and travel demand forecasting models for the metropolitan area. Year 2025 travel demand forecasts for this project were developed using DRCOG's most current Year 2025 model (the 2025-BA model version). The DRCOG regional forecasting process is based on demographic data and forecasts for each of 1530 transportation analysis zones (TAZs) in the regional modeling area. In all, 30 TAZs are within or immediately adjacent to the Valley Highway study area.

Traffic forecasts were first prepared based on a Valley Highway "no action" scenario, with the *2025 Regional Transportation Plan* background roadway network in place. The same travel demand levels were reallocated to represent the system alternatives under evaluation in the Valley Highway EIS process.

For the EIS modeling effort, the one DRCOG TAZ that covers the bulk of the Cherokee Development area (bounded by Santa Fe Drive, I-25, Broadway, and Mississippi Avenue) was subdivided into three TAZs (TAZs 180, 1531, and 1532) to provide a more refined view of the access configurations being evaluated for this development area. For the three TAZs in the Cherokee Development area and TAZ number 235 (the Gates Redevelopment area), revised household and employment forecasts were substituted based on current plans for the redevelopment of these two areas. Developers of these two parcels are working with the City and County of Denver to develop mixed use, transit oriented developments that are anticipated to generate substantially higher numbers of vehicle trips than the continued Gates Rubber operation that is reflected in DRCOG 2025 forecasts.

Based on discussions among DRCOG, CDOT, FHWA, and City and County of Denver representatives, it was determined that demographic forecasts for these areas should reflect current development plans in order to provide more realistic traffic forecasts as a basis for roadway improvement planning. DRCOG has developed Year 2030 demographic forecasts for

these areas that reflect current development plans. For this EIS, an estimate of 75 percent of the Cherokee and Gates Development plans was included in the forecasting process and a sensitivity check to DRCOG's 2030 demographic forecasts was performed. The two were found to be reasonably compatible relative both to land use forecasts and resulting traffic forecasts. A detailed comparison is provided in the Traffic Report Addendum (FHU, 2006b). That comparison supports the validity of using the 2025 model forecast as a basis for EIS analysis.

Figure 3-5 depicts Year 2025 two-way daily traffic volumes for movements within the study area. A comparison of these forecasts with existing traffic volumes shows forecasted growth of 10 percent to more than 20 percent on freeway segments of I-25 and US 6. Growth projections on arterial street segments range from little or no growth on certain ramps and roadway segments to sharp growth at other locations. Specifically, traffic volumes are projected to grow by more than 30 percent along segments of Broadway and Santa Fe Drive serving the anticipated future redevelopment of Gates, Cherokee Denver, and other sites.

3.3.1 Traffic Volumes

Year 2025 traffic volume forecasts were developed for each of the system alternatives by modifying the No Action forecasts discussed in **Section 3.3** *Future Travel Demand*. Access to I-25 provided by the system alternatives is comparable to the existing level of access. Therefore, projected peak-hour traffic volumes for the No Action Alternative in Year 2025 were directly adapted to the roadway and interchange configurations proposed with each system alternative.

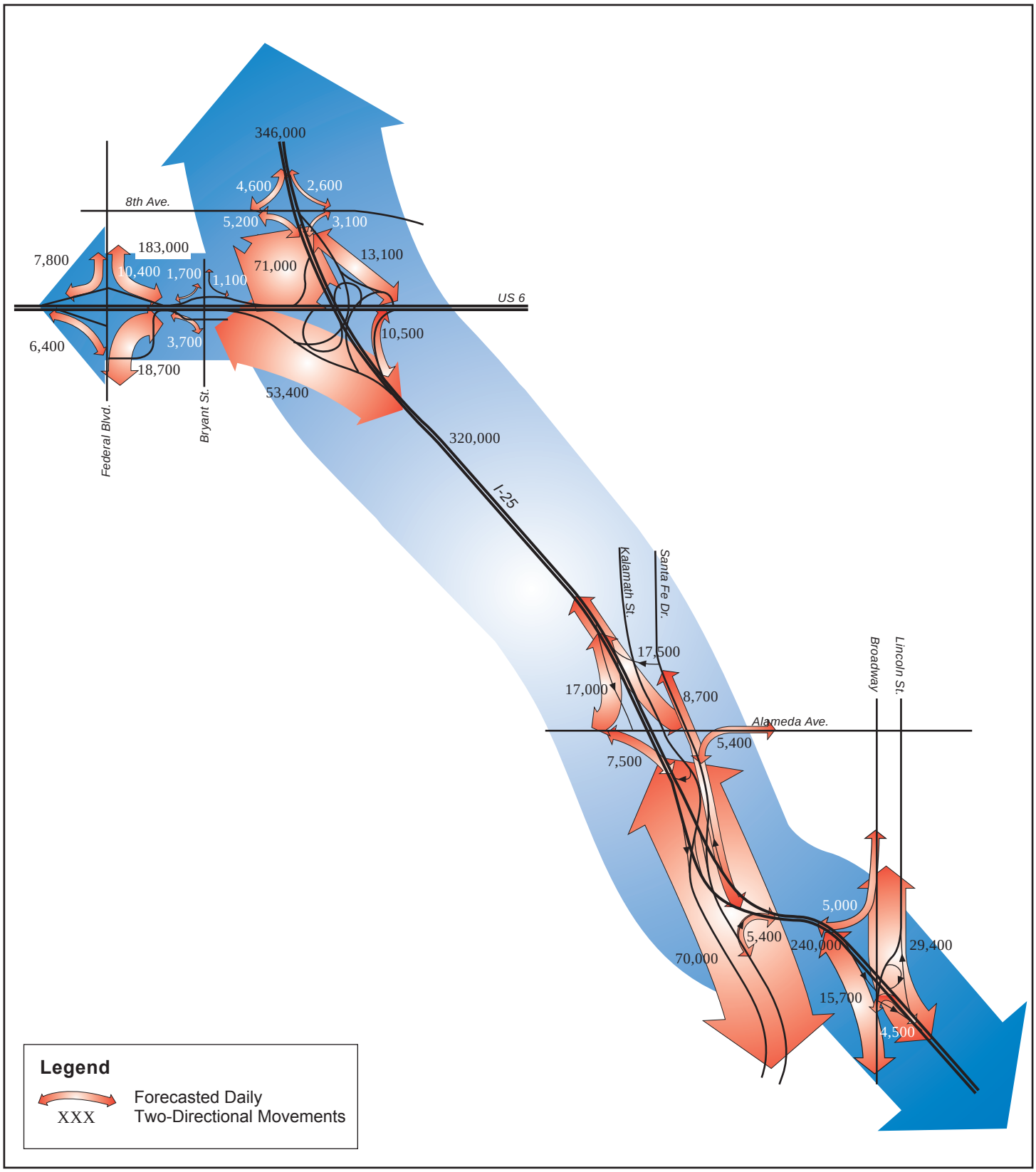
The one exception to this general consistency of access occurs along US 6. Implementation of System Alternatives 2, 3, and the Preferred Alternative would adjust US 6 access between Federal Boulevard and I-25. A common element in the system alternatives for the US 6, Federal Boulevard to I-25 study area was the removal of one or more of the existing US 6/Bryant Street ramps. **Table 3-1** identifies which Bryant Street ramps were eliminated in each of the system alternatives.

Table 3-1 System Alternative Treatment of Bryant Street Access

System Alternatives	US 6 / Bryant Street Ramps			
	EB US 6 On-Ramp	EB US 6 Off-Ramp	WB US 6 On-Ramp	WB US 6 Off-Ramp
System Alternative 1[a]	Retained at Decatur	Retained at Decatur	Retained at Decatur	Retained at Decatur
System Alternative 2	Closed – Diverted to Federal Boulevard	Retained Using Federal Supplemental Ramp	Retained Using Federal Supplemental Ramp	Closed – Diverted to Federal Boulevard
System Alternative 3	Closed – Diverted to Federal Boulevard	Closed – Diverted to Federal Boulevard	Closed – Diverted to Federal Boulevard	Closed – Diverted to Federal Boulevard
Preferred Alternative[b]	Closed – Diverted to Federal Boulevard	Retained Using Federal Supplemental Ramp	Retained Using Federal Supplemental Ramp	Closed – Diverted to Federal Boulevard

[a]System Alternative 1 shifts existing Bryant Street access to Decatur Street
[b] On US 6 the Preferred Alternative is a refinement of System Alternative 2

Alternatives that eliminate one or more ramp movements cause traffic to be diverted elsewhere throughout the study area. These assumptions and other traffic analysis results are detailed in the *Traffic Report* and addendum (FHU, 2005c; FHU, 2006c).



North

System Traffic Movements
Year 2025 Forecasts

Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Figure 3-5

3.3.2 Traffic Operations

Analysis of forecasted Year 2025 traffic operations in the study area used methods documented in the *Highway Capacity Manual* (Transportation Research Board, 2000). In addition, the CORSIM traffic simulation tool was used to evaluate traffic operations at a system-wide level. The traffic analysis effort divided the study network into two subareas:

- Logan Street to Alameda Avenue
- US 6 Area

3.3.2.1 NO ACTION ALTERNATIVE

Operational analysis of the No Action Alternative considered the present day roadway network as well as improvements that are currently programmed or identified in the *2025 Regional Transportation Plan*. Improvements incorporated in the No Action Alternative include completing construction of T-REX and the Broadway viaduct project and the proposed widening of Federal Boulevard to six lanes between Alameda Avenue and US 6. An EA is currently being prepared for the Federal Boulevard project.

Freeway Sections

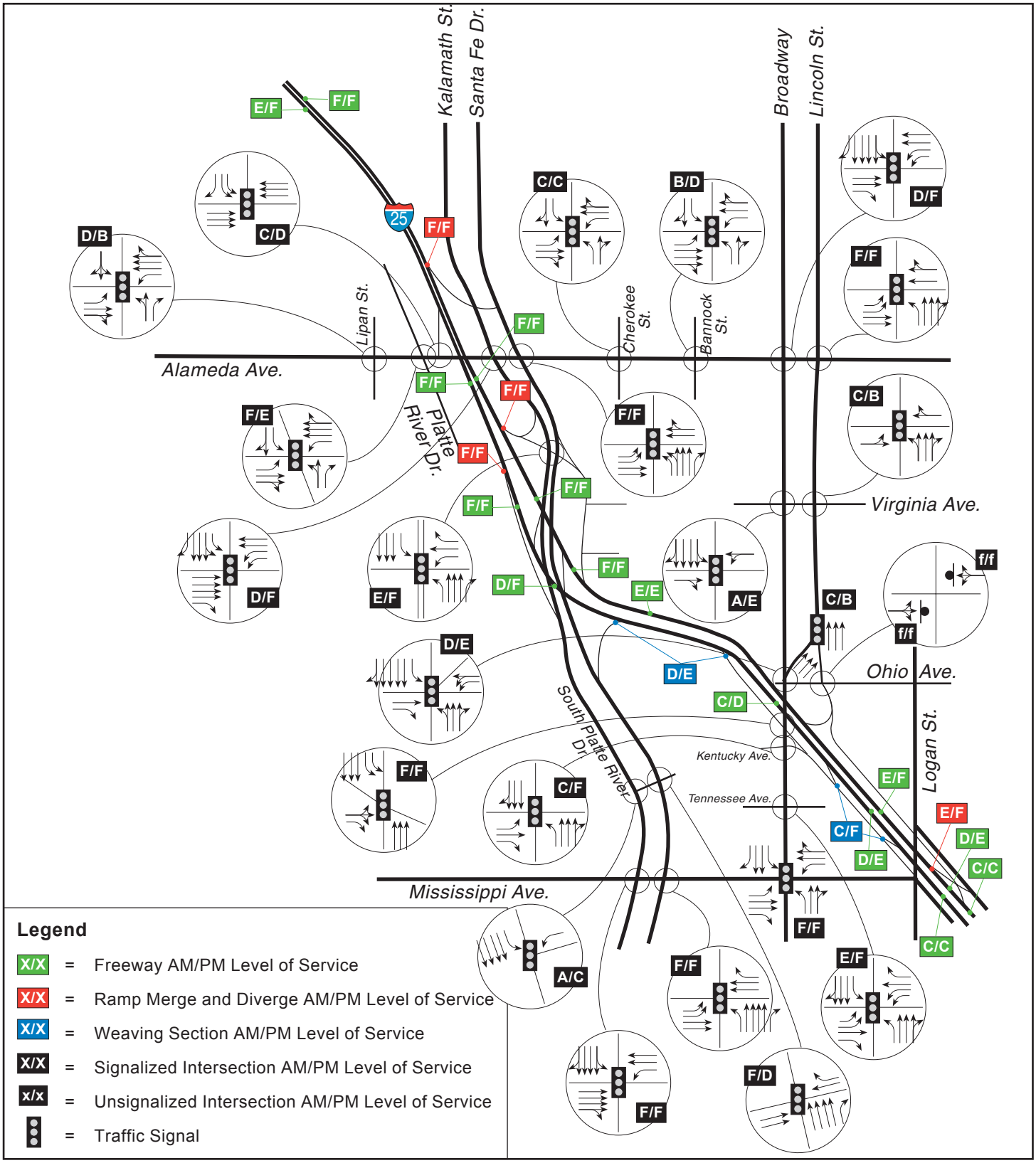
LOS results for 2025 are depicted graphically on **Figure 3-6** (Logan Street to Alameda) and **Figure 3-7** (US 6 Area). As is the case with existing conditions, the northbound direction of I-25 would exhibit poorer operational conditions than the southbound direction. The completion of the viaduct would improve northbound mainline LOS north of the Broadway interchange from F to E (see **Figure 3-6**). Congested operating conditions along mainline I-25 would create difficulty for ramp weaving, merge, and diverge movements. Weaving and ramp sections along I-25 are expected to operate at LOS F.

Freeway analysis of US 6 in the No Action Alternative revealed a general deterioration in freeway operations compared with existing conditions. In the westbound direction, the highly constrained collector-distributor road weave between southbound I-25 off-ramp and Bryant Street off-ramp would degrade from a current LOS of B/F to a future LOS of E/F (see **Figure 3-7**). In the eastbound direction, the weave section between the Federal Boulevard on-ramp and the Bryant Street off-ramp would operate at LOS F in the AM peak hour.

Surface Streets

Similar to the freeway results, analysis of projected Year 2025 traffic conditions at the surface street intersections reflects a general pattern of worsened operational conditions. Thirteen of the 29 analyzed signalized intersections are expected to operate at LOS F during either the AM or PM peak hour (see **Figure 3-6**). An average intersection delay in excess of 80 seconds per vehicle results in LOS F. Several intersections are anticipated to operate with well above 80 seconds of average delay. For example, an average delay of 279 seconds per vehicle is anticipated during the PM peak hour at the intersection of Mississippi Avenue and South Platte River Drive.

Level of service results for surface street intersections are discussed in more detail in the *Traffic Report* (FHU, 2005c).

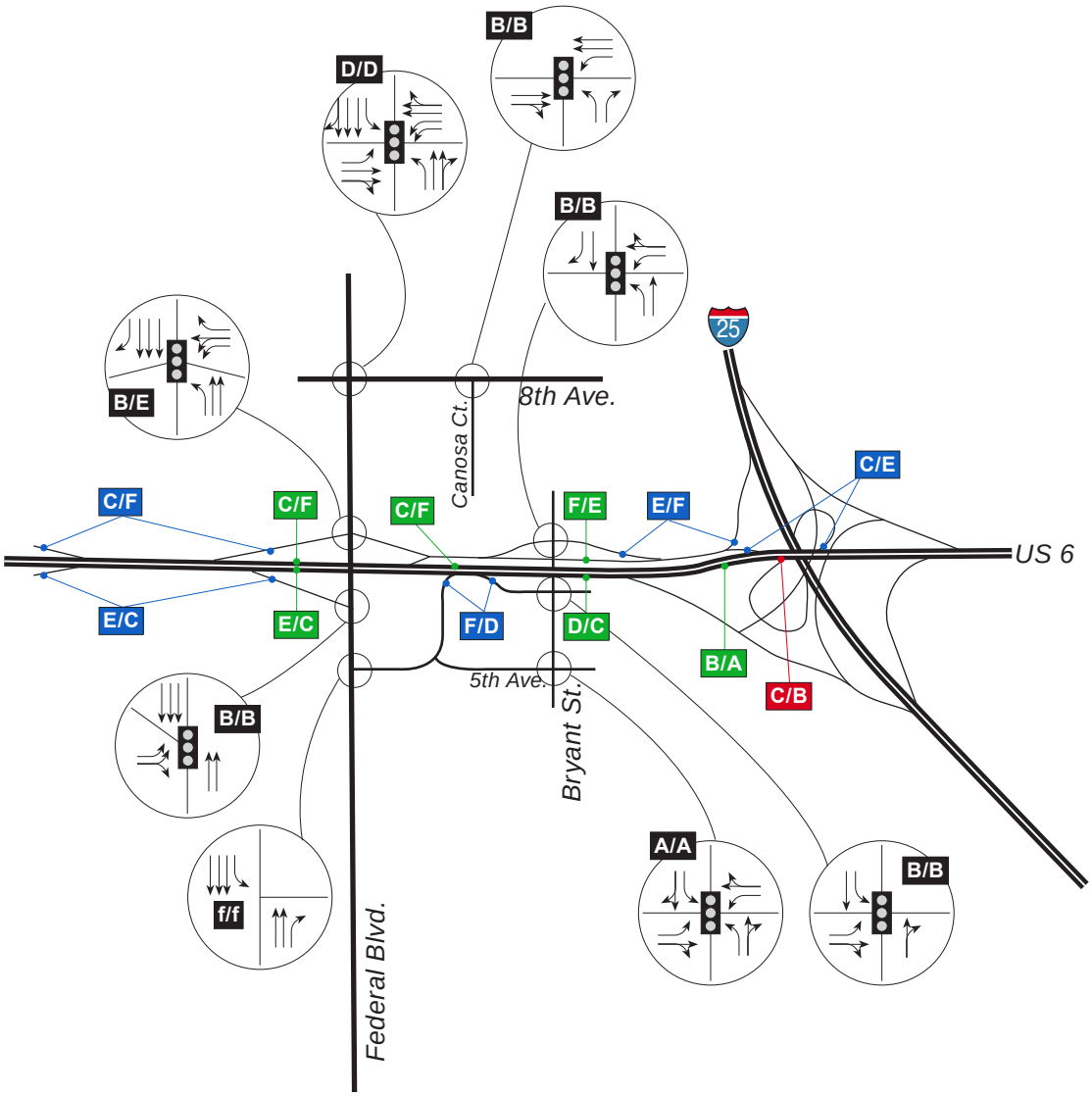


No Action Alternative: Logan Street to Alameda Avenue 2025 Levels of Service and Lane Geometry

North

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 3-6



Legend

X/X	=	Freeway AM/PM Level of Service
X/X	=	Ramp Merge and Diverge AM/PM Level of Service
X/X	=	Weaving Section AM/PM Level of Service
X/X	=	Signalized Intersection AM/PM Level of Service
x/x	=	Unsignalized Intersection AM/PM Level of Service
	=	Traffic Signal

North

No Action Alternative: US 6 Area 2025 Levels of Service and Lane Geometry

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 3-7

No Action System Traffic Simulation

A comparison of the existing (CORSIM) delay times with the 2025 No-Action simulation results is provided in **Table 3-2.** The anticipated 2025 network delay represents nearly a threefold increase over existing delay. Delay would comprise a greater portion of total travel time by the Year 2025, accounting for more than 50 percent of travel time.

Table 3-2 Existing and 2025 No Action Daily Hours of Delay

	Existing Conditions (Vehicle-Hours)		2025 No Action Conditions (Vehicle-Hours)	
	AM Peak Hour	**PM Peak Hour**	**AM Peak Hour**	**PM Peak Hour**
Delay Time (% of total)	1,206 (42%)	1,254 (40%)	2,702 (58%)	3,858 (65%)
Free-Flow Time (% of total)	1,655 (58%)	1,857 (60%)	1,925 (42%)	2,085 (35%)
Total Travel Time	2,861	3,111	4,627	5,943

Source: FHU, 2005c

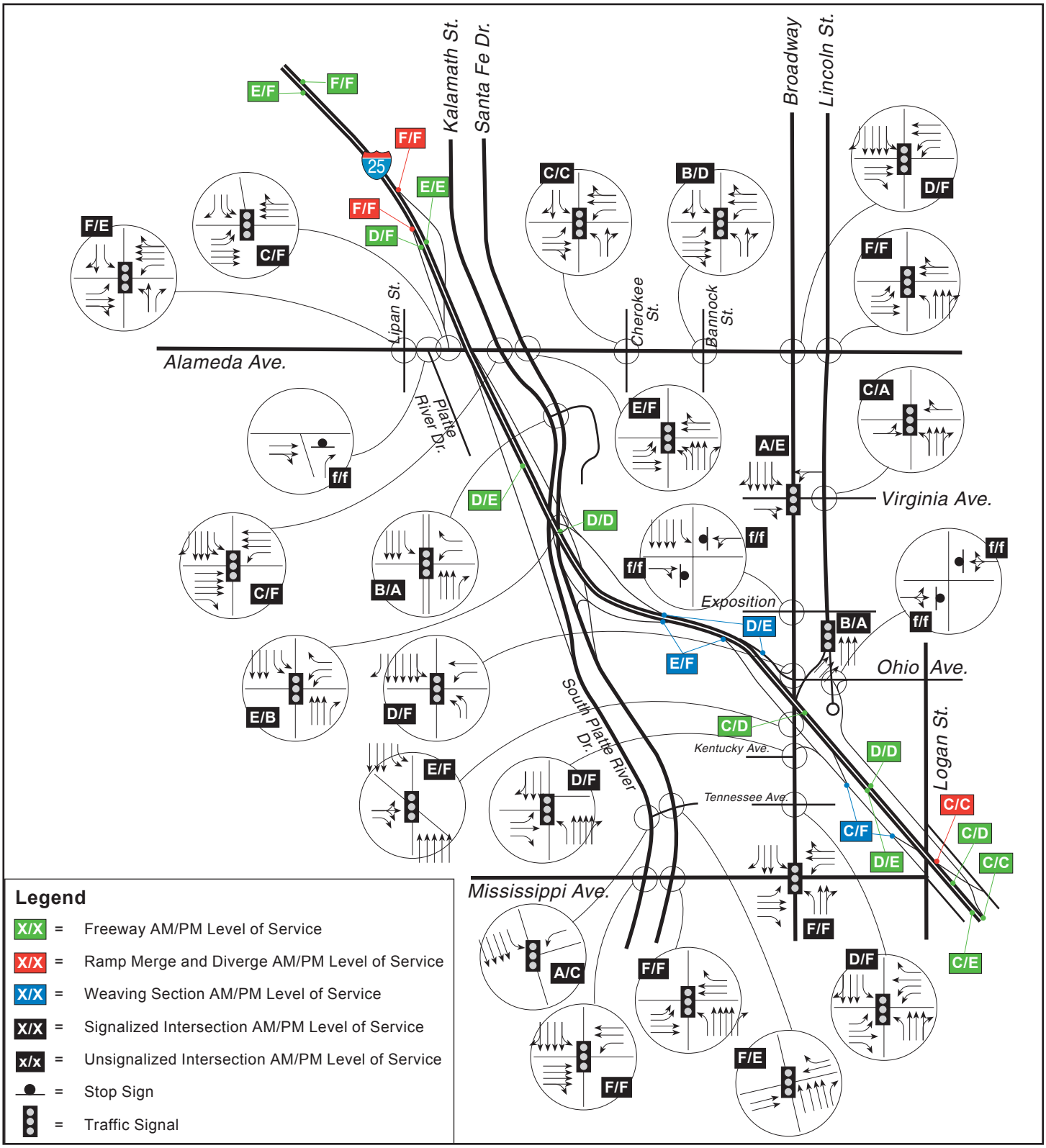
3.3.2.2 SYSTEM ALTERNATIVES

Traffic operations were quantified for each system alternative (System Alternative 1, 2, 3, and the Preferred Alternative) based on a number of metrics that indicate the extent and duration of congestion in the traffic analysis study area. These include intersection and freeway levels of service, delay calculations per the *Highway Capacity Manual*, time duration of congested conditions, CORSIM statistics including total system delay, average speeds, and a calculation of travel rate index. The results of these analyses are detailed in the *Traffic Report* (FHU, 2005c).

Level of Service

Level of service analysis of the system alternatives used methods documented in the *Highway Capacity Manual*. The results are depicted graphically as follows and provide a qualitative comparison of alternative operational performance:

- **Figures 3-8 and 3-9: System Alternative 1**
- **Figures 3-10 and 3-11: System Alternative 2**
- **Figures 3-12 and 3-13: System Alternative 3**
- **Figures 3-14 and 3-15: Preferred Alternative**

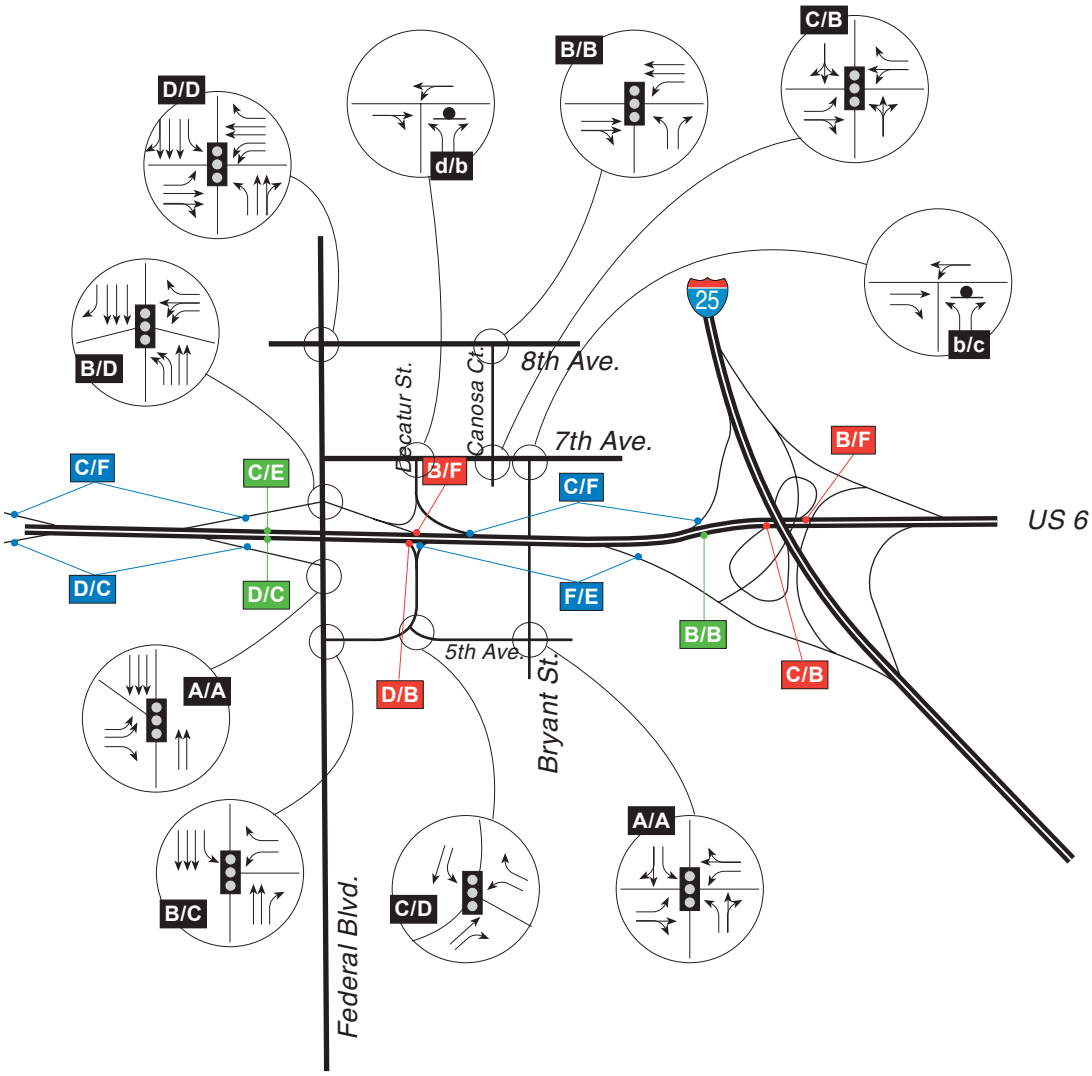


System Alternative 1: Logan Street to Alameda Avenue 2025 AM/PM Peak Hour Levels of Service and Lane Geometry

North

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 3-8



Legend

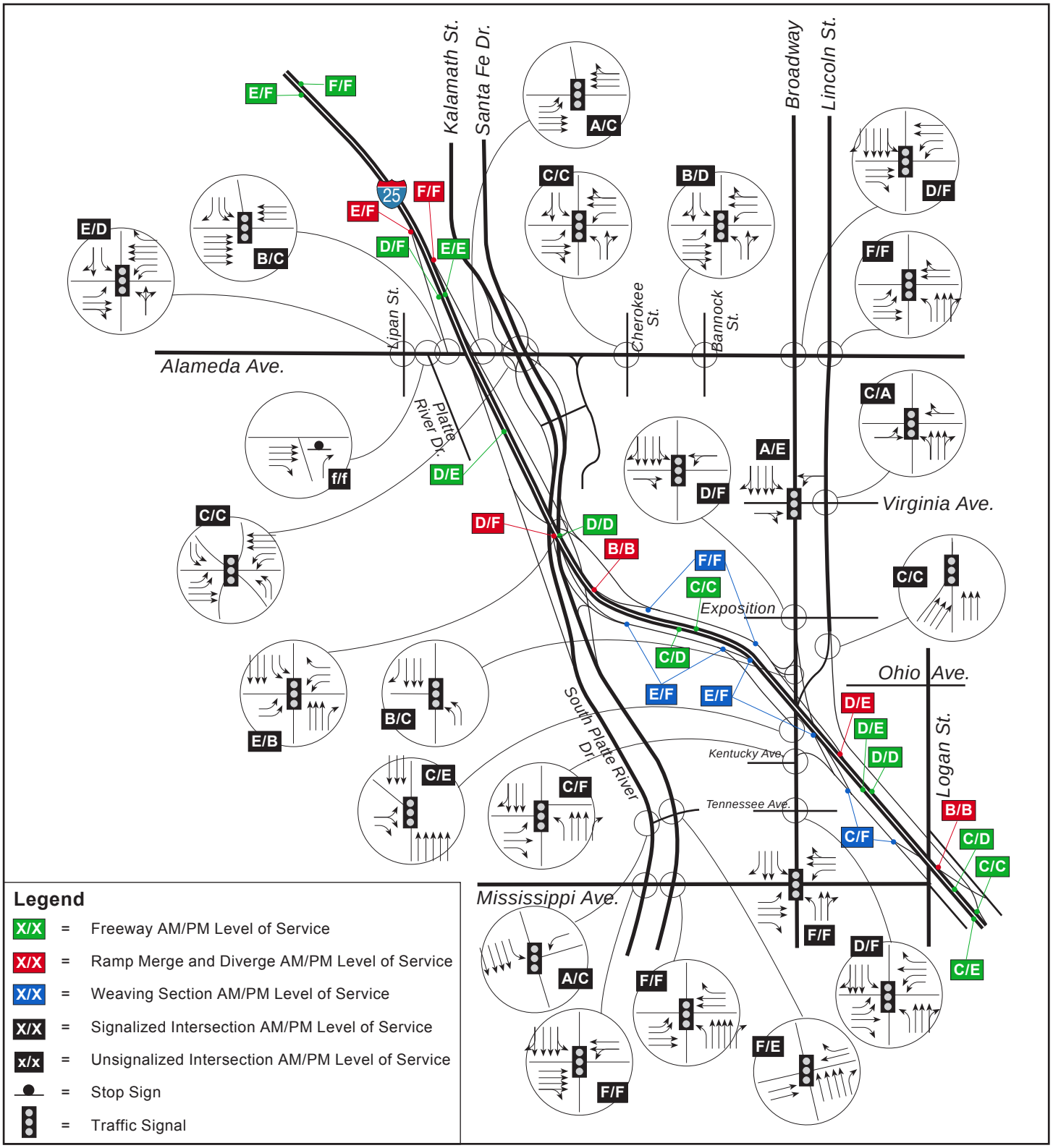
X/X	=	Freeway AM/PM Level of Service
X/X	=	Ramp Merge and Diverge AM/PM Level of Service
X/X	=	Weaving Section AM/PM Level of Service
X/X	=	Intersection AM/PM Level of Service
	=	Stop Sign
	=	Traffic Signal

System Alternative 1: US 6 2025 AM/PM Peak Hour Levels of Service and Lane Geometry

North

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 3-9

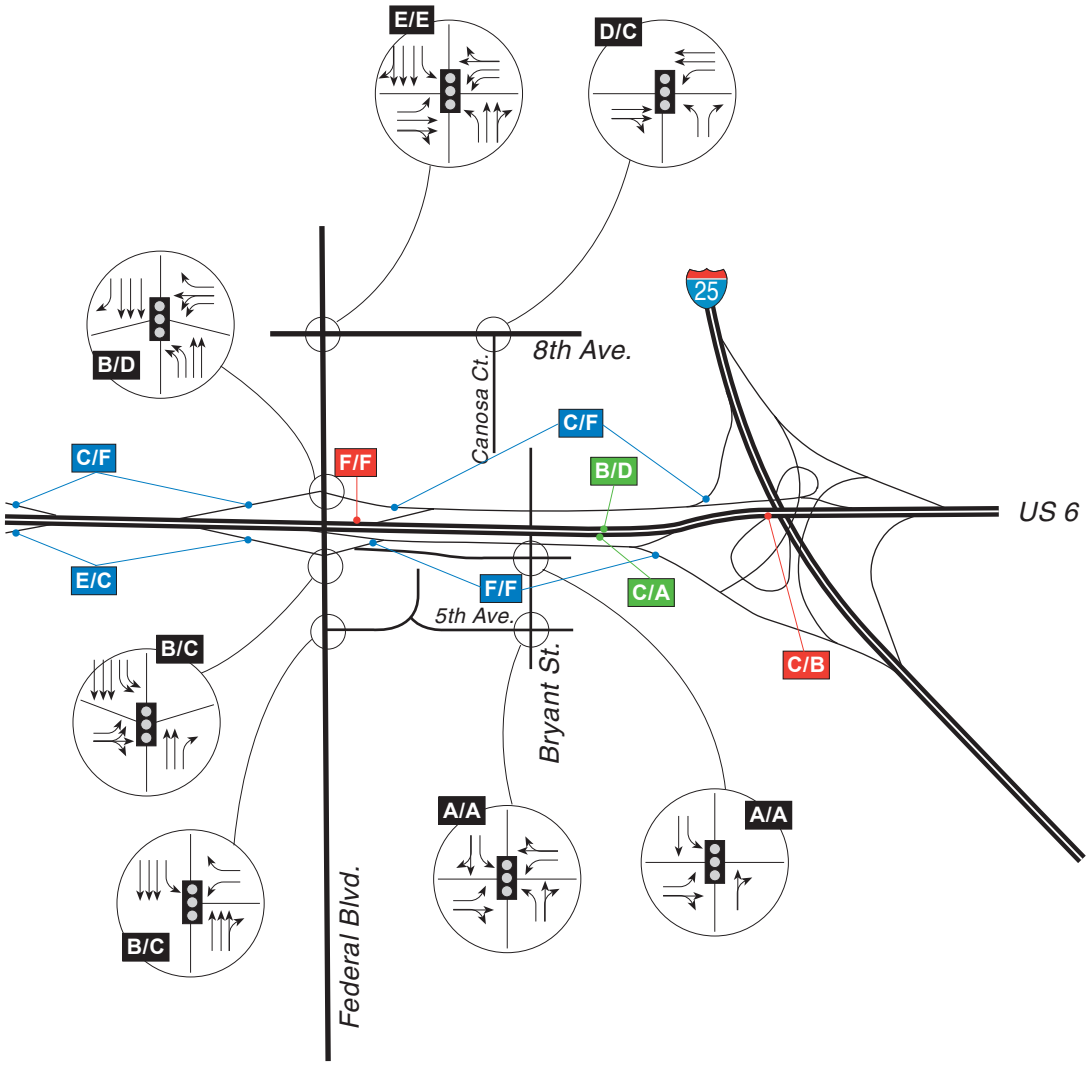


North

System Alternative 2: Logan Street to Alameda Avenue 2025 AM/PM Peak Hour Levels of Service and Lane Geometry

Valley Highway Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 3-10



Legend

X/X = Freeway AM/PM Level of Service

X/X = Ramp Merge and Diverge AM/PM Level of Service

X/X = Weaving Section AM/PM Level of Service

X/X = Intersection AM/PM Level of Service

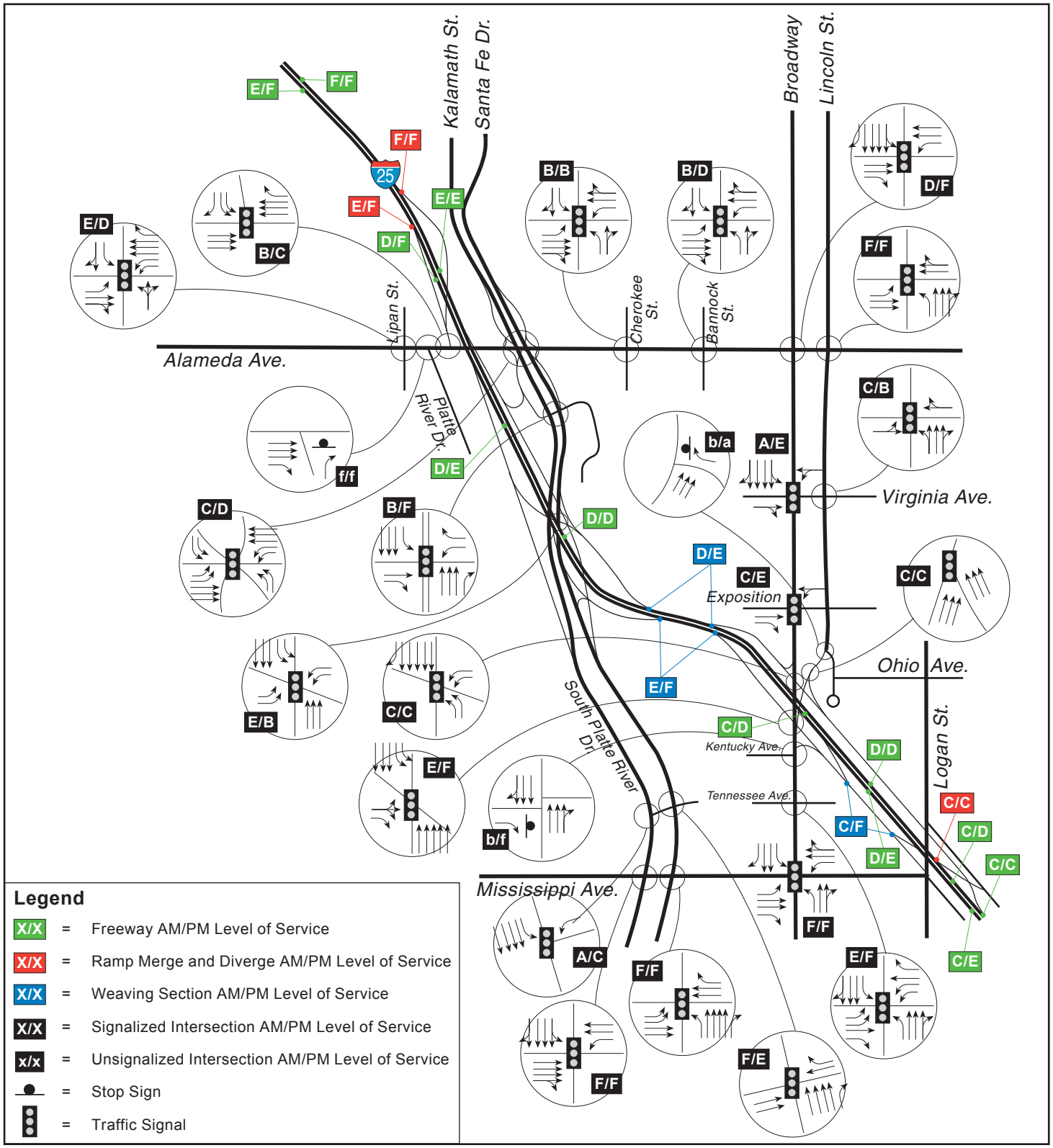
= Traffic Signal

System Alternative 2: US 6 2025 AM/PM Peak Hour Levels of Service and Lane Geometry

North

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 3-11

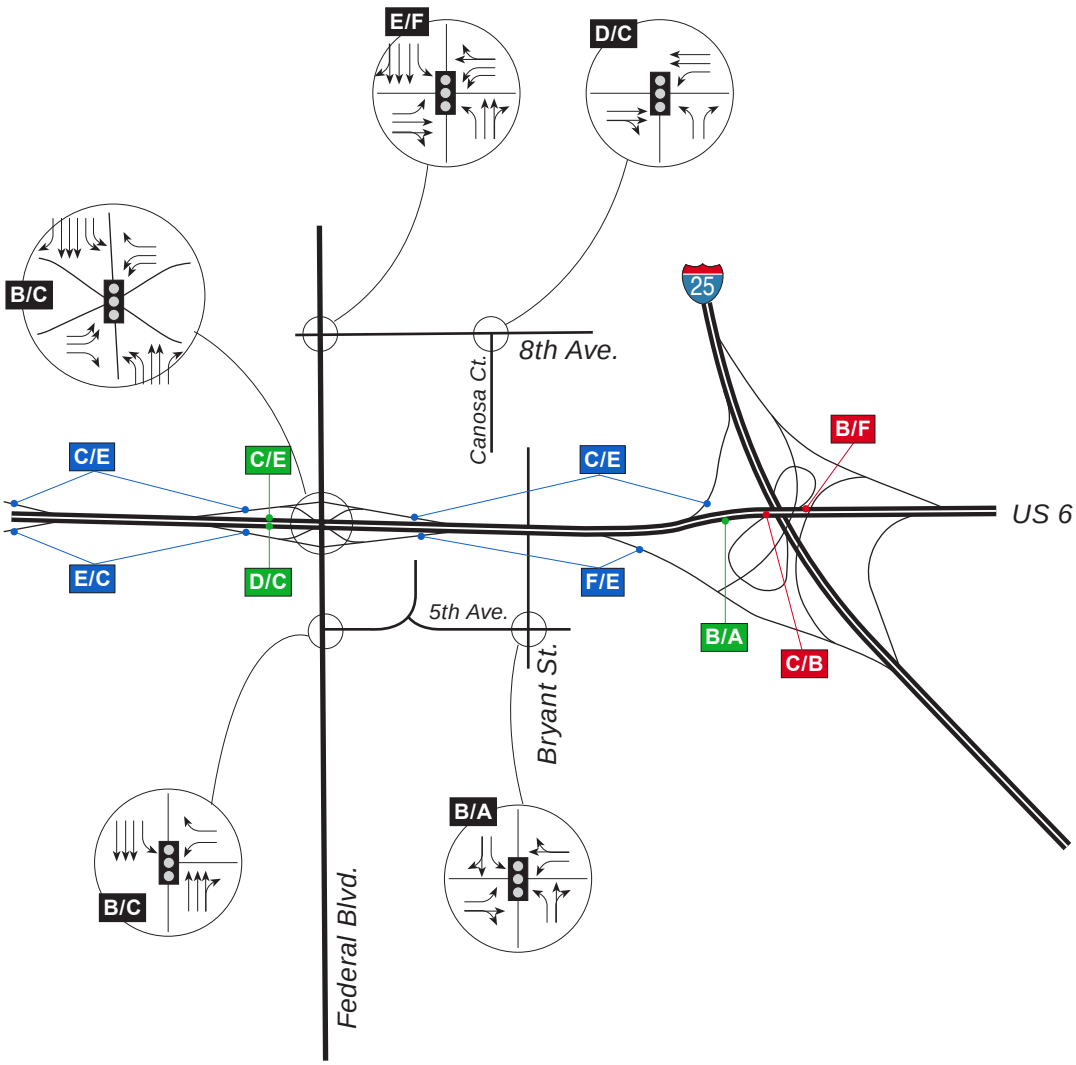


System Alternative 3: Logan Street to Alameda Avenue 2025 AM/PM Peak Hour Levels of Service and Lane Geometry

North

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 3-12



Legend

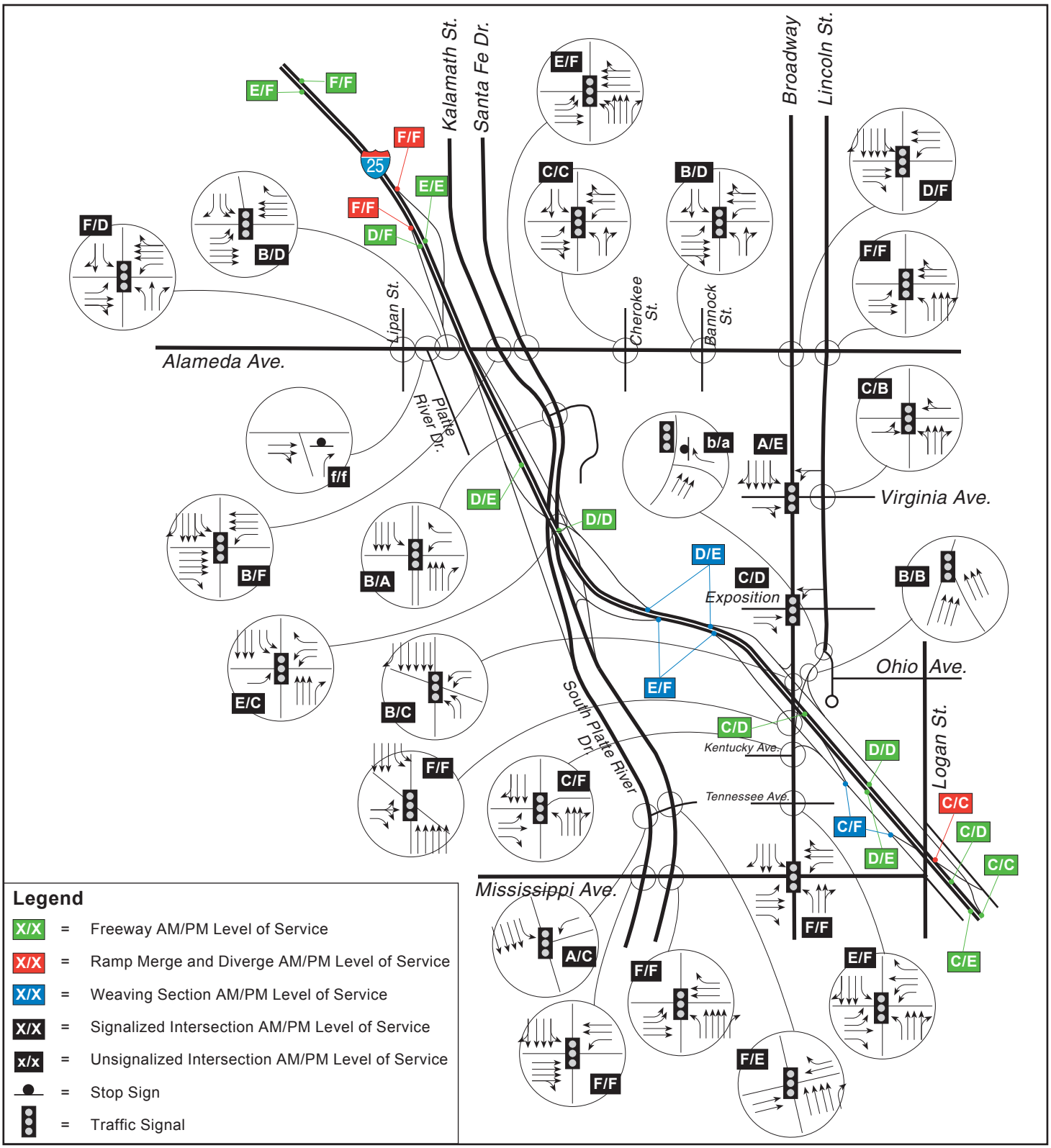
X/X	=	Freeway AM/PM Level of Service
X/X	=	Ramp Merge and Diverge AM/PM Level of Service
X/X	=	Weaving Section AM/PM Level of Service
X/X	=	Intersection AM/PM Level of Service
	=	Traffic Signal

System Alternative 3: US 6 2025 AM/PM Peak Hour Levels of Service and Lane Geometry

North

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 3-13

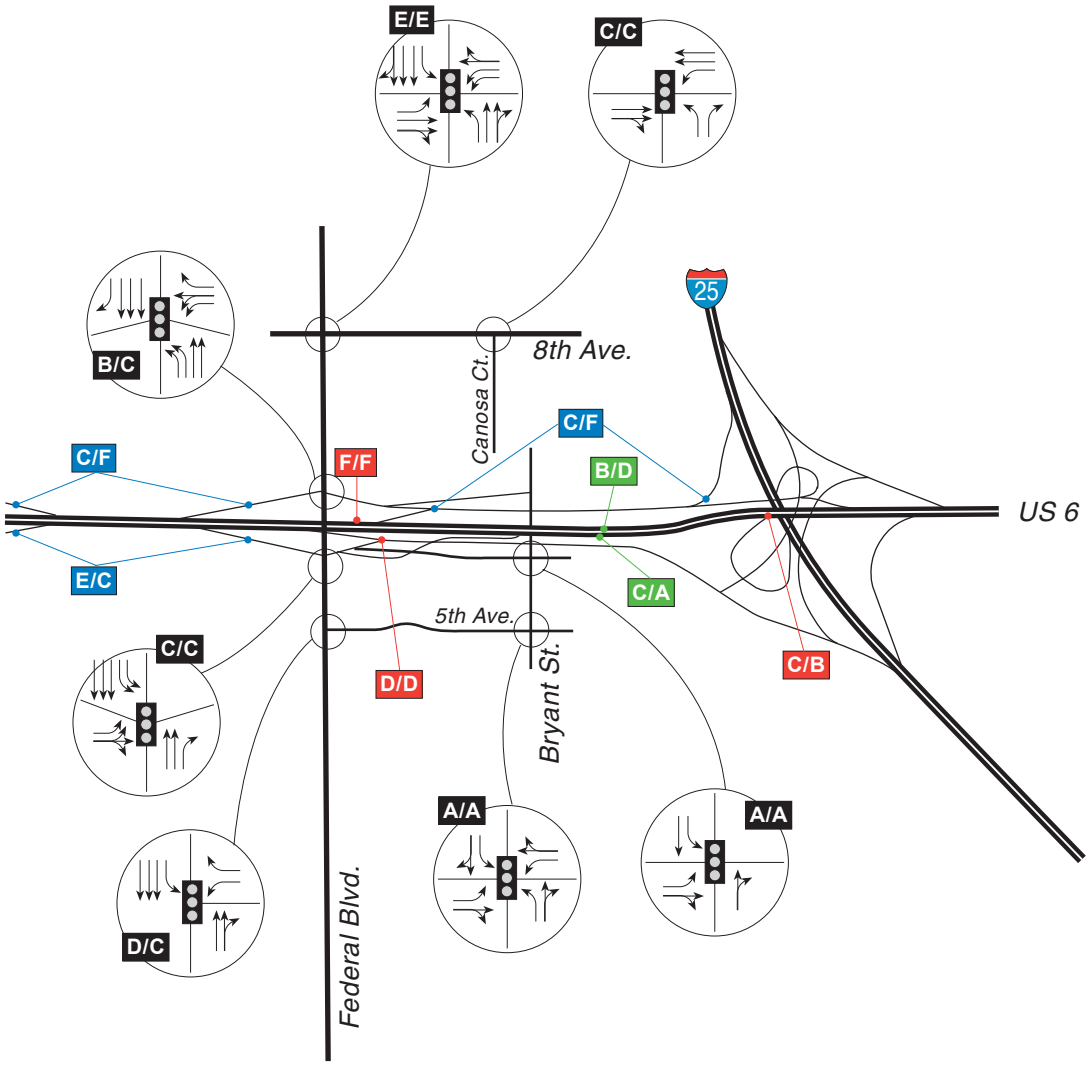


Preferred Alternative
Logan Street to Alameda Avenue
2025 AM/PM Peak Hour Levels of Service and Lane Geometry

North

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 3-14



Legend

X/X	=	Freeway AM/PM Level of Service
X/X	=	Ramp Merge and Diverge AM/PM Level of Service
X/X	=	Weaving Section AM/PM Level of Service
X/X	=	Intersection AM/PM Level of Service
	=	Traffic Signal

North

Preferred Alternative
US 6 2025 AM/PM Peak Hour Levels of Service and Lane Geometry

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 3-15

Hours of Congestion

Tables 3-3 and **3-4** depict the hours of congestion anticipated to occur throughout the roadway system with each alternative. Congestion is defined as LOS F operations at surface street intersections or along freeway sections. Hours of congestion were calculated by using characteristic hourly traffic volume distributions to determine the times of day during which traffic volumes are projected to result in operations of LOS E or better. The system alternatives are not projected to eliminate congestion but are shown to decrease the time duration of congested conditions in comparison with the No Action Alternative. The analysis was performed for each intersection and key freeway segments shown to operate at LOS F during either the AM or PM peak hour.

Table 3-3 depicts the hours of congestion for the surface street intersections. The number of hours of congestion at each location were averaged and added together to provide a measurement of overall congestion. Based on this measure, results for the surface street intersections indicate that System Alternative 2 would operate with the fewest cumulative hours of congestion during a typical day.

Table 3-3 Daily Hours of Congestion at Signalized Intersections

INTERSECTION	Hours of Congestion at LOS F Intersections				
	No Action	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Alameda Avenue & South Platte River Drive	4.00	0.00	0.00	0.00	0.00
Alameda Avenue & Lipan Street	0.00	1.00	0.00	0.00	1.00
Alameda Avenue & Kalamath Street	6.50	1.75	0.00	0.00	1.75
Alameda Avenue & Santa Fe Drive	6.25	3.50	0.00	0.00	1.75[a]
Alameda Avenue & I-25 ramps	0.00	2.50	0.00	0.00	0.00
Broadway & Kentucky Avenue	1.75	2.75	2.75	0.00	1.75
Broadway & Tennessee Avenue	3.75	3.75	1.00	7.50	3.75
Broadway & Exposition Avenue	0.00	0.00	1.25	0.00	0.00
Broadway & Ohio Avenue	0.00	3.50	0.00	0.00	0.00
Broadway & SB I-25 Ramps	9.50	4.00	1.00	4.50	4.25[b]
Broadway & Mississippi Avenue	10.75	10.75	10.75	10.75	10.75
Mississippi Avenue & Santa Fe Drive	10.75	10.75	10.75	10.75	10.75
Mississippi Avenue & South Platte River Drive	13.50	13.50	13.50	13.50	13.50
8th Avenue & Federal Boulevard	0.00	0.00	0.00	1.75	0.00
Sum of hours of congestion at LOS F intersections	**66.75**	**57.75**	**41.00**	**48.75**	**49.25**

[a]*Result differs from System Alternative 1 because Preferred Alternative includes a third westbound Alameda Avenue lane at Santa Fe Drive*
[b]*Result differs from System Alternative 3 because Preferred Alternative includes effect of Broadway /Kentucky Ave signalized intersection*
Source: FHU 2005c; FHU 2006c

Table 3-4 depicts hours of congestion along I-25 freeway sections. The analysis includes weaving and mainline sections shown to operate at LOS F. The No Action Alternative would exhibit the greatest duration of congestion. System Alternatives 1, 3, and the Preferred Alternative, representing very similar design concepts along I-25, would show marked improvement over the No Action Alternative. Freeway congestion would be the lowest with System Alternative 2, although the southbound I-25 Santa Fe Drive to Broadway collector-distributor road weave is not included in the calculation. By adding a collector-distributor road along I-25 between the Santa Fe Drive and Broadway interchanges, System Alternative 2 removes weaving activity from the mainline freeway. The freeway weaving section present in System Alternatives 1, 3, and the Preferred Alternative would operate at LOS F for a projected 5.5 hours per day, affecting both weaving and non-weaving vehicles.

Table 3-4 Daily Hours of Congestion along I-25 Freeway Sections

INTERSECTION	Hours of Congestion along LOS Freeway Sections				
	No Action	**System Alternative 1**	**System Alternative 2**	**System Alternative 3**	**Preferred Alternative**
Northbound 1-25					
North of Alameda Avenue On-Ramp	4.50	4.00	4.00	4.00	4.00
North of Santa Fe Drive	11.25	----	----	----	----
Southbound 1-25					
North of Alameda Avenue Off-Ramp	6.75	6.75	6.75	6.75	6.75
South of Alameda Avenue Off-Ramp	11.75	2.50	3.25	2.50	2.50
Santa Fe Drive to Broadway Weave	----	5.50	----	5.50	5.50
Sum of hours of congestion along LOS Freeway Sections	**34.25**	**18.75**	**14.00[a]**	**18.75**	**18.75**

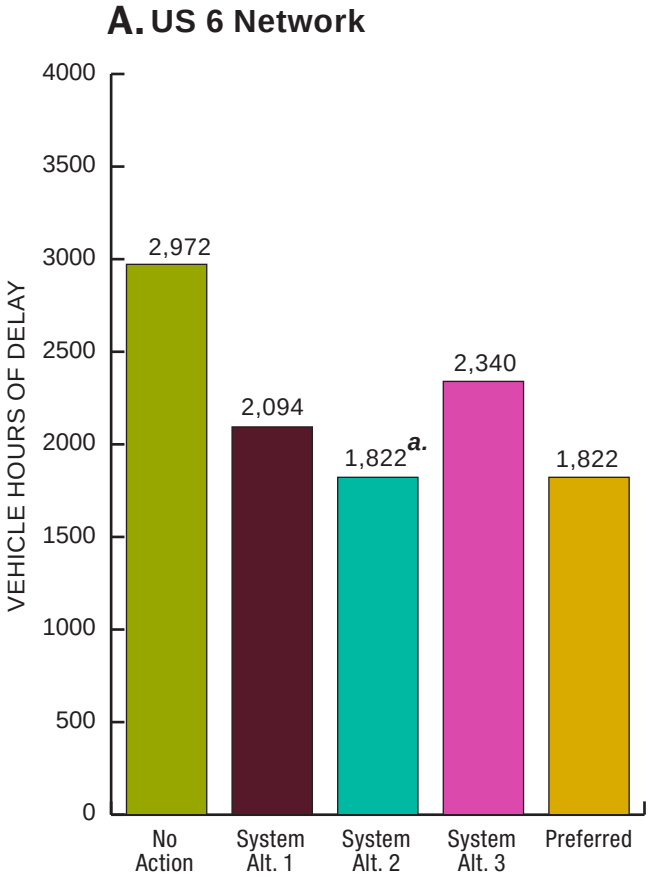
Source: FHU, 2005c
[a] Collector-distributor roads not included in compilation of hours of congestion for System Alternative 2.

Traffic Simulation Results

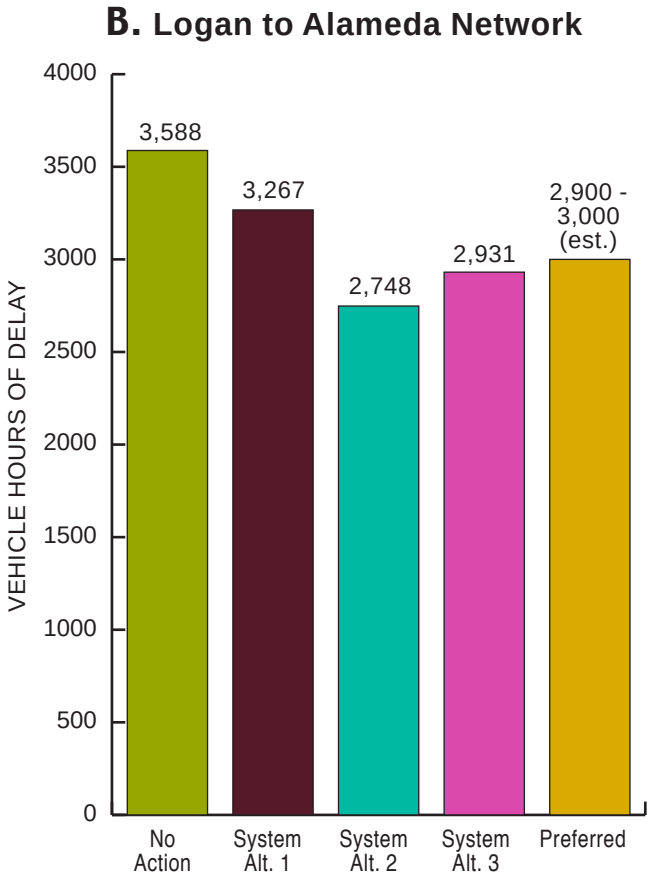
Overall Measures of Effectiveness

CORSIM traffic simulation models were developed for the Logan Street to Alameda Avenue portion and US 6 portion of the study area. Detailed output from these models is available in the *Traffic Report* (FHU, 2005c). A summary of the vehicle-hours of delay for each alternative is depicted on **Figure 3-16**. These delay results combine the AM peak hour and PM peak hour and include both the freeway and surface street portions of the networks. As shown, the Preferred Alternative operates most efficiently in the US 6 area.

Within the Logan Street to Alameda Avenue portion of the study area, System Alternatives 2, 3, and the Preferred Alternative exhibit the least peak hour delay. For the Logan to Alameda Network, results for the Preferred Alternative are estimated based on Subnetwork models created for the Preferred Alternative and similarities between the Preferred Alternative and System Alternatives 1, 2 and 3.



a. DEIS traffic analysis was inconsistent with DEIS System Alt. 2 Concept Plan. Results reported in DEIS changed above to reflect Preferred Alternative concept.



Legend

AM Peak + PM Peak Hour Network Delay (veh-hrs.)

CORSIM Network 2025 Delay Comparisons

An additional measure that provides insight into system alternative traffic operations is the travel rate index. The travel rate index, a metric developed by the Texas Transportation Institute, is a measure of the amount of extra time it takes to travel during the peak period. A travel rate index of 1.50, for example, indicates it would take 50 percent longer to travel on a roadway during the peak than it would to travel during uncongested conditions. A lower travel rate index indicates that delay represents a lesser portion of overall network travel time. As shown in **Table 3-5**, System Alternative 1, 2, and the Preferred Alternative operate with the lowest travel rate index in the US 6 area and System Alternatives 2, 3, and the Preferred Alternative operate with the lowest travel rate index in the Logan Street to Alameda Avenue portion of the study area.

Table 3-5 Peak Hour Travel Rate Index Comparison

PORTION OF STUDY AREA	Peak Hour Travel Rate Index (TRI)				
	No-Action	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
US 6	2.97	2.42	2.20[a]	2.58	2.20[b]
Logan Street to Alameda Avenue	2.43	2.35	2.03	2.12	2.12

Source: FHU, 2005c; FHU, 2006c
[a] Revised from Draft EIS to reflect braided ramp operations.
[b] Estimated based on subnetwork results.

Within the overall system model, it is possible to isolate portions of the network to focus on the efficiency of a particular roadway configuration. By focusing on interchange subnetworks, the operational differences between the alternatives may be seen more clearly. For example, the interchange at I-25 and Broadway is designed differently in each of the system alternatives. By isolating the links and nodes comprising the Broadway interchange, one can examine the differences between the alternatives at a finer level of detail than is provided by the network-wide measures depicted on **Figure 3-16**.

Simulation results were compiled for three subnetworks within the Broadway to Alameda Avenue model. The Alameda Avenue subnetwork included Alameda Avenue between Lipan Street and Cherokee Street. The Alameda Avenue plus Santa Fe Drive subnetwork added Santa Fe Drive/Kalamath Street between Bayaud Avenue and I-25. The Broadway subnetwork included Broadway between Exposition Avenue and Mississippi Avenue. The subnetwork simulation results are described below.

Alameda Avenue Subnetwork

As shown on **Figure 3-17**, each of the system alternatives, including the Preferred Alternative, would improve operations over the No Action Alternative, primarily by reducing the number of traffic signals along Alameda Avenue. The results of the Alameda Avenue subnetwork analysis indicated that System Alternative 3 would operate most efficiently. System Alternatives 2 and 3 both introduce a grade-separated interchange at the intersection of Alameda Avenue with Santa Fe Drive, improving operations. This intersection remains an at-grade, one-way pair in System Alternative 1, and the Preferred Alternative. In the Alameda Avenue interchange area, implementation of System Alternative 3 would save approximately 37 percent in delay over System Alternative 1.

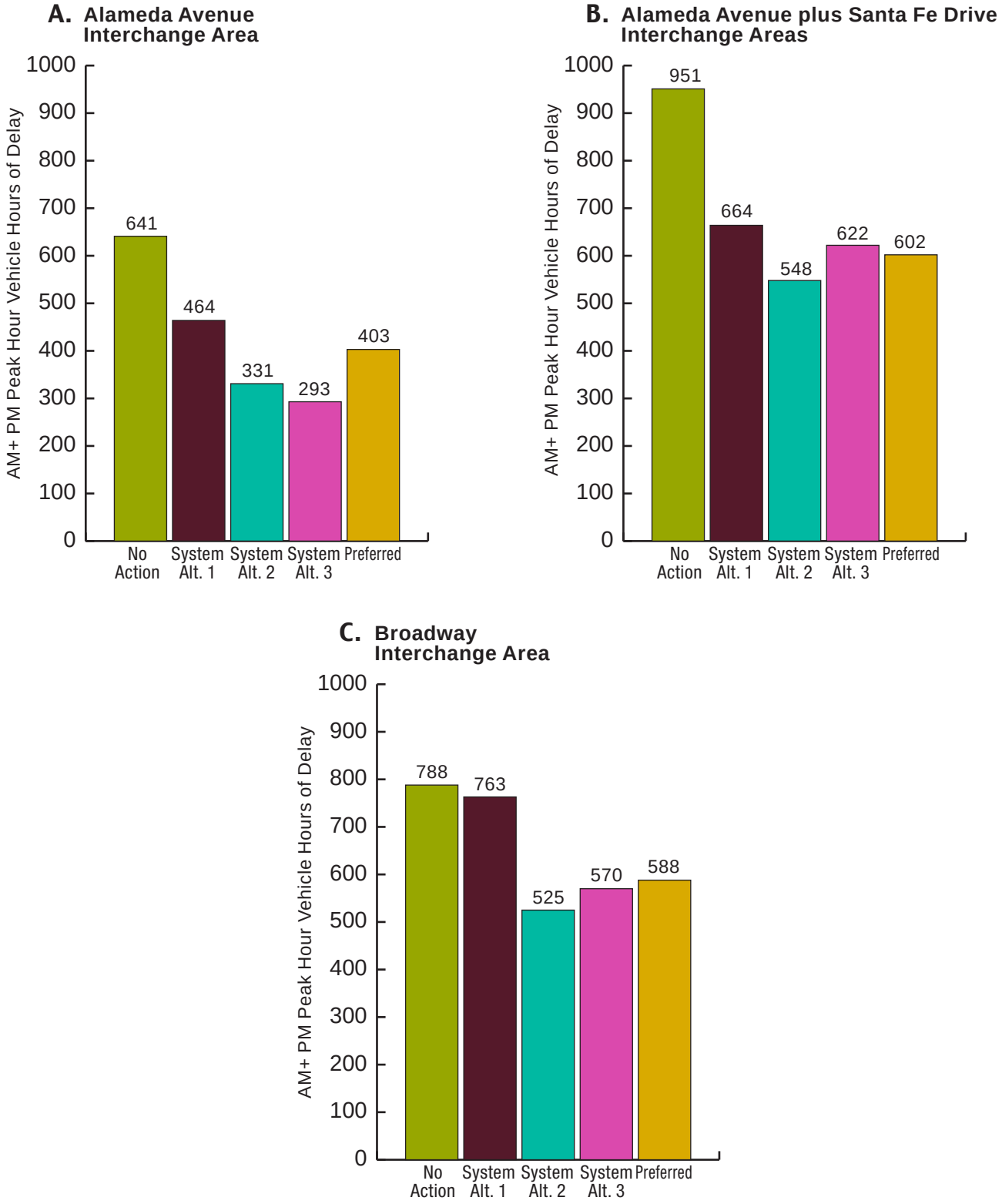
It is important to note that additional delay savings could be achieved with System Alternative 2 if the ½ diamond I-25 ramp configuration were reconfigured as a single-point interchange aligned with the mainline I-25 centerline. Preliminary operational tests of this modification indicate that a reconfigured System Alternative 2 would operate slightly more efficiently than System Alternative 3 in the Alameda Avenue area.

Alameda Avenue plus Santa Fe Drive Subnetwork

Figure 3-17 depicts the CORSIM delay results for the Alameda Avenue plus Santa Fe Drive interchange area subnetwork. As in the case of the Alameda Avenue Interchange subnetwork, each of the system alternatives would represent a marked improvement over the No Action Alternative. System Alternative 2 would perform best, in part because local access to development east of Santa Fe Drive and south of Alameda Avenue is accommodated without adding a traffic signal to Santa Fe Drive. System Alternative 1 would exhibit the greatest delay of the system alternatives.

Broadway Subnetwork

As shown on **Figure 3-17**, both System Alternatives 2, 3, and the Preferred Alternative show significant improvement over the No Action Alternative. As shown, System Alternative 2 is projected to operate with the least delay through the Broadway interchange area. This is due largely to the provision of a southbound Broadway to southbound I-25 grade-separated on-ramp. However, System Alternative 3 and the Preferred Alternative would operate with only slightly more delay. A principal reason for the relatively good operation of System Alternative 3 and the Preferred Alternative is the access provided to and from the Broadway transit station at Exposition Avenue. With the Preferred Alternative, the Exposition Avenue access would be limited to automobile traffic only (no buses).The No Action Alternative and System Alternative 1 would exhibit the poorest operations.



Surface Street Subnetwork Delay Comparisons

3.3.3 Traffic Evaluation of Consolidated Main Line Railroad Crossing

The one-way arterial street pair of Santa Fe Drive and Kalamath Street currently crosses the Consolidated Main Line railroad at grade north of Alameda Avenue. One of the principal purposes of the Valley Highway Project is to increase safety and reduce congestion and delays related to the at-grade crossing of Santa Fe Drive/Kalamath Street and the Consolidated Main Line. Therefore, each of the three system alternatives includes a grade separation of Santa Fe Drive and Kalamath Street at the Consolidated Main Line railroad. This section provides a summary of the benefits associated with this grade separation.

It should be noted that the Burlington Northern Santa Fe and Union Pacific railroads have proposed a plan for improving freight operations along the Front Range. That plan includes building a bypass on the Eastern Plains that would divert through-train movements heading south along the Consolidated Main Line. The plan would move through-freight movements and rail yards to the east, but local rail traffic would remain. The plan would also make it more possible to implement passenger rail service to the south, though there are no specific plans for such service at this time.

In response to the railroads' proposed plan, CDOT agreed to conduct a study of the public benefits and costs of participating in a partnership with the railroads to implement the proposed plan. CDOT completed that study, which indicates there would be significant public and private benefits to completing the project. The study estimates, for example, that the number of daily train movements south of Denver along the Consolidated Main Line would decrease to 16 by the Year 2030. The study is an early phase of what will become a larger effort to examine what it would take to implement the proposed plan, including detailed costs, a funding plan, a financing plan, and engineering design.

3.3.3.1 Railroad Grade Separation Benefits

As discussed in **Chapter 1** *Purpose and Need*, the at-grade railroad crossing north of Alameda Avenue currently poses a crossing Exposure Factor above 75,000, which indicates that consideration of a grade separation is warranted based on Colorado Public Utilities Commission guidelines (Colorado Public Utilities Commission, 2003). The crossing also meets the FRA conditions for consideration of a grade separation, with an estimated 310 vehicle-hour delay based on current conditions, compared with the FRA's threshold of 40 vehicle-hours of delay (FRA, 2002). The presence of a crossing train during peak travel hours creates significant vehicle queues and delays; there is a history of train and automobile accidents at the crossings.

The following benefits would be anticipated to occur with the installation of a railroad grade separation at this location:

- From 1975 to the present, there have been 22 train/automobile accidents at the crossing. The accident exposure would be eliminated with a grade separation.
- By the Year 2025, a grade separation would reduce vehicle delay by approximately 438 vehicle-hours per day.
- By removing the conflict between trains and vehicles, a grade separation would eliminate the potential for vehicle queues to extend south along Santa Fe Drive and interfere with traffic operations along Alameda Avenue.

The above benefits would primarily impact automobile travel through the study area. However, alternative modes of travel including pedestrians, bicycles, emergency vehicles, and buses would also benefit from the operational safety improvements highlighted above.

The assumptions used in deriving these benefits are based on assumptions contained in the *Denver Citywide Railroad Study and Plan* (CCD and CRSS Civil Engineers 1992a). Key assumptions are detailed in the *Traffic Report* (FHU, 2005c).

3.3.4 Traffic Operations Conclusions

Based on the results of the traffic operations analyses, several conclusions may be drawn regarding the relative performance of the proposed alternatives. Conclusions are summarized below according to the affected area.

3.3.4.1 US 6 / I-25 / Federal Boulevard Area

System Alternative 3 provides the shortest mainline weaving distance between Federal Boulevard and I-25 and exhibited the greatest freeway and overall delay of the system alternatives.

The collector-distributor roads along US-6 introduced by System Alternative 2 and the Preferred Alternative provide operational and safety benefits associated with segregating weaving traffic from mainline traffic. The Preferred Alternative and System Alternative 2 operate best within the freeway portion of the network.

Delay results for the surface street portion of the network indicate that the system alternatives would operate at similar levels of delay. Surface street delay results generally reflect operational conditions along Federal Boulevard. The single-point urban interchange of System Alternative 3 would eliminate one traffic signal along Federal Boulevard, thereby decreasing surface street delay in comparison with the diamond interchange signals of System Alternative 2.

System Alternative 1 operates with the lowest overall delays of the system alternatives. The Preferred Alternative exhibited the lowest freeway delays (primarily due to the collector-distributor system) while System Alternative 1 exhibited the lowest surface street delays (primarily because Bryant Street traffic would not be diverted to Federal Boulevard).

3.3.4.2 Mainline Interstate 25

Mainline I-25 from Logan Street to Alameda Avenue clearly would improve with the widening of the 6-lane section between the Broadway and Santa Fe Drive interchanges to 8-lanes, which is included in all three system alternatives. This improvement would remove a bottleneck from the freeway system, as I-25 in the future will consist of 8 travel lanes south of Broadway and 8+ lanes north of Santa Fe Drive.

Mainline I-25 north of Alameda Avenue is the most heavily-traveled portion of I-25 within the traffic analysis study area. This section is shown to operate at LOS F in the Year 2025 for all of the alternatives. Mainline traffic operations south of Santa Fe Drive represent general improvement compared with the north end of the I-25 section.

System Alternative 2 introduces collector-distributor roads along I-25 between the Broadway and Santa Fe Drive interchanges. Though weaving movements along the collector-distributor roads would operate at LOS F, mainline I-25 operations would be improved with System Alternative 2.

3.3.4.3 SURFACE STREETS - BROADWAY INTERCHANGE AREA

The installation of a grade-separated southbound Broadway to southbound I-25 on-ramp would help to make System Alternative 2 the most operationally efficient alternative for the Broadway area. However, System Alternative 3 and the Preferred Alternative would provide operational benefits by providing a connection from the Broadway transit station area to Broadway via Exposition Avenue and by simplifying traffic signal phasing patterns at the north ramp terminal intersection.

3.3.4.4 SURFACE STREETS – ALAMEDA AVENUE INTERCHANGE AREA

The provision of an interchange at the intersection of Alameda Avenue and Santa Fe Drive would provide operational benefits relative to the other alternatives. System Alternatives 2 and 3, which would both implement an interchange at this location, represent a delay savings of 15 to 40 percent over System Alternative 1 and the Preferred Alternative, both of which would not provide this interchange. In addition, a portion of the delay savings with System Alternatives 2 and 3 is attributable to the widening of Alameda Avenue east of Santa Fe Drive, which would impact the existing railroad bridges over Alameda Avenue in this area. This widening was not included in System Alternative 1 or the Preferred Alternative.

3.3.4.5 SURFACE STREETS - SANTA FE DRIVE INTERCHANGE AREA

The Santa Fe Drive interchange area would operate quite similarly across the system alternatives. System Alternative 2 would provide local access to Santa Fe Drive south of Alameda Avenue without adding a signalized intersection to the network, thereby providing some operational benefits.

3.3.4.6 SANTA FE DRIVE / KALAMATH STREET RAILROAD GRADE SEPARATION

The grade separation of Santa Fe Drive and Kalamath Street with the Consolidated Main Line railroad, which is included in all three system alternatives, would create significant benefits in terms of increased safety, reduced travel delay, enhanced reliability for all modes of travel, and improved operations on Alameda Avenue and other adjacent streets.

3.3.4.7 SYSTEM-WIDE TRAFFIC OPERATIONS

A comparison of system-wide traffic operations indicates that of the build alternatives, System Alternatives 2, 3, and the Preferred Alternative would provide the least delay to the traveling public, particularly throughout the portion of the study area between Logan Street and Alameda Avenue. The Preferred Alternative would operate best within the US 6 area.

Table 3-6 depicts the relative performance of the alternatives based on the operational analyses described in this report. The overall ratings are compiled in the column on the far right of the table, indicating that System Alternatives 2, 3, and the Preferred Alternative would perform best.

System Alternative 1 would represent an improvement over the No Action Alternative, but it would not perform as well as System Alternatives 2, 3, or the Preferred Alternative. These conclusions represent findings consistent with the anticipated results, as System Alternative 2 was developed to maximize operational efficiency. System Alternative 3 and the Preferred Alternative lag only slightly behind System Alternative 2 in terms of operational efficiency.

Table 3-6 Relative Operational Performance of System Alternatives

Legend: ○ = Best, ◒ = Moderate, ● = Worst	US 6 / Federal / I-25 Area	Broadway Interchange Area	Alameda Interchange Area	Santa Fe Interchange Area	Overall Freeway Operations	Signalized Intersection Hours of Congestion	Overall Surface Street Operations	Overall Operations
No Action	●	●	●	◒	◒	●	●	●
System Alternative 1	○	◒	◒	○	○	◒	◒	◒
System Alternative 2	○	○	○	○	○	○	○	○
System Alternative 3	◒	○	○	○	○	◒	○	○
Preferred Alternative	○	○	◒	○	○	◒	○	○

3.4 Freeway and Street Safety

This section addresses how well each alternative addresses safety problems identified based on analysis of existing conditions. The extent to which these problems are addressed is quantified by the estimated accident reduction for each design alternative. These estimates are inherently associated with some degree of uncertainty, yet this approach identifies design alternatives that are safer than others.

3.4.1 No Action Alternative

As discussed earlier, the history of collisions throughout the corridor indicates a high potential for accident reduction if improvements are constructed. Safety problems on I-25 and US 6 may be related to congestion, recurrent and frequent queuing, close interchange spacing, and geometric characteristics of the existing I-25 alignment. Safety problems along interchange ramps can be largely attributed to congestion and backups along the mainline freeway that result in rear end and “sideswipe same direction” accidents.

These existing problems are expected to persist in the No Action Alternative, as the basic configuration of roadways throughout the study area will remain the same. The safety effects of the completion of the new I-25 Broadway viaduct are considered negligible.

3.4.2 System Alternatives

The implementation of any of the system alternatives is expected to reduce the number of accidents in comparison with the No Action Alternative, though the degree of the reduction varies. Results of the safety analysis of alternatives are addressed in detail in the *Traffic Safety Report* (CDOT, 2005).

Safety improvements associated with each of the system alternatives include intersection improvements (signal phasing, protected left-turns, and geometric enhancements), ramp access improvements, additional lanes along I-25, and separation of weaving and through freeway movements on collector-distributor roadways.

Table 3-7 below depicts the relative safety performance of the system alternatives. Each of the system alternatives represents clear improvement over the No Action Alternative, with System Alternatives 2, 3, and the Preferred Alternative performing best. The Preferred Alternative and System Alternative 2 and 3 represent distinct safety advantages in the US 6 area. The primary advantage of System Alternative 2 and the Preferred Alternative in this area is the provision of a collector-distributor road along US 6 in the eastbound direction. The provision of a single-point intersection at the US 6/Federal Boulevard interchange provides a safety advantage in System Alternative 3.

Table 3-7 Relative Safety Performance of System Alternatives

Legend ○ = Best ◒ = Moderate ● = Worst	US 6 Freeway and Interchanges	I-25 Mainline Freeway	Broadway Interchange Area	Santa Fe Interchange Area	Alameda Interchange Area	Overall Safety
No Action	●	●	●	●	●	●
System Alternative 1	◒	○	○	○	○	◒
System Alternative 2	○	○	○	○	○	○
System Alternative 3	○	○	○	○	○	○
Preferred Alternative	○	○	○	○	○	○

3.5 Transit / HOV Access

3.5.1 Bus / HOV Impacts

CDOT operates a bus/HOV system along Santa Fe Drive from Florida Avenue south in the southbound direction and from I-25 south in the northbound direction. The City and County of Denver and RTD manage and operate bus-only lanes along Broadway and Lincoln Street north

of I-25. They terminate/start at the Broadway park-n-Ride. These will be preserved with the three system alternatives although the southbound Broadway bus only entrance into the park-n-Ride will be integrated with a new ramp connection and signal reconfiguration.

The existing Santa Fe Drive HOV lane south of I-25 is expected to remain in place, and appropriate connections with the existing bus/HOV lanes have been integrated into the system alternatives. As discussed in **Chapter 2** *Alternatives*, expansion of the existing HOV system would not address the purpose and need goal of providing lane continuity and balance.

3.5.2 I-25 and Broadway park-n-Ride

The No Action Alternative and each of the system alternatives would retain vehicular access to the Broadway park-n-Ride generally to the current levels. Systems Alternatives 1 and 2 would retain full movement vehicular access at Kentucky Avenue and Broadway as it is today. System Alternative 3 would convert this Kentucky Avenue access to a right in/right out and introduce a new full movement access at Exposition Avenue. The Preferred Alternative would retain full movement access at Kentucky Avenue and Broadway, and add access at Exposition Avenue.

Pedestrian and bicycle access to the park-n-Ride would be improved with wider sidewalks and signals along Ohio Avenue, Lincoln Street, and Broadway. The improvements are described in detail in **Chapter 2** *Alternatives*.

3.6 Pedestrian and Bicycle Facilities

3.6.1 Common Elements to the System Alternatives

As discussed previously, pedestrian and bicycle mobility within the corridor has been identified as a project need. The City and County of Denver has identified key corridors for pedestrian and bicycle mobility and adopted standards for these facilities (CCD, 2002a; CCD, 2002b). Key components of the plan applicable to this corridor address the South Platte River Trail, east-west connectivity, and the Santa Fe Drive/Kalamath Street pedestrian facilities.

3.6.1.1 SOUTH PLATTE RIVER TRAIL

Common improvements to the trail associated with this project would include:

- Connectivity to the trail at Alameda Avenue would be enhanced
- The trail section parallel to I-25 between 2nd and 3rd Avenue would be upgraded to include widening and shoulder enhancements and screening to shield the trail from I-25
- Horizontal and vertical clearance at the US 6 underpass would be improved
- Horizontal and vertical clearance at the Santa Fe Drive bridge over the South Platte River south of I-25 would be improved

3.6.1.2 EAST-WEST CONNECTIVITY

Two principal east west bicycle/pedestrian corridors were identified for enhancement within the project corridor – along Ohio Avenue at Broadway and along Alameda Avenue.

Common improvements to bicycle/pedestrian facilities along Broadway at Ohio Avenue associated with the project would include:

- Bicycle and pedestrian movements would be improved with wider sidewalks and signals along Ohio Avenue, Lincoln Street, and Broadway. The alignments would be slightly different and are discussed further in the specific alternatives.
- Pedestrian overpasses and underpasses were considered by the Citizen Working Group but eliminated from further consideration because of the out-of-direction travel required, the visual obtrusiveness of the structures, and potential security risks.

Common improvements to bicycle/pedestrian facilities along Alameda Avenue associated with this project would include:

- An attached sidewalk would be incorporated along the south side of Alameda Avenue while a shared use bike trail offset 5 feet from the street would be provided on the north side. System Alternate 3 would provide a subtle variation on this and is discussed below.
- A pedestrian/bicycle grade-separated crossing of I-25, the South Platte River, Santa Fe Drive, Kalamath Street, and the Consolidated Main Line would be incorporated to complement the current City master plan. The alignment generally would follow an extension of Bayaud Avenue north of Alameda Avenue. The details would vary subtly with each alternative and are discussed in **Chapter 2** *Alternatives*.

3.6.1.3 SANTA FE DRIVE / KALAMATH STREET PEDESTRIAN FACILITIES

Sidewalks exist sporadically along Santa Fe Drive and Kalamath Street through the project limits. Enhanced pedestrian connectivity along Santa Fe Drive and Kalamath Street would be provided within the system alternatives. Common improvements include:

- Attached sidewalks would be included with the grade-separation options with the railroad along Santa Fe Drive and Kalamath Street north of Alameda Avenue
- Attached sidewalks would be added on the east side of Santa Fe Drive for pedestrian access to Home Depot and the Warehouse District/Cherokee Redevelopment south of I-25

3.6.2 Differentiating Elements of the System Alternatives

3.6.2.1 BROADWAY EAST-WEST CONNECTIVITY

Both the No Action Alternative and the system alternatives would route pedestrians and bicycles from areas east of Lincoln Street to areas west of Broadway via signalized at-grade crossings. The route with the fewest pedestrian/bike conflicts with vehicular traffic would be System Alternative 2. However, System Alternative 3 and the Preferred Alternative more directly eliminate conflict with the high-speed northbound Lincoln Street off-ramp.

3.6.2.2 ALAMEDA AVENUE

By grade-separating the intersection of Alameda Avenue with Santa Fe Drive, System Alternatives 2 and 3 would remove a significant amount of traffic that could conflict with pedestrians and bicycles through the intersection. System Alternative 3 would further improve safety for pedestrians and bicycles by including 10-foot wide paths separated by a buffer from both sides of Alameda Avenue.

3.7 Freight and Rail Operations

The No Action Alternative would result in continued and increasing difficulty for freight transportation throughout the corridor. Freeway sections within the corridor are expected to remain congested, causing delay for freight trucks traveling through the corridor. Rail impacts are expected to be negligible, as track configurations remain similar for each of the system alternatives. Implementation of any of the system alternatives would improve conditions for freight travel through the corridor to the same degree that traffic operations would be improved.

The US 6 area represents a substantial portion of freight travel within the study area. Multiple industrial sites concentrated around the US 6/Bryant Street area make it a key location for truck travel. In the No Action Alternative, access to the Bryant Street area is extremely constrained with closely-spaced interchange ramps and weaving sections. Each of the system alternatives would improve freight access to this area by removing the existing US 6/Bryant Street ramps.

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TABLE OF CONTENTS

Page

4.0 ENVIRONMENTAL CONSEQUENCES 4-1

4.1 Socio-Economics and Community 4.1-1
4.2 Right-of-Way and Displacements 4.2-1
4.3 Parks and Recreation 4.3-1
4.4 Aesthetics and Urban Design 4.4-1
4.5 Air Quality 4.5-1
4.6 Noise and Vibration 4.6-1
4.7 Historic Preservation 4.7-1
4.8 Paleontology 4.8-1
4.9 Water Resources 4.9-1
4.10 Floodplains 4.10-1
4.11 Wetlands, Waters of the U.S. and Open Water 4.11-1
4.12 Vegetation and Wildlife 4.12-1
4.13 Hazardous Waste 4.13-1
4.14 Soils and Geology 4.14-1
4.15 Energy 4.15-1
4.16 Short-term Uses and Long-term Productivity 4.16-1
4.17 Irreversible and Irretrievable Commitments of Resources 4.17-1
4.18 Construction Impacts 4.18-1
4.19 Permits Required 4.19-1
4.20 Cumulative Impacts 4.20-1
4.21 Summary of Impacts, Mitigation Measures, and Monitoring Commitments 4.21-1

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4.0 AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION MEASURES

This chapter provides a description of the existing social, economic, and environmental settings for the area affected by the system alternatives (System Alternatives 1, 2, 3, and the Preferred Alternative) and the No Action Alternative. Current conditions are described for each resource of concern in the proposed project area. The discussion contains study methodologies, background information, descriptive data, issues, and values that have a bearing on possible impacts and mitigation measures associated with the system alternatives, including the Preferred Alternative.

Probable beneficial and adverse social, economic, and environmental consequences of alternatives under consideration are described. The information provides a basis for evaluating the comparative merits of the alternatives. Impacts to specific resources in the human and natural environment were evaluated for each system alternative and the No Action Alternative. This chapter also identifies measures to avoid, minimize, or mitigate identified adverse impacts of the alternatives.

This EIS was prepared consistent with the National Environmental Policy Act of 1969 (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR 1500. et seq) and FHWA's Guidance for Preparing and Processing Environmental and Section 4(f) Documents (FHWA Technical Advisory T 6640.8A, October 30, 1987). The FHWA guidance lists potentially significant impacts most commonly encountered by highway projects and directs that these factors should be discussed for each reasonable alternative where a potential for impact exists.

Environmental and socioeconomic factors potentially impacted by the proposed project are analyzed in detail in this chapter. The following resources do not occur in the vicinity of the project and therefore have no potential for project-related impacts and are not discussed in this chapter:

- Farmland
- Wild and Scenic Rivers

The following technical reports and addenda were prepared for this EIS, and are available at the locations listed in **Chapter 9**:

- Aesthetics and Urban Design Report and Addendum
- Air Quality Impact Assessment Report and Addendum
- Noise and Vibration Impact Assessment Report and Addendum
- Cultural Resources Inventory
- Paleontology Survey Report
- Water Resources Report and Addendum
- Wetland Delineation Report
- Wetland Finding (presented as Appendix C of this Final EIS)

- Modified Environmental Site Assessment

These technical reports and addenda provide additional detail to supplement the information presented in this Chapter.

TABLE OF CONTENTS

Page

4.1 Socio-Economics and Community.....4.1-1
4.1.1 Current Conditions.....4.1-2
4.1.2 Consequences of the Alternatives.....4.1-28
4.1.3 Environmental Justice Evaluation.....4.1-40

LIST OF FIGURES

Page

Figure 4.1-1 Neighborhood Study Area 4.1-3
Figure 4.1-2 Existing Land Use - Generalized 4.1-5
Figure 4.1-3 Existing Zoning 4.1-6
Figure 4.1-4 Areas of Stability and Change 4.1-8
Figure 4.1-5 Future Concept Land Use 4.1-9
Figure 4.1-6 Baker Neighborhood Proposed Land Use 4.1-10
Figure 4.1-7 Cherokee Denver Transit Oriented Development Plan 4.1-12
Figure 4.1-8 Public and Community Facilities 4.1-14
Figure 4.1-9 Population by Neighborhood 4.1-18
Figure 4.1-10 Racial Minority Population by Census Block 4.1-19
Figure 4.1-11 African American Population by Census Block 4.1-20
Figure 4.1-12 Asian American Population by Census Block 4.1-21
Figure 4.1-13 Native American Population by Census Block 4.1-22
Figure 4.1-14 Hispanic Population by Census Block 4.1-23
Figure 4.1-15 Employment by Neighborhood 4.1-25
Figure 4.1-16 Low-Income Population by Census Block Group 4.1-26
Figure 4.1-17 Denver Enterprise Zone 4.1-27
Figure 4.1-18 Land Use Concept – System Alternative 1 ....4.1-32
Figure 4.1-19 Land Use Concept – System Alternative 2 ....4.1-33
Figure 4.1-20 Land Use Concept – System Alternative 3 ....4.1-34
Figure 4.1-21 Land Use Concept – Preferred Alternative 4.1-35

LIST OF TABLES

Page

Table 4.1-1 Demographics of the Neighborhood Study Area – 2000 ....4.1-17
Table 4.1-2 Employment and Income within the Neighborhood Study Area – 2000 ....4.1-24

4.1 Socio-Economics and Community

This section describes the land use, social, economic, and community characteristics of the project area. The consequences (both positive and adverse) that the system alternatives, which include System Alternatives 1, 2, 3, and the Preferred Alternative, would have on the local area, and measures identified to avoid, minimize, and mitigate adverse impacts are also presented.

The socio-economic characteristics of the project area have been evaluated using a variety of available information sources including:

- Site visits
- Maps and aerial photographs
- Zoning information and land use data
- U.S. Census Bureau data
- Regional, City, and neighborhood plans
- Regional and local employment and population data
- Published directories
- Assessors records

These information sources have been used as a starting point for detailed discussions with a wide range of knowledgeable individuals and groups including:

- City and County of Denver staff and elected officials
- Resource agency staff
- Local neighborhood and business groups
- Local non-profit and advocacy groups
- Local residents
- Local business owners

Further information regarding public and agency discussions is provided in **Chapter 6** *Public Involvement*. Additional detail is provided in **Appendix A** *Agency Coordination* and **Appendix B** *Public Coordination*.

The information sources and discussions have provided a basis for identification of the consequences, both beneficial and adverse, of the system alternatives on the local community. In addition, these discussions have provided valuable input regarding mitigation measures to address adverse impacts.

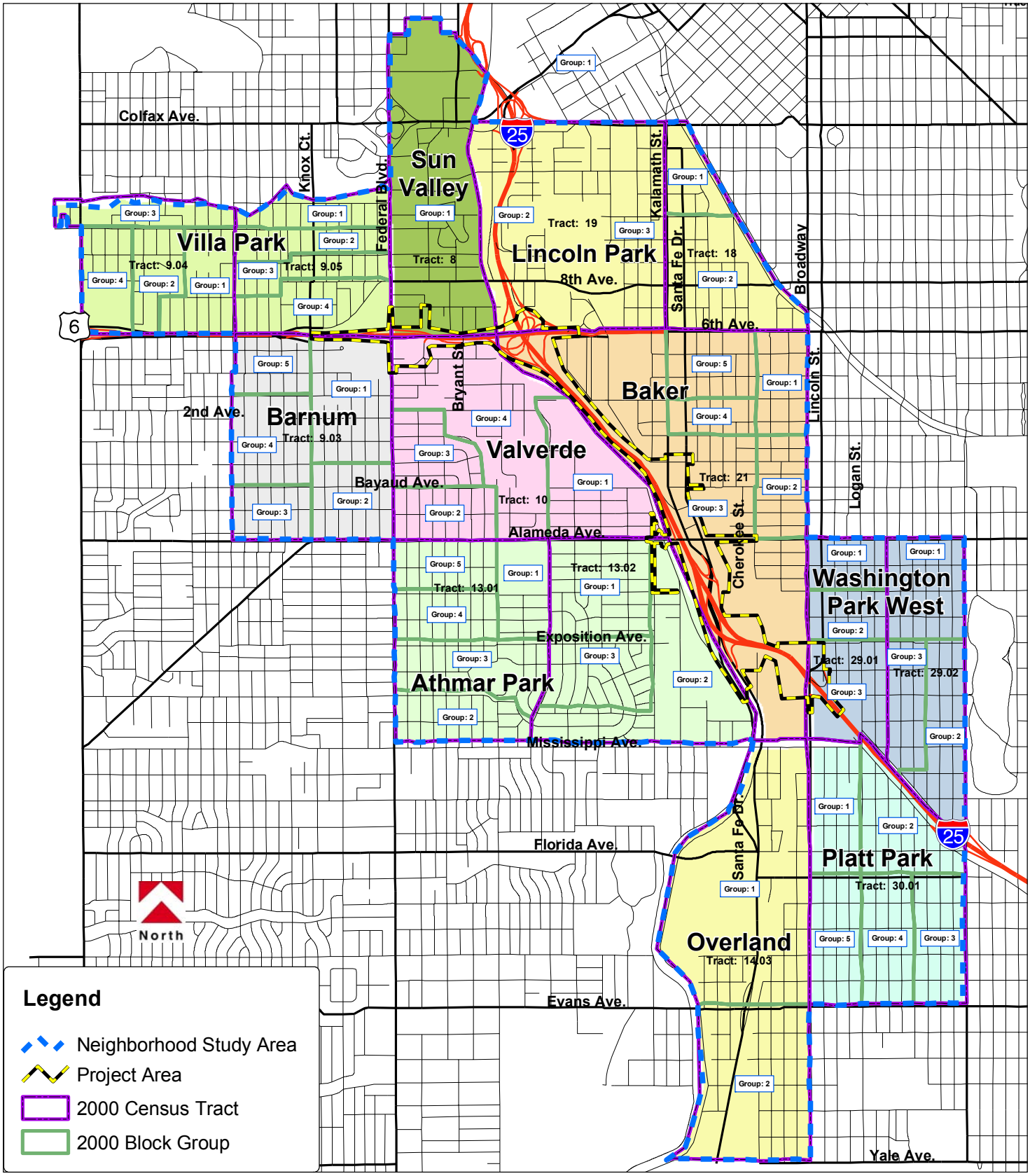
The consequences of the system alternatives have been considered throughout the alternatives development process and identification of the Preferred Alternative, and strong efforts have been made to avoid adverse effects. This is in keeping with CDOT and FHWA policy and guidance, and recognizes the important role that transportation systems have in supporting and maintaining vibrant and livable communities.

4.1.1 Current Conditions

The project is located entirely within the City and County of Denver. A Neighborhood Study Area has been identified (see **Figure 4.1-1**) to provide a basis for discussion of affected environment and potential impacts. The Neighborhood Study Area includes the following Denver neighborhoods adjacent or close to the project area:

- Villa Park – a mostly residential neighborhood with limited commercial and industrial areas
- Sun Valley – a neighborhood containing commercial and industrial areas, public facilities, and public housing
- Lincoln Park – a neighborhood containing primarily industrial areas in the western half and a mixture of residential, commercial, and school uses in the eastern half
- Barnum – a mostly residential neighborhood with commercial areas along the eastern and southern edges
- Valverde – a neighborhood containing residential areas on the west and south, and industrial areas in the north and east
- Baker – a neighborhood containing a historic residential area, commercial and industrial areas, and emerging transit oriented development areas
- Athmar Park – a mostly residential neighborhood with a commercial/industrial area on the east side and a shopping center considered a candidate for redevelopment on the north side
- West Washington Park – a mostly residential neighborhood with some commercial use on the western and northern edges
- Overland – a neighborhood containing residential areas, commercial/industrial areas, and a large public golf course
- Platt Park – a mostly residential neighborhood with some commercial use and an emerging transit oriented development area at the northern end

The identification of this Neighborhood Study Area allows focus on the areas most likely to be affected by the system alternatives. Where appropriate, information regarding the City and County of Denver and/or State of Colorado as a whole has been included for comparison.



Valley Highway, 02-069, 09/29/2004

0 0.25 0.5 1 Miles

Neighborhood Study Area

Valley Highway - Logan To 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-1

4.1.1.1 CURRENT LAND USE AND ZONING

Figure 4.1-2 shows existing land use within the Neighborhood Study Area, based on information provided by the City and County of Denver. As shown on **Figure 4.1-2,** the Neighborhood Study Area includes a wide range of land uses. Industrial and commercial are the predominant land uses bordering the project area. Several parks and the South Platte River also border the project area.

The properties along the South Platte River corridor tend to be industrial in use and have a mix of new and old properties of varying character, size, and specific industrial use. These industrial areas are located primarily along the central axis of the Neighborhood Study Area, effectively bisecting the area. Main arterial thoroughfares tend to be lined with commercial or light industrial uses. Existing right-of-way for I-25, US 6, LRT lines, and railroads are also central to the Neighborhood Study Area.

Residential areas within the Neighborhood Study Area are generally separated from the existing highways, railroad corridor, and system alternatives by the land uses described above. The residential areas are generally older, established neighborhoods developed between the late 1890s and 1950s, with some localized later development or redevelopment such as multi-family units in some locations.

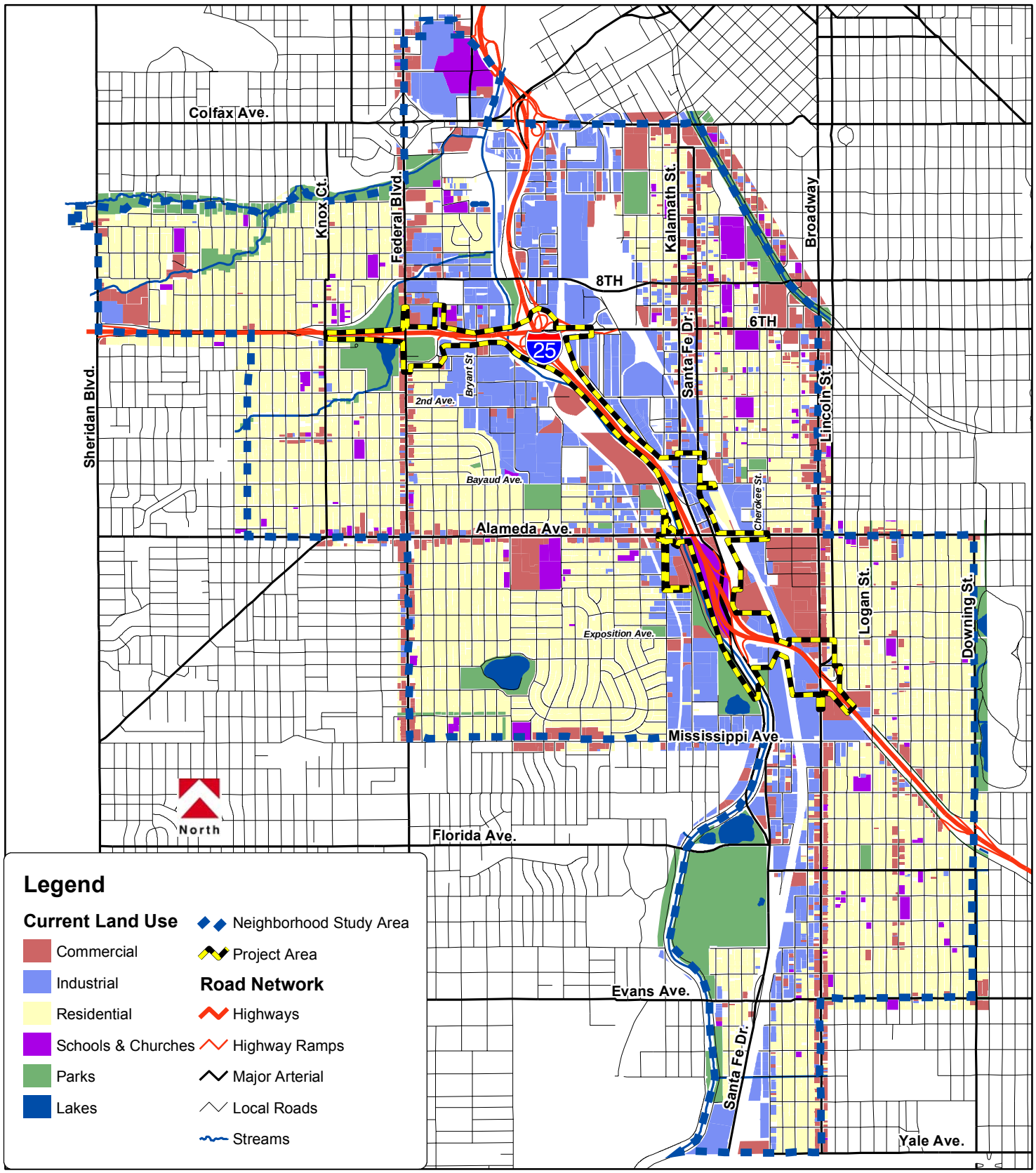
Residential properties are located adjacent or very close to the project area in the following limited areas:

- 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
- On west Ellsworth Avenue between Kalamath Street and Santa Fe Drive
- West of Lipan Street, one block north of Alameda Avenue
- Along the north side of Alameda Avenue, east of Cherokee Street
- Along Lincoln Street, north of I-25

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
- Along Alameda Avenue both east and west of I-25
- Along Santa Fe Drive and Kalamath Street, interspersed with industrial properties
- Along Broadway both north and south of I-25

The existing land use is generally consistent with the existing zoning, as shown on **Figure 4.1-3.**



Source: City and County of Denver, 2004

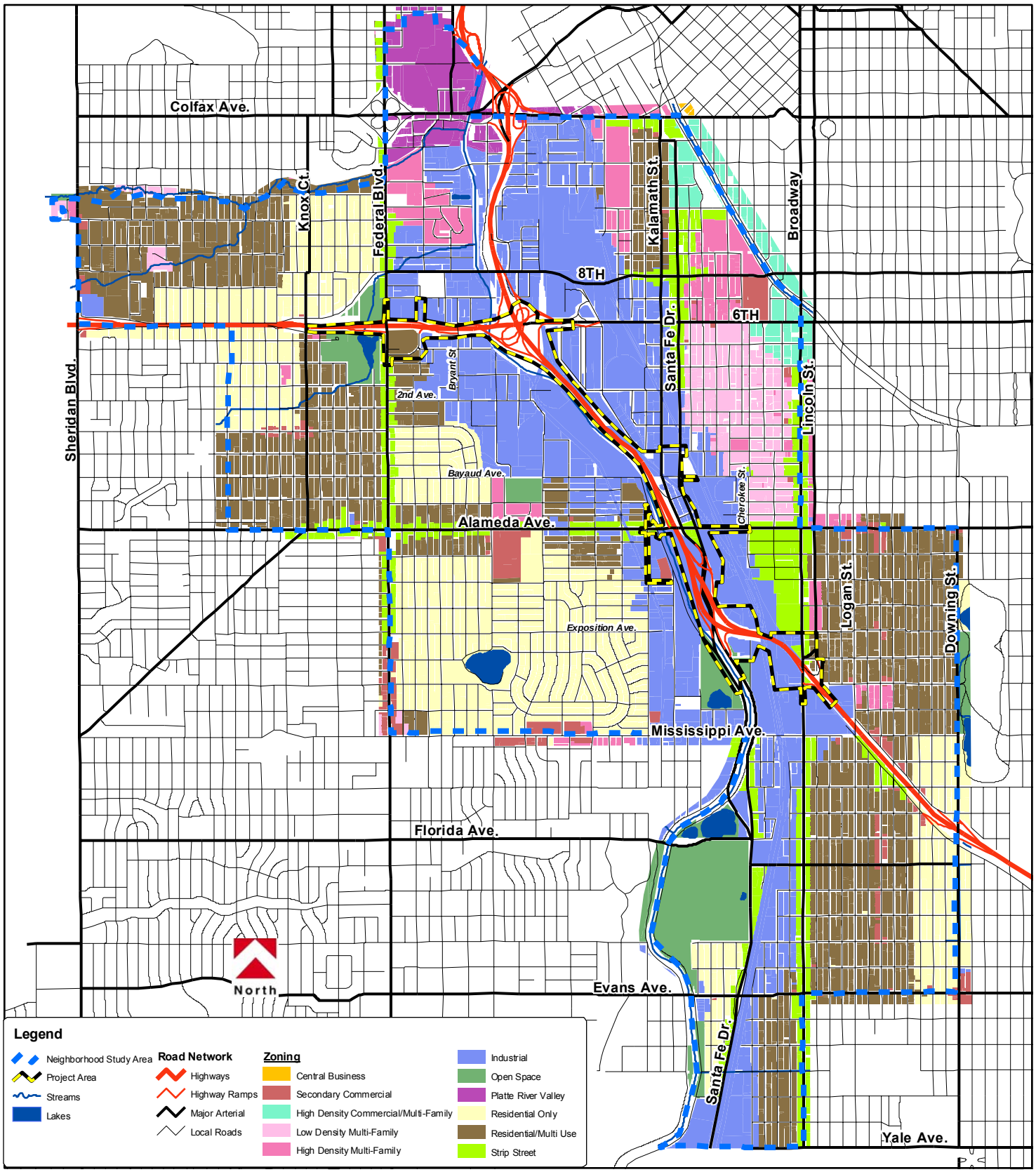
Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Existing Land Use-Generalized

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-2



Source: City and County of Denver, 2004c

Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Existing Zoning

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-3

4.1.1.2 FUTURE PLANNED LAND USE

City and County of Denver Land Use Planning

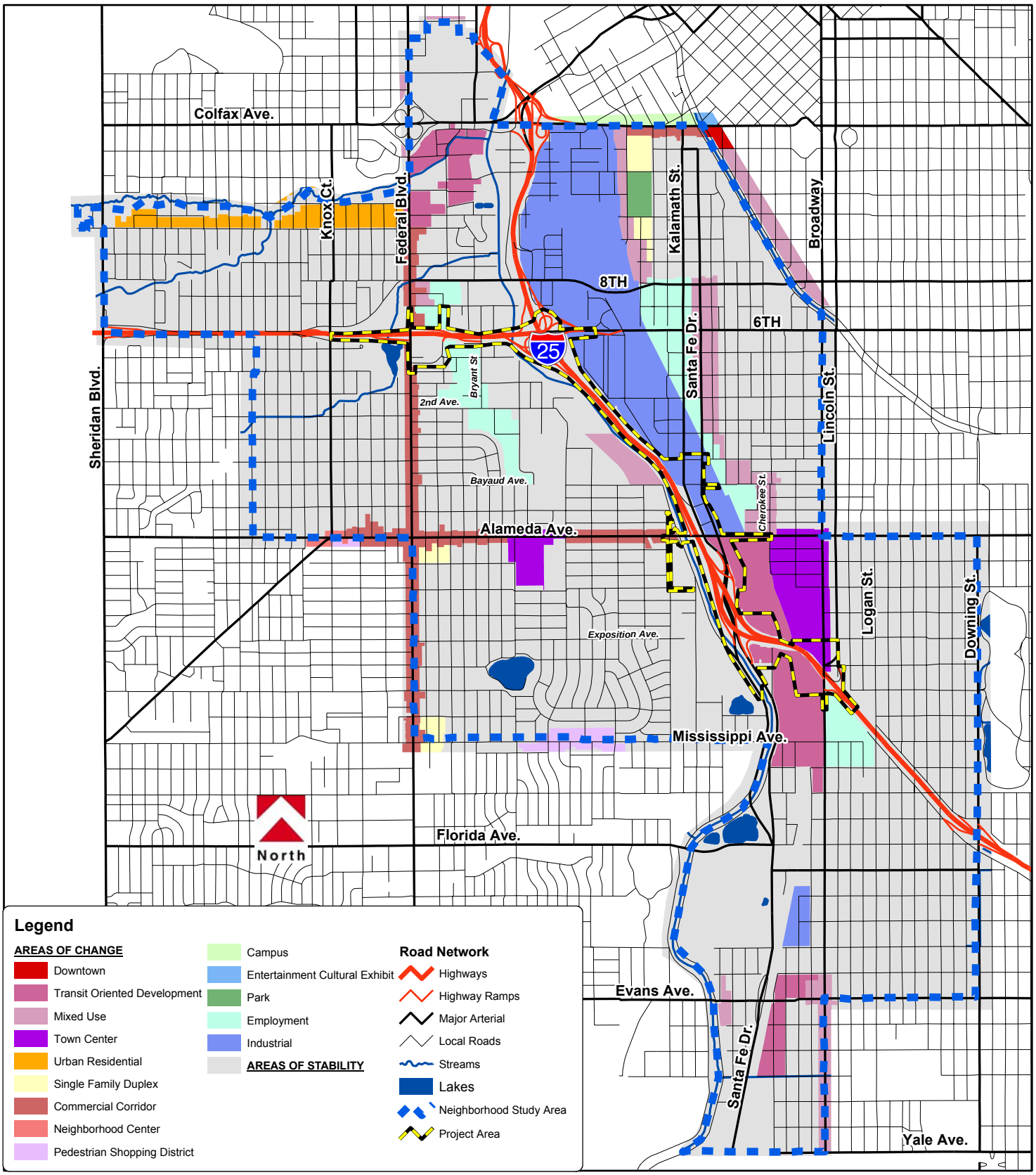
The City and County of Denver recently undertook a comprehensive planning effort to provide a vision for integrated future land use and transportation within the city. This vision, known as *Blueprint Denver* (City and County of Denver, 2002c), is an adopted Denver plan and is a supplement to the Denver Comprehensive Plan (City and County of Denver, 2000b). Blueprint Denver *"encourages and promotes more efficient use of transportation systems, expanded transportation choices, appropriate and mixed land use, and the revitalization of declining neighborhoods – all of which will ultimately improve our quality of life*". *Blueprint Denver* seeks to further the principles of *Metro Vision 2020* (DRCOG, 2000), the plan for the Denver metropolitan region.

Blueprint Denver identified all areas of Denver as either Areas of Stability or Areas of Change. According to *Blueprint Denver*, Areas of Stability include primarily stable residential neighborhoods and their associated commercial areas, where limited change is expected during the next 20 years. The goal for an Area of Stability is to identify and maintain the character of the area while accommodating some new development and redevelopment.

Blueprint Denver also identifies Areas of Change, which represent those areas of Denver where change is either underway or desirable. These Areas of Change are primarily older industrial districts, major arterial corridors, and areas adjacent to existing or planned transit facilities. *Blueprint Denver* seeks to distribute forecasted growth to Areas of Change, where it will be most beneficial and away from Areas of Stability, where it may have some negative consequences.

Figure 4.1-4 shows the Areas of Stability and Change identified by *Blueprint Denver* within the Neighborhood Study Area. As shown on **Figure 4.1-4**, much of the industrial and commercial land adjacent to the project area has been identified as an Area of Change. **Figure 4.1-5** shows Denver's future concept land use, combining the future land uses for the Areas of Stability and Change. Comparison of **Figure 4.1-5** with **Figure 4.1-2** (*Existing Land Use-Generalized*) highlights the planned emergence of transit oriented development, mixed use, town center, and pedestrian shopping district land uses, modifying or replacing some existing industrial and commercial uses.

Blueprint Denver emphasizes the advantages of and recommends a process for developing small area plans which are consistent with and complement citywide planning. *The Baker Neighborhood Plan* (City and County of Denver, 2003b) provides additional detail regarding future land use within the Baker neighborhood. **Figure 4.1-6** shows the proposed land use identified in the *Baker Neighborhood Plan*. The proposed land use generally emphasizes transit oriented development in the vicinity of the Broadway and Alameda LRT stations. Industrial/commercial and residential/office Areas of Change are identified north of Alameda Avenue and east of the LRT line, while continued industrial use is anticipated north of Alameda Avenue and west of the LRT line.



Source: Blueprint Denver Land Use & Transportation and Land Use Plan, 2002

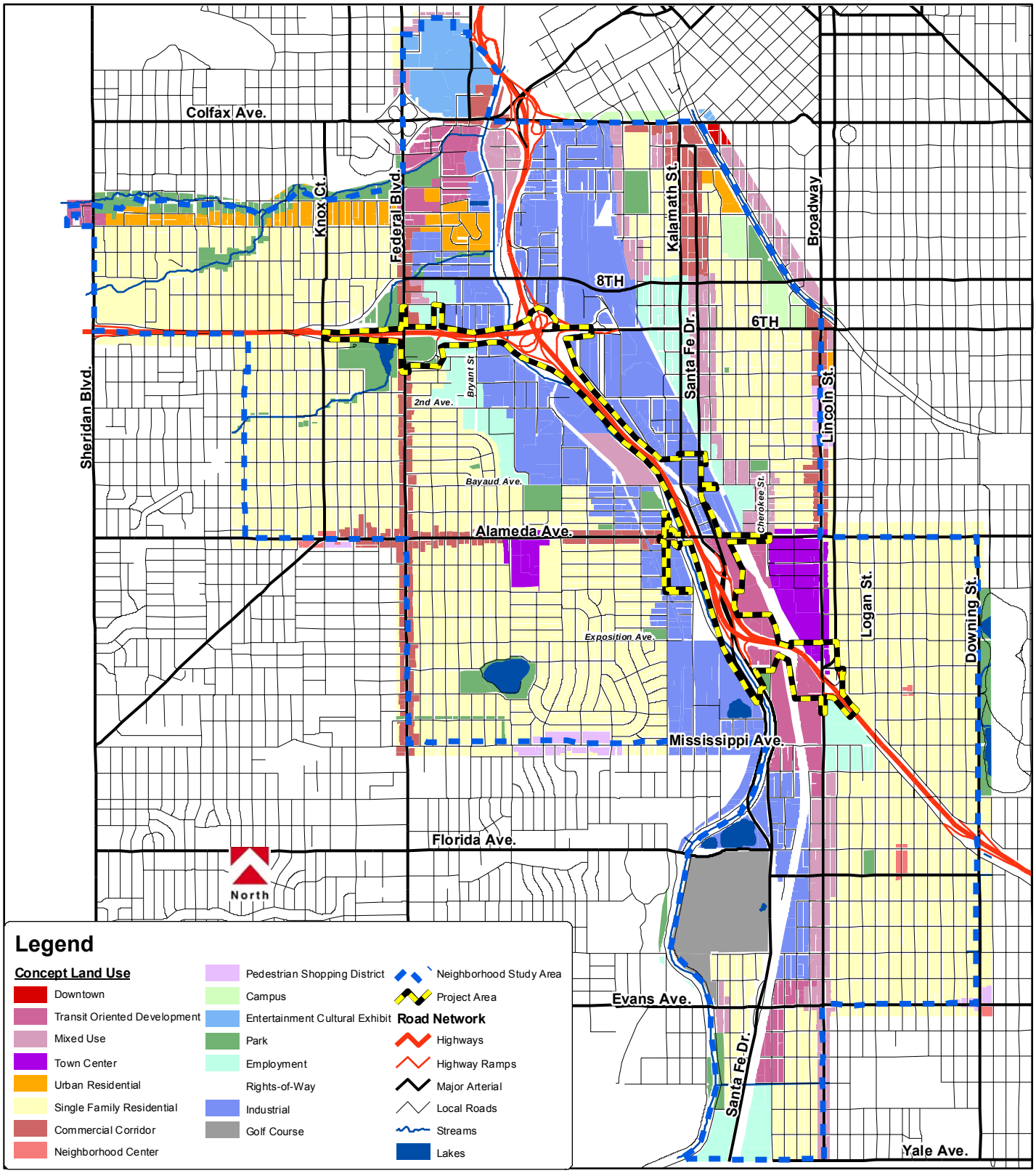
Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Areas of Stability and Change

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-4



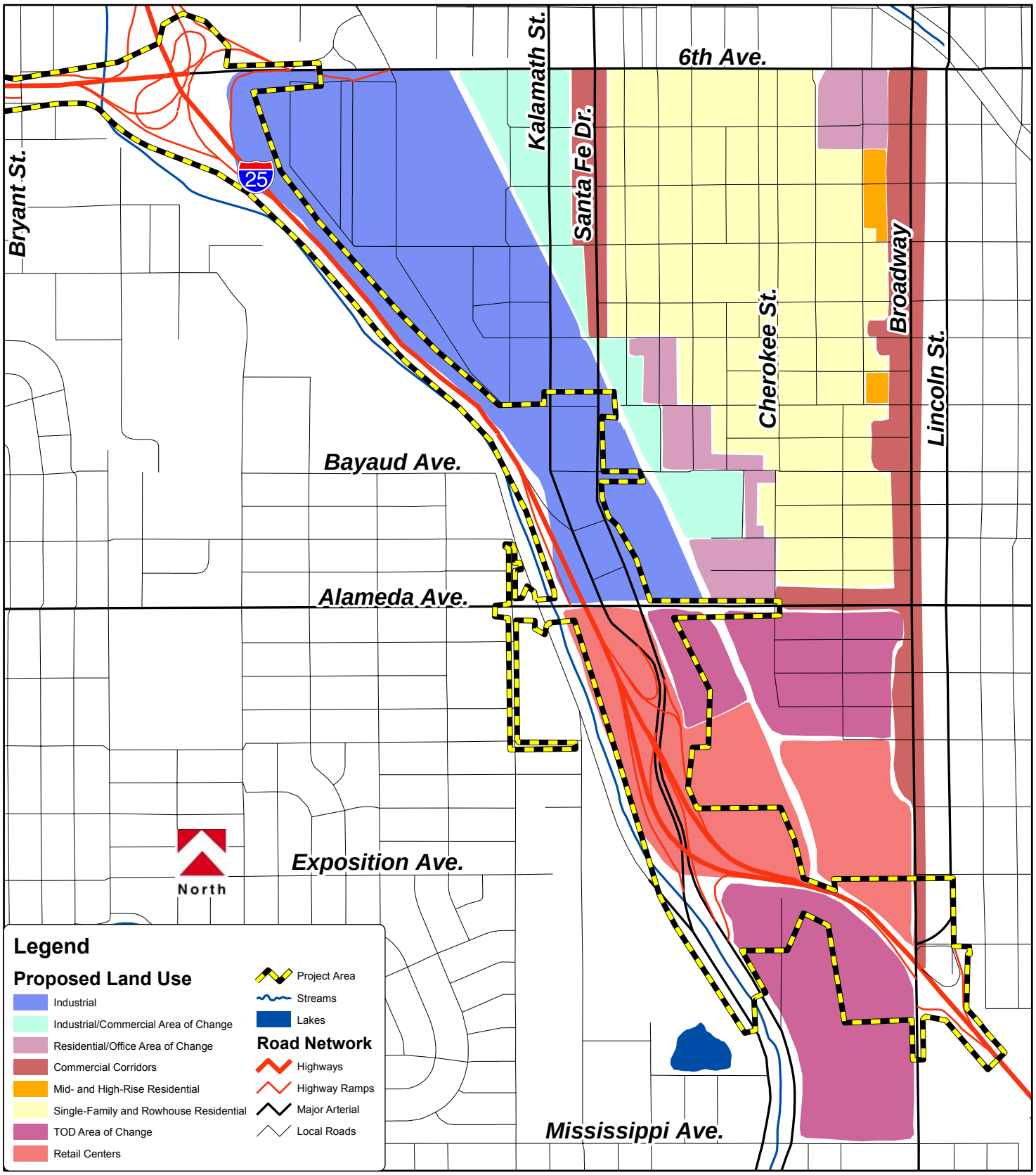
Source: CCD, Blueprint Denver Land Use & Transportation Plan, 2002c

Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Future Concept Land Use

Figure 4.1-5



Source: Baker Neighborhood Plan, 2003

Valley Highway, 02-069, 10/27/2004

0 500 1,000 2,000 Feet

Baker Neighborhood Proposed Land Use

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-6

The Baker Neighborhood Plan is most relevant to the Valley Highway Project because many of the transportation improvements being considered are within that neighborhood. Other neighborhood plans developed within the Neighborhood Study Area include the *Athmar Park Neighborhood Plan* (City and County of Denver, 2000c), and the *Villa Park Neighborhood Plan* (City and County of Denver, 1991).

Gates / Cherokee Redevelopment

The former Gates Rubber Company site, located south of I-25 and on both sides of Broadway, is currently in the planning stages for redevelopment as transit oriented mixed use. Gates currently retains the portion east of Broadway (the East Campus; approximately 28 acres) but has sold the portions west of Broadway to Cherokee Denver LLC (approximately 50 acres). The status and plans for the East Campus and Cherokee Denver sites are summarized below.

Cherokee Denver Site

Cherokee Denver is in the process of redeveloping the former Gates factory area located between Santa Fe Drive and Broadway. Cherokee Denver rezoned the property to Transit Mixed Use-30 (TMU-30) in 2002, and has initiated planning and environmental clean-up in preparation for redevelopment. **Figure 4.1-7** shows the master plan for Cherokee Denver site.

Gates East Campus

The Gates East Campus was located on the east side of Broadway, bounded by I-25 and the new T-REX LRT alignment to the north and east, and Arizona Avenue to the south. Gates owned most, but not all, of the property between Mississippi and Arizona Avenues.

Prior to selling the property, Gates received city approval of a change of zoning consistent with mixed-use transit oriented development of the site. The rezoning includes TMU-30 north of Mississippi Avenue, and a mixture of Residential Mixed Use-30 (RMU-30), RMU-20 and R-2 (Residential) south of Mississippi Avenue. In 2005, Gates sold the East Campus to a master developer, Lionstone Group. Lionstone Group subsequently sold the portion of the property south of Mississippi Avenue to McStain Homes.

Simulation Looking North

Site Master Plan

Simulation Looking Southeast

SOURCE: Cherokee Denver, 2002

North

Cherokee Denver Transit Oriented Development Plan

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-7

4.1.1.3 COMMUNITY FACILITIES, SERVICES, AND NEIGHBORHOOD COHESION

Community Facilities

Community facilities and public services are important factors in maintaining communities. This section describes the existing community facilities and public services within the Neighborhood Study Area, and identifies factors that may contribute to or hinder community development and cohesion.

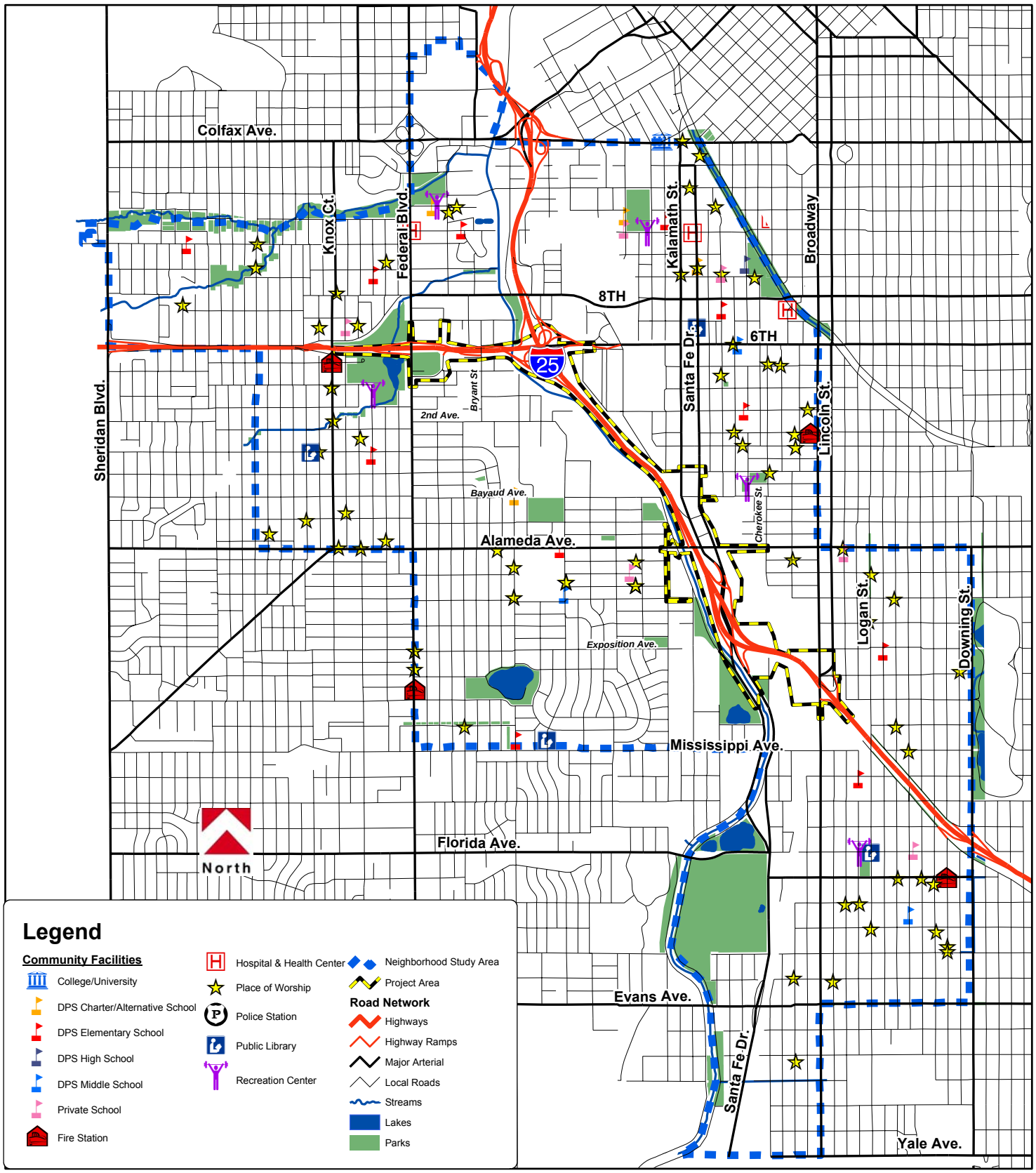
Figure 4.1-8 shows the type of public and community facilities within the Neighborhood Study Area. Key community facilities include:

- Several public parks (these are further described in **Section 4.3** *Parks and Recreation*)
- Five public recreation centers
- Four public libraries
- Numerous public, charter and private schools
- Many places of worship

Four fire stations are located within the Neighborhood Study Area. No police stations are located within the Neighborhood Study Area, but the area is served by police stations located in adjacent areas. The Neighborhood Study Area includes three hospitals/health centers, and is served by additional hospital/health providers located in the adjacent area.

In general, the neighborhoods in the vicinity of the project area are relatively well served by public facilities. Neighborhood residents typically have access to public facilities in their neighborhood or adjacent neighborhood (as in the case of the Valverde neighborhood, whose residents access schools, a recreation center, and libraries in the adjacent Barnum and Athmar Park neighborhood).

The general availability of community facilities is consistent with the urban residential nature of the neighborhoods, and the long-standing commitment of the City and County of Denver to provide such facilities to its residents. The City and County of Denver recently reinforced its emphasis on community facilities by establishing the Focus Neighborhoods Initiative. The initiative seeks to improve public facilities in neighborhoods that may have seen underinvestment in public facilities in the past. Within the Neighborhood Study Area, the Baker, Valverde, Lincoln Park, Sun Valley, and Villa Park neighborhoods are included in the Focus Neighborhoods Initiative. Examples of improvement projects undertaken under this initiative include new and improved playgrounds, alley reconstruction, neighborhood beautification, and several other programs (City and County of Denver, 2003e).



Source: Piton Foundation, 2004.
Additional information, data and maps are available at: www.piton.org.

Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Public and Community Facilities

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-8

Community Service Providers

Several organizations serving groups or populations with specific needs are located within the Neighborhood Study Area. These include:

- Altantis Community: This is a residential and resource center serving physically disabled people throughout Metro Denver. Located at 201 S. Cherokee Street, this central facility includes an apartment complex and offices in separate buildings. Service providers also travel out from this location by car to visit clients located throughout the Metro area.
- Bayaud Industries: Bayaud Industries, located at 333 W. Bayaud, is a work center and training facility, primarily serving individuals that have experienced mental illness and are returning to work. The facility serves clients from throughout the Metro area.
- Shalom: Shalom, located at 2498 W. 2nd Avenue, is a work and training center serving developmentally disabled individuals from throughout the Metro area.
- Platte River Industries: Platte River Industries is located at 490 Bryant Street and provides work and training for disabled individuals from throughout the Metro area.
- The Bridge Project at Columbine Homes: The Bridge Project is a community outreach initiative of the University of Denver Graduate School of Social Work that has teamed with the Denver Housing Authority. Located at the Denver Housing Authority Columbine Homes development at 2390 W. Cedar Avenue, the Bridge Project provides mentoring, tutoring, teaching and youth development programs to children and families.
- City Church Youth Center: This organization is located at 135 S. Kalamath Street. A sign on the facility indicates that the organization serves pregnant teens. Several attempts have been made over a number of months to contact the organization to confirm its mission and obtain additional information, but these attempts have been unsuccessful.
- Mi Casa Resource Center for Women: The Mi Casa Resource Center for Women is located at 360 Acoma Street and provides a number of programs to promote self-sufficiency for primarily low-income Hispanic women and youth.
- Santa Fe Drive Redevelopment District (NEWSED): NEWSED promotes and develops economic and community programs to raise the income, educational, and political levels of West Denver residents. NEWSED sponsors the annual *El Grito de la Independencia* Festival along Santa Fe Drive and works to revitalize businesses along Santa Fe Drive. NEWSED is located at 1029 Santa Fe Drive.
- Making Connections – Denver: Making Connections is an initiative to improve life for residents in the Baker, La Alma/Lincoln Park, Sun Valley, and Cole neighborhoods. Located at 370 17th Street, Making Connections provides training, funding, and technical support for community organizing efforts.
- Metro Organizations for People: The Metro Organizations for People supports local communities and assists with the community organizing process. The organization is located at 1980 Dahlia Street but is involved in organizing the Valverde Neighborhood Association.

Neighborhood Cohesion

Many factors affect the cohesion and vitality of neighborhoods. The presence of the public facilities and service providers identified above are positive factors that contribute to a sense of community. The vitality of local business and employment opportunities also exert a strong influence on community cohesion.

The neighborhoods within the Neighborhood Study Area generally exhibit relatively high cohesion. There is a strong sense of community. This is supported by the City and County of Denver's emphasis on neighborhood support and development, and through Denver's comprehensive planning initiatives described in **Section 4.1.1.2**.

Transportation facilities can be both positive and negative factors. These facilities provide vital links enabling residents to access goods, services, employment, and travel to other areas of the city. However, major transportation facilities can also act as a barrier that hinders cross travel (particularly for pedestrians and bicyclists) and can detract from cohesion and sense of community.

Within the Neighborhood Study Area, the following highway and majority arterials hinder, to a greater or lesser degree, cross travel between or within neighborhoods:

- I-25: I-25 combined with the largely parceled South Platte River and rail corridors restrict east-west travel across the area. However, this corridor also provides key north-south mobility for transit riders on the LRT line, bicyclists traveling along the South Platte River trail, as well as for motorists.
- US 6: This east-west freeway restricts north-south travel in the area west of I-25.
- City Arterials: There are several major arterials present in the area. These provide mobility throughout the area, but may hinder pedestrian and bicycle cross travel and the connection between adjacent areas. Major east-west arterials near the project area include 8th Avenue and Alameda Avenue. Major north-south arterials include Federal Boulevard, Santa Fe Drive, Kalamath Street, Broadway, and Lincoln Street.

4.1.1.4 DEMOGRAPHICS AND EMPLOYMENT

The Neighborhood Study Area includes a diverse community with a broad range of racial and ethnic backgrounds represented. 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. This section summarizes the demographic character of the individual neighborhoods that make up the Neighborhood Study Area, based primarily on census data from 2000.

Year 2000 demographic information for the Neighborhood Study Area is summarized in **Table 4.1-1.**

Table 4.1-1 Demographics of the Neighborhood Study Area – 2000

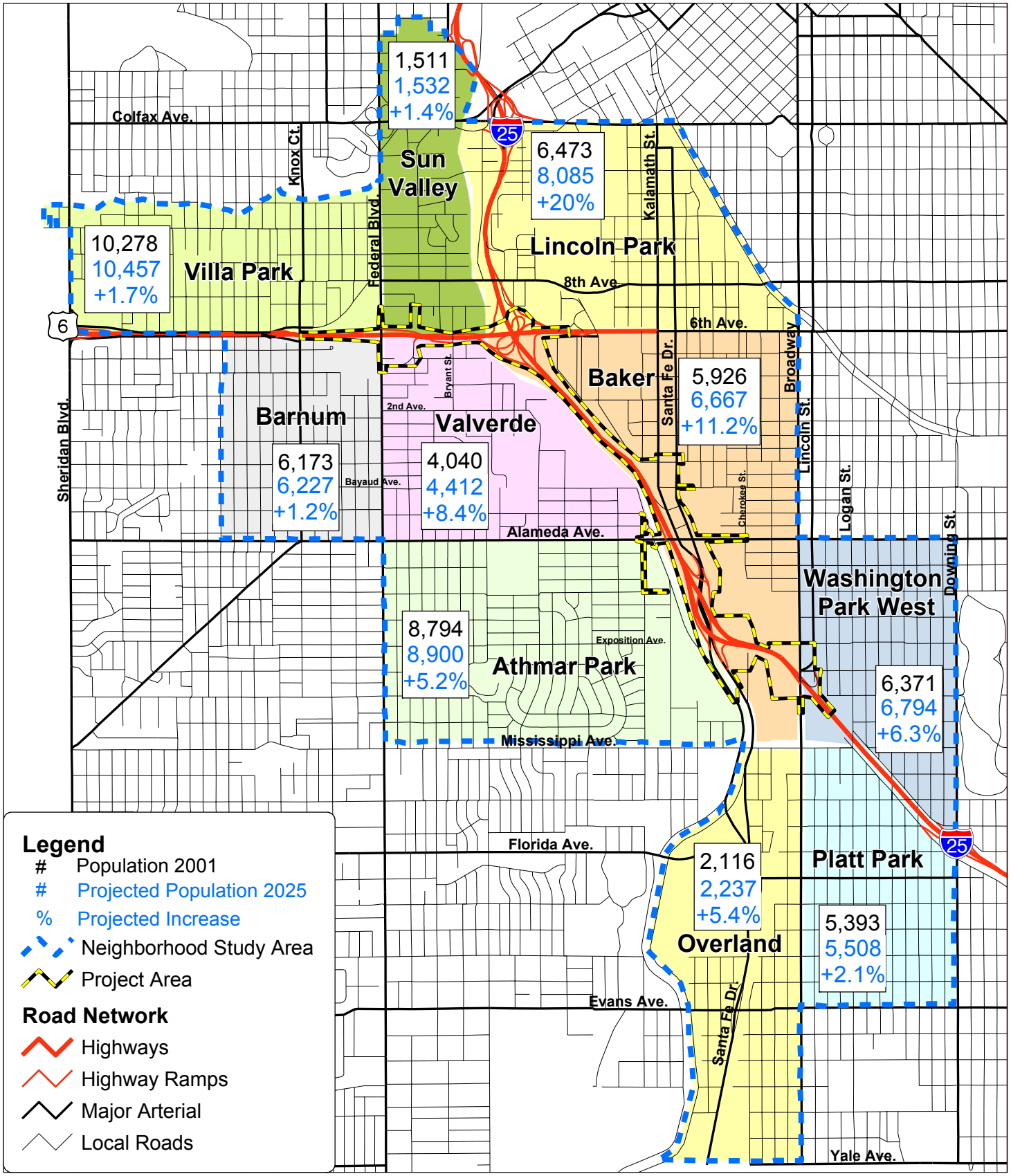
Area	Race/Ethnicity (%)				
	(Non-Latino) White [1]	Black or African American	Native American	Asian/Pacific Islander	Hispanic or Latino
State of Colorado	74.5	3.7	0.7	2.2	17.1
City and County of Denver	51.9	10.8	0.7	2.7	31.7
By Neighborhood					
Villa Park	15.7	1.4	0.9	1.1	79.9
Sun Valley	10.1	17.3	1.9	13.5	52.6
Lincoln Park[2]	32.4	7.2	1.5	4.0	52.5
Barnum	20.7	0.6	0.8	0.6	75.8
Valverde	18.2	2.5	1.4	2.1	74.6
Baker	39.7	2.9	1.2	0.7	53.7
Athmar Park	29.5	0.8	0.4	3.2	65.2
Washington Park West	87.0	1.1	0.7	1.4	8.5
Overland	64.3	2.1	1.0	1.5	29.6
Platt Park	86.9	1.2	0.7	1.0	8.5

Source: Piton Foundation compilation of U.S. Census Bureau Year 2000 data
Note: Unaccounted percentages were for the census categories of "Some Other Race" or "Two or More Races." Percentages shown will not add up to 100%.
[1] "Non-Latino White" percentages of less than 50% imply a minority population of greater than 50%, thus indicating a "Minority Population" according to guidance from the Interagency Working Group on Environmental Justice (established by Executive Order 12898).
[2] Data shown are for Auraria-Lincoln Park.

Figure 4.1-9 shows population projections for each neighborhood for the year 2025. Projected population increases range from a low of 1.2 percent in Barnum to a high of 20 percent in Lincoln Park. The higher projected population increases for Lincoln Park and Baker are largely the result of a projected increase in available residential units due to development.

The racial and ethnic distribution within the Neighborhood Study Area is presented on the following figures, by comparing census block data with the City and County of Denver averages:

- **Figure 4.1-10:** Racial Minority Population (includes African American, Asian American and Native American)
- **Figure 4.1-11:** African American Population
- **Figure 4.1-12:** Asian American Population
- **Figure 4.1-13:** Native American Population
- **Figure 4.1-14:** Hispanic Population (Hispanic origin/ethnicity of any race)



Source: DRCOG, 2002

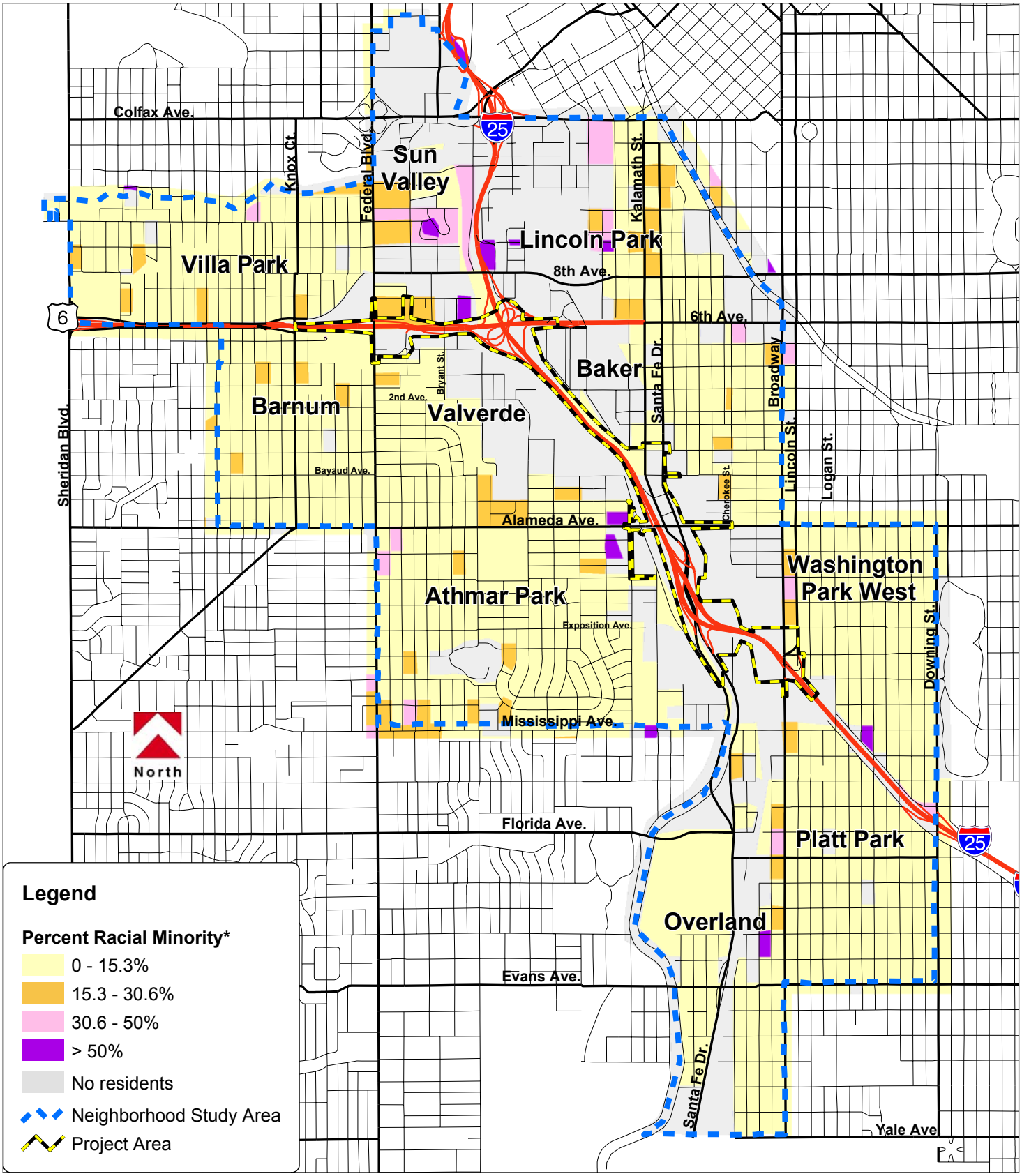
Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Population by Neighborhood

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-9



U.S. Census 2000
* City and County of Denver Average = 15.3%

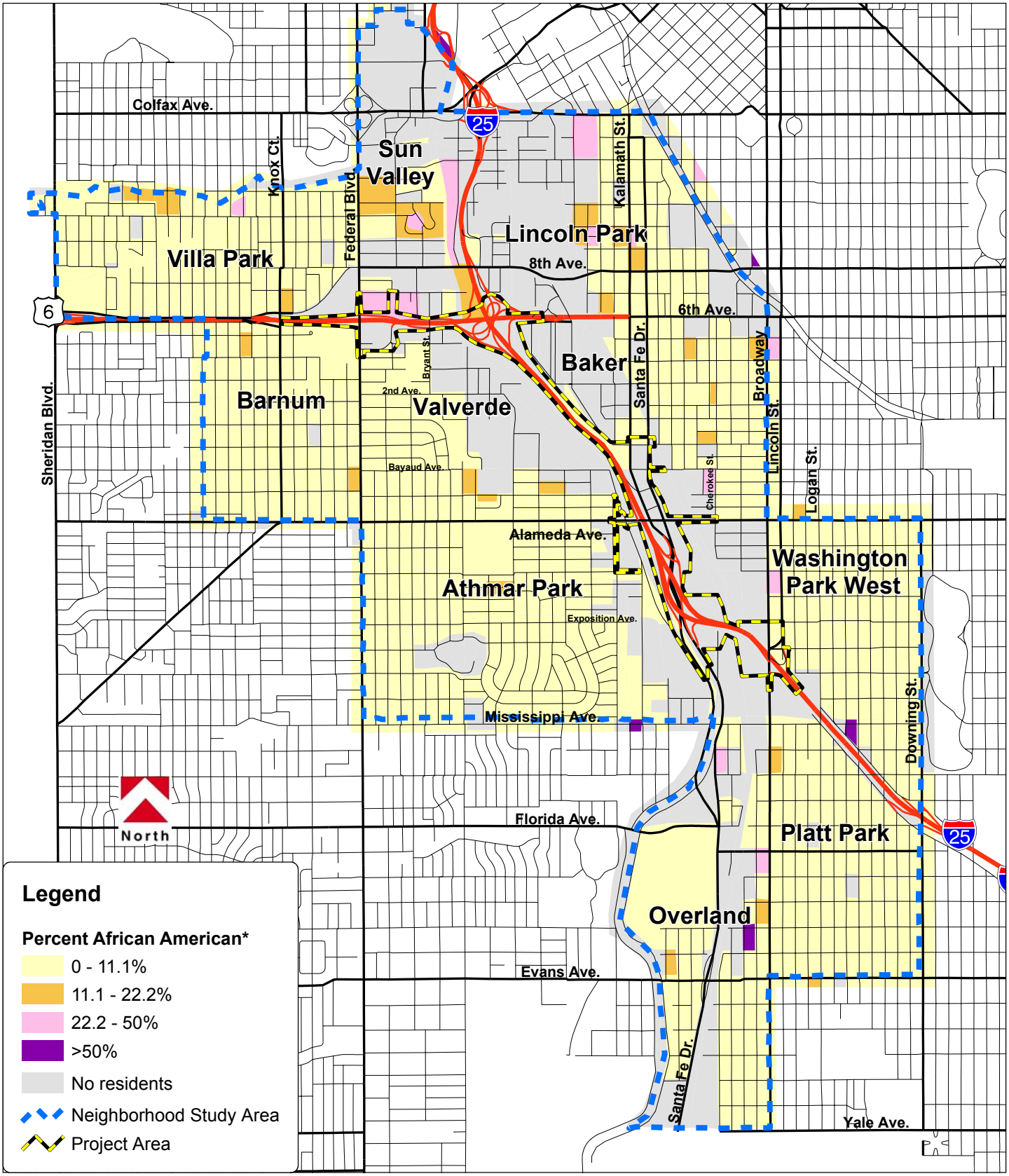
Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Racial Minority Population by Census Block

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-10



U.S. Census, 2000
* City and County of Denver Average = 11.1%

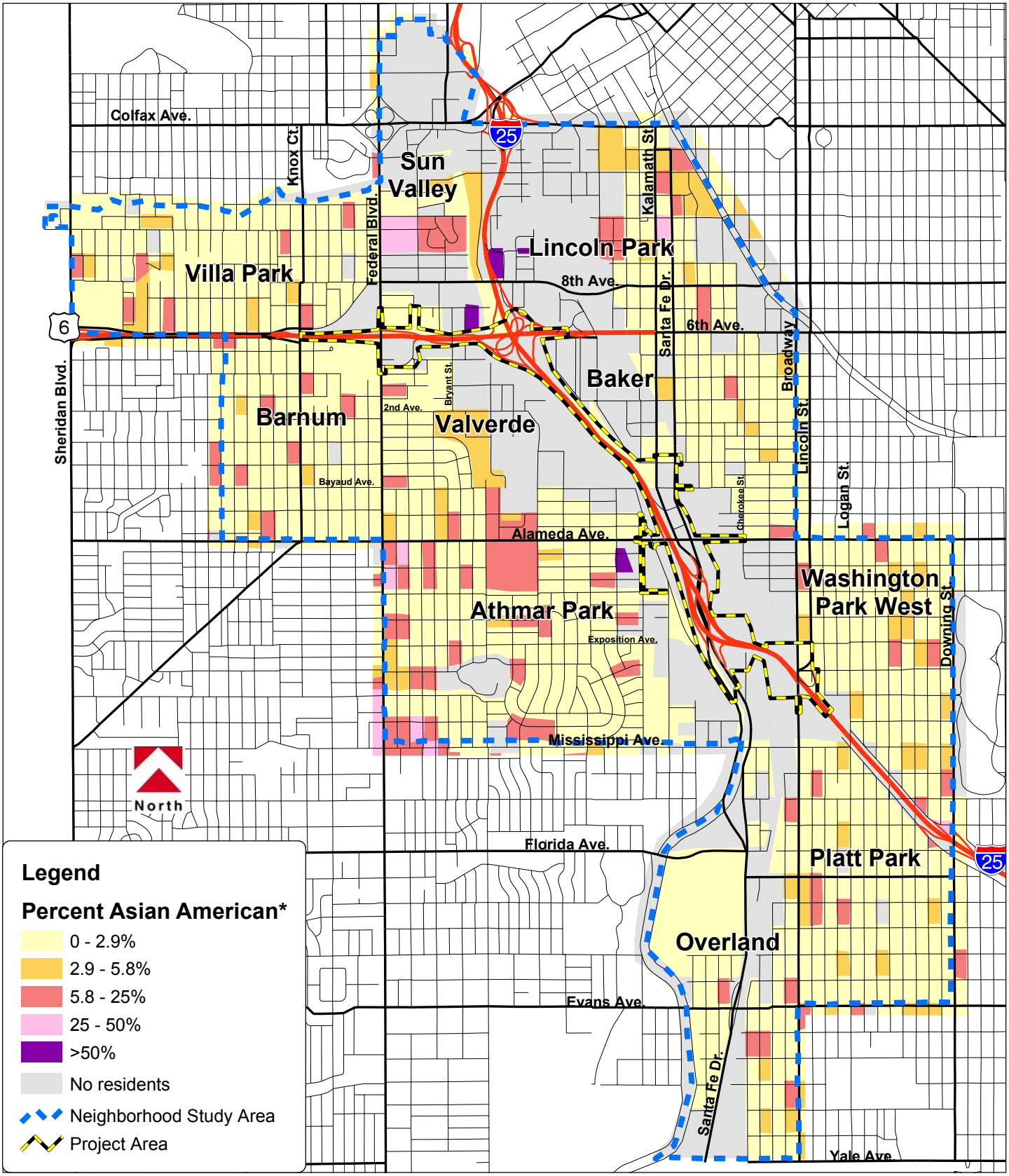
Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

African American Population by Census Block

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-11



U.S. Census, 2000
* City and County of Denver Average = 2.9%

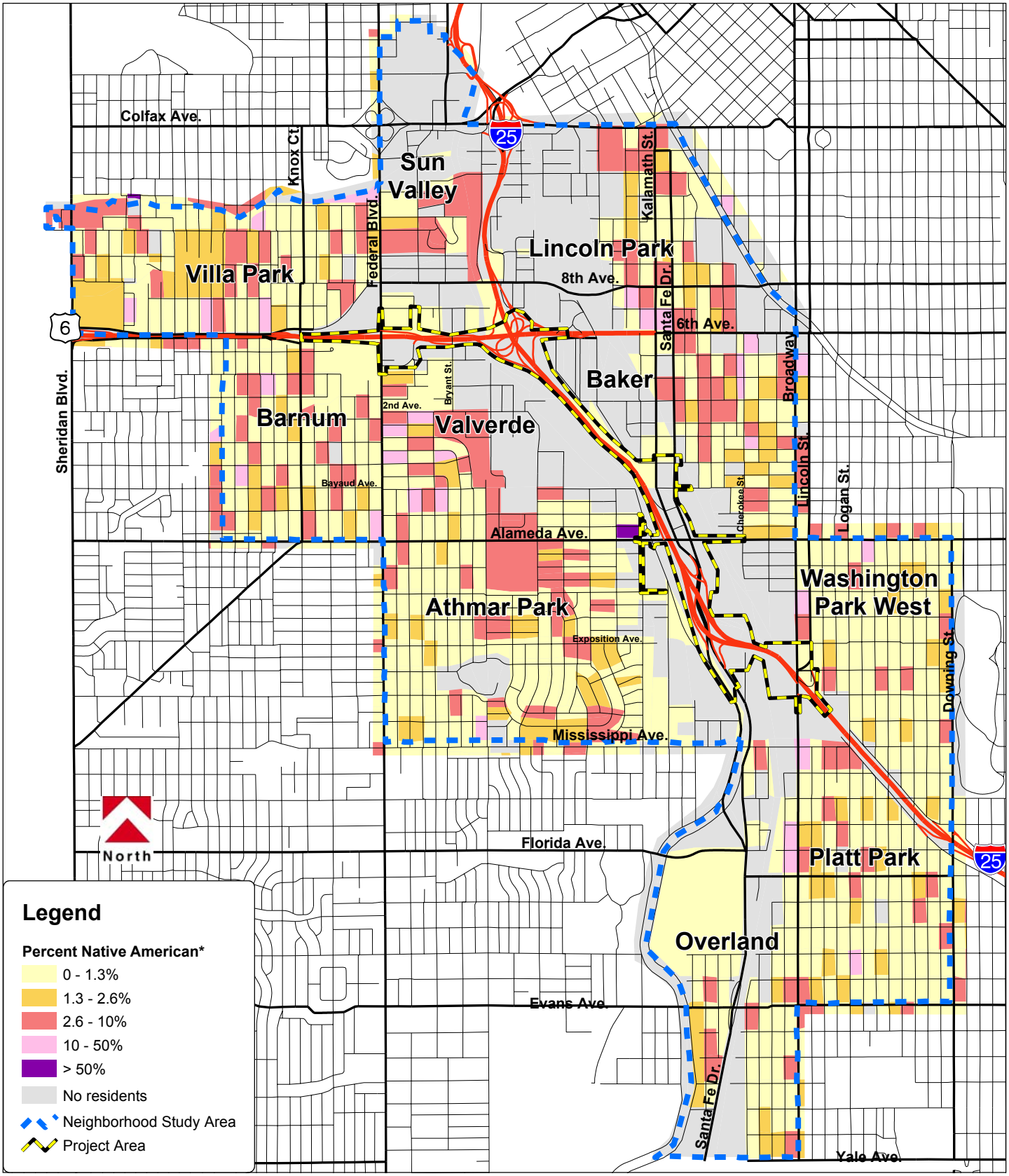
Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Asian American Population by Census Block

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-12



U.S. Census, 2000
* City and County of Denver Average = 1.3%

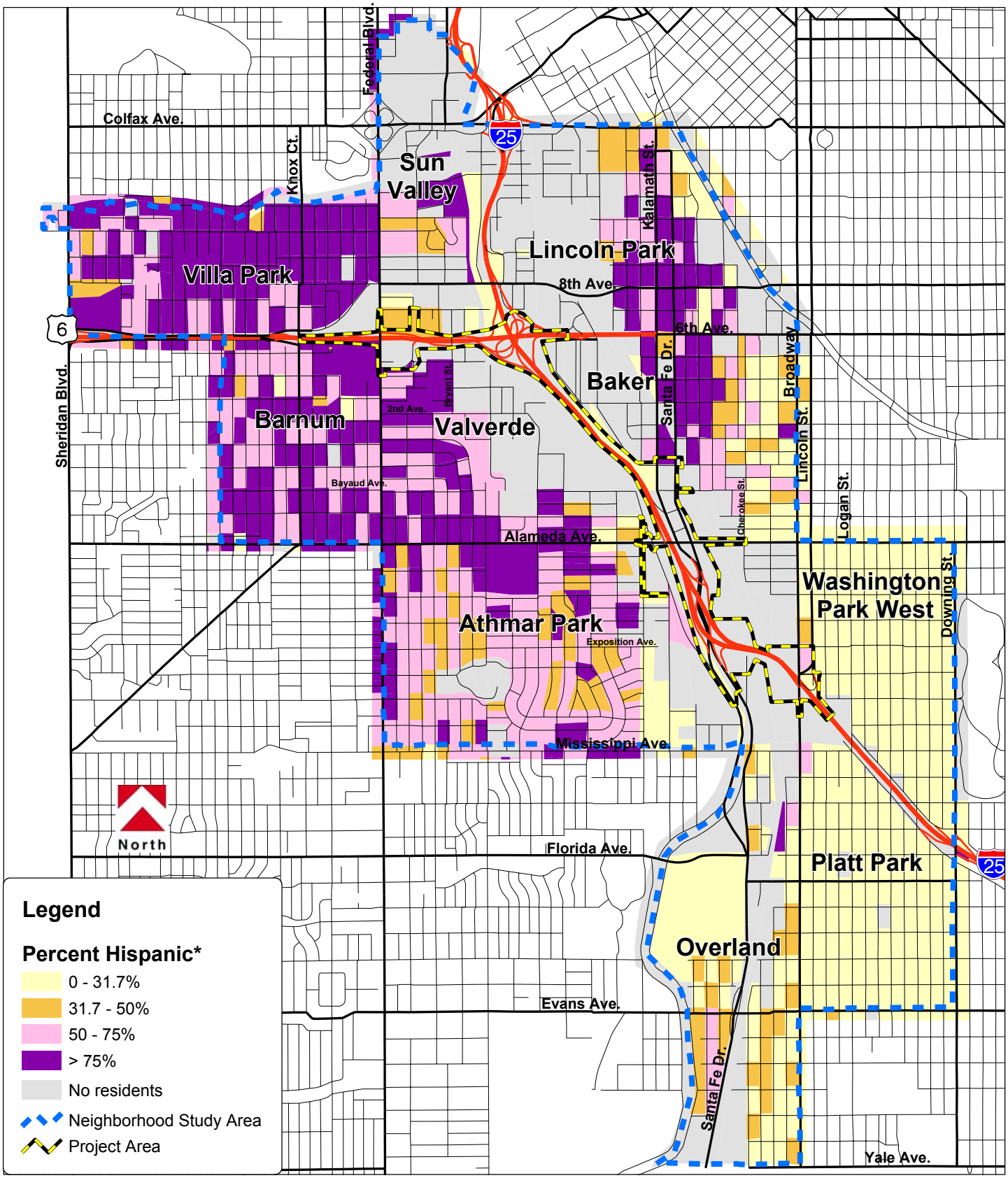
Valley Highway, 02-069, 09/29/2004

0 0.25 0.5 1 Miles

Native American Population by Census Block

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-13



U.S. Census, 2000
* City and County of Denver Average = 31.7%

Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Hispanic Population by Census Block

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-14

A range of employment opportunities and income levels are represented within the Neighborhood Study Area. **Table 4.1-2** compares neighborhood employment and income data with City and County of Denver averages.

Table 4.1-2 Employment and Income within the Neighborhood Study Area – 2000

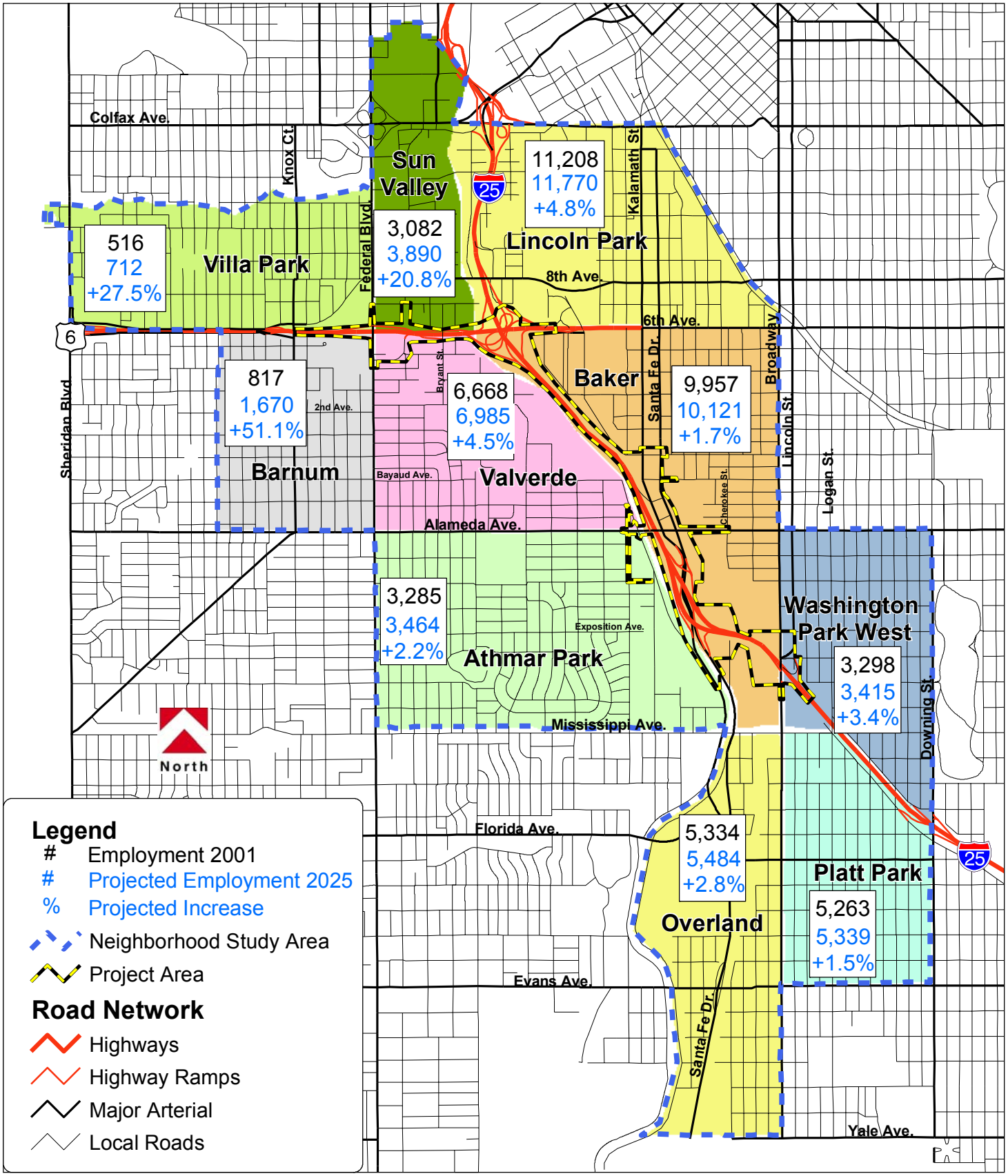
Area	Average Household Income ($)	Persons in Poverty (%)	Unemployment Rate (%)
City and County of Denver	55,129	14.3	5.7
By Neighborhood			
Villa Park	40,468	19.7	8.8
Sun Valley	12,434	71.5	18.0
Lincoln Park[1]	38,481	37.7	10.6
Barnum	41,185	13.4	6.9
Valverde	35,918	27.7	7.4
Baker	42,603	24.3	4.5
Athmar Park	47,932	12.6	5.7
Washington Park West	69,444	6.8	2.9
Overland	44,649	11.1	9.4
Platt Park	63,588	6.1	4.0

Source: Piton Foundation, compilation of U.S. Census Bureau Year 2000 data

[1] Data shown are for Auraria-Lincoln Park.

Figure 4.1-15 shows projected employment for the year 2025. These data do not currently include additional employment due to development of the Gates and Cherokee sites, which is expected to further increase employment in the Platt Park and Baker neighborhoods.

Figure 4.1-16 shows the low-income population by census block group, in comparison with City and the County of Denver average. **Figure 4.1-17** shows the extent of the Denver Enterprise Zone within Neighborhood Study Area. The Denver Enterprise Zone is one of several enterprise zones established by the State of Colorado to provide tax incentives for the purpose of encouraging business investment in economically disadvantaged areas.



Source: DRCOG, 2002

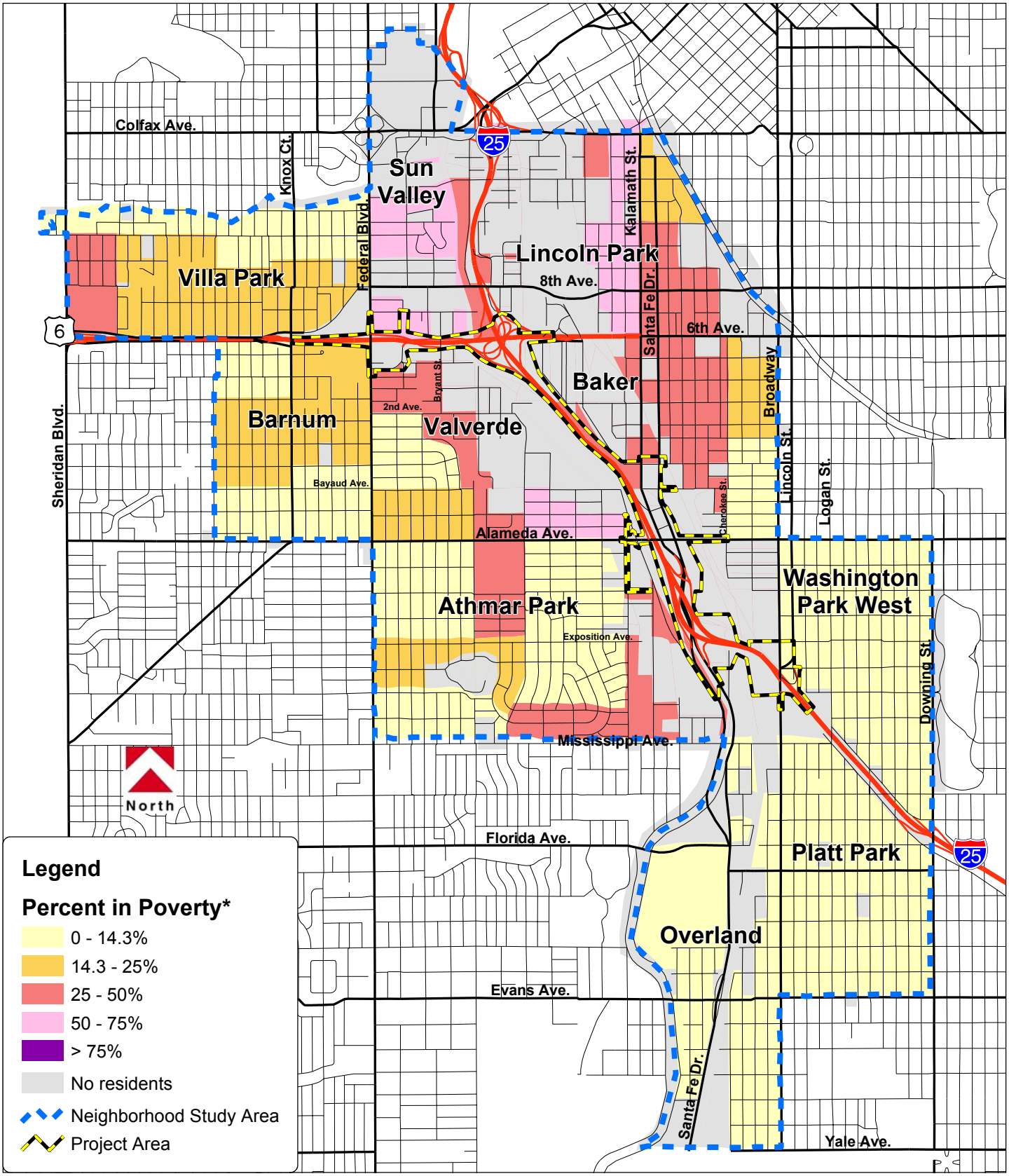
Valley Highway, 02-069, 09/29/2004

0 0.25 0.5 1 Miles

Employment by Neighborhood

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-15



U.S. Census, 2000
* City and County of Denver Average = 14.3%

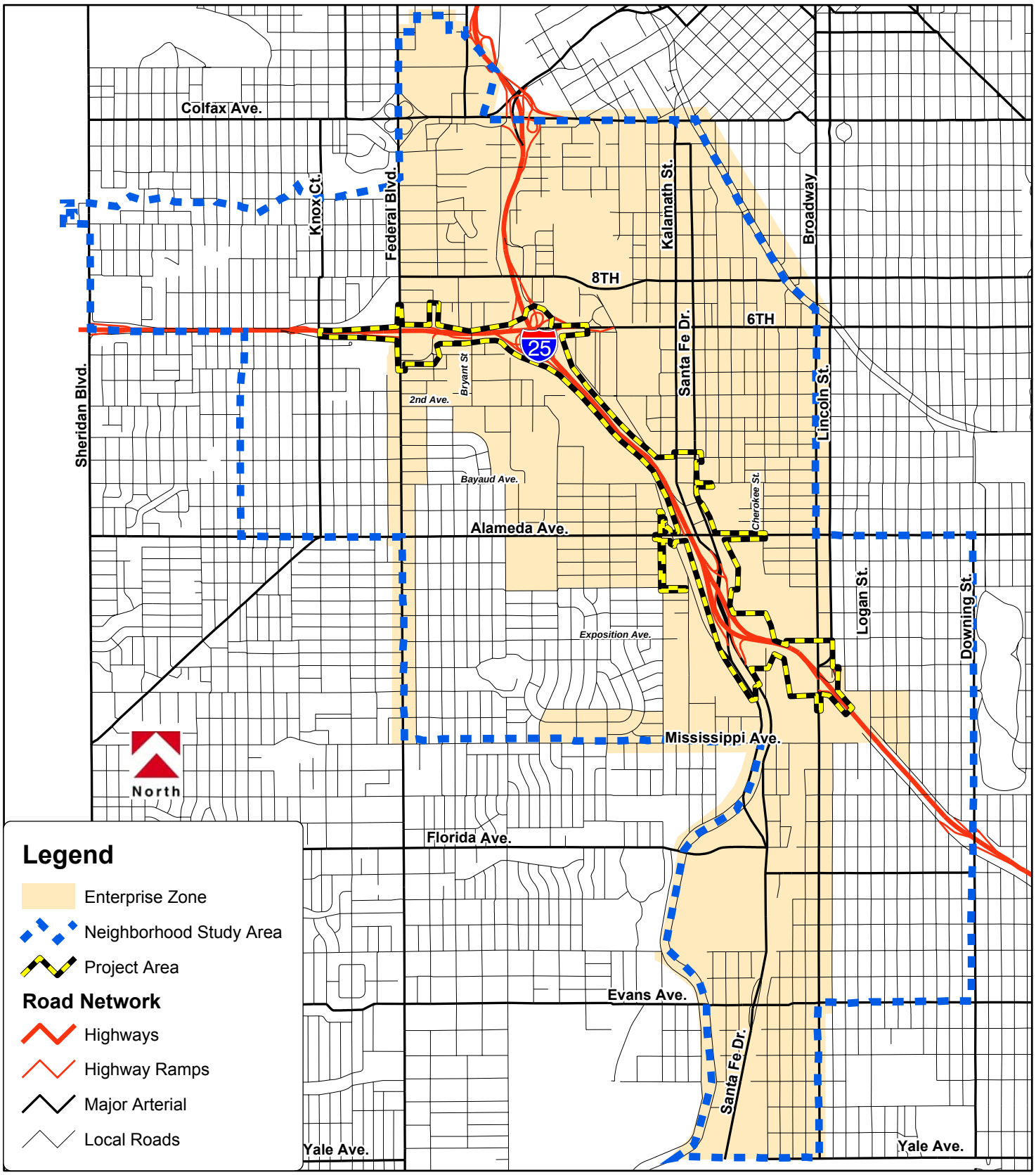
Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Low-Income Population by Census Block Group

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-16



Source: City and County of Denver, 2004

Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Denver Enterprise Zone

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-17

4.1.2 Consequences of the Alternatives

Implementing improvements included in the system alternatives, including the Preferred Alternative, would address identified needs and provide substantial benefits for both local residents and those traveling through the area. Many of these benefits were detailed in **Chapter 2** *Alternatives* and **Chapter 3** *Transportation Analysis*, and include the following:

- Improvements providing lane continuity/balance and correcting roadway deficiencies would improve safety and reduce delays for motorists accessing and traveling on the highway system. These improvements would also increase the reliability of the transportation system.
- Improvements to pedestrian and bicycle facilities would improve mobility across the corridor and also improve connectivity between transportation modes.
- Grade separation of the Consolidated Main Line railroad from Santa Fe Drive and Kalamath Street would increase safety and reduce delays associated with the current at-grade crossing.

These benefits would not be provided by the No Action Alternative.

The remainder of this section discusses specific effects of the No Action Alternative, System Alternatives 1, 2, 3, and the Preferred Alternative on land use, community facilities, and the local socio-economic environment. Mitigation measures to be applied to eliminate or reduce adverse effects are addressed in **Section 4.1.3**. The environmental justice issues of the equitable sharing of benefits and burdens of the systems alternatives are discussed in **Section 4.1.4**.

4.1.2.1 LAND USE

No Action Alternative

The No Action Alternative would not affect current land use because no additional right-of-way would need to be acquired. However, the No Action Alternative would not promote the most efficient use of the existing transportation corridors. The No Action Alternative would not be fully supportive of future land use and transportation identified by the City and County of Denver in *Blueprint Denver* and the *Denver Comprehensive Plan.* These local planning efforts emphasize the need to manage the effectiveness of Denver's roadway network first by investing in operational and reconstruction improvements. This strategy is intended to support the land use vision for Areas of Stability and Change, as described in *Blueprint Denver*.

Consequences Common to System Alternatives 1, 2, 3, and the Preferred Alternative

Each of the system alternatives, including the Preferred Alternative, would require the acquisition of some land for transportation facilities and the relocation of several businesses. In addition, residential relocations would be required for System Alternatives 2, 3, and the Preferred Alternative. The specific relocations required are presented in detail in **Section 4.2**, *Right-of-Way and Displacements*. Of the alternatives, System Alternative 1 requires the least relocations, while System Alternative 2 requires the most relocations. The majority of the required relocations for each alternative are located within Areas of Change, and thus the

alternatives are generally consistent with the City and County of Denver's goal of maintaining the Areas of Stability.

In implementing transportation improvements, CDOT seeks only to acquire property needed for the project. As a result of the acquisition process, sometimes a total ownership acquisition is required when only a portion is needed for the project. In those instances, remainder parcels may be available for disposition following project implementation. Future land use for any remainder parcels would be expected to occur in accordance with the current and planned zoning for the area. During preparation of this EIS, CDOT has worked cooperatively with the City and County of Denver to identify possible future land use for potential remainder parcels.

CDOT may sell remainder parcels according to CDOT and FHWA legal requirements and procedures. The general steps in this process would be as follows:

1. At the appropriate time in the project implementation phase, CDOT would identify remainder parcels for possible sale. CDOT would then obtain approval from the Colorado Transportation Commissions to sell the parcels, in accordance with statutory requirements.
2. CDOT would determine the appropriate assemblage of remainder parcels and proposed method of sale. CDOT would then discuss the planned sale with the City and County of Denver, and consider any comments or input. However, CDOT shall be the final decision maker on what will be sold and how it will be sold.
3. If all appropriate approvals are obtained, CDOT would then proceed with an offer of the parcels for sale in accordance with CDOT and FHWA procedures.

It is important to note that CDOT disposes of remainder parcels in accordance with several legal and procedural requirements. Detailed procedures are specified in the CDOT *Right-of-Way Manual.*

Because System Alternative 1 requires the least relocations, this alternative would have the least remainder parcels. Conversely, with the most relocations, System Alternative 2 would have the largest number of remainder parcels. The Preferred Alternative has a similar, but slightly larger number of relocations to System Alternative 1. For each of the alternatives, the total amount of available industrial/commercial property would be somewhat reduced, but the land use would remain consistent with *Blueprint Denver.* Each of the system alternatives would also be consistent with *Blueprint Denver's* goal of managing the transportation system's effectiveness by investing in operational and reconstruction improvements.

The construction of transportation facilities is sometimes considered to contribute to urban sprawl, as improved access to vacant land under some circumstances makes it prime for development. This is often referred to as induced growth, a situation where growth is attracted to an area due to easy access and limited traffic congestion. This concern is especially applicable to the construction of new access to undeveloped areas, assuming that all of the other supporting development stimulants are in place.

In the case of the Valley Highway Project, the transportation improvements are unlikely to contribute to unplanned growth. This is because the proposed project is located in a developed urban environment, and land use planning has already been initiated on the local and regional level. Each of the system alternatives would also improve access to RTD park-n-Ride facilities

at the Broadway and Alameda LRT stations, thus helping to facilitate transit use. In addition, the relatively small size of the project area on a regional scale tends to indicate that the system alternatives would not produce large changes in regional growth patterns.

The system alternatives would accommodate future land use as envisioned for the identified Areas of Change, and would not direct development to identified Areas of Stability. Changing land uses to a different type of use would be unlikely to result from the system alternatives. Changes to existing land uses would be determined by local and regional planning processes and implemented through local planning and zoning ordinances.

System Alternative 1

System Alternative 1 has the most constrained footprint of the system alternatives and, therefore, has the smallest direct impact on land use. As described in detail in **Section 4.2**, this alternative would require the relocation of approximately 25 existing businesses. Most of the businesses requiring relocation are in the vicinity of the I-25/Alameda Avenue interchange or near the crossing of Santa Fe Drive/Kalamath Street the Consolidated Main Line, however; two businesses in the vicinity of I-25 and Broadway would also require relocation. No residential relocations would be required under System Alternative 1.

Figure 4.1-18 presents a conceptual scenario for potential land use that could occur through a consolidation of remainder parcels following implementation of System Alternative 1. As shown on **Figure 4.1-18**, a number of sizable parcels would be available. Many of these parcels would have relatively high visibility and would have access to improved transportation facilities. Overall, the area of commercial/industrial land would be somewhat reduced under this alternative, but the reduction would be relatively minor in relation to the amount of commercial/industrial land within the Neighborhood Study Area and Denver as a whole.

System Alternative 2

System Alternative 2 has the broadest footprint of the system alternatives and, therefore, has the largest impact on land use. As described in detail in **Section 4.2**, this alternative would require the relocation of approximately nine existing residences and approximately 51 existing businesses. All of the residences requiring relocation are located on the 800 block of South Lincoln Street. Most of the businesses requiring relocation are in the vicinity of the I-25/ Alameda Avenue interchange or near the crossing of Santa Fe Drive/ Kalamath Street the Consolidated Main Line, however, approximately six businesses in the vicinity of I-25 and Broadway and approximately six businesses in the vicinity of US 6 and Federal Boulevard would also require relocation.

Figure 4.1-19 presents a conceptual scenario for potential land use that could occur through a consolidation of remainder parcels following implementation of System Alternative 2. As shown on **Figure 4.1-19**, the residential parcels that would be acquired on the 800 block of South Lincoln Street would not be suitable for residential or commercial land use, but would be retained as open areas. A number of sizable parcels would be available for industrial or commercial land use. Many of these blocks would have relatively high visibility and would have access to improved transportation facilities.

Commercial/industrial land area would be reduced under this alternative and this reduction would be greater than for the other system alternatives. However, the reduction would be relatively minor in relation to the amount of commercial/industrial land within the Neighborhood Study Area and Denver as a whole.

System Alternative 3

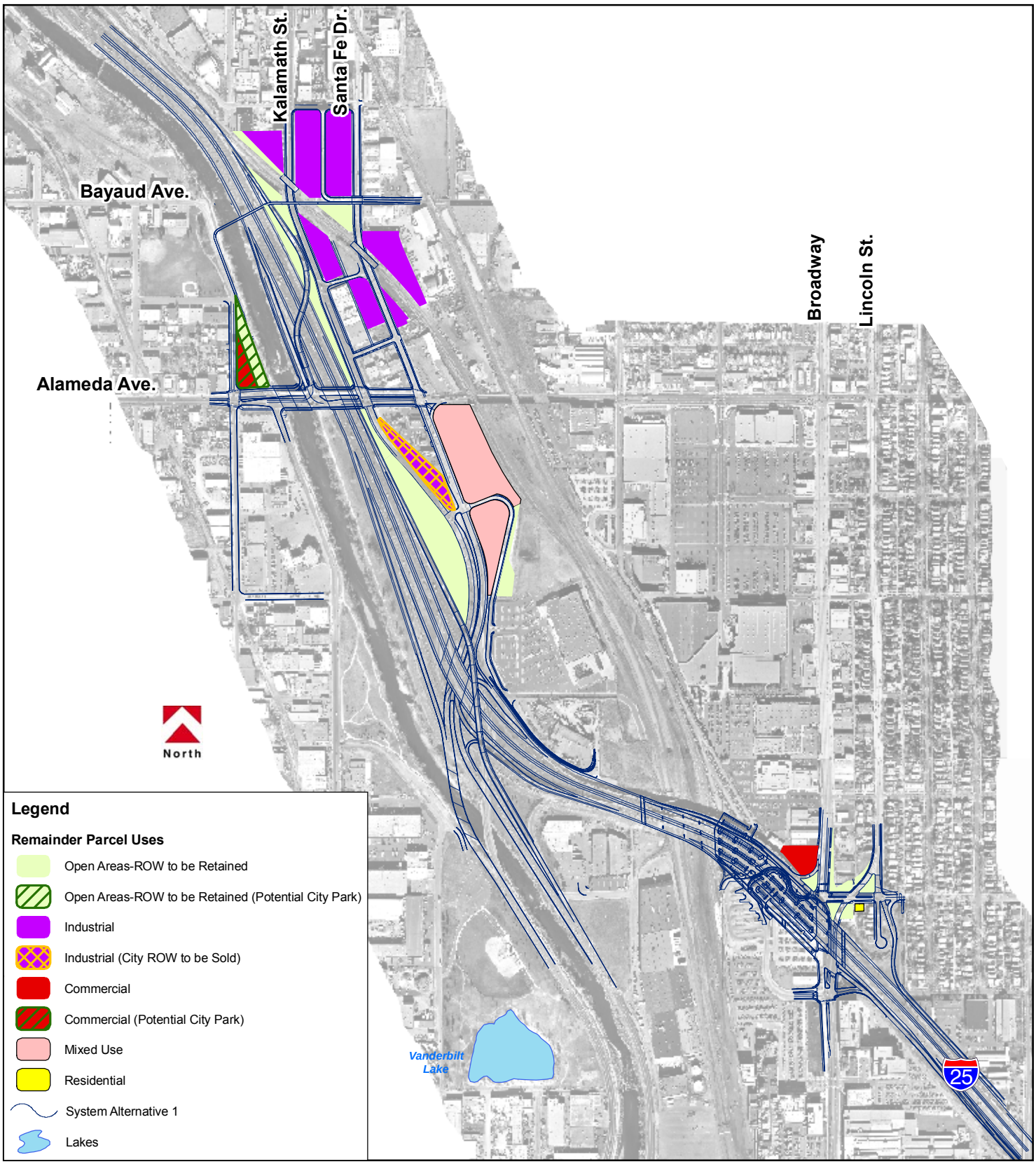
System Alternative 3 is intermediate to System Alternatives 1 and 2 in terms of impact on land use. As described in detail in **Section 4.2** *Right-of-Way and Displacements*, this alternative would require the relocation of approximately three existing residences and approximately 38 existing businesses. All of the residences requiring relocation are located on the 800 block of South Lincoln Street. Most of the businesses requiring relocation are in the vicinity of the I-25/Alameda Avenue interchange or near the crossing of Santa Fe Drive/Kalamath Street the Consolidated Main Line, however, approximately three businesses in the vicinity of I-25 and Broadway and approximately six businesses in the vicinity of US 6 and Federal Boulevard would also require relocation.

Figure 4.1-20 presents a conceptual scenario for potential future land use that could occur through a consolidation of remainder parcels following implementation of System Alternative 3. As shown on **Figure 4.1-20**, the residential parcels that would be acquired on the 800 block of South Lincoln Street would not be suitable for residential or commercial land use. Some current right of way on the east side of the Lincoln Street (currently beneath and adjacent to the northbound I-25 off-ramp to Lincoln Street) could be used for residential parcels following relocation of the off-ramp under this alternative. A number of sizable parcels would be available for industrial or commercial land use, and many of these would have relatively high visibility and would have access to improved transportation facilities.

Preferred Alternative

The Preferred Alternative requires more relocations than System Alternative 1, but less than System Alternatives 2 and 3. As described in detail in **Section 4.2** *Right-of-Way and Displacements*, this alternative would require the relocation of approximately three residences and approximately 30 existing businesses. All of the residences requiring relocation are located on the 800 block of South Lincoln Street. Most of the businesses requiring relocation are in the vicinity of the I-25/Alameda Avenue interchange or near the crossing of Santa Fe Drive/Kalamath Street the Consolidated Main Line. However, three businesses in the vicinity of I-25 and Broadway and approximately six businesses in the vicinity of US 6 and Federal Boulevard would also require relocation.

Figure 4.1-21 presents a conceptual scenario of land use that could occur if CDOT disposes of remainder parcels following implementation of the Preferred Alternative. As shown on **Figure 4.1-21**, similar to System Alternative 3 the residential parcels that would be acquired on the 800 block of South Lincoln Street would not be suitable for residential or commercial land use. Some current right of way on the east side of the Lincoln Street (currently beneath and adjacent to the northbound I-25 off-ramp to Lincoln Street) could be used for residential parcels following relocation of the off-ramp under this alternative. A number of sizable parcels would be available for industrial or commercial land use, and many of these would have relatively high visibility and would have access to improved transportation facilities.



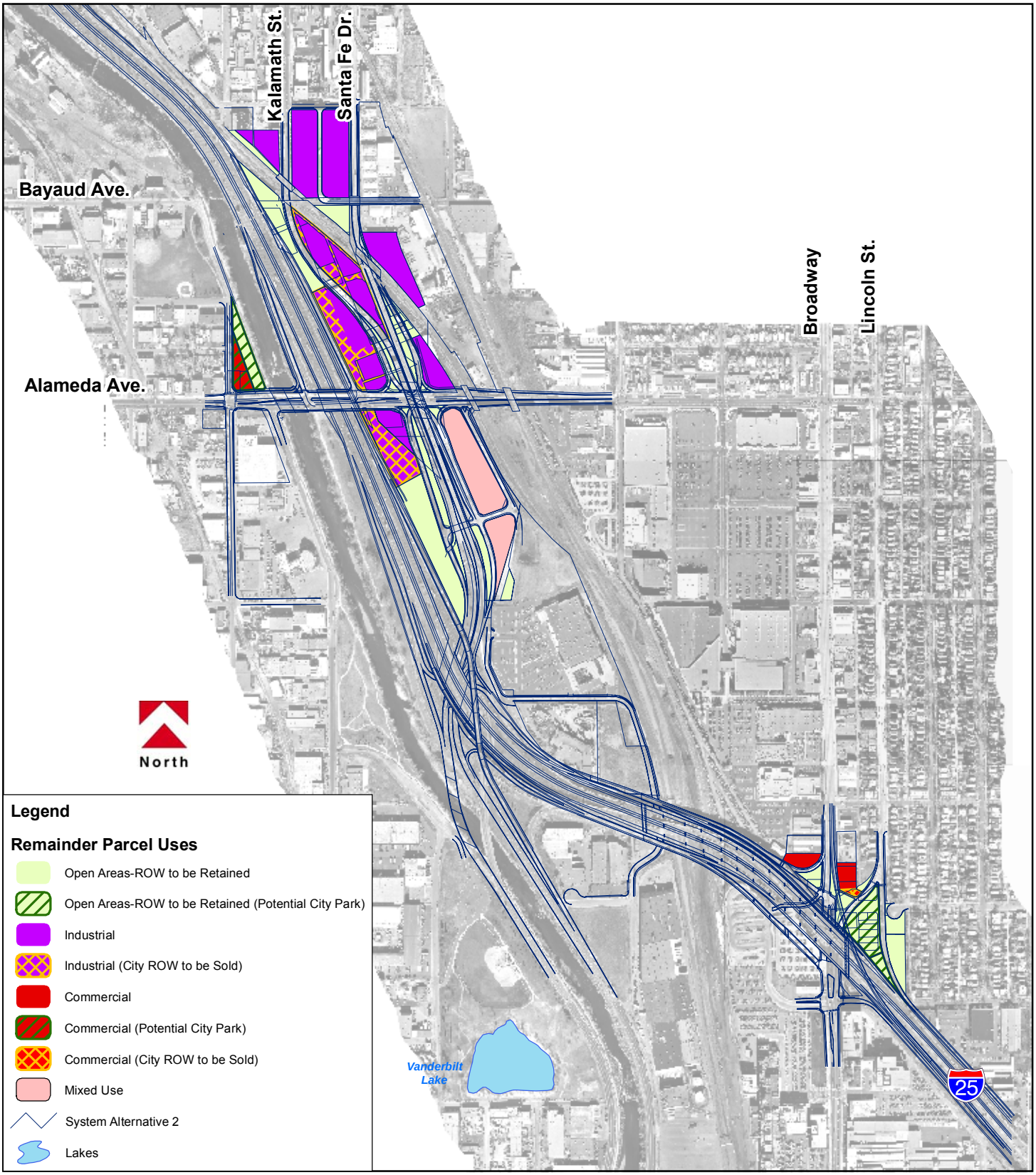
Valley Highway, 02-069, 10/27/2004

0 500 1,000 2,000 Feet

Land Use Concept-System Alternative 1

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-18



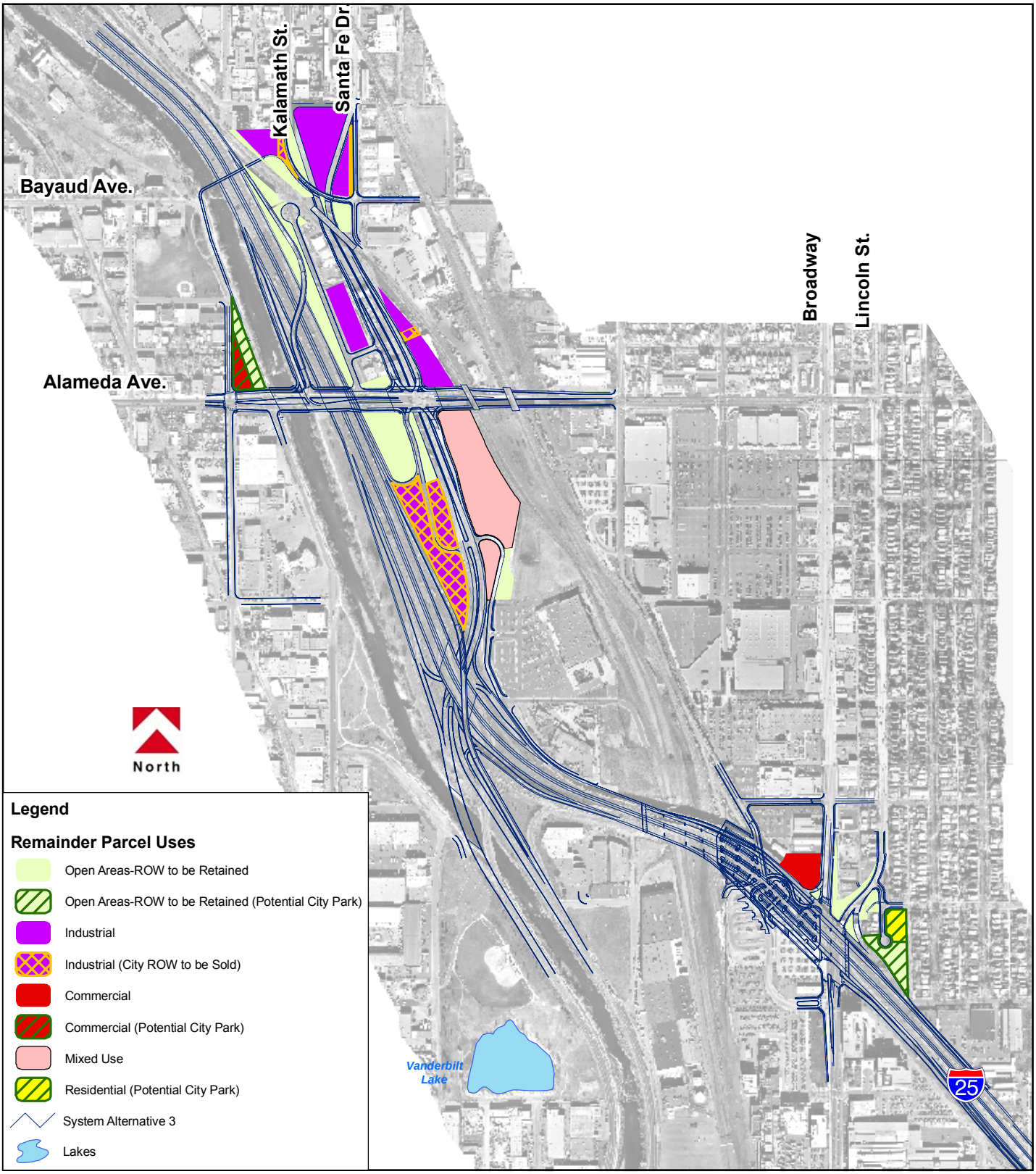
Valley Highway, 02-069, 01/17/2005

0 500 1,000 2,000 Feet

Land Use Concept-System Alternative 2

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-19

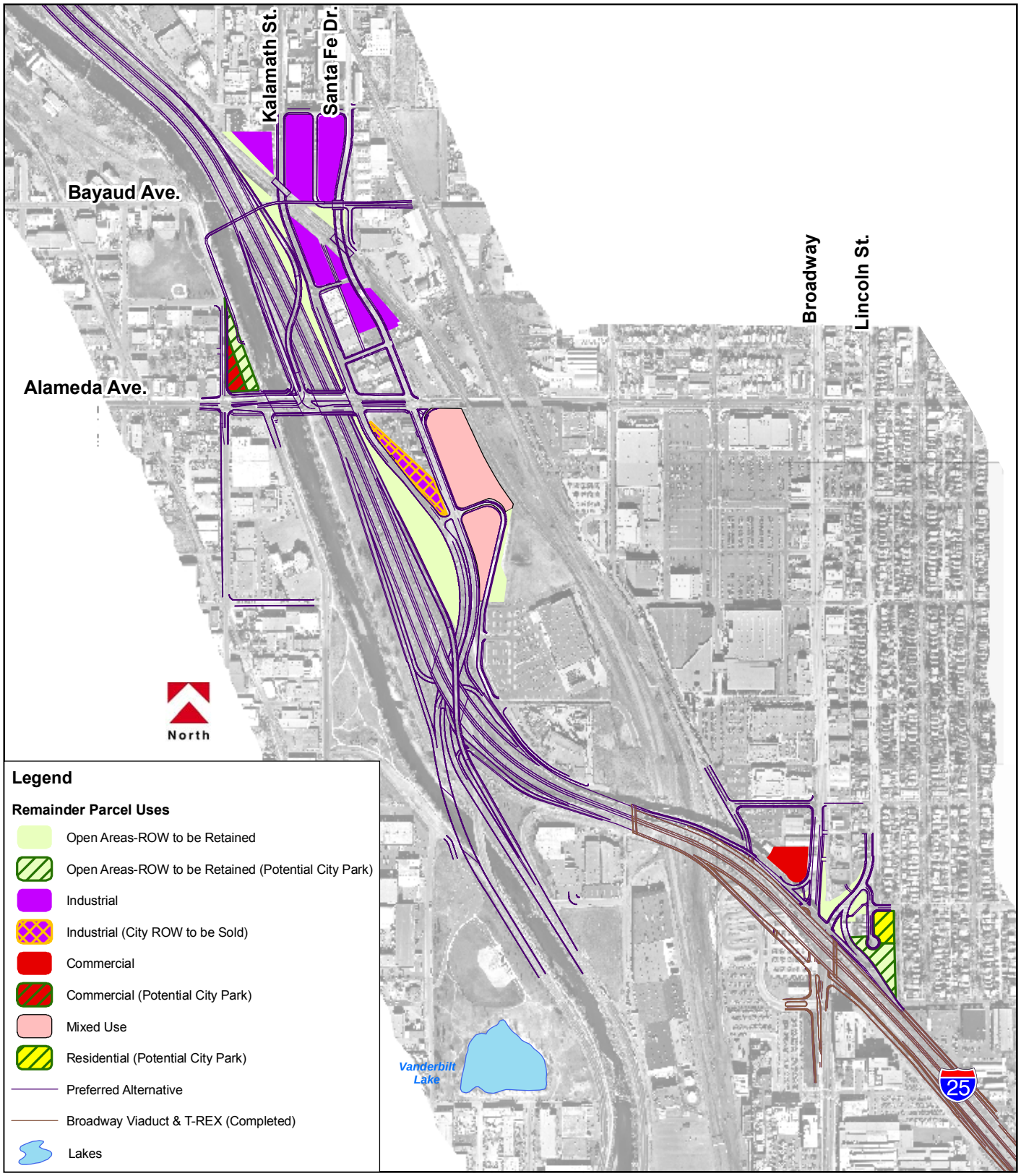


0 500 1,000 2,000 Feet

Land Use Concept-System Alternative 3

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-20



0 500 1,000 2,000 Feet

Land Use Concept-Preferred Alternative

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.1-21

4.1.2.2 COMMUNITY FACILITIES, SERVICES, AND NEIGHBORHOOD COHESION

No Action Alternative

The No Action Alternative would not physically affect current community facilities or neighborhood cohesion. However, specific transportation safety and delay problems, as well as multi-modal access and mobility limitations, would remain. In addition, portions of the existing transportation facilities are in deteriorating physical condition and are not aesthetically pleasing in the context of the adjacent area. These conditions would persist under the No Action Alternative.

Increased congestion and system disruptions due to the lack of lane continuity and balance on I-25 could result in more neighborhood cut-through traffic from frustrated motorists seeking alternative routes to I-25. Additional traffic on neighborhood streets could impact public safety, increase street noise, and degrade air quality.

Access to community facilities in the vicinity of the project is generally adequate at the present time. With increased congestion and system disruptions, this access could worsen in the future with the No Action Alternative. Under the No Action Alternative, mobility across the corridor would not be improved for bicyclists and pedestrians, nor would access to multi-modal facilities.

Consequences Common to System Alternatives 1, 2, 3, and the Preferred Alternative

While I-25, US 6, and Santa Fe Drive/Kalamath Street provide needed access through and within the local neighborhoods, improvements to these facilities have the potential to affect the quality of life within adjacent neighborhoods. An evaluation of potential effects on neighborhood cohesion, local travel patterns, physical character, safety, and neighborhood services has been an important focus in the development of the system alternatives, including the Preferred Alternative.

The system alternatives would replace aging and deteriorating transportation facilities with new facilities that would operate more smoothly and with less disruption. The system alternatives would also provide aesthetic improvements, as described in **Section 4.4** *Aesthetics and Urban Design*. Mobility across the corridor would be improved for pedestrians and bicyclists, and access to multi-modal facilities would be improved.

As described previously, the majority of the property impacts associated with the system alternatives would be located within identified Areas of Change. The system alternatives would not further divide or isolate neighborhoods, nor would any existing community service boundaries such as school districts, police or fire districts be severed or bisected.

As described previously and also detailed in **Section 4.2** *Right-of-Way and Displacements*, a number of businesses will be displaced by the system alternatives. These businesses provide goods, services, and employment, but generally do not form a unique focal point for the neighborhood. One community service provider, the City Church Youth Center, would be displaced by all of the system alternatives. As stated previously, attempts to contact this organization have been unsuccessful.

Travel patterns of motorists, pedestrians, and bicyclists in and between neighborhoods would be altered temporarily during construction. Access to public facilities may also require modification during construction. The effects of construction are discussed in **Section 4.18** *Construction Impacts*. Permanent neighborhood access or traffic patterns would not generally be changed, but the elimination of the Bryant Street exit would reroute access to the businesses located in that area.

The system alternatives would not generally affect current community facilities. By improving the transportation system, pedestrian and bicycles facilities, multi-modal access, and mobility across the corridor, the system alternatives would improve access to public facilities.

4.1.2.3 ECONOMICS

No Action Alternative

The No Action Alternative would not directly affect population, income, or employment, but it would result in continued safety and system reliability problems for local and regional trips on I-25 and US 6. This would be true for both local residents and employees traveling to and from work. Localized congestion at some interchanges could have operational and cost implications to some existing businesses and could limit the potential uses of some sites, as envisioned by *Blueprint Denver*.

Consequences Common to System Alternatives 1, 2, 3, and the Preferred Alternative

I-25 and US 6 are existing transportation corridors. The system alternatives would not introduce new transportation infrastructure to areas that do not already have access to these facilities. However, improvements to the transportation system would help maintain access and reduce traffic congestion getting 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, as described in **Chapter 2** *Alternatives*.

Construction of any one of the system alternatives would have positive, short-term impacts on the local economy. The overall cost of improvements is several hundred million dollars, but expenditures would occur over a number of years, depending upon availability of project funding. During construction, the project would employ construction workers and workers in industries that provide supplies and support. Construction workers are currently employed on a number of transportation projects in the Denver Metro area, so continued activity on this scale would probably not represent a major change to existing conditions in the regional employment market.

As described in **Section 4.2** *Right-of-Way and Displacements*, no residential displacements are expected under System Alternative 1, nine residential displacements under System Alternative 2, three residential displacements under System Alternative 3, and three residential displacements under the Preferred Alternative. These residents would need to relocate, and would receive relocation assistance/benefits as described in **Section 4.2.** At the time of this writing residential property is generally in good supply in the Metro Denver and the local area for both rental and purchase.

As described in **Section 4.2** *Right-of Way and Displacements*, relocation assistance would be provided to displaced businesses. Employees of the relocated businesses would be affected by moving work locations. Preliminary estimates indicate that between 250 and 600 employees could be affected depending on the alternative selected. CDOT's past experience indicates that most displaced businesses relocate rather than go out of business, and those that relocate generally stay nearby if suitable space is available. It is possible that some businesses would relocate to distant locations or go out of business entirely. In that case, employees would need to seek other employment. The reestablishment of affected businesses would depend on a number of factors, such as the needs and desires of the business owner, availability of suitable property, and the general economic conditions.

At the time of this writing, commercial property is generally in good supply within Metro Denver, due to the current slowdown in economic conditions. The ultimate availability will depend on the specific facilities and type of location required, and the timing of the relocations in relation to changes in the local real estate market. However, due to the very large size of the commercial real estate market in Metro Denver in comparison with the number of required relocations, it is safe to assume that businesses would be able to find suitable locations for reestablishment.

On a Denver, Metro Denver, and State of Colorado basis, the impact of the system alternatives on employment and tax revenues would be negligible. The system alternatives would affect only a few businesses out of the tens of thousands of privately-owned businesses in Metro Denver, and lost property and sales taxes from the properties acquired would be insignificant relative to all property taxes.

As described previously, a portion of the acquired property (remainder parcels) would be available for future land uses. As these properties are redeveloped, additional employment and taxes would be generated.

The level of employment and taxes generated would depend on the nature of the businesses that are established on the available sites. The timing of future land use would largely be a function of the time that the property can be made available and the economic conditions at that future date. This process would also be influenced by the development planning, review, and approval process.

Project payrolls would increase local household income, business revenues, and may increase income for local businesses. However these increases would be small compared with the size of the local and regional economy. The system alternatives would not have substantial long-term impacts on regional income levels.

The system alternatives provide a number of benefits relative to socio-economic conditions, including increased safety and improving efficient movement of goods and services through the community. The system alternatives are also consistent with long-term planning by the City and County of Denver and DRCOG.

4.1.2.4 REGIONAL PLANNING CONSIDERATIONS

DRCOG has developed the Metro Vision 2030 Plan in cooperation with local governments, CDOT, RTD and CDPHE. The Metro Vision 2030 Plan is the region's long range plan for growth and development, and includes a number of interrelated elements. The system alternatives,

including the Preferred Alternative, are consistent with the goals and policies established in Metro Vision. The elements of Metro Vision are listed below, and an asterisk (*) denotes elements more relevant to the Valley Highway project:

- Extent of urban development*
- Semi-urban development
- Urban centers*
- Freestanding communities
- Rural town centers
- Senior-friendly development*
- Transportation*
- Parks and open space*
- Water quality*
- Air quality*

Within the Transportation Element, Metro Vision identifies 13 policies to guide the implementation of the transportation system. The system alternatives, including the Preferred Alternative, directly support several of theses policies including:

- Roadways. Expand capacity of existing roadways in the most critically congested corridors and at key traffic bottleneck and encourage access controls to maintain capacity.
- Denver Central Business District. Improve and maintain transportation access to downtown Denver.
- Safety. Develop a transportation system that promotes increased safety and security for all of its users.
- Management and Operations. Make the best use of existing transportation facilities by implementing measures that actively manage and integrate systems, improve traffic operations, and reduce the demand for single-occupant motor vehicle travel.
- Bicycle and Pedestrian. Provide bicycle and pedestrian access through developments, between developments, and links to transit facilities.
- Interconnections. Improve interconnection of the transportation system within modes, between modes, and between the metropolitan area and the rest of the state and nation.
- Land Use Integration. Implement transportation system components that support Metro Vision's urban growth boundary/area, urban centers, and associated concepts.
- Transportation for the Disadvantaged. Provide a transportation system that considers the needs of and impacts on minority, low-income, elderly, and disabled persons.
- Air and Water Quality. Develop a transportation system that contributes to improved air quality and minimizes impacts on water quality.

For additional information on the system alternatives with regard to these issues, see the relevant sections of this EIS.

4.1.2.5 MITIGATION MEASURES

The system alternatives, including the Preferred Alternative, have been developed to provide transportation benefits to the local community, the City and County of Denver, and the region. Throughout the development of the system alternatives, a strong emphasis has been placed on avoiding adverse impacts to the local community. Where such impacts could not be avoided, the impacts have been minimized. This effort has included an on-going dialog with members of the community and local agencies. The public and agency involvement efforts are summarized in **Chapter 6** *Public Involvement.*

The primary community impacts requiring mitigation fall into two categories:

- Right-of-way acquisition / relocation
- Temporary construction impacts

4.1.2.6 MITIGATION FOR RIGHT-OF-WAY ACQUISITION

When acquisition of right-of-way is necessary, it is done in compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. This mitigation measure is discussed in more detail in **Section 4.2** *Right-of-Way and Displacements*. Compliance with the Act ensures that all persons regardless of race, color, religion, sex, national origin, disability, or age will be fairly and equitably treated.

4.1.2.7 MITIGATION FOR OTHER COMMUNITY IMPACTS

Mitigation measures to reduce or eliminate adverse impacts on the local community are presented in a number of subsequent sections as follows:

- **Section 4.4** *Aesthetics and Urban Design*
- **Section 4.5** *Air Quality*
- **Section 4.6** *Noise and Vibration*
- **Section 4.18** *Construction Impacts*

4.1.3 Environmental Justice Evaluation

4.1.3.1 ENVIRONMENTAL JUSTICE BASIS AND OBJECTIVES

Environmental justice refers to social equity in sharing the benefits and the burdens of specific projects or programs. Some racial or ethnic minorities and low-income residents historically have experienced a disproportionate share of adverse affects resulting from major federal actions such as the construction of new roadways. *Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, was issued in 1994 to address this. The Executive Order directs that each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

The definition for minority populations and low-income populations is contained in both Executive Order 12898 and Title VI of the Civil Rights Act of 1964, as well as the final U.S. Department of Transportation Order 5610.2 on Environmental Justice published in the *Federal Register* on April 15, 1997. The definition provided is any readily identifiable group of minority or low-income persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers) who would be affected by a proposed federal program, policy, or activity. Minorities constitute races and ethnic groups, and include these U.S. Census Bureau-identified groups: Black/African Americans, American Indian/Alaskan Natives, Asians, Native Hawaiian/Pacific Islanders, and Hispanics. In the 2000 census, Hispanics are treated as an ethnic group distinct from racial groups, thus a person could be Hispanic and white or another race.

Low income is defined as persons/families with incomes at or below the Department of Health and Human Services or Census Bureau poverty guidelines. The Council on Environmental Quality (CEQ, 1997) guidance on environmental justice states that *"The selection of the appropriate unit of geographical analysis may be a governing body's jurisdiction, a neighborhood, a census tract, or other similar unit that is chosen so as not to artificially dilute or inflate the affected minority population."* CEQ further adds that *"Minority populations should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographical analysis."* The CEQ guidelines do not specifically state the percentage considered meaningful in the case of low-income populations.

FHWA Order 6640.23(1998) sets out FHWA's policy regarding environmental justice, which includes: *"When determining whether a particular program, policy, or activity will have disproportionately high and adverse effects on minority and low-income populations, FHWA managers and staff should take into account mitigation and enhancement measures and potential offsetting benefits to affected minority and low-income populations. Other factors that may be taken into account include design, comparative impacts, and the relative number of similar existing systems in non-minority and non-low-income areas."*

In addition, FHWA has embraced the following objectives for environmental justice:

- To avoid, minimize, or mitigate disproportionately high and adverse human health or environmental effects on minority populations and low-income populations
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority populations and low-income populations

Community and environmental justice considerations have been fully integrated into the EIS process from the beginning and, thus, have been considered during scoping, alternatives development, public and agency involvement and environmental analysis. Throughout this process, efforts have been made to avoid and minimize adverse impacts to minority and low income populations, and to incorporate features into the project to address the concerns of the communities.

4.1.3.2 IDENTIFICATION OF MINORITY AND LOW-INCOME POPULATIONS

The demographic and employment characteristics of the Neighborhood Study Area were presented in **Section 4.1.1.4**. Based on these characteristics, the following neighborhoods and populations were identified for targeted outreach and consideration:

- Villa Park, Sun Valley, Lincoln Park, Barnum, Valverde, Baker and Athmar Park neighborhoods (neighborhoods with identified Hispanic and low-income populations)
- Community and business groups serving the Hispanic community (based on area demographics and connections to the larger Hispanic community of west Denver)
- Community and business groups serving the Asian American community (based on an identified Asian American residential population and concentration of Asian businesses nearby on Alameda Avenue and Federal Boulevard)
- Community and business groups serving the Native American community (based on a distribution of Native American residents greater than the City and County of Denver average in many census block throughout the Neighborhood Study Area)

In addition, outreach efforts specifically targeted groups, such as social service providers that serve specific populations within the Neighborhood Study Area.

4.1.3.3 PUBLIC AND AGENCY INVOLVEMENT RELEVANT TO ENVIRONMENTAL JUSTICE

An extensive public and agency involvement program has been implemented and is on-going. Elements of this program are discussed in **Chapter 6** *Public Involvement*. Elements of the public involvement program particularly targeting minority and low-income populations and the local communities have included:

- Project mailers and newsletters in English and Spanish
- Project meetings held in convenient locations in the project area with Spanish translation provided. Facilitated discussion employed to encourage participation and dialog
- Citizen Working Groups organized on specific topics, as requested during public scoping, with a wide variety of participants meeting at various locations within the project area
- Numerous meetings and focused discussions with neighborhood associations and community groups including:
  - Neighborhood associations - Baker, Valverde, West Washington Park, Athmar Park, Villa Park, Platt Park, Barnum
  - La Alma / Lincoln Park Planning Group
  - Northwest Neighborhood Coalition
  - Poder Advocacy Council
  - NEWSED Development Corporation
  - Mi Casa Woman's Resource Center
  - Bridge Project/Columbine Homes
  - Denver Indian Center
  - Hispanic Chamber of Commerce
  - Sumner Business Group

- Broadway Merchants Group
- Bryant Street Businesses
- Alameda Avenue businesses (with Spanish translation)
- Alameda Avenue Square Businesses (with Vietnamese translation)

- Door-to-door visits to businesses, churches, and public facilities (recreation centers) in the area
- Informational booth at El Grito festival in September 2003 and September 2006 (with Spanish translation)
- Individual meetings with City Councilwomen representing the area, both before and after recent City elections
- Specific meetings with CDOT right-of-way staff, preceded by invitation letters, for property owners (residential and business) potentially affected by acquisitions
- Feature story on Univision
- Individual meetings with business owners and residents on request
- Meetings with organizations in the area that serve specific populations including:
  - Atlantis Community (physically disabled individuals)
  - Bayaud Industries (individuals with history of mental illness)
  - Platte River Industries (developmentally disabled individuals)
  - Shalom (developmentally disabled individuals)
- Monthly meetings with Technical Working Group including lead agency, cooperating agencies and key resource agencies
- Quarterly meeting with Policy Advisory Committee including elected officials and management personnel from CDOT, FHWA, cooperating agencies and key resource agencies

4.1.3.4 Environmental Justice Considerations During Alternatives Development and Screening

Throughout the process of alternatives development, screening and identification of the Preferred Alternative, efforts have been made to avoid/minimize community impacts and address community concerns. Key efforts have included:

- Alternatives were developed with strong preference toward avoidance of residential and business property acquisitions. To this end, the system alternatives under consideration, including the Preferred Alternative, all hold relatively closely to the existing roadway alignments.
- Alternatives were developed to avoid impacts to community facilities and parks.

- The system alternatives include many features that will benefit the local community and address community concerns, including:
  - Closure of the Bryant Street/ US 6 interchange to address safety concerns shared by residents and businesses
  - Improvements to pedestrian and bicycle mobility across the I-25 corridor at Broadway and along Alameda Avenue
  - A dedicated pedestrian and bicycle bridge crossing I-25, the South Platte River and the rail corridor at Bayaud Avenue. This bridge alignment was identified in the *Denver Bicycle Master Plan and* will link the Baker neighborhood with the South Platte Trail and with the Valverde neighborhood.
  - Aesthetic improvements identified in coordination with a Citizen Working Group
  - Measures to address noise concerns identified in coordination with a Citizen Working Group
  - Measures to minimize construction impacts identified in coordination with a Citizen Working Group
- A detailed assessment of required property acquisitions has been performed by CDOT, including evaluation of access to remaining businesses.
- A detailed evaluation of land use potential for possible remainder parcels has been done in coordination with the City and County of Denver, considering parcel size, access, zoning and other factors.

4.1.3.5 ENVIRONMENTAL JUSTICE FINDINGS

Implementation of the project would include a number of direct benefits to the local community as well as the City and Region, including:

- A safer, more reliable, and more efficient transportation system
- Improved mobility across the corridor for pedestrians, bicyclists, and motorists
- Improved access to the LRT stations and the South Platte River Trail
- Aesthetic improvements relative to the aging transportation facilities now in place
- Improvement in the quality of stormwater discharge to the South Platte River

These benefits are expected to be equitably shared across demographic groups and communities.

Possible adverse community impacts of the systems alternatives, including the Preferred Alternative are primarily related to displacements of businesses and residents. In general terms, the findings are as follows:

- Residential displacements vary from 0 to 9 residences, depending on the alternative, all within the West Washington Park neighborhood. The West Washington Park neighborhood in general, and the census block/block group specifically affected, have not been identified as having minority and/or low income populations greater than the City and County of Denver as a whole.

- CDOT has provided, and will continue to provide, specific information regarding the alternatives and right-of-way acquisition procedures to the affected individuals.
- Displaced businesses do not seem to provide unique goods and services not available from other sources.
- The primary impact of business displacements would be disruption for employees and owners. Depending on the decision of individual business owners, some businesses may relocate to other areas or remain close to their existing location. Relocation to another area could result in a loss of jobs in the area, but this may be offset to some degree by construction employment and future land use of remainder parcels. Also, employment in the area is forecast to grow through redevelopment of properties such as the former Gates Rubber Company site.
- Business displacements would affect a cross section of owners and employees. Minority and low-income individuals would be affected along with others. A review of the types of businesses that would be displaced (see **Section 4.1** *Right-of Way and Displacements*) and information gained through public involvement and agency coordination (see **Chapter 6** *Public Involvement*) indicates that the business displacements would not be concentrated in any one industry or employment sector, and the impacts of the displacements would not fall disproportionately on any particular segment of the population.
- Under current market conditions, displaced residents and business owners would likely be able to find replacement properties in the area if they desire. However, actual availability will be largely a function of the real estate market at the time of implementation.
- The future land use potential of remainder parcels has been identified. Many of the remainder parcels should be attractive for potential land uses. However, the timing and character of actual future land use will depend on a number of factors such as market conditions, property divestment procedures, infrastructure availability, existing contamination, and other planning considerations.

The system alternatives, including the Preferred Alternative, vary in the degree to which they displace existing residents and businesses. Alternative 1 has the least displacements (no residential displacements and 25 business displacements), while Alternative 2 has the greatest number of displacements (nine residential displacements and 51 business displacements). System Alternative 3 has three residential displacements and 38 business displacements, while the Preferred Alternative has three residential and 30 business displacements.

Consideration of the mitigation strategies identified above in **Section 4.1.3** *Mitigation Measures* and future public involvement will assist CDOT and FHWA in completing the community impacts and environmental justice efforts, as part of final design and project implementation.

No Action Alternative

The No Action Alternative would not improve the existing transportation facilities; therefore, no property belonging to minority or low-income residents would be acquired for right-of-way, and no relocations would be required. The No Action Alternative does not address existing safety and operational concerns on I-25 and US 6. Congestion caused by geometric deficiencies and system upsets may cause increased cut-through traffic on neighborhood streets. Increased

neighborhood traffic could be expected throughout the I-25 and US 6 corridor where convenient cut-through opportunities exist and would not be concentrated in minority or low-income neighborhoods.

Potential environmental impacts associated with cut-through traffic—to safety, noise, and air quality—would be borne equally by all residents adjacent to I-25 and US 6 and not be experienced disproportionately by minority or low-income residents. The same would be true for operations and safety issues on I-25 US 6, which would affect all residents adjacent to the highway.

To the extent that low income and minority populations may be more dependent on transit, bicycle, and/or pedestrian modes of travel, the No Action Alternative may have some disproportionate adverse impacts on these populations because existing deficiencies relative to access to these modes would not be addressed.

System Alternatives 1, 2, 3, and the Preferred Alternative

As described previously, construction of any of the system alternatives, including the Preferred Alternative, would require the relocation of a number of businesses. In general, the businesses requiring relocation do not seem to have a unique function or serve a particular population within the community. The businesses requiring relocation are diverse in nature, but their location in the area generally appears to be related to the established industrial areas as well as to proximity to I-25, US 6, and other transportation facilities, rather than proximity to the local communities. The surrounding neighborhoods do not appear to be dependent on these businesses for goods and services. Therefore, the relocation of these specific businesses would not be expected to have an adverse effect on the communities near the project, nor would this be expected to have a disproportionate adverse impact on minority or low-income populations.

Some of the businesses requiring relocation may be minority-owned and/or may employ minority and/or low-income individuals. The relocation of these businesses would affect these owners and employees in a similar manner as non-minority and non low-income owners and employees. A disproportionate adverse impact would exist only if the burden of this falls more heavily on low-income or minority individuals than on the population as a whole. There is currently no indication that this would be the case.

System Alternatives 2 and 3 require the relocation of 9 and 3 households, respectively. The Preferred Alternative requires the relocation of 3 households. These households are not in the areas identified as containing low-income or minority populations. As described in **Section 4.2** *Right-of-Way and Displacements*, residents would receive relocation benefits in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act. These relocations would not be expected to cause disproportionately high and adverse effects to minority and low-income populations.

Construction of any of the system alternatives, including the Preferred Alternative, would require temporary detours, and could require relocating transit routes, or moving transit stops during construction of the project. These would need to be carefully planned, as described in **Section 4.18**, and with such planning would not have a disproportionate adverse impact on minority and/or low-income populations.

The system alternatives, including the Preferred Alternative, would not divide or segment neighborhoods, nor introduce new streets in residential neighborhoods. Potential impacts to minority and low-income communities, such as noise and visual impacts would be experienced proportionately by residents throughout the project corridor. The system alternatives, including the Preferred Alternative, would provide improvements to sidewalks, bike lanes, crosswalks, pedestrian islands, and crossing signals at several locations. These improvements would provide better and safer access and mobility for pedestrians and bicyclists, and the improvements would be shared equitably among residents.

4.1.3.6 ENVIRONMENTAL JUSTICE CONCLUSIONS AND FUTURE ACTIONS

At the current planning stage (Final EIS), FHWA and CDOT have concluded that the system alternatives, including the Preferred Alternative, are not likely to have disproportionately high and adverse impact on minority and/or low income populations, provided that the mitigation measures identified in **Section 4.1.3** *Mitigation Measures* are implemented and future detailed project planning/design/implementation phases continue to consider and honor the principles of environmental justice.

Because the project is in the early planning stages, further coordination, consideration of impacts, and detailed development of mitigation will be required to ensure that the environmental justice commitment and considerations are fully addressed. This will include working with the communities, community service providers and local agencies on issues such as aesthetic/urban design elements to be included in the final design (see **Section 4.4** *Aesthetics and Urban Design*) and measures to minimize disruption during construction (see **Section 4.18** *Construction Impacts*). Coordination will be required at the following future stages of project development:

- Final EIS public hearing and comment period
- Commitment to project elements and mitigation measures (Record of Decision)
- Detailed engineering design
- Relocation planning and relocation assistance
- Construction planning
- Construction implementation

The project team has worked closely with the communities in the study area, resulting in the following components that have contributed greatly to the project as a whole:

- **Full and Fair Participation** – The development and consideration of alternatives to date has benefited greatly from an open and extensive public outreach and involvement effort. This included the specific public involvement elements targeting minority and low income populations, as described in **Section 4.1.4.3** and in **Chapter 6**. Public meetings, small group meetings, and Citizen Working Group meetings have proved to be invaluable forums to provide information and gather input and suggestions. This input has been used to develop alternatives that not only meet the operational needs of the transportation system, but also are compatible with and encouraged by the local community. The extensive discussions have resulted in an increased level of public awareness of the project and generally high level of support for both the improvement of the transportation system and the process used to develop and screen alternatives.

- **Equitable Sharing of Benefits** – As described above in **Section 4.1.4.4**, the system alternatives, including the Preferred Alternative, provide a number of benefits. Many of these benefits, such as operational and safety improvements of the transportation system (see **Chapter 3** *Transportation Analysis*), will benefit both the local community and others traveling on the transportation system. Other benefits, such as aesthetic improvements by replacement of aging and deteriorating structures and improvements to pedestrian and bicycle mobility, will provide more tangible direct benefits to the local community, including minority and low income populations. When considered as a whole, there is every indication that the benefits of any of the system alternatives would be shared equitably among all segments of the population.
- **Avoidance of Disproportionately High and Adverse Impacts** – A key principle of environmental justice is the avoidance of disproportionately high and adverse impacts of a project on minority and/or low income populations. Throughout the development of the system alternatives including the Preferred Alternative (see **Chapter 2** *Alternatives*), a strong and concerted effort has been made to first avoid (where possible), then minimize, and finally mitigate adverse impacts to the community. This effort has included such actions as minimizing the footprint of the project so that only a limited number of businesses and residences are displaced, considering the constrained urban nature of the corridor. Where adverse impacts could not be avoided, appropriate mitigation measures have been identified. These are identified by resource throughout the remainder of this chapter. Key mitigation commitments protecting low income and minority populations, as well as others, in the local community are found in **Section 4.2** *Right-of-Way and Displacements*, **Section 4.3** *Parks and Recreation*, **Section 4.4** *Aesthetics and Urban Design*, **Section 4.5** *Air Quality*, **Section 4.6** *Noise and Vibration*, **Section 4.13** *Hazardous Waste*, and **Section 4.18** *Construction Impacts*. Through the full and fair participation process described above, the local communities including low income and minority populations have had an opportunity to participate in the identification of impacts and mitigation measures. Through the application of the mitigation measures identified in these sections, and others, FHWA and CDOT intend to fulfill their commitment to the principles of environmental justice and to a positive outcome for the community.

In summary, with the comprehensive approach outlined above, CDOT and FHWA are on target to fully address the environmental justice fundamental principles of:

- Full and fair participation
- Avoidance of disproportionately high and adverse impacts
- Equitable sharing of benefits

TABLE OF CONTENTS

Page

4.2 Right-of-Way and Displacements 4.2-1
4.2.1 Existing Right-of-Way 4.2-1
4.2.2 Consequences of the Alternatives 4.2-1
4.2.3 Mitigation Measures 4.2-12

LIST OF FIGURES

Page

Figure 4.2-1 Displacements 4.2-9

LIST OF TABLES

Page

Table 4.2-1 Additional Right-of-Way Required 4.2-2
Table 4.2-2 Property Impacts 4.2-4
Table 4.2-3 Displacements 4.2-10

4.2 Right-of-Way and Displacements

This section discusses right-of-way requirements and displacements of businesses and/or residences that would occur with the system alternatives, which include System Alternatives 1, 2, 3, and the Preferred Alternative. The right-of-way requirements and displacements discussed are preliminary, and are subject to revision during final design and right-of-way acquisition.

4.2.1 Existing Right-of-Way

Existing right-of-way information for the Valley Highway project area was collected from CDOT and the City and County of Denver assessor's records. Existing publicly owned right-of-way width in the corridor is described below.

Along I-25:

- Broadway to Santa Fe Drive – 300 feet average width
- Santa Fe Drive to Alameda Avenue – 600 feet average width
- Alameda Avenue to US 6 – 200 feet average width

Along US 6:

- I-25 to Federal Boulevard – 300 feet average width

Interchanges along I-25:

- Largest interchange is Santa Fe Drive (US 85) – 700 feet average width
- Smaller size interchanges of Broadway and Alameda Avenue – 350 feet average width

Interchanges along US 6:

- Federal Boulevard Interchange – 500 feet average width
- Bryant Street Interchange – 350 feet average width

Santa Fe Drive / Kalamath Street:

- Santa Fe Drive north of Alameda Avenue – 65 feet average width
- Kalamath Street north of Alameda Avenue – 90 feet average width

In general, public right-of-way is owned by the City and County of Denver and CDOT. However, CDOT has primary responsibility for all I-25 transportation facilities located within the right-of-way.

4.2.2 Consequences of the Alternatives

The implementation of any of the system alternatives, including the Preferred Alternative, would have impacts due to the physical right-of-way requirements and the displacement of some occupants of that right-of-way. This section summarizes these impacts associated with the

No Action Alternative and system alternatives, including the Preferred Alternative. Impacts are summarized in two categories:

- Right-of-way requirements – the physical land required for each alternative.
- Property impacts and displacements - impacted properties are those where the alternative results in a partial or total acquisition of a property or modifies access to the property. Access modifications include changing the location of existing access to certain streets and providing new access from different streets. Displacements occur where the impacts are substantial. Displaced occupants may be eligible for relocation benefits.

Residential, commercial, and industrial land uses and ownership information are reported using current (2006) data and do not consider future development or ownership changes that might occur prior to right-of-way acquisition for the project.

4.2.2.1 RIGHT-OF-WAY REQUIREMENTS

No Action Alternative

The No Action Alternative would require no additional right-of-way.

System Alternatives 1, 2, and 3

Table 4.2-1 lists the approximate amount of right-of-way that would need to be acquired for each of the system alternatives, including the Preferred Alternative. System Alternative 2 would require the greatest amount of right-of-way acquisition, approximately 11 acres more than System Alternative 1. This difference is attributed to the grade separation of Santa Fe Drive and Kalamath Street with Alameda Avenue and limited access opportunities. System Alternative 3 would also grade separate Santa Fe Drive and Kalamath Street with Alameda Avenue but would better preserve access opportunities.

Preferred Alternative

Table 4.2-1 lists the approximate amount of right-of-way that would need to be acquired for each alternative. The Preferred Alternative would require approximately 21 acres of additional right of way.

Table 4.2-1 Additional Right-of-Way Required

	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Additional Right-of-Way Required (Acres)	18 acres	29 acres	21 acres	21 acres

4.2.2.2 PROPERTY IMPACTS AND DISPLACEMENTS

No Action Alternative

The No Action Alternative would have no property impacts nor would it require displacements.

System Alternatives 1, 2, and 3

Table 4.2-2 summarizes the property impacts and access modifications to business and residences associated with System Alternatives 1, 2 and 3.

Preferred Alternative

Table 4.2-2 also summarizes the property impacts and access modifications to business and residences associated with the Preferred Alternative.

Figure 4.2-1 shows the locations of businesses and residences that would be displaced by at least one of the system alternatives, while **Table 4.2-3** provides more specific information on the type of use and address for the displaced occupants.

Right-of-way impacts and displacement of property owners and tenants varies from alternative to alternative. Of the System Alternatives, 1, 2, 3 and the Preferred Alternative, System Alternative 1 requires the least additional right-of-way and requires the fewest displacements. System Alternative 2 requires the most.

Table 4.2-2 Property Impacts

Location	Full Purchase				Partial Purchase				Access Modification			
System Alternative	1	2	3	Preferred Alternative	1	2	3	Preferred Alternative	1	2	3	Preferred Alternative
I-25 Improvements												
I-25 Mainline												
1001 W Bayaud Avenue	X	X	X	X								
135 S Kalamath Street	X	X	X	X								
131 S Kalamath Street	X	X	X	X								
101-125 S Kalamath Street	X	X	X	X								
50 S Lipan Street (approximate)					X	X	X	X				
25 Rio Grande Boulevard (approximate)					X	X	X	X				
1401-1501 W 1st Avenue					X	X	X	X				
1500 W 3rd Avenue (approximate)					X	X	X	X				
301 Raritan Way (approximate)					X	X	X	X				
501 Raritan Way					X	X	X	X				
400-700 Tejon Street					X	X	X	X				
10 S Lipan Street	X	X	X	X								
1030 W Ellsworth Avenue					X	X	X	X				
1100 W Ellsworth Avenue (approximate)					X	X	X	X				
I-25 / Broadway												
685 S Broadway							X	X			X	X
695 S Broadway							X	X			X	X
701-711 S Broadway							X	X			X	X
742-752 S Broadway										X		
754 S Broadway		X										
755 S Broadway					X	X	X	X	X	X	X	X
765 S Broadway	X	X	X	X								
770 S Broadway		X										
788-796 S Broadway		X										
800 S Broadway	X	X	X	X								

Table 4.2-2 Property Impacts (Continued)

Location	Full Purchase				Partial Purchase				Access Modification			
System Alternative	1	2	3	Preferred Alternative	1	2	3	Preferred Alternative	1	2	3	Preferred Alternative
I-25 Improvements (continued)												
I-25 / Broadway (continued)												
801-803 Lincoln Street		X										
805 S Lincoln Street		X					X	X				
807 S Lincoln Street		X					X	X				
819 S Lincoln Street						X	X	X				
823 S Lincoln Street		X					X	X				
827 S Lincoln Street		X	X	X								
831-833 S Lincoln Street		X	X	X								
26 E Ohio Avenue (approximate)		X	X	X								
I-25/Santa Fe												
500 S Santa Fe Drive					X		X	X	X		X	X
350 S Santa Fe Drive					X	X	X	X	X	X	X	X
500 S Santa Fe Drive						X				X		
600 S Santa Fe Drive						X				X		
600 S Santa Fe Drive						X						
600 S Santa Fe Drive						X				X		
666-698 S Santa Fe Drive						X						
330 S Kalamath Street		X	X									
I-25 / Alameda Avenue												
900 W Alameda Avenue		X			X			X	X			X
919 W Alameda Avenue		X			X			X	X			X
950 W Alameda Avenue		X			X			X	X			X
1101 W Alameda Avenue	X	X	X	X								
1101 W Alameda Avenue	X	X	X	X								
1150 W Alameda Avenue					X	X	X	X			X	
1197 W Alameda Avenue	X	X	X	X								
1200 W Alameda Avenue									X	X	X	X
235-255 S Cherokee Street						X						
Total I-25 Improvements	**10**	**24**	**14**	**13**	**16**	**19**	**20**	**23**	**7**	**7**	**8**	**10**

Table 4.2-2 Property Impacts (Continued)

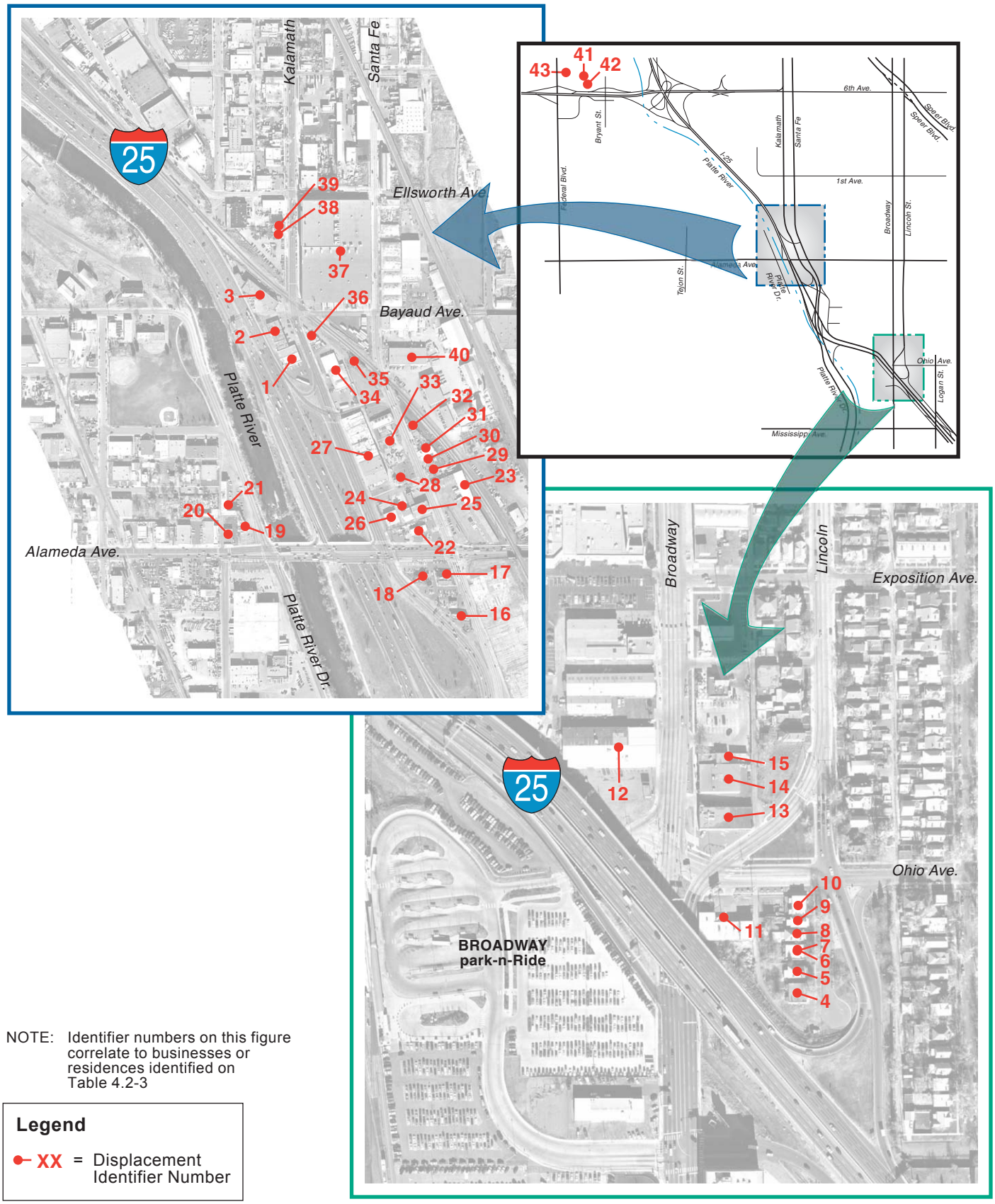
Location	Full Purchase				Partial Purchase				Access Modification			
System Alternative	**1**	**2**	**3**	**Preferred Alternative**	**1**	**2**	**3**	**Preferred Alternative**	**1**	**2**	**3**	**Preferred Alternative**
Santa Fe Drive / Kalamath Street Improvements												
Santa Fe Drive / Kalamath Street / Alameda Avenue												
919 W. Byers Place		X	X									
920 W Byers Place		X										
920 W Byers Place		X										
924-930 W Byers Place		X										
261 S Santa Fe Drive		X	X									
263 S Santa Fe Drive		X	X									
267-269 S Santa Fe Drive		X	X									
268 S Santa Fe Drive		X										
280 S Santa Fe Drive		X	X									
285 S Santa Fe Drive		X	X									
208-236 S Kalamath Street		X										
400 W Alameda Avenue							X					
900 W Alameda Avenue			X									
919 W Alameda Avenue			X									
950 W Alameda Avenue			X									
235-255S Cherokee Street							X					
301#B-1 S Cherokee Street							X					
4-80 S Santa Fe Drive									X	X	X	X
Santa Fe Drive / Kalamath Street / Railroad Grade Separation												
10 S Santa Fe Drive	X	X	X	X								
100 S Santa Fe Drive									X	X	X	X
106-120 S Santa Fe Drive	X	X										X
130-140 S Santa Fe Drive									X	X	X	X
185 S Santa Fe Drive		X	X	X	X				X			
195 S Santa Fe Drive		X	X	X	X				X			
200 S Santa Fe Drive (approximate)						X						

Table 4.2-2 Property Impacts (Continued)

Location	Full Purchase				Partial Purchase				Access Modification			
System Alternative	1	2	3	Preferred Alternative	1	2	3	Preferred Alternative	1	2	3	Preferred Alternative
Santa Fe Drive / Kalamath Street Improvements (continued)												
Santa Fe Drive / Kalamath Street / Railroad Grade Separation (continued)												
201-251 S Santa Fe Drive	X	X	X	X								
230 S Santa Fe Drive	X	X	X	X								
254-262 S Santa Fe Drive	X	X	X	X								
262 S Santa Fe Drive	X		X	X								
264 S Santa Fe Drive	X	X	X	X								
268 S Santa Fe Drive		X	X		X			X				
268 S Santa Fe Drive		X	X									
23 S Kalamath Street	X	X		X								
25 S Kalamath Street	X	X		X								
31 S Kalamath Street	X	X		X								
39 S Kalamath Street (approximate)	X	X	X	X								
50 S Kalamath Street	X	X	X	X								
120 S Kalamath Street	X	X	X	X								
132-142 S Kalamath Street	X	X		X								
144 S Kalamath Street (approximate)	X	X		X								
172-178 S Kalamath Street	X	X		X								
182 S Kalamath Street	X	X		X								
184 S Kalamath Street	X	X		X								
194 S Kalamath Street	X	X		X								
208-236 S Kalamath Street			X									
10 S Lipan Street (approximate)	X	X	X	X								
Total Santa Fe Drive / Kalamath Street Improvements	**20**	**34**	**24**	21	**3**	**1**	**3**	**1**	**5**	**3**	**3**	**4**

Table 4.2-2 Property Impacts (Continued)

Location	Full Purchase				Partial Purchase				Access Modification			
System Alternative	1	2	3	Preferred Alternative	1	2	3	Preferred Alternative	1	2	3	Preferred Alternative
US 6 (6th Avenue) Improvements												
Federal Boulevard / Bryant Street / US 6												
375-399 Federal Boulevard							X					
400 Federal Boulevard					X	X	X	X				
401 Federal Boulevard					X		X					
405 Federal Boulevard					X		X					
412 Federal Boulevard					X	X	X	X				
425 Federal Boulevard					X		X					
438 Federal Boulevard					X		X					
445 Federal Boulevard					X		X					
450 Federal Boulevard					X	X	X	X	X	X	X	X
499 Federal Boulevard					X	X	X	X	X	X	X	X
600 Federal Boulevard					X	X		X				
620 Federal Boulevard					X	X	X	X	X	X	X	X
642 Federal Boulevard		X		X	X				X			
690 Federal Boulevard					X	X	X	X				
710 Federal Boulevard					X							
724 Federal Boulevard					X							
730 Federal Boulevard					X							
2800-2930 W. 7th Avenue					X							
2790 W. 7th Avenue	X											
2701 W. 6th Avenue						X	X	X				
2727 W. 6th Avenue		X	X	X	X							
2727 W. 5th Avenue					X			X				
Total US 6 Improvements	**1**	**2**	**1**	**2**	**19**	**8**	**13**	**9**	**4**	**3**	**3**	**3**
Total	**32**	**60**	**39**	**36**	**38**	**28**	**36**	**33**	**16**	**13**	**14**	**17**



NOTE: Identifier numbers on this figure correlate to businesses or residences identified on Table 4.2-3

Legend

XX = Displacement Identifier Number

North

Displacements

Valley Highway - Logan To 6th Ave. Environmental Impact Statement (EIS)

Figure 4.2-1

Table 4.2-3 Displacements

Identifier	Business/Tenant Name	Type of Business	Address	Potential Displacements			
				Alt. 1	Alt. 2	Alt. 3	Preferred Alternative
I-25 Mainline							
1	Pro/File Systems	Office Filing System Supplier	135 S. Kalamath St.	1	1	1	1
2	Backyard Fantasy	Home Playgrounds Equipment and Decks	101-131 Kalamath St.	1	1	1	1
2	City Church Youth Center	Pregnant Teen Outreach Center	101-131 Kalamath St.	1	1	1	1
2	City Perk Coffee	Coffee Shop	101-131 Kalamath St.	1	1	1	1
2	Mountain Trade Supply	Wholesale Carpet Tool and Supply	101-131 Kalamath St.	1	1	1	1
3	Denver Fastening Systems	Wholesale Fastening Systems	1001 W. Bayaud Ave.	1	1	1	1
3	The Grand Entrance	Custom Door Manufacturer	1001 W. Bayaud Ave.	1	1	1	1
I-25 / Broadway							
4	Duplex Residence		831 and 833 S. Lincoln Street	0	2	2	2
5	Private Residence		827 S. Lincoln Street	0	1	1	1
6	Private Residence (Half of Legally Subdivided Duplex)		823 S. Lincoln Street	0	1	0	0
7	Private Residence (Half of Legally Subdivided Duplex)		819 S. Lincoln Street	0	1	0	0
8	Private Residence		807 S. Lincoln Street	0	1	0	0
9	Private Residence		805 S. Lincoln Street	0	1	0	0
10	Duplex Residence		801 & 803 S. Lincoln Street	0	2	0	0
11	Hurricane Drain	Plumbing Repair	800 S. Broadway	1	1	1	1
12	Renal Care Clinic	Dialysis Clinic	765 S. Broadway	1	1	1	1
12	Vacant Rear Space		765 S. Broadway	1	1	1	1
13	Office Space	Offices	788 & 796 S. Broadway	0	2	0	0
14	Iyengar Yoga Center	Yoga Studio	770 S. Broadway	0	1	0	0
15	Vacant		754 S. Broadway	0	1	0	0
I-25 / Alameda							
16	Diamond Shamrock	Gas Station/Convenience Shop	330 S. Kalamath Street	0	1	1	0
17	Denny's	Casual Restaurant	900 W. Alameda	0	1	1	0
18	Burger King	Fast Food Restaurant	950 W. Alameda	0	1	1	0
19	Valverde Yacht Club	Restaurant and Bar	1101 W. Alameda	1	1	1	1
20	Alameda International Market	Ethnic/Convenience Market/Accountant	1197 W. Alameda	1	1	1	1
21	Motel 5	Motel	1101 W. Alameda	1	1	1	1
Santa Fe / Kalamath / Alameda							
22	Vacant	Former Gas Station/ Auto Service	919 W. Alameda	0	1	1	0
23	Dahl Plumbing	Wholesale Plumbing Supply	280 S. Santa Fe Dr.	0	1	1	0

Table 4.2-3 Displacements (continued)

Identifier	Business Name	Type of Business	Address	Potential Displacements			
				Alt. 1	Alt. 2	Alt. 3	Preferred Alternative
Santa Fe / Kalamath / Alameda (continued)							
24	Brady Real Estate	Small Warehouse or Storage	924-930 W. Byers Place	0	1	0	0
24	Survey and Construction Supply	Survey Trade Supply	924-930 W. Byers Place	0	1	0	0
25	Thermo Tech	Industrial Piping Manufacturer and Supplier	285 S. Santa Fe Drive	0	1	1	0
26	Warehouse	Small Warehouse and Storage	920 W. Byers Place	0	1	0	0
27	Vacant	Former Brew Pub and Restaurant	208-236 S. Kalamath	0	1	1	0
27	Office Space Above Heavenly Daze	Vacant Office Space	208-236 S. Kalamath	0	1	1	0
27	Wine Storage of Denver	Wine Storage	208-236 S. Kalamath	0	1	1	0
27	Vacant Space North of Heavenly Daze	Vacant Commercial Space	208-236 S. Kalamath	0	1	1	0
28	Vacant House/ Storage	Formerly Housing for Brew Pub Employees	919 W. Byers Place	0	1	1	0
Santa Fe / Kalamath Grade Separation							
29	Raul's Auto Trim / Caravea Auto Body	Auto Body and Trim	268 S. Santa Fe Drive	0	2	2	0
30	Thermal Grid Windows	Window and Door Contractor	264 S. Santa Fe Drive	1	1	1	1
31	Jarcon Contractors	Contractor Storage	254-262 S. Santa Fe Drive	1	1	1	1
32	Vacant	Vacant Commercial Building	230 S. Santa Fe Drive	1	1	1	1
33	Del Rio	Restaurant Under Construction	201-251 S. Santa Fe Drive	1	1	1	1
34	Customized Tabs	Wholesale Bookbinding Supplier	132-174 S. Kalamath	1	1	0	1
34	MC2 Electrical Contractor	Electrical Contractor	132-174 S. Kalamath	1	1	0	1
35	Platte River Letter Press	Printer	185 S. Santa Fe Drive	0	1	1	1
36	Lincoln Automotive	Auto Sales	120 S. Kalamath	1	1	1	1
37	Sports Authority Warehouse	Sporting Goods Warehouse	50 S. Kalamath	1	1	1	1
38	Vacant	Formerly Heating Contractor	25-31 S. Kalamath	1	1	0	1
39	Alpine AC and Heat	Heating Contractor	23 S. Kalamath	1	1	0	1
40	XPEDEX	Paper Store and Warehouse	120-160 S. Santa Fe Drive	1	1	0	0

Table 4.2-3 Displacements (continued)

Identifier	Business Name	Type of Business	Address	Potential Displacements			
				Alt. 1	Alt. 2	Alt. 3	Preferred Alternative
US 6							
41	School District #1	Office/Storage/Parking	2790 W. 7th Avenue	1	0	0	0
42	Rocky Mountain Window Films	Window Tinting Supplier	2727 W. 6th Avenue	0	1	1	1
42	McCarten	Wire and Cable Installation Equipment Supplier	2727 W. 6th Avenue	0	1	1	1
42	City Church	Church	2727 W. 6th Avenue	0	1	1	1
42	First Love	Screen printing and Christian Apparel Supplier	2727 W. 6th Avenue	0	1	1	1
42	Chaparral Night Club	Night Club	2727 W. 6th Avenue	0	1	1	1
43	Austrian Auto Repair	Auto Service	642 S. Federal	0	1	0	1
			Total Displacements Per Alternative	25	60	41	33

Note: Business names and types as of August 1, 2006.

4.2.3 Mitigation Measures

4.2.3.1 ACQUISITION

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 Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, (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 insure 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 Right of Way Specialist will be assigned to each property owner to assist them with this process.

4.2.3.2 RELOCATION

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. 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. Relocation benefits will be provided to all eligible persons regardless of race, color, religion, sex or national origin. Benefits under the 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 Right of Way Specialist .

4.2.3.3 RELOCATION PLANNING

Prior to relocation, CDOT staff will prepare a relocation analysis that will enable the relocation activities to be planned so that the problems associated with the displacement of individuals, families, businesses, and nonprofit organizations are recognized, and solutions are developed to minimize the adverse impacts of displacement. The scope of planning will be based on the complexity and nature of the anticipated displacing activity, including the evaluation of program resources available to carry out timely and orderly relocations. The relocation study will include the following:

- A current estimate of the number of households to be displaced, including information such as owner/tenant status, estimated value and rental rates of property to be acquired, family characteristics, and special consideration of impacts on minorities, the elderly, large families, and the handicapped, when applicable
- An estimate of the number of comparable replacement dwellings in the area (including the price ranges and rental rates) that are expected to be available to fulfill the needs of those households displaced (when an adequate supply of properties for displacees to be relocated into is NOT available, CDOT must take actions or make assurances to address the inadequate supply before it can start any relocation activities)
- An estimate of the number, type, and size of businesses and nonprofit organizations to be displaced and the approximate number of employees that may be affected
- Consideration of any special advisory services that may be necessary from CDOT and cooperating agencies

4.2.3.4 RELOCATION ASSISTANCE

Relocation assistance advisory services will include:

- Determining the relocation needs and preferences of each person to be displaced and explaining the relocation benefits and other assistance for which the person may be eligible
- Providing current and continuing inventory of available residential and business properties to purchase or lease, and information about such properties
- Minimizing hardships to persons adjusting to relocation by providing counseling, advice, and other sources of assistance that may be available and other help as may be appropriate
- Supplying the person to be displaced with appropriate information concerning federal, state, and local housing programs administered by the Small Business Administration, and other programs offering assistance to the displaced persons, as well as technical help to persons applying for such assistance

4.2.3.5 RELOCATION PAYMENTS

The relocation benefits provided to those displaced are determined by eligibility guidelines based on federal regulations. For eligible businesses, this includes reimbursement of actual reasonable and necessary moving and related expenses and certain reestablishment costs, or a fixed payment in lieu of all other possible relocation benefits. For eligible residencies, this includes reimbursement of moving and related expenses, a replacement housing benefit for owners or a rental supplement for renters. The rental supplement payment may also be used towards the down payment for the purchase of a replacement dwelling to encourage renters to become property owners. The replacement housing benefit and rental supplement benefit have certain monetary limitations; however, these limitations can be exceeded in certain circumstances.

TABLE OF CONTENTS

Page

4.3 Parks and Recreation 4.3-1
4.3.1 Current Conditions 4.3-1
4.3.2 Consequences of the Alternatives 4.3-5
4.3.3 Mitigation Measures 4.3-10

LIST OF FIGURES

Page

Figure 4.3-1 Parks and Recreation Resources....4.2-2
Figure 4.3.2 Barnum East Park Concept - Preferred Alternative....4.2-13

LIST OF TABLES

Page

Table 4.3-1 Park and Recreation Resources....4.2-1
Table 4.3-2 Impacts to Parks and Recreation Resources....4.2-6
Table 4.3-3 Elements of Barnum East Park Reconstruction....4.2-15

4.3 Parks and Recreation

Parks and recreation areas are important community facilities that warrant consideration under NEPA. Additionally, publicly-owned parks are afforded protection under Section 4(f) of the Department of Transportation Act (49 USC 303). Section 4(f) protects public park and recreation lands (as well as wildlife and waterfowl refuges and historic sites) from use for transportation projects unless there is no prudent and feasible alternative to using that land, and unless the transportation project includes all possible planning to minimize harm. Section 4(f) impacts to parks and recreation facilities are addressed in **Chapter 5** *Section 4(f) Evaluation*. Additionally, public parks and recreation areas acquired, developed, or improved with grant funds provided by the federal Land and Water Conservation Fund Act are protected, under Section 6(f) of the Act, from conversion to uses other than public outdoor recreation, as discussed below.

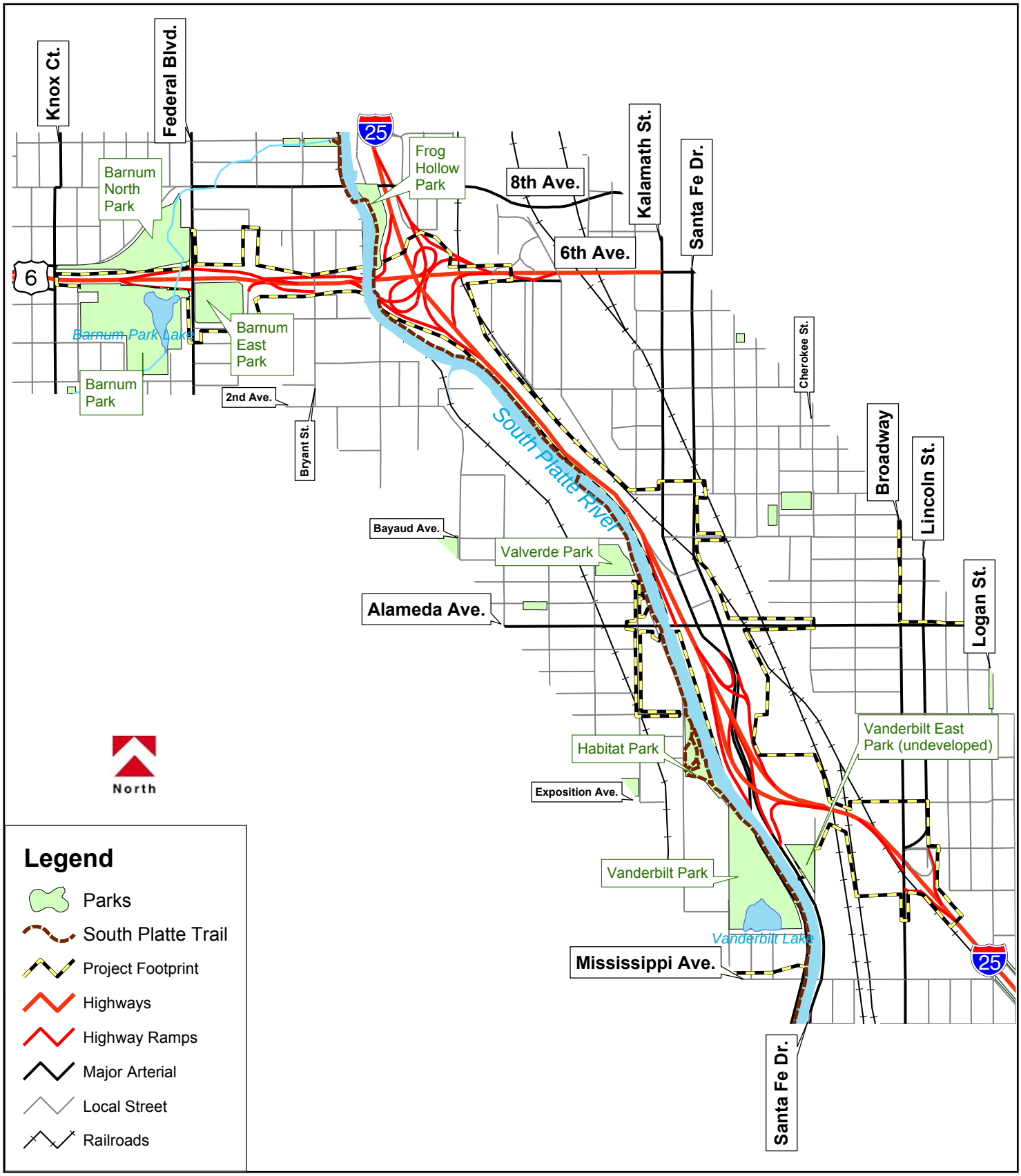
4.3.1 Current Conditions

A total of 9 parks and recreation resources occur in the vicinity of the project area, all of which are owned by City and County of Denver (see **Table 4.3-1**). Information about the size and amenities of these City-owned parks was derived from park inventory data provided by City and County of Denver (CCD, 2004a). Information about 6(f) improvements to specific parks was obtained from the Colorado State Parks headquarters in Denver. The locations of these facilities are shown on **Figure 4.3-1**. Summary information about each park and recreation facility is provided below.

Table 4.3-1 Park and Recreation Resources

Park or Recreation Resource	Year Acquired/ Established	Size	Facilities	Section 6(f) Improvements ?
Barnum Park	1906	35.6 acres	Basketball court, drinking fountain, flower garden, fishing/lake, outdoor swimming pool, playground, picnic tables and shelter, recreation center, restroom, soccer field, tennis court	Yes
Barnum East Park	1937	11.8 acres	Lighted baseball field, drinking fountain, restroom, lighted soccer field	No
Barnum North Park	1951	13.6 acres	Soccer field, lighted softball field, drinking fountain, restroom,	Yes
Frog Hollow Park	1976	4.0 acres	Bike path, drinking fountain, fishing, picnic tables	No
Habitat Park	1976	6.5 acres	Bike path, drinking fountain, fishing, picnic table	No
Valverde Park	1944	4.8 acres	Baseball field, basketball court, football field, softball field	Yes
Vanderbilt Park	1922	30.9 acres	Bike path, drinking fountain, lake, restroom, lighted softball field	Yes
Vanderbilt East Park	1922	+/- 5 acres	Undeveloped, no facilities	No
South Platte River Trail	1980	~2.25 miles	Paved bike trail	No

Source: City and County of Denver, Department of Parks and Recreation, 2003a



Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Parks and Recreation Resources

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.3-1

The boundaries of these parks were investigated to establish a basis for determining impacts. This effort involved a review of sources in a variety of repositories, including the Denver Parks and Recreation Department, the Denver County Clerk & Recorder, the Denver County Assessor, the Colorado State Archives, the Denver City Clerk's Office, the Denver Public Library, CDOT Archives, the Colorado Railroad Museum, and the Denver County Transportation and Surveyor's Offices (Farnsworth, 2004). The boundaries were discussed with the City and County of Denver, the local agency with jurisdiction over the parks. Some discrepancies remain in historical boundary documentation and efforts to resolve boundary / right-of-way issues are on-going.

4.3.1.1 BARNUM PARK

Barnum Park (also known as Barnum South Park) is located on the southwest side of the US 6 and Federal Boulevard interchange, within the Southwest Denver Park District. The irregularly shaped parcel extends approximately between US 6 on the north and 3rd Avenue on the south, and between Federal Boulevard on the east and Julian Street on the west. This 35.6-acre park contains a small man-made lake (Barnum Park Lake) and provides facilities for a wide variety of recreational activities, including fishing, swimming, basketball, soccer, tennis, and picnicking.

Section 6(f) improvements were made at Barnum Park between 1965 and 1967 under Land and Water Conservation Project # 05-00106. The improvements included installation of 150 feet of 8 foot by 1 foot culvert, earth fill, landscaping, and sprinkler system expansion. These improvements were confined to the southeastern portion of the park.

4.3.1.2 BARNUM EAST PARK

Barnum East Park is located southeast of the intersection of US 6 and Federal Boulevard. This roughly rectangular, 11.8-acre park is situated in the Southwest Denver Park District. Barnum East Park is bounded on the north by US 6, on the south by the on-ramp from Federal Boulevard to eastbound US 6, on the west by Federal Boulevard, and on the east by Decatur Street. Barnum East Park provides facilities for baseball and soccer and is equipped with lights for night games.

Parts of the parking facilities for Barnum East Park extend beyond the parks southern and eastern boundaries. No Section 6(f) improvements have been made to the park.

4.3.1.3 BARNUM NORTH PARK

Barnum North Park is located northwest of the intersection of US 6 and Federal Boulevard. This 13.6-acre park is situated within the Northwest Denver Park District. This roughly triangular parcel is bounded by Federal Boulevard on the east, US 6 on the south, and the 8th Avenue bypass/ramp to westbound US 6 on the northwest. Landscaped CDOT-owned land extends from the western edge of the park to Knox Court. Barnum North Park provides facilities for soccer and softball and is equipped with lights for night softball games.

Section 6(f) improvements were made at Barnum North Park in 1973 and 1976. The 1973 project (Land and Water Conservation Project # 08-00363), included design and construction of an archery range shooting pad, a hiking and biking trail, and a parking lot. These improvements encompassed a large area of the park. Additional improvements were made in 1976 (Land and

Water Conservation Project # 08-00514) and included construction of two ball fields with fencing, backstops, and a sprinkler system, as well as restrooms and a combination storage/press box building in the central area of the park. Certain 6(f) improvements made in 1973 have been modified or are no longer in use, including the archery range, southwest parking lot, and practice ball field located in the southeastern part of Barnum North Park. Another 1973 6(f) improvement, the hiking/biking trail, has been partially reconfigured in the past, and now serves primarily as a park maintenance access road. A portion of this park maintenance access road extends south of the southern park boundary, onto the US 6 right-of-way.

4.3.1.4 FROG HOLLOW PARK

Frog Hollow Park is a narrow, irregularly shaped park located along the east bank of the South Platte River between US 6 and 8th Avenue. Its eastern boundary is the I-25 right-of-way line. This park encompasses 14.5 acres. Facilities include a bike path (the South Platte River Trail), a drinking fountain, and picnic tables. The main uses of the park are biking and fishing. The park also provides access to a pedestrian bridge that spans the South Platte River.

No Section 6(f) improvements have been made to Frog Hollow Park.

4.3.1.5 HABITAT PARK

Habitat Park is an irregularly shaped park located along the west bank of the South Platte River, a short distance south of Alameda Avenue. The 10-acre park is bounded on the south by Exposition Avenue and on the west by Jason Street. Facilities include a bike path (the South Platte River Trail), a drinking fountain, and picnic tables. The park's main uses are biking and fishing.

No Section 6(f) improvements have been made to Habitat Park.

4.3.1.6 VALVERDE PARK

Valverde Park occupies a trapezoid-shaped parcel on the west side of the South Platte River and is situated between Bayaud Avenue on the north, Cedar Avenue on the south, Navajo Street on the west, and South Platte River Drive on the east. The 4.8-acre park is situated within the Southwest Denver Park District. Valverde Park provides facilities for outdoor sports, including baseball and softball fields, a basketball court, and a football field.

Section 6(f) improvements were made at Valverde Park in 1980 under Land and Water Conservation Project # 08-00716. The improvements included grading, filling, landscaping, and construction of a sprinkler system, and a multi-purpose area with equipment, trail, bike rack, and picnic tables. These improvements encompassed a large area of the park – all but the southeast corner.

4.3.1.7 VANDERBILT PARK

Vanderbilt Park occupies a 30.9-acre roughly triangular-shaped parcel on the west side of the South Platte River, directly south of Habitat Park. The park is bounded by Tennessee Avenue on the south, Huron Street on the west and Santa Fe Drive on the east. An undeveloped four-

acre triangular parcel adjoining the southeast side of the park is owned by Cherokee Denver L.L.C. Vanderbilt Park is within the Southwest Denver Park District. A man-made lake (Vanderbilt Lake), approximately seven-acres in area, occupies the southern portion of the park. Facilities include a lighted softball field, a restroom, drinking fountain, a parking lot, and a bike path.

Section 6(f) improvements were made at Vanderbilt Park from 1967 to 1969 and again in 1977. The first project (Land and Water Conservation Project #05-00140) involved the installation of a sprinkler system and landscaping throughout the entire park. The second project (Land and Water Conservation Project #08-00526) involved earthwork, grass installation, a sprinkler system, fencing, and buried electric utility lines, as well as construction of lighted ball fields, a restroom, a combination storage/press box building, a parking lot with an access road, and a model airplane flying pad.

4.3.1.8 VANDERBILT EAST PARK

Vanderbilt East Park is located on the east side of the South Platte River, directly opposite and east of Vanderbilt Park. Vanderbilt East Park is currently undeveloped and occupies a small, triangular-shaped parcel bounded on the east by Cherokee Street, on the north by Ohio Avenue, and on the west by Santa Fe Drive. The park encompasses an estimated five acres and does not contain any improvements or facilities.

No Section 6(f) improvements have been made to Vanderbilt East Park.

4.3.1.9 SOUTH PLATTE RIVER TRAIL

The South Platte River Trail runs along the west side of the South Platte River, from the southern project limits to approximately 1st Avenue, where it crosses a bridge to the east side of the river. From this point to the northern project limits, the South Platte River Trail follows the east bank of the South Platte River. The segment in the project area is approximately 2.25-miles long. The trail serves dual purposes as a City and County of Denver maintenance access road and as a heavily used public bike and pedestrian trail.

Trail improvements include a five acre landscaped area with picnic tables on the east bank of the South Platte River, between 4th Avenue on the south and US 6 on the north. The bike trail provides the only means of public access. This area, known as “Phil Milstein Park” or “Milstein Grove,” is located with in City and County of Denver-owned land dedicated as right-of-way for the Valley Highway, and is not officially designated a park.

No Section 6(f) improvements have been made to the South Platte River Trail.

4.3.2 Consequences of the Alternatives

Impacts to park and recreational resources from the system alternatives, which include System Alternatives 1, 2, 3, and the Preferred Alternative, are summarized in **Table 4.3-2** and discussed below. Impacts to public parks are also discussed in **Chapter 5** *Section 4(f) Evaluation***.**

Table 4.3-2 Impacts to Parks and Recreation Resources

Resource	No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Barnum Park	No impacts	Widening of Federal Boulevard, including westward relocation of sidewalk would result in very small acquisition of land (0.01 acre) from the park's northeast corner. Recreational use of the park will be unaffected.	Widening of Federal Boulevard, including westward relocation of sidewalk would result in very small acquisition of land (0.01 acre) from the park's northeast corner. Recreational use of the park will be unaffected.	Widening of Federal Boulevard, including westward relocation of sidewalk would result in very small acquisition of land (0.02 acre) from the park's northeast corner. Recreational use of the park will be unaffected.	Widening of Federal Boulevard, including westward relocation of sidewalk would result in very small acquisition of land (0.01 acre) from the park's northeast corner. Recreational use of the park will be unaffected
Barnum East Park	No impacts	Widening of Federal Boulevard south of US 6 would cause encroachment along west edge of park, necessitating acquisition of a narrow (14 ft-wide/0.16 acre) strip of landscaped land adjacent to Federal Boulevard. No impacts to recreational features (ball fields) should occur. Reconfiguration of the on- and off-ramp to eastbound US 6 would increase separation of roadway from ball field at east end of park, and allow for potential park expansion. Pedestrian access and safety should be improved by installation of traffic signals at the park's southwest and southeast corners. Temporary construction impacts associated with replacement of the Federal Boulevard bridge over US 6 may occur.	Substantial encroachment along the northern and western edges of park due to eastward expansion of Federal Boulevard to accommodate turning lanes on Federal Boulevard bridge over US 6, and new roadway/ramp from Federal Boulevard to eastbound US 6 or Bryant Street. Approximately 1.54 acres of park land would be converted to transportation use. New right-of-way would cut across both ball fields, impairing their use and necessitating redesign and construction of some or all park facilities. Temporary construction impacts associated with replacement of the Federal Boulevard bridge over US 6 may occur.	Narrow (10 ft-wide/0.14 acre) strip of new right-of-way would be required along the west side of the park due to expansion of Federal Boulevard to accommodate turning lanes on Federal Boulevard bridge over US 6, and new roadway/ramp from Federal Boulevard to eastbound US 6. No impacts to recreational features (ball fields) should occur. Closing ramp from Federal Boulevard on south side of park to eastbound US 6 will increase separation of roadway from ball field at east end of park and allow for potential park expansion. Temporary construction impacts associated with replacement of the Federal Boulevard bridge over US 6 may occur.	Substantial encroachment along the northern and western edges of park due to eastward expansion of Federal Boulevard to accommodate turning lanes on Federal Boulevard bridge over US 6, and new roadway/ramp from Federal Boulevard to eastbound US 6 or Bryant Street. Approximately 1.54 acres of park land would be converted to transportation use. New right-of-way would cut across both ball fields, impairing their use and necessitating redesign and construction of some or all park facilities. Temporary construction impacts associated with replacement of the Federal Boulevard bridge over US 6 may occur.

Table 4.3-2 Impacts to Parks and Recreation Resources (continued)

Resource	No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Barnum North Park	No impacts	Narrow (10 ft-wide/0.02 acre) strip of land along the east edge of the park would be required for new right-of-way to accommodate a redesigned westbound on-ramp to US 6 from southbound Federal Boulevard. A portion of the existing maintenance access road/trail that terminates at the park's southwest corner would be removed, but no impacts to recreational facilities or recreational uses are expected.	Narrow (10 ft-wide/0.03 acre) strip of land along the east edge of the park would be required for new right-of-way to accommodate a redesigned westbound on-ramp to US 6 from southbound Federal Boulevard. Small (0.02 acre) area required along south side of the park for ramp to US 6. The existing maintenance access road/trail that terminates at the park's southwest corner would be impacted, but no impacts to recreational facilities or recreational uses are expected.	Small amounts of new right-of-way would be required along the eastern and southern edges of the park. Acquisitions include 0.11 acre of park land along the park's east edge, and another acquisition (0.29 acre) at the south side to accommodate the westbound US 6 on-ramp. The existing maintenance access road/trail that terminates at the park's southwest corner would be impacted, but no impacts to recreational facilities or recreational uses are expected.	Narrow (10 ft-wide/0.03 acre) strip of land along the east edge of the park would be required for new right-of-way to accommodate a redesigned westbound on-ramp to US 6 from southbound Federal Boulevard. Small (0.02 acre) area required along south side of the park for ramp to US 6. The existing maintenance access road/trail that terminates at the park's southwest corner would be impacted, but no impacts to recreational facilities or recreational uses are expected
Frog Hollow Park	No impacts	No impacts	No impacts	No impacts	No impacts
Valverde Park	No impacts	No impacts	No impacts	No impacts	No impacts
Habitat Park	No impacts	No impacts	No impacts	No impacts	No impacts
Vanderbilt Park	No impacts	No impacts. Realignment of southbound Santa Fe Drive toward northeastern edge of park would stay within existing designated right-of-way.	No impacts. Realignment of southbound Santa Fe Drive toward northeastern edge of park would stay within existing designated right-of-way.	No impacts. Realignment of southbound Santa Fe Drive toward northeastern edge of park would stay within existing designated right-of-way.	No impacts. Realignment of southbound Santa Fe Drive toward northeastern edge of park would stay within existing designated right-of-way.
Vanderbilt East Park	No impacts	No impacts	No impacts	No impacts	No impacts
South Platte River Trail	No impacts	Replacement of bridges at US 6, Alameda Avenue, and Santa Fe Drive would result in temporary closure with detours during construction, but would provide permanent benefits by raising of bridge profiles.	Replacement of bridges at US 6, Alameda Avenue, and Santa Fe Drive would result in temporary closure with detours during construction, but would provide permanent benefits by raising of bridge profiles.	Replacement of bridges at US 6, Alameda Avenue, and Santa Fe Drive would result in temporary closure with detours during construction, but would provide permanent benefits by raising of bridge profiles.	Replacement of bridges at US 6, Alameda Avenue, and Santa Fe Drive would result in temporary closure with detours during construction, but would provide permanent benefits by raising of bridge profiles.

4.3.2.1 NO ACTION ALTERNATIVE

Under the No Action Alternative, no impacts or new benefits would occur and the intensity of park use would likely remain unchanged, since all of these facilities are surrounded by well-established residential, commercial, and industrial areas.

4.3.2.2 SYSTEM ALTERNATIVE 1

This alternative would result in slight encroachments and direct impacts (see **Table 4.3-2**) to three parks in the vicinity of the US 6/Federal Boulevard interchange: Barnum Park, Barnum East Park, and Barnum North Park. Proposed reconfiguration of the interchange includes widening of both sides of Federal Boulevard and would require the acquisition of a tiny (0.01 acre) piece of land from Barnum Park's northeast corner, as well as narrow strips of land for new right-of-way along the west edge of Barnum East Park and along the east edge of Barnum North Park. These right-of-way acquisitions are limited to landscaping and would not affect existing park use but would result in 4(f) impacts.

System Alternative 1 would result in beneficial effects to Barnum East Park, since reconfiguration of the on- and off-ramp to eastbound US 6 will increase the separation distance of the roadway from the ball field located at the park's east end. Additionally, pedestrian access and safety for users of Barnum East Park should be improved by installation of traffic signals at the park's southwest and southeast corners.

Two of the parks affected by this alternative – Barnum and Barnum North – have had 6(f) improvements. None of Barnum Park's 6(f) improvements will be impacted. In Barnum North Park, however, a portion of the existing maintenance access road/trail (originally a 6(f) bike/hiking trail near the park's southern edge) falls within the proposed new right-of-way needed for construction of the new westbound on-ramp from Federal Boulevard to US 6. No other park or recreation resources would be affected by System Alternative 1.

Replacement of bridges at US 6, Alameda Avenue, and Santa Fe Drive would result in temporary closure of the South Platte River Trail with detours occurring during construction.

4.3.2.3 SYSTEM ALTERNATIVE 2

This alternative would result in direct impacts (see **Table 4.3-2**) to three parks in the vicinity of the US 6/Federal Boulevard interchange: Barnum Park, Barnum East Park, and Barnum North Park. Under System Alternative 2, substantial acquisitions of land for new right-of-way would be required from Barnum East Park, to accommodate construction of a new ramp from Federal Boulevard to eastbound US 6 and access to Bryant Street, as well as substantial widening of Federal Boulevard to provide turning and ramp access lanes. New right-of-way will cut across both existing ball fields in Barnum East Park, impairing their use and necessitating redesign and construction of some or all park facilities.

Widening of Federal Boulevard under System Alternative 2 would also require the acquisition of a tiny (0.01 acre) piece of land from Barnum Park's northeast corner, as well as approximately 0.03 acre of land for new right-of-way along the eastern edge of Barnum North Park. These right-of-way acquisitions would not affect existing recreational uses of Barnum and Barnum North Parks, but would result in 4(f) use.

Two of the parks affected by this alternative – Barnum and Barnum North – have had 6(f) improvements. None of Barnum Park's 6 (f) improvements will be impacted. In Barnum North Park, however, a portion of the existing maintenance access road/trail (originally a 6(f) bike/hiking trail) near the park's southern edge falls within the proposed new right-of-way needed for construction of the new westbound on-ramp from Federal Boulevard to US 6. No other park or recreation resources would be affected by System Alternative 2.

Replacement of bridges at US 6, Alameda Avenue, and Santa Fe Drive would result in temporary closure of the South Platte River Trail with detours occurring during construction.

4.3.2.4 SYSTEM ALTERNATIVE 3

This alternative would result in slight encroachments and direct impacts to three parks (see **Table 4.3-2**) in the vicinity of the US 6/Federal Boulevard interchange: Barnum Park, Barnum East Park, and Barnum North Park. These right-of-way acquisitions would not affect existing park use but would result in 4(f) impacts.

Widening Federal Boulevard included in this alternative and westward relocation of the sidewalk would result in acquisition of a tiny (0.02 acre) land from Barnum Park's northeastern corner. Recreational use of the park will be unaffected.

A narrow strip of new right-of-way would be required along the west side of Barnum East Park due to expansion of Federal Boulevard to accommodate turning lanes on the Federal Boulevard bridge over US 6 and a new on-ramp from Federal Boulevard to eastbound US 6. This area of the park contains landscaping. No impacts to recreational features (ball fields) should occur. Closure of the existing ramp from Federal Boulevard to eastbound US 6 would result in increased physical separation of the roadway from a ball field at the east end of Barnum East Park.

With respect to Barnum North Park, relatively small amounts of new right-of-way would be required along its eastern and southern edges. These right-of-way needs include a 0.11 acre of landscaped park land along the park's east side (similar to System Alternatives 1 and 2, and the Preferred Alternative), and another acquisition (0.29 acre) at the southern margin of the park-south of its boundary – to accommodate the proposed westbound US 6 on-ramp. The existing maintenance access road/trail that terminates at the park's southwestern corner would be impacted, but no impacts to recreational facilities or recreational uses are expected.

Two of the parks affected by this alternative – Barnum and Barnum North – have had 6(f) improvements. None of Barnum Park's 6(f) improvements would be impacted. In Barnum North Park, however, a portion of the existing maintenance access road/trail (originally a 6(f) bike/hiking trial) near the park's southern edge falls within the proposed new right-of-way needed for construction of the new westbound on-ramp from Federal Boulevard to US 6. The same ramp would also necessitate taking of land from an existing secondary (unused) parking lot near the park's southwest corner. No other park or recreation resources would be affected by System Alternative 3.

Replacement of bridges at US 6, Alameda Avenue, and Santa Fe Drive would result in temporary closure of the South Platte River Trail with detours occurring during construction.

4.3.2.5 PREFERRED ALTERNATIVE

This alternative, similar to System Alternative 2, would result in direct impacts (see **Table 4.3-2**) to three parks in the vicinity of the US 6/Federal Boulevard interchange: Barnum Park, Barnum East Park, and Barnum North Park. Under the Preferred Alternative, acquisition of approximately 1.54 acres of land for new right-of-way would be required from Barnum East Park, to accommodate construction of a new ramp from Federal Boulevard to eastbound US 6 and access to Bryant Street, as well as widening of Federal Boulevard to provide turning and ramp access lanes. This new right-of-way would include the northern portion of both existing ballfields in Barnum East Park, impairing their use and necessitating redesign and construction of some or all park facilities.

Widening of Federal Boulevard under the Preferred Alternative would require the acquisition of approximately 0.01 acre of land from Barnum Park's northeast corner. The Preferred Alternative would also require approximately 0.03 acre for new right-of-way along the eastern edge and approximately 0.02 acre along the southern edge of Barnum North Park. These right-of-way acquisitions would not affect existing recreational uses of Barnum and Barnum North Parks, but would result in 4(f) use.

Two of the parks affected by this alternative – Barnum and Barnum North – have had 6(f) improvements. None of Barnum Park's 6(f) improvements will be impacted. In Barnum North Park, a portion of the existing maintenance access road/trail (originally a 6(f) bike/hiking trail) near the park's southern edge falls within the proposed new right-of-way needed for construction of the new westbound on-ramp from Federal Boulevard to US 6. No other park or recreation resources would be affected by the Preferred Alternative.

Replacement of bridges at US 6, Alameda Avenue, and Santa Fe Drive would result in temporary closure of the South Platte River Trail with detours occurring during construction.

4.3.3 Mitigation Measures

Avoidance, minimization, and mitigation of impacts to parks and recreation resources are detailed in the following sections. Specific mitigation measures will be refined during final design.

No parks are impacted under the No Action Alternative. Three parks – Barnum Park, Barnum East Park, and Barnum North Park – are subject to impacts by each of the system alternatives, including the Preferred Alternative. Minimization and mitigation measures for these impacts are described below.

As described above, each of the system alternatives, including the Preferred Alternative would require relocation of a portion of a trail in Barnum North Park that was originally constructed as part of 6(f) improvements to this park. The trail was originally constructed to provide access to an archery range that has been removed. The portion of the trail to be relocated is contained mostly within the US 6 right-of-way (not within the park boundary) and currently serves primarily as a maintenance trail for park staff. Following relocation, the trail will serve an equivalent function. CDOT has consulted with the City and County of Denver regarding impacts to this trail (as well as other impacts to the parks), and they have indicated that minor changes in this area can be accommodated if the overall park function is maintained. Based on the above, the

realignment of the trail near the southern boundary does not represent a land conversion under the provisions of Section 6(f). CDOT and FHWA will continue consultations regarding this issue during final design and will provide appropriate mitigation.

Each of the system alternatives, including the Preferred Alternative, would also require temporary closure of portions of the South Platte River Trail during bridge replacement. Detours will be provided and closure time minimized.

4.3.3.1 NO ACTION ALTERNATIVE

The No Action Alternative would not change the physical characteristics or uses of park and recreation resources. No avoidance, minimization, or mitigation measures are required.

4.3.3.2 SYSTEM ALTERNATIVE 1

Under System Alternative 1, the following measures would be undertaken to minimize and/or mitigate impacts to parks and recreation facilities.

Acquisition of right-of-way along the eastern edge of Barnum North Park, the western edge of Barnum East Park, and the northeastern corner of Barnum Park would be minimized to the greatest extent possible. The Federal Boulevard cross section would be designed to acquire the least possible amount of park land while meeting geometric and safety requirements. No impacts would occur to athletic facilities.

A portion of Barnum North Park's maintenance access road/trail near the park's southern edge would be relocated to allow for construction of the proposed new westbound on-ramp from Federal Boulevard to US 6, as described above. Periodic closure of portions of the South Platte River Trail would be required primarily for bridge replacement, as described above. Detours would be provided and closure time would be minimized.

4.3.3.3 SYSTEM ALTERNATIVE 2

Under System Alternative 2, the following measures would be undertaken to minimize and/or mitigate impacts to parks and recreation facilities.

Acquisition of right-of-way along the northern and western sides of Barnum East Park would be impossible to avoid. The Federal Boulevard cross section and US 6 ramp would be designed to acquire the least possible amount of park land while meeting operational and safety requirements. Encroachment on the park's baseball fields will render them unsuitable for use, and would require redesign and construction of the park to restore this use.

Right-of-way acquisition on the east edge of Barnum North Park and at the northeastern corner of Barnum Park would be minimized to the greatest extent possible while allowing sufficient roadway width to meet operational and safety standards and objectives.

A portion of Barnum North Park's maintenance access road/trail near the park's southern edge would be relocated to allow for construction of the proposed new westbound on-ramp from Federal Boulevard to US 6, as described above. Periodic closure of portions of the South Platte

River Trail would be required primarily for bridge replacement, as described above. Detours would be provided and closure time would be minimized.

4.3.3.4 SYSTEM ALTERNATIVE 3

Under System Alternative 3, the following measures would be undertaken to minimize and/or mitigate impacts to parks and recreation facilities.

Right-of-way acquisition on the western edge of Barnum East Park, the northeastern corner of Barnum Park, and the eastern and southern edges of Barnum North Park would be minimized to the greatest extent possible, while allowing sufficient roadway width to meet operational and safety standards and objectives. An existing maintenance access road/trail in Barnum North Park will be impacted by the right-of-way acquisition at the southern edge of the park, and would be reconfigured to restore its utility.

A portion of Barnum North Park's maintenance access road/trail near the park's southern edge would be relocated to allow for construction of the proposed new westbound on-ramp from Federal Boulevard to US 6, as described above. Periodic closure of portions of the South Platte River Trail would be required primarily for bridge replacement, as described above. Detours would be provided and closure time would be minimized.

4.3.3.5 PREFERRED ALTERNATIVE

Under the Preferred Alternative, the following measures will be undertaken to minimize and/or mitigate impacts to parks and recreation facilities.

As with the other system alternatives, the Preferred Alternative will require relocation of a portion of a trail in Barnum North Park and temporary closures of portions of the South Platte Trail. A portion of Barnum North Park's maintenance access road/trail near the park's southern edge will be relocated to allow for construction of the proposed new westbound on-ramp from Federal Boulevard to US 6, as described above. Periodic closure of portions of the South Platte River Trail will be required primarily for bridge replacement, as described above. Detours would be provided and closure time would be minimized.

Right-of-way acquisition on the east and south edges of Barnum North Park and at the northeastern corner of Barnum Park will be minimized to the greatest extent possible while allowing sufficient roadway width to meet operational and safety standards and objectives.

Acquisition of right-of-way along the northern and western sides of Barnum East Park will be impossible to avoid. The Federal Boulevard cross section and US 6 ramp would be designed to acquire the least possible amount of park land while meeting operational and safety requirements. Encroachment on the park's baseball fields will render them unsuitable for use, and will require redesign and construction of the park to restore this use.

A concept for reconstructing Barnum East Park (see **Figure 4.3.2**) with upgraded facilities has been developed in consultation with the City and County of Denver. This concept would maintain the existing functions of the park and add some amenities.

North

Barnum East Park Concept - Preferred Alternative

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.3-2

Specific mitigation measures included in the Preferred Alternative for Barnum East Park include the following:

- Spacing between intersections on Federal Boulevard at the ramp terminals will be kept to a minimum in order to keep as compact an interchange as possible
- Providing additional new park land along the east edge of the park by vacating the existing on-ramp and acquiring a strip of land from an adjacent property owner. The addition of this new park land will result in a net reduction in park functional area of only 0.3 acre
- Redesign and reconstruction of park facilities to provide upgraded facilities with enhanced function. The concept presented in **Figure 4.3-4** provides for replacement of the existing facilities with new facilities, enhanced accessibility for disabled individuals through ADA compliance, and the addition of a playground area between the ball fields. Final design and construction will be achieved through a cooperative effort between CDOT and the City and County of Denver. **Table 4.3-3** lists the elements of the reconstruction and upgrade of the Barnum East Park facilities.
- Arrangements to be made by the City and County of Denver to provide alternative ballfield locations from permitted field users during seasons that will be disrupted by construction.

With the measures identified above and detailed in Table 5-5, the Preferred Alternative minimizes harm to Barnum, Barnum East, and Barnum North Parks. Based on the substantial safety and operational benefits over other alternatives and the inclusion of the harm minimization measures, FHWA and CDOT have concluded that it would not be prudent to select any other alternative at this location.

Table 4.3-3 Elements of Barnum East Park Reconstruction

Measure	Preferred Alternative
Functional Park Space	• Includes two baseball fields, two parking lots, commons area between ball fields, and landscaped perimeter • Total area = 421,995 square feet = 9.69 acres (3% less than the existing; primarily lost in landscaped perimeter between ball fields)
Parking	• Refined concept provides a single contiguous parking lot with 174 parking spaces (3.5% greater than existing) • Overflow parking is provided along adjacent 5th and Decatur Streets and undeveloped park land south of 5th Street
Pedestrian Mobility/ Accessibility	North-South • Sidewalks along Federal Blvd. from 5th Street to 7th Street would be replaced to meet Denver standards • The new park layout better aligns its easterly most access across from Decatur St. providing more direct and safer pedestrian access East-West • New sidewalks are provided within the park • Detached sidewalks will be provided along the northern edge of 5th Avenue for the length of the park • An additional pedestrian crossing of Federal Blvd. will be provided at 5th Avenue with a new traffic signal
Amenities	• Two baseball fields - adult (larger) field and youth (smaller) field • The adult field has a built in soccer field and is also used for Frisbee golf • Other site amenities to be replaced in kind or better include: **Adult Ball Field -** Backstop and surrounding chain link fence, Bleachers, Benches, Storage cabinet, Score Board **Youth Ball Field -** Backstop and surrounding chain link fence, Bleachers, Benches, Storage cabinet **Landscape -** Deciduous trees, Evergreen trees **Lighting -** Parking Lot and Plaza Area, Night lighting for Adult Field, Night lighting for Youth Field **Park Structures -** Restroom (men and women) **Miscellaneous -** Barrel trash cans, Vehicular gates, Trash enclosures, Trash dumpsters, Bollards, Utility Boxes
Current Deficiencies Corrected	• Final design of the adult field will establish an appropriate size to address Denver Parks comment that the outfield is too large • The youth field will be a more uniform and symmetrical shape replacing the shorter right field • Artificial turf will be considered in final design to address downtime during construction. • Trench drains will be considered on field perimeters for improved drainage during final design • Secure chain link fencing (10-12 ft. height) and gate to the parking lot will be provided on the edges of the fields to control illegal use of the fields • Shared rest room and concession stands facilities will be incorporated • A new press box for the youth field will be included • Additional bleachers can be accommodated • A playground will be included in the “plaza” between the two fields • The new “plaza” area offers a flatter/usable space between the two fields, much improved over the current terraced space between the two fields

Table 4.3-3 Elements of Barnum East Park Reconstruction (Continued)

Measure	Preferred Alternative
Park Accessibility for Vehicles	• Access to the park will be through two full movement access intersections to 5th Ave.
Use	• The new facilities will accommodate the current uses and potentially enhanced usage due to improved accessibility, a new modern facility and amenities and efficiency of layout
Temporary Construction Impacts	• Construction sequencing is likely to impact the use of the facility for potentially two seasons. Integrating artificial turf may allow for earlier use of the fields • Alternative ball fields may have to be identified within the City and County of Denver park system to accommodate the loss of use for this facility. Denver must assist with determining where this can best be met
Miscellaneous	• Noise impacts to residential properties to the south of 5th Av. would be reduced as a result of the realignment of the US 6 EB on-ramp. • Park functional areas are offset to the east, adjacent to Federal Blvd., preserving opportunities for possible future needs by others

TABLE OF CONTENTS

Page

4.4 Aesthetics and Urban Design 4.4-1
4.4.1 Current Conditions 4.4-1
4.4.2 Consequences of the Alternatives 4.4-6
4.4.3 Future Design Goals/Consideration 4.4-14
4.4.4 Mitigation Measures 4.4-26

LIST OF FIGURES

Page

Figure 4.4-1 Existing Land Use and Views along the Corridor 4.4-2
Figure 4.4-2 Photographs of Existing Views 4.4-3
Figure 4.4-3 Washington Park View Plane 4.4-5
Figure 4.4-4 System Alternative 1 – Recommended Aesthetic Features 4.4-19
Figure 4.4-5 System Alternative 2 – Recommended Aesthetic Features 4.4-20
Figure 4.4-6 System Alternative 3 – Recommended Aesthetic Features 4.4-21
Figure 4.4-7 Preferred Alternative – Recommended Aesthetic Features 4.4-22

LIST OF TABLES

Page

Table 4.4-1 Citizen Working Group Preferences for Corridor and Individual Element Identities 4.4-17

4.4 Aesthetics and Urban Design

Transportation facilities are important elements of the urban landscape that can complement or detract from the aesthetics of the surrounding area. Appropriate design elements can contribute to a sense of place and enhance the function and feel for the community. Therefore, aesthetics and urban design are important considerations in the planning for any major transportation project, as reflected in FHWA and CDOT policy and guidance.

Aesthetics and urban design were considered during development of the system alternatives, which include system alternatives 1, 2, 3, and the Preferred Alternative. Visual effects were considered when establishing the basic layout of the system alternatives. In addition, design elements have been identified that may be used to provide enhancement to the local environment.

Consideration of aesthetics and urban design has included the following:

- Characterization of current conditions in the project area through site observation and discussion with local agencies to identify key features of the area
- Discussion of local concerns and possible design elements with a Citizen Working Group established to explore this topic
- Evaluation of the consequences of the system alternatives with regard to aesthetics and urban design
- Identification of a “kit of parts” of design elements appropriate for use in the project area to serve as a resource during final design of the Preferred Alternative

This section describes the current conditions, consequences of the alternatives, and mitigation measures with regard to aesthetics and urban design. Further details regarding the “kit of parts” and recommendations for final design are provided in the *Aesthetics and Urban Design Report* (FHU and Design Workshop, 2005d).

4.4.1 Current Conditions

Figure 4.4-1 shows existing land use and views along the corridor. **Figure 4.4-2** shows photographs of the view locations indicated on **Figure 4.4-1**.

4.4.1.1 Land Use and Visual Character

Land use along the existing I-25 Valley Highway corridor includes commercial/light industrial, residential, government, parks and open areas, and highway facilities. Since the dominant land use bordering the corridor is commercial/light industrial, the defining character of this section of the corridor is considered to be urban.

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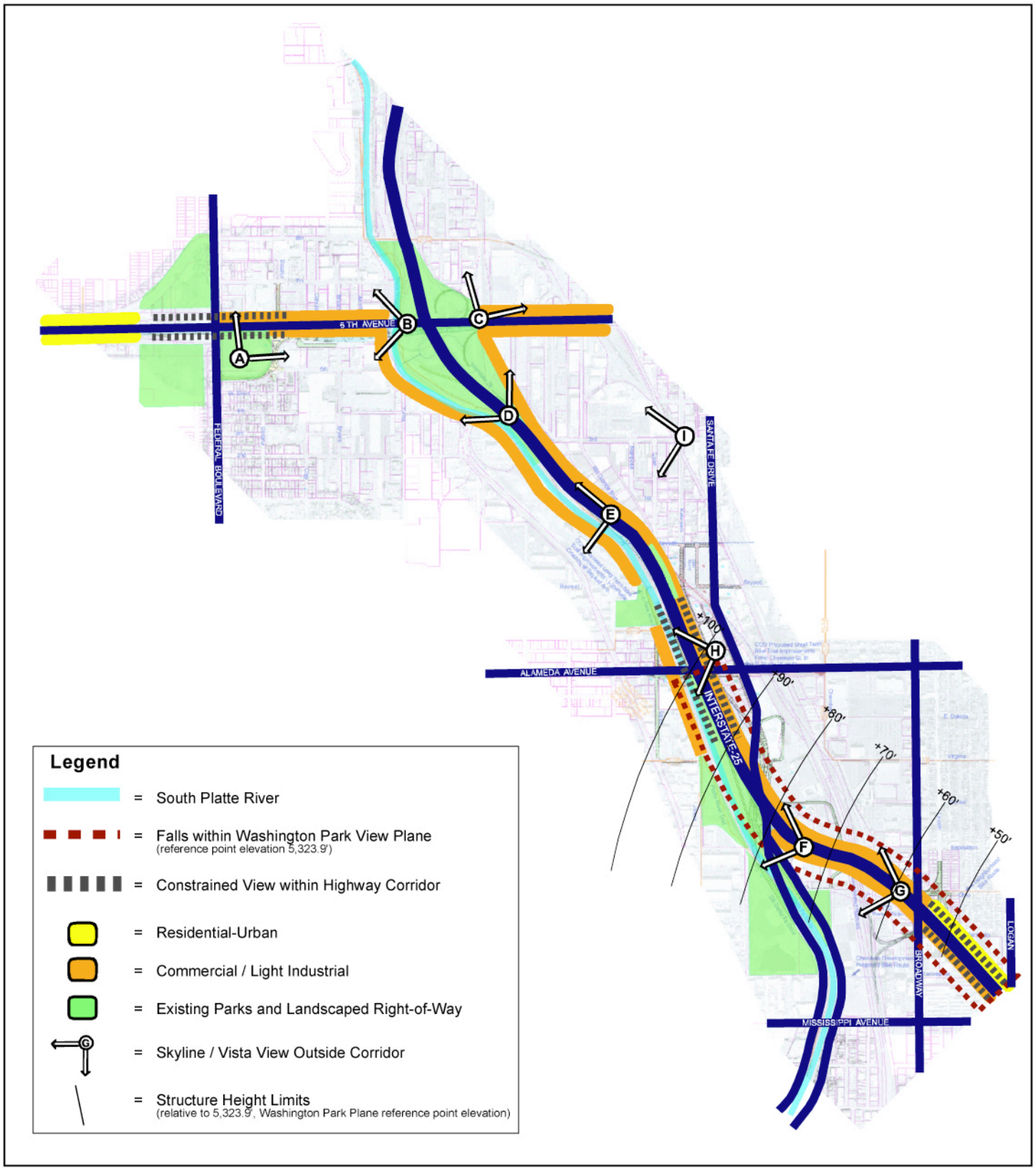
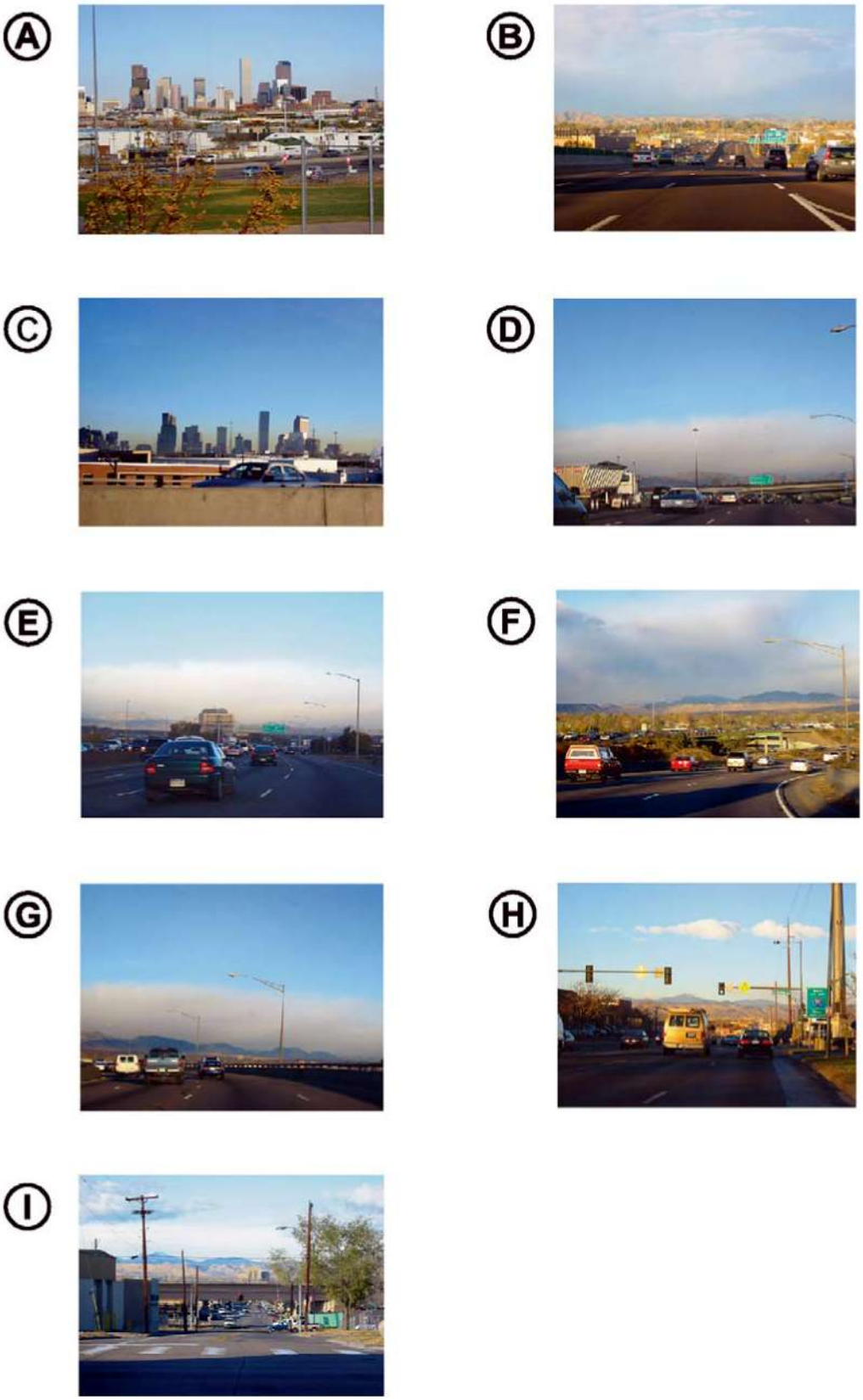


North

Existing Land Use and Views along the Corridor

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.4-1



North

Photographs of Existing Views

Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Figure 4.4-2

Government uses along the corridor include the City and County of Denver Wastewater Management facility on the west side of the South Platte River, south of US 6, near West Third Avenue, and a U.S. Postal Service facility at 915 South Logan Street.

Several parks, open areas, and areas of highway landscaping immediately adjoin or are situated in or near the project area. Existing land uses are shown on **Figure 4.4-1**. Parks and landscape areas contribute to the area's visual character by offering occasional scenic views of trees clustered along the river, at parks, recreational fields, or in open vegetated areas near the highway. Highway landscaping occurs on slopes at grade separations, at the Alameda Avenue interchange, on the east side of the highway across from the Denver Wastewater Management facility, and between US 6 and 8th Avenue.

Along US 6, the Barnum and Villa Park neighborhoods are separated from the US 6/Federal Boulevard interchange by graded slopes landscaped with grasses and trees, on-and off-ramps, and parks containing recreational ball fields at the northwest, southwest, and southeast corners of the interchange.

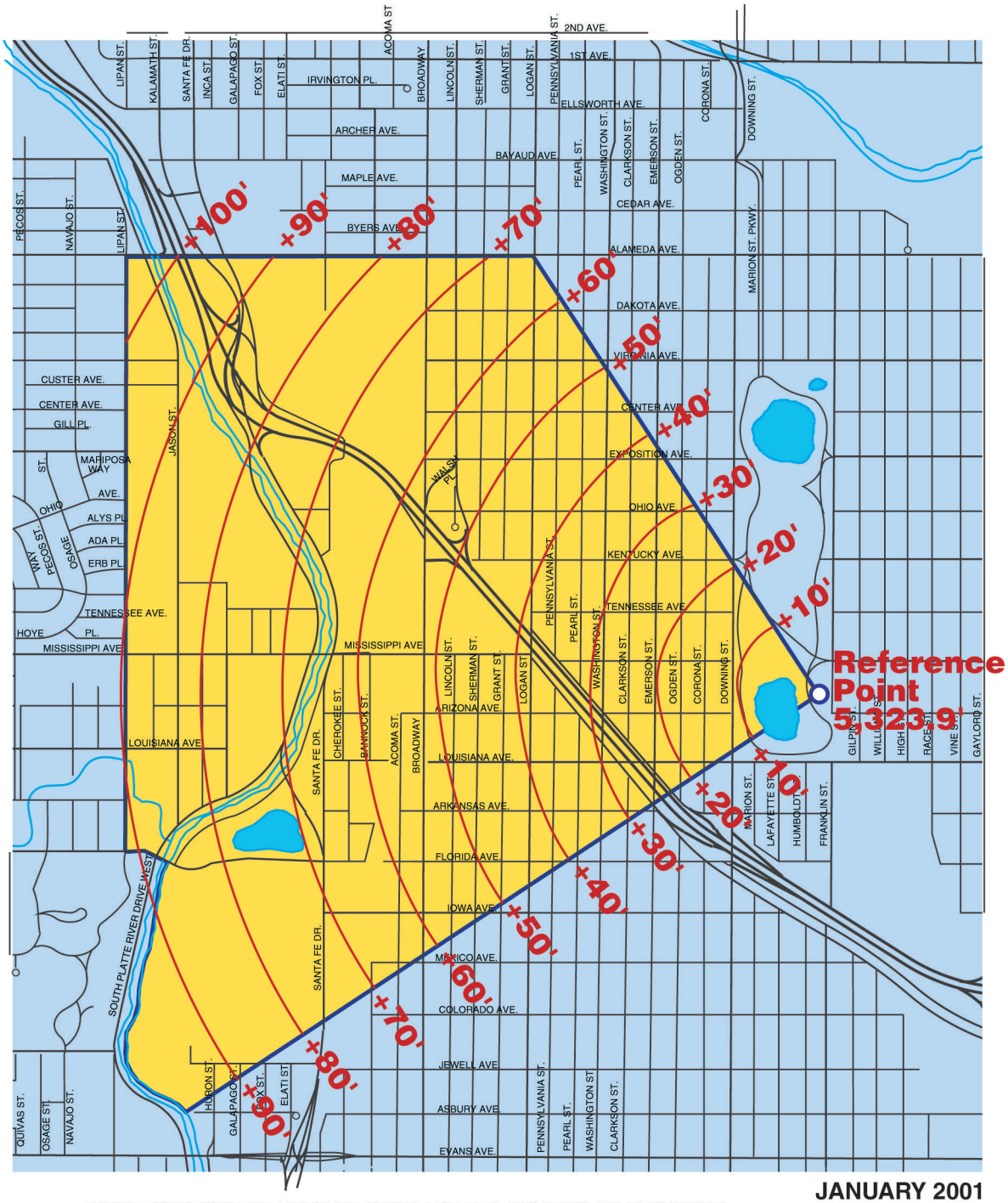
4.4.1.2 VIEWS

Visual character was inventoried with regard to foreground, middleground, and background views to and from the project area. Vantage points of views within the project area are shown on **Figure 4.4-1.** Photographs provided on **Figure 4.4-2** depict views from several of these locations.

Foreground views are immediately visible and define the local character of the area. Middleground views from within the project area are mostly to adjacent light industrial and commercial areas, with the occasional view of a residential community sound barrier, open space adjacent to the South Platte River, or an undeveloped property amidst other light industrial uses. Background views to the east are limited due to I-25's close proximity to light industry, businesses, and residential communities with noise barriers. Background views to the west are primarily of the Rocky Mountains and are considered to be important, as are background views of downtown Denver to the northeast. These two points of reference help with orientation in the project area. Locations and images of some of these views are shown on **Figure 4.4-1** and **Figure 4.4-2**.

The City and County of Denver protects certain valued views by establishing view planes by council ordinance (Denver Building Code, RMC Section 10-61.5) in which the height of structures is limited. While no protected view planes originate along the project area, the Washington Park View Plane extends into it. This view plane originates in Washington Park from a point west of South Franklin Street as shown in **Figure 4.4-3**. **Figure 4.4-1** identifies the extension of the Washington Park View Plane into the project area.

Residential land use along the corridor is minimal and is typically screened by noise barriers or separated from I-25 by commercial/industrial properties or recreational fields. Residential areas adjacent to the corridor include the West Washington Park neighborhood north of I-25 from Logan Street to Lincoln Street, the Barnum neighborhood south of US 6 and west of Federal Boulevard, and the Villa Park neighborhood north of US 6 and west of Federal Boulevard. Much of the West Washington Park neighborhood is visually separated from the project corridor by noise barriers and a landscaped edge between the noise barrier and the I-25 pavement.



JANUARY 2001

NOTE: STRUCTURE HEIGHT LIMITS ARE RELATIVE TO WASHINGTON PARK VIEW PLANE REFERENCE POINT ELEVATION 5,323.9'.

North

Washington Park View Plane

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.4-3

4.4.1.3 AESTHETICS AND URBAN DESIGN CONDITIONS

The project area contains landscaped slopes at areas where I-25 is separated from the surrounding grade, as well as several mature landscape areas in sections where I-25 parallels the South Platte River. Highway infrastructure throughout the project area includes highway retaining walls, interchange structures, and slope protection systems. The existing structures are constructed primarily of concrete and steel. Individual structures generally lack color, texture, and visual interest.

Two sections of I-25 are elevated on viaduct structures (between Broadway and Santa Fe Drive, and US 6 at the I-25 interchange). These sections and the ramps leading to them afford mountain views to the west. The remaining sections are at grade (Logan Street to Broadway, Santa Fe Drive to US 6, and US 6 to Federal Boulevard). At-grade sections exhibit one of the following three conditions:

- The highway is at the same grade as the adjacent land uses
- The highway is depressed and passes between retaining walls and graded landscape slopes
- The highway is elevated above adjacent land uses by graded landscape slopes

In the areas where the highway is depressed below grade (typically where the highway crosses under an arterial road), views outside the project area are constrained (see **Figure 4.4-1**).

Detailed descriptions of existing land use, visual character, and views that focus on specific sections of the project area are provided in the *Aesthetics and Urban Design Report* (FHU and Design Workshop, 2005d).

4.4.2 Consequences of the Alternatives

4.4.2.1 NO ACTION ALTERNATIVE

Two separate highway infrastructure projects are underway that will affect sections of the highway corridor. As part of T-REX, which is contiguous with the Valley Highway project at Logan Street, a masonry noise barrier has been built north of the highway and east of Lincoln Street to separate the West Washington Park neighborhood from the highway and its northbound off-ramp at Lincoln Street. This barrier replaces the current wooden noise barrier, and has a positive visual effect in that it complements other visually interesting T-REX wall treatments, which are concrete panels faced with bas-relief patterns (sculpted forms projecting slightly from the background).

As part of the T-REX improvements, the landscaped swath between the current noise barrier and the edge of the highway has been eliminated. In addition, the LRT track crosses over Broadway south of the viaduct and runs parallel adjacent to the southbound lane of I-25. Elevated and retained portions of the LRT track are faced with the same concrete panels with bas-relief patterns as other T-REX walls. The addition of the LRT flyover is another overhead structure that Broadway vehicles and pedestrians cross underneath, and has the potential to make the interchange area feel visually cluttered. However, since the area is already characterized by transportation-related structures, the impact is minimal.

An additional project, reconstruction of the I-25 Broadway viaduct, is underway and will likely be completed by the time the Valley Highway Project is implemented. This work includes improvements to the structure, lighting, and design details, as well as the Broadway streetscape underneath and surrounding the viaduct. The viaduct structure will be several feet higher than before and require far fewer support columns, which will open up the expanse underneath, enabling clearer views across. These improvements will have a beneficial impact on the appearance, navigability, and safety of the area for both vehicles and pedestrians.

The No Action Alternative would not improve other aging structures and facilities, beyond normal maintenance.

4.4.2.2 CONSEQUENCES COMMON TO THE SYSTEM ALTERNATIVES 1, 2, 3, AND THE PREFERRED ALTERNATIVE

I-25 and US 6 Mainline Improvements

Improvements to the I-25 and US 6 mainline that would affect, and generally improve, the aesthetic qualities and visual character of the roadway experience include:

- **Highway landscapes**, including graded slopes, would occur throughout the project area. Since these landscaped slopes are already present in the project area, they would not have an adverse effect. However, their appearance will be improved with plant choice and grading design (see **Section 4.4.3** *Future Design Goals/Considerations*). Several irrigated highway landscapes would be impacted by the system alternatives. These areas include: the graded landscape slopes at the Alameda Avenue bridge, a highway landscape on the east side of I 25 directly across from the City and County of Denver Waste Water Management facility building, and landscaped areas surrounding the I-25/US 6 interchange.
- **Retaining walls** supporting sections of the highway and its ramps would occur throughout the project area. Since such walls are already present in the project area, they would not have an adverse effect. However, the appearance of such walls will be improved through design with color, texture, and relief (see **Section 4.4.3**).
- **High-mast highway lighting** would have a positive effect by providing more efficient coverage, which would result in greater spacing between poles and fewer vertical elements contributing to the visual clutter along the project area. Adverse impacts would include the potential for the high-mast lighting to generate light pollution that spills into upper story windows of neighboring residences, and the possibility of these vertical elements extending beyond the height limits delineated in the Washington Park View Plane by the City and County of Denver (see **Figure 4.4-3**).
- **Highway signage**, which must meet FHWA design standards, would remain the same and therefore would have no impact.
- **Slope and ditch paving** would occur on either side of the highway as it passes under arterial road bridges or on slopes of the South Platte River bank where it is crossed by arterial road bridges. Since there are already several bridges with slope and ditch paving conditions in the project area, the paving would have no adverse effect. However, there is the potential to improve upon the typical slope and ditch paving design (see **Section 4.4.3**).
- **Concrete barriers** at the roadway middle and edge, which must meet FHWA design standards, would remain the same and therefore would have no impact.

Broadway Interchange

The system alternatives, including the Preferred Alternative, would affect the aesthetic qualities and visual character of the Broadway interchange area through changes in the alignments for I-25 and its ramps, and the arterial roads of Broadway, Ohio Avenue, Kentucky Avenue, and Lincoln Street. These alignments would require acquisition of property and demolition of several buildings and open spaces north of the viaduct. The aesthetic changes would generally be positive or neutral as aging structures would be replaced with new, more visually appealing structures. The change of the northbound on-ramp from an at-grade approach east of Broadway to a new ramp west of Broadway would be the most visible of these adjustments. Moving this ramp from its current location immediately adjacent to a row of houses on the furthest south block of Lincoln Street to an area whose character is already dominated by the highway and commercial land use would have a positive visual impact for the West Washington Park neighborhood.

Santa Fe Drive Interchange

The system alternatives , including the Preferred Alternative, would affect the aesthetic qualities and visual character of the Santa Fe Drive interchange area through changes in the alignments for I-25 and its ramps. All ramp connections between I-25 and Santa Fe Drive would involve changes ranging from realignments to complete shifts in location. The aesthetic changes would generally be positive or neutral as aging structures would be replaced by new, more visually appealing structures. The most visible change is that the ramp connecting northbound Santa Fe Drive to northbound I-25 would now cross over I-25 instead of underneath and would require retaining walls in certain sections. The addition of a ramp over I-25 would not have an adverse visual impact because the interchange area is already characterized by merging roadways, ramps, and bridges. There is a possibility that this new flyover ramp would be visible from the South Platte River Trail, which runs along the west side of the river; however, views in this direction most likely would be obscured by mature riparian vegetation.

Santa Fe Drive / Kalamath Street Improvements

The most visible change to this area would be the reconstruction of Kalamath Street and Santa Fe Drive as roads that are depressed below the street elevations and retained so that they can pass underneath the existing Consolidated Main Line railroad tracks. The experience of traveling below-grade instead of at the level of the buildings would have a visual impact because the passage would be darker and the extent of retaining walls required would create a canyon-like effect. However, with appropriate design this effect would not be negative.

A new pedestrian and bicycle bridge would be built over I-25 at Bayaud Avenue to connect the South Platte River Trail on the west side of the river to the Baker neighborhood to the east. The bridges required for the northbound on-ramp and dedicated bicycle use would increase the number of transportation structures passing over the highway and have the potential to make the Alameda Avenue interchange feel more visually cluttered. However, the area is already characterized by highway structures and commercial and light industrial land uses, so the effect would be minimal. Creating a pedestrian/bicycle bridge to connect the Baker neighborhood to the bike trail, as well as consolidating all highway entry / exit points north of Alameda Avenue to the bridge instead of from the arterial roads, would provide safer and clearer passage through this interchange area for vehicles, pedestrians, and bicyclists.

4.4.2.3 SYSTEM ALTERNATIVE 1

Alameda Avenue Interchange

The existing loop ramp south of Alameda Avenue that connects north- and southbound Santa Fe Drive to northbound I-25 would move north to the west side of the Alameda Avenue bridge, leaving the existing area open for a possible City and County of Denver water quality pond and open area. The creation of an open area, which could be landscaped, would have a positive visual effect.

System Alternative 1 improvements that would affect the aesthetic qualities and visual character of the Alameda Avenue interchange include the alignments for I-25 and its ramps, and the arterial roads of Alameda Avenue, South Platte River Drive, and Lipan Street. The aesthetic changes would generally be positive or neutral as aging structures would be replaced by new, more visually appealing structures. The alignments would require acquisition of property and demolition of several buildings on the east and west sides.

The most visible of these adjustments would result from changing the I-25 northbound on-ramp from an at-grade approach at Santa Fe Drive and Kalamath Street to a ramp that is accessed off of the west end of the Alameda Avenue bridge and passes over the highway. There is a possibility that this new flyover ramp would be visible from the South Platte River Trail; however, views in this direction most likely would be obscured by mature riparian vegetation.

Retaining walls would be required to support the I-25 southbound off-ramp at Alameda Avenue, as well as a small section of the northbound on-ramp as it departs from the Alameda Avenue bridge. As part of the alignments and retaining wall requirements, all or part of the irrigated landscape graded slopes on either side of the Alameda Avenue bridge would be eliminated. However, the increase in open area resulting from the shifts would have a positive visual impact.

US 6 Improvements

System Alternative 1 improvements that would affect the aesthetic qualities and visual character of the US 6 interchange and the Federal Boulevard interchange include alignments for I-25 and its ramps, as well as US 6 and its ramps. The aesthetic changes would generally be positive or neutral. The most visible change would result from moving the Bryant Street interchange on the north side of westbound US 6 to Decatur to align and consolidate it with the ramp connecting Federal Boulevard to eastbound US 6. This change would represent a shift of the highway system, not an impact to the visual environment that would differ from what currently exists. Retaining walls required at some sections of the ramps at the US 6/Decatur Street interchange would have no impact because retaining walls and proximity to highway structures currently define the character of this largely light-industrial area. None of these changes would impact the park and South Platte River Trail below the US 6 ramps or their views.

At the I-25 and US 6 interchange, improvements to ramps and the construction of a water quality pond would impact the existing landscaped area within and around this interchange. Appropriate design will be required for re-landscaping of these areas to maintain the aesthetic appeal (see **Section 4.4.3**).

Santa Fe Drive / Kalamath Street Improvements

System Alternative 1 improvements that would affect the aesthetic qualities and visual character of the area to the east side of I-25 near Alameda Avenue include alignments and elevations for Santa Fe Drive, Kalamath Street, Ellsworth Avenue, Bayaud Avenue, and other streets. The aesthetic changes would generally be positive or neutral. The alignments would require acquisition of property and demolition of approximately one dozen buildings, as well as the partial acquisition or access change of an additional dozen properties. The elimination of four buildings adjacent to the highway corridor to accommodate the aligned on-ramp from the Alameda Avenue bridge would result in additional area for graded landscape slopes below, which would provide a positive visual impact for highway travelers.

4.4.2.4 SYSTEM ALTERNATIVE 2

Alameda Avenue Interchange

System Alternative 2 improvements that would affect the aesthetic qualities and visual character of the Alameda Avenue interchange include alignments for I-25 and its ramps, and the arterial roads of Alameda Avenue, South Platte River Drive, and Lipan Street. The aesthetic changes would generally be positive or neutral. The alignments would require acquisition of property and demolition of several buildings on the east and west sides, which would affect land use. The change of the I-25 northbound on-ramp from an at-grade approach at Santa Fe Drive and Kalamath Street to a ramp that is accessed off of the Alameda Avenue Underpass/Bridge would be the most visible of these adjustments. Views to and from the South Platte River would be unaffected.

The new location of the on-ramp would have minimal visual effect, as it mirrors the existing southbound off-ramp. As part of the alignments and retaining wall requirements, all or part of the irrigated landscape graded slopes on either side of the Alameda Avenue/Bridge would be eliminated. However, the increase in open area resulting from the shifts would have a positive visual impact. The increase in the amount of open land resulting from the reconfiguration of the Alameda Avenue interchange and the demolition of buildings would have a positive impact. These open areas have the potential to be transformed into visually engaging planted spaces.

US 6 Improvements

System Alternative 2 improvements that would affect the aesthetic qualities and visual character of the US 6 interchange and the Federal Boulevard interchange include alignments for I-25 and its ramps, as well as US 6 and its ramps. The aesthetic changes would generally be positive or neutral. None of these changes would affect the park and South Platte River Trail below the US 6 ramps or their views. The most visible change would result from moving the Federal Boulevard to US 6 on-ramp to a new location immediately adjacent to the south side of US 6 from its current location looping around the recreation fields at the southeast corner of US 6 and Federal. Travelers on this directional ramp would have the option of merging with eastbound US 6 or continuing down the ramp to Bryant Street. In addition to eliminating the graded landscape slope on the southeast corner of the interchange, the ramp location would cut off a portion of two recreation fields affecting their ability to function. This would have an adverse impact.

The addition of a collector-distributor road on the north side of US 6 to accommodate all access on and off of US 6 between I-25 and Federal would have no adverse visual impact, as it would merely realign and redistribute traffic, as opposed to introducing an entirely new use and transportation feature.

At the I-25 and US 6 interchange, improvements to ramps and the construction of a water quality pond would impact the existing landscaped area within and around this interchange. Appropriate design will be required for re-landscaping of these areas to maintain the aesthetic appeal (see **Section 4.4.3**).

Santa Fe Drive / Kalamath Street Improvements

System Alternative 2 improvements that would affect the aesthetic qualities and visual character of the area to the east side of I-25 near Alameda Avenue include alignments and elevations for Santa Fe Drive, Kalamath Street, Ellsworth Avenue, Bayaud Avenue, and other streets associated with this system. The aesthetic changes would generally be positive or neutral. The alignments would require acquisition of property and demolition of approximately two dozen buildings as well as the partial acquisition or access change of an additional dozen properties. Elimination of several buildings adjacent to the highway corridor to accommodate the aligned on-ramp from the Alameda Avenue bridge would result in an additional area for graded landscape slopes below, which would have a positive visual impact for highway travelers.

Santa Fe Drive and Kalamath Street would meet at Alameda Avenue as a single-point urban interchange, which would require more space than the current condition, but the visual clarity this solution offers would have a positive impact.

4.4.2.5 SYSTEM ALTERNATIVE 3

Alameda Avenue Interchange

System Alternative 3 improvements that would affect the aesthetic qualities and visual character of the Alameda Avenue interchange include alignments for I-25 and its ramps, and the arterial roads of Alameda Avenue, South Platte River Drive, and Lipan Street. The aesthetic changes would generally be positive or neutral. The road and ramp alignments would require acquisition of property and demolition of several buildings on the east and west sides of the highway, which would affect land use. The most visible of these adjustments would result from changing the I-25 northbound on-ramp from an at-grade approach at Santa Fe Drive and Kalamath Street to a ramp that is accessed off of the west end of the Alameda Avenue bridge and passes over the highway. There is a possibility that this new flyover ramp would be visible from the South Platte River Trail; however, views in this direction most likely would be obscured by mature riparian vegetation.

Retaining walls would be required to support the reconstructed I-25 southbound Alameda Avenue off-ramp as well as a small section of the northbound on-ramp as it departs from the Alameda Avenue bridge. As part of the alignments and retaining wall requirements, all or part of the irrigated landscape graded slopes on either side of the Alameda Avenue bridge would be eliminated. However, the increase in open space resulting from the shifts would have a positive visual impact.

US 6 Improvements

System Alternative 3 improvements that would affect the aesthetic qualities and visual character of the US 6 interchange and the Federal Boulevard interchange include alignments for I-25 and its ramps, as well as US 6 and its ramps. The aesthetic changes would generally be positive or neutral. None of these changes would affect the park and South Platte River Trail below the US 6 ramps, or their views. The most visible changes would include eliminating the Bryant Street interchange and redirecting all access on and off of US 6 in this area to a single-point urban interchange at Federal Boulevard, as well as moving the US 6 on-ramp to a new location immediately adjacent to the south side of US 6 from its current loop. Although this ramp location would be very close to the edge of the existing baseball field, it would not affect its ability to function. However, it would eliminate the graded landscape slope at the southeast corner of the interchange.

The addition of a single-point urban interchange at Federal Boulevard would require retaining walls to support the US 6 on- and off-ramps and eliminate the existing graded landscape slopes. This would have an adverse impact. The visual effect of concentrating all highway access at Federal Boulevard would be a greater awareness of overhead transportation structures; however, since US 6 travelers already have to cross underneath Federal Boulevard, the impact would be minimal.

At the I-25 and US 6 interchange, improvements to ramps and the construction of a water quality pond would impact the existing landscaped area within and around this interchange. Appropriate design will be required for re-landscaping of these areas to maintain the aesthetic appeal (see **Section 4.4.3**).

Santa Fe Drive / Kalamath Street Improvements

System Alternative 3 improvements that would affect the aesthetic qualities and visual character of the area to the east side of I-25 near Alameda Avenue include alignments and elevations for Santa Fe Drive, Kalamath Street, Ellsworth Avenue, Bayaud Avenue, and other streets associated with this system. The aesthetic changes would generally be positive or neutral. Road and ramp alignments would require acquisition of property and demolition of approximately two dozen buildings as well as partial acquisition or access change of several additional properties. The elimination of a dozen such buildings adjacent to the highway corridor to accommodate the aligned on-ramp from the Alameda Avenue bridge would result in additional area for graded landscape slopes below, which would represent a positive visual impact for highway travelers.

The most visible change to this area would be the reconstruction of Kalamath Street and Santa Fe Drive as roads that are depressed below the existing street elevations and retained so that they can pass underneath the railroad tracks and Alameda Avenue. The visual impact of traveling below-grade instead of at the level of the buildings would be that the passage would be darker and the extent of retaining walls required would create an adverse canyon-like effect. Santa Fe Drive and Kalamath Street would meet at Alameda Avenue as a single-point urban interchange, which would occupy more space than the current condition, but the visual clarity this solution offers would be of positive visual impact.

4.4.2.6 PREFERRED ALTERNATIVE

Alameda Avenue Interchange

The existing loop ramp south of Alameda Avenue that connects north- and southbound Santa Fe Drive to northbound I-25 would move north to the west side of the Alameda Avenue bridge, leaving the existing area open for a possible City and County of Denver water quality pond and open area. The creation of an open area, which could be landscaped, would have a positive visual effect.

Preferred Alternative improvements are similar to System Alternative 1 at this location. The improvements that would affect the aesthetic qualities and visual character of the Alameda Avenue interchange include the alignments for I-25 and its ramps, and the arterial roads of Alameda Avenue, South Platte River Drive, and Lipan Street. The aesthetic changes would generally be positive or neutral as aging structures would be replaced by new, more visually appealing structures. The alignments would require acquisition of property and demolition of several buildings on the east and west sides.

The most visible of these adjustments would result from changing the I-25 northbound on-ramp from an at-grade approach at Santa Fe Drive and Kalamath Street to a ramp that is accessed off of the west end of the Alameda Avenue bridge and passes over the highway. There is a possibility that this new flyover ramp would be visible from the South Platte River Trail; however, views in this direction most likely would be obscured by mature riparian vegetation.

Retaining walls would be required to support the I-25 southbound off-ramp at Alameda Avenue, as well as a small section of the northbound on-ramp as it departs from the Alameda Avenue bridge. As part of the alignments and retaining wall requirements, all or part of the irrigated landscaped graded slopes on either side of the Alameda Avenue bridge would be eliminated. However, the increase in open area resulting from the shifts would have a positive visual impact.

Santa Fe Drive / Kalamath Street Improvements

Preferred Alternative improvements are similar to System Alternative 1 at this location. The improvements that would affect the aesthetic qualities and visual character of the area to the east side of I-25 near Alameda Avenue include alignment changes and a lowering of Santa Fe Drive and Kalamath Street to pass under the Consolidated Main Line. Improvements are shown in Figure 2-17 in Chapter 2, *Alternatives.* The aesthetic changes would generally be positive or neutral. The alignments would require acquisition of property and demolition of approximately one dozen buildings, as well as the partial acquisition or access change of an additional dozen properties. The elimination of four buildings adjacent to the highway corridor to accommodate the aligned on-ramp from the Alameda Avenue bridge would result in additional area for graded landscape slopes below, which would provide a positive visual impact for highway travelers.

US 6 Improvements

Preferred Alternative improvements are similar to System Alternative 2 at this location. The improvements that would affect the aesthetic qualities and visual character of the US 6 interchange and the Federal Boulevard interchange include alignments for I-25 and its ramps, as well as US 6 and its ramps. The aesthetic changes would generally be positive or neutral. None

of these changes would affect the park and South Platte River Trail below the US 6 ramps or their views.

The most visible change would result from moving the Federal Boulevard to US 6 on-ramp to a new location immediately adjacent to the south side of US 6 from its current location looping around the recreation fields at the southeast corner of US 6 and Federal. Travelers on this directional ramp would have the option of exiting right to a braided flyover ramp to eastbound US 6, merging left with traffic bound for southbound I-25, or continuing down the ramp to Bryant Street. In addition to eliminating the graded landscape slope on the southeast corner of the interchange, the ramp location would cut off a portion of two recreation fields affecting their ability to function. Reconfiguration reconstruction of these ball fields is included in the Preferred Alternative as described in **Section 4.3** *Parks and Recreation*. The addition of a collector-distributor road on the north side of US 6 to accommodate all access on and off of US 6 between I-25 and Federal would have no adverse visual impact, as it would merely realign and redistribute traffic.

At the I-25 and US 6 interchange, improvements to ramps and the construction of a water quality pond would impact the existing landscaped area within and around this interchange. Appropriate design will be required for re-landscaping of these areas to maintain the aesthetic appeal (see **Section 4.4.3**).

4.4.3 Future Design Goals/Consideration

During two public work sessions convened in the fall of 2003, the Aesthetics and Urban Design Citizen Working Group defined categories of highway elements – a kit of parts – that could be applied to enhance the aesthetic qualities and to mitigate adverse impacts of the highway corridor improvements. The Citizen Working Group and representatives from city agencies requested that all materials demonstrate durability, longevity, and permanence; resistance to wear, graffiti, and vandalism; ease of installation, maintenance, and replacement; and resistance to damage from air pollution and exhaust.

These elements are conceptual recommendations and possible design treatments. They do not indicate specific implementation commitments by CDOT or any city agency. CDOT will consider these and other possible elements and establish specific designs in the final design process that will follow the Final EIS. Elements of the kit and a description of their mitigation potential are summarized below:

- **Highway Landscape –** Landscape design has the capacity to punctuate the continuous linear experience of the highway. The sculptural, textural, and colorful qualities of plantings stimulate visual interest for travelers passing through landscape features. Landscape along the highway can have a softening effect on transportation structures and water quality ponds and can frame scenic views as the roadway passes through different areas. Landscape can also be used to block negative views. The design of highway landscapes can achieve these effects while remaining responsive to the limitations of the Colorado climate by using low-maintenance, drought-tolerant vegetation.

- **Wall Treatments –** At certain locations along the highway corridor, walls are required to screen, mitigate sound, and retain adjacent grade. In some instances, the scale of these walls would be large and would be visible to drivers, to people walking through adjacent neighborhoods, and to bikers along the South Platte River Trail. Therefore, they should be aesthetically pleasing. Walls present design opportunities for distinctive color, texture, and material treatments, which can help to break down scale and create a sense of place. The design of wall treatments must consider the scale, speed, and context of viewers, as well as transitions to contiguous sections of the highway.
- **Vehicular Bridges –** Due to the linear nature of highways, most elements experienced by the highway traveler are parallel to the road. Bridges are the only perpendicular elements that interrupt the predominant path of travel. Bridge crossings present opportunities to distinguish neighborhoods and districts adjacent to highways. A series of bridges can share common elements but also maintain a unique identity. Components that create identity include form, character, detailing, color, and materials.
- **Pedestrian Bridges –** Similar to vehicular bridges, pedestrian and bicycle bridges interrupt the linear passage of I-25. Because they do not need to support the weight and trip-frequency of large vehicles, these bridges present additional design opportunities to create structures with unique, identifiable and interesting forms and detailing. In addition to enhancing the identity of adjacent areas, pedestrian bridges must offer safe and visually interesting passage for pedestrians and bicyclists. There may be instances where there is pedestrian and bicycle access on vehicular bridges.
- **Bridge Piers –** Bridges consist of multiple parts. Piers support the weight of the structure and anchor the bridge span and also may be used to further enhance neighborhood identity and character. The design of bridge piers should lend scale to the shared pedestrian and vehicular crossing and express bridge structure. Pier form, detailing, color, and texture may be used to form identity.
- **Bridge Railings –** Bridges consist of multiple parts. Railings serve to protect pedestrians and vehicles from the road edge and what is below the bridge and can enhance neighborhood identity and character. The design of bridge railings should lend scale to the shared pedestrian and vehicular crossing. Railing form, detailing, color, and degree of transparency help form identity.
- **Lighting –** As per CDOT standards, high-mast or mid-mast fixtures would be used to light the highway and ramps. Additional opportunities for lighting exist at arterial streets that cross the project area. This lighting should have a neighborhood orientation, although it may also be experienced by the highway traveler. In addition to providing illumination for the purpose of safety, lighting can be used to distinguish commercial and residential districts and to reinforce area image and history. All lighting must meet City and County of Denver and Xcel Energy fixture and color standards. It should be selected to contribute to district character and identity in addition to its functional attributes. The lighting selection process should consider shields, reflectors and/or other measures to minimize light spill.
- **Slope and Ditch Paving –** As a bridge structure rises from the ground and begins to span across a roadway or river, slope and ditch paving is used to retain earth or structure underneath. Slope paving is distinguished from vertical wall treatments, although some of the same applications of texture, color, and materials can be used to increase visual appeal and to enhance the experience of passing under a highway bridge.

- **Medians –** Medians generally have two purposes. At an urban design level, they help create a more comfortable scale for vehicles and pedestrians. In terms of safety, they function to separate traffic traveling in different directions. In medians, the incorporation of planting and hardscape materials with distinct color and texture creates visual interest and builds identity for adjacent neighborhoods and districts. Tree lawns must adhere to City and County of Denver standards, which stipulate either trees in sod or trees in grates. For the purposes of this project, medians and tree lawns are suitable only for arterial roads that cross I-25.
- **Signage and Monumentation –** All signs located within the highway corridor would meet CDOT standards; all roadway signs along streets would meet City and County of Denver requirements. Additional opportunities for signs exist along arterial streets, on- and off-ramps, and bridges that cross the project area. This signage should have a neighborhood orientation and should be used to distinguish and clarify district identity through the use of form, character, detailing, color, and materials. While the primary purpose of signs would be for neighborhood or landmark identification, some signs can be scaled or positioned to be readable from the highway. Signage should be used to create a transition from the highway to the local streets, reinforcing change of speed and scale. It should be used for wayfinding, emphasizing connections to downtown as well as directions to neighborhoods and major destinations.
- **Public Art and Special Features –** Public art and other special features play an important role in the highway corridor. Using placement, scale, distinctive materials, and themes, these features have the potential to announce or to define areas along the highway as it passes through neighborhoods and crossings. Such features can enhance a sense of place or act as transition between the highway and neighborhood experiences.

It should be noted that these “kit” elements are intended as conceptual recommendations and possible design treatments. They do not indicate specific implementation commitments by CDOT or any city agency. Specific designs will be determined in the final design process. Specific examples of the application of “kit” elements to enhance aesthetics and provide visual interest are provided in the *Aesthetics and Urban Design Report* (FHU and Design Workshop, 2005d).

The Citizen Working Group further agreed the highway kit-of-parts must:

- Enhance the appearance of the project area and its related structures
- Improve safety for all users of the project area and its nodes
- Address the needs of both the highway user and the residents or workers in adjacent neighborhoods and districts

The Citizen Working Group also indicated which elements should have a common appearance and identity throughout the project area, and which elements should have a unique appearance at each project area node. These conclusions are summarized in **Table 4.4-1.**

Table 4.4-1 Citizen Working Group Preferences for Corridor and Individual Element Identities

Element	Common Corridor Identity Preferred	Individual Node Identity Preferred
Highway Landscape	●	
Highway Landscape Features		●
Wall Treatments	●	●
Vehicular Bridges		●
Pedestrian and Bicycle Bridges		●
Bridge Railings		●
Bridge Lighting		●
Slope and Ditch Paving		●
Medians and Tree Lawns		●
Signage and Monuments		●
Public Art and Special Features		●

4.4.3.1 NO ACTION ALTERNATIVE

Urban design improvements associated with the I-25 Broadway viaduct replacement that is underway will enhance the accessibility and navigability of the entire interchange area for both pedestrians and vehicles.

4.4.3.2 SYSTEM ALTERNATIVES 1, 2, 3, AND THE PREFERRED ALTERNATIVE

The Citizen Working Group evaluated the system alternatives in terms of existing land use, transportation and neighborhood connections, and emphasis of interchanges, or nodes. Where the analysis indicated a mix of land uses, connections to transit, access to open spaces or recreation, and an emphasis on pedestrian activity, the Citizen Working Group recommended the application of highway elements that would enhance these inherent qualities of the node. Where the analysis indicated an emphasis on vehicular activity only, the Citizen Working Group limited its recommendations to the application of highway elements that are more appropriate to the scale of transportation infrastructure and effective for the speed of cars on the highway.

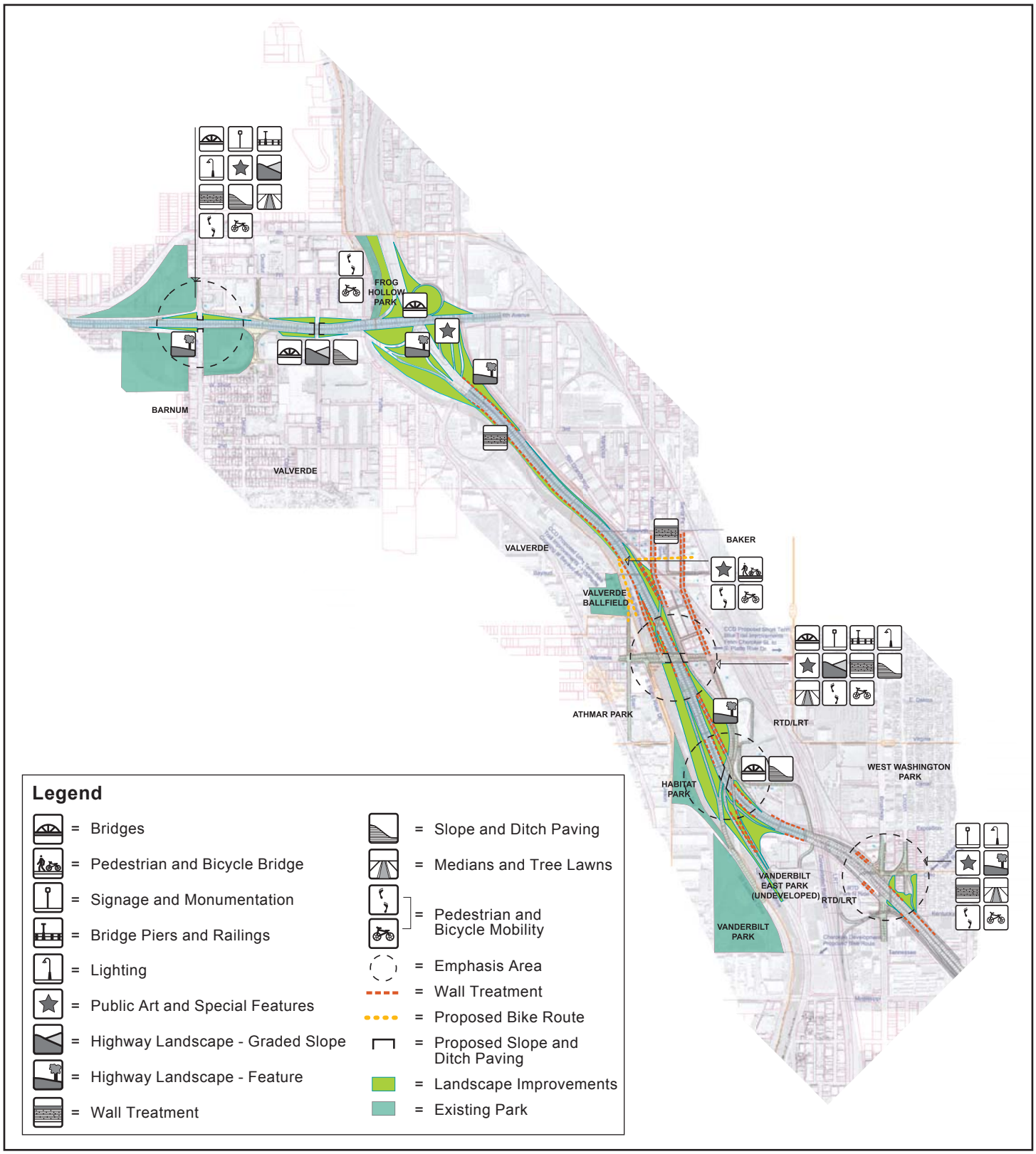
The Citizen Working Group concluded that wherever the highway crossed an arterial road at Broadway, Alameda Avenue, and Federal Boulevard – the node should have a pedestrian emphasis. Wherever the highway interchange was with another highway, Santa Fe Drive, or US 6 – the emphasis was exclusively vehicular. Despite the differences between the system alternatives in terms of their alignments and configurations, the recommended applications of the highway kit of parts are consistent. These elements are intended as conceptual recommendations and possible design treatments. They do not indicate specific implementation commitments by CDOT or any city agency. Specific designs will be determined in a separate design process that will follow the Final EIS.

Figures 4.4-4, 4.4-5, 4.4-6, and 4.4-7 identify recommended locations for aesthetic mitigation for the Preferred Alternative and System Alternatives 1, 2, and 3, respectively.

I-25 Improvements

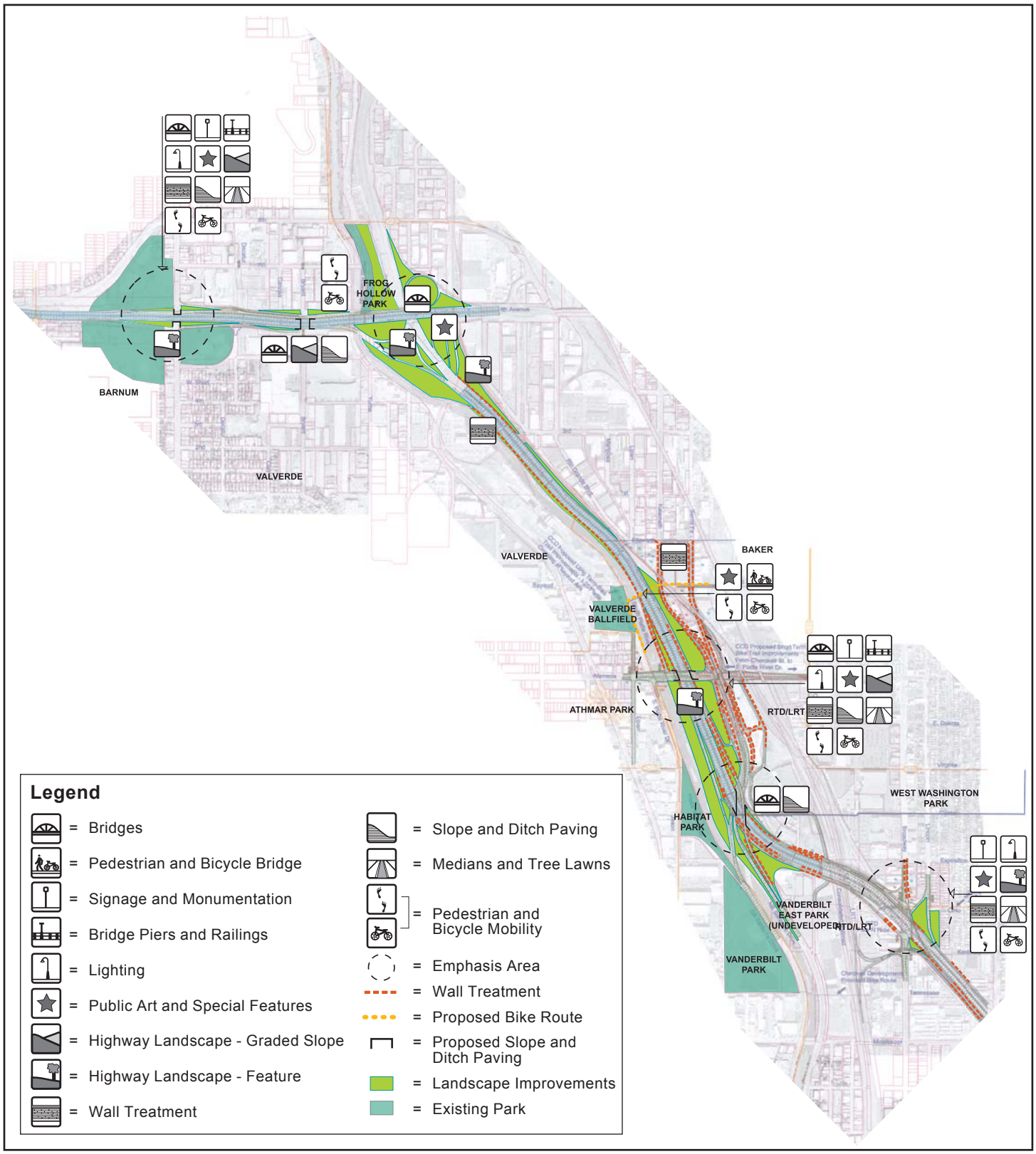
Most of the elements proposed for the I-25 and US 6 highway corridors (highway landscape, retaining walls, slope and ditch paving, and concrete barriers) are already present in the project area and therefore would not have an adverse impact or require mitigation. One exception is high-mast lighting, which is being used in other Denver area highways. Introduction of high-mast lighting would have a positive impact by providing more efficient coverage and therefore requiring fewer vertical elements, but it also has the potential to generate light pollution that would affect the upper-story occupants of residences near the highway. These fixtures should include reflectors to direct the light on the highway and away from residences, and their height should not infringe upon the view plane limits set by the City and County of Denver (see Washington Park View Plane on **Figure 4.4-3**).

There are opportunities to enhance the design and to improve upon the appearance of some of the proposed typical highway elements. Highway landscapes throughout the project area, including the graded landscape slopes that retain sections of the highway and its ramps, topographical features and special plantings, should be more visually interesting and well-maintained. Plants should be chosen for low-maintenance and minimal water requirements as well as for visual interest. Slopes that are part of the linear highway corridor should be planted similarly so that the entire project area is consistent in vegetated appearance. Interchanges, or nodes - where the linear experience of the highway is interrupted - present opportunities for topographic or vegetative distinction to provide orientation and to reflect the identity and character of adjacent neighborhoods and districts (see the *Aesthetics and Urban Design Report* for example applications).



North

System Alternative 1
Recommended Aesthetic Features

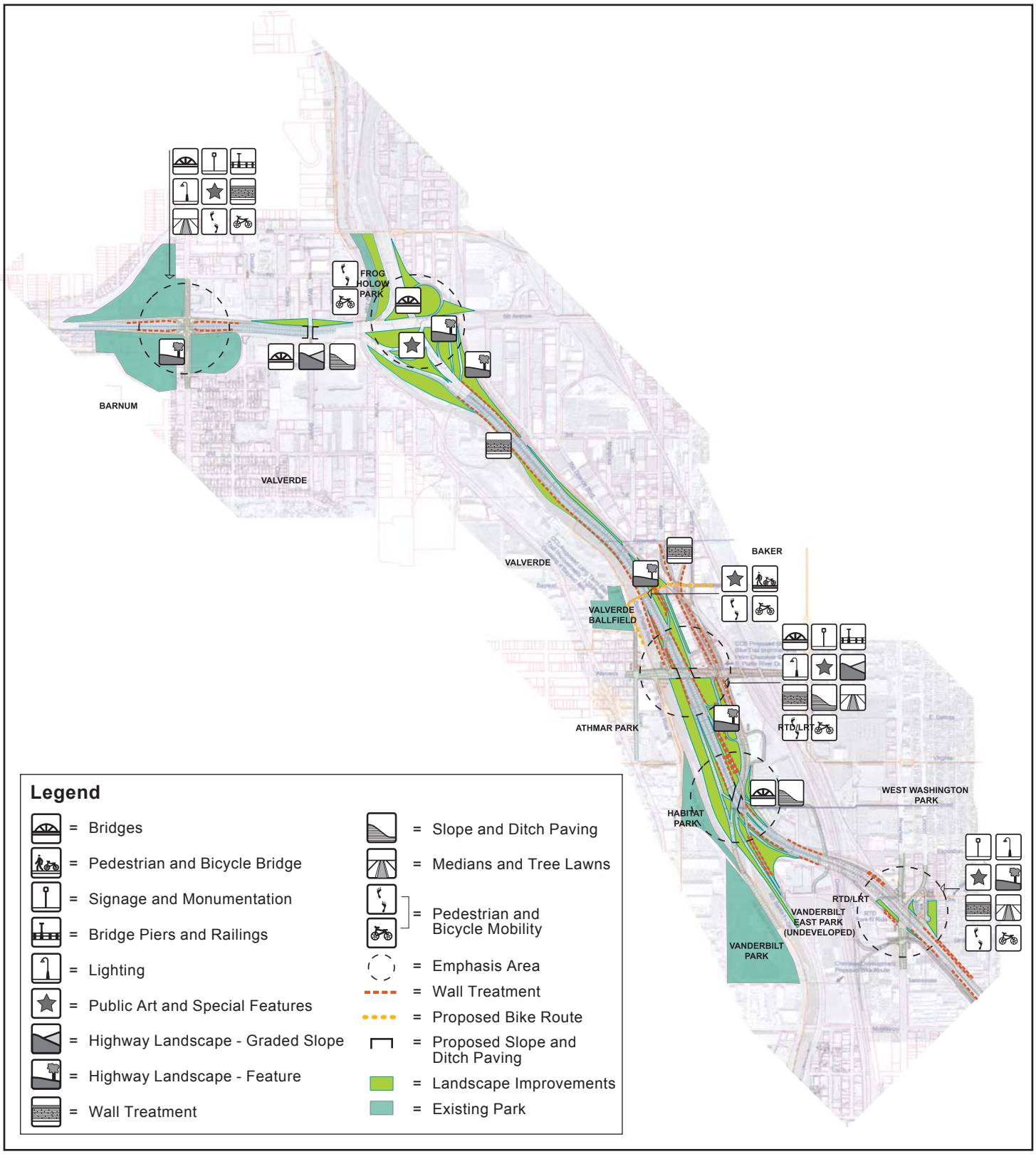


North

System Alternative 2
Recommended Aesthetic Features

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.4-5

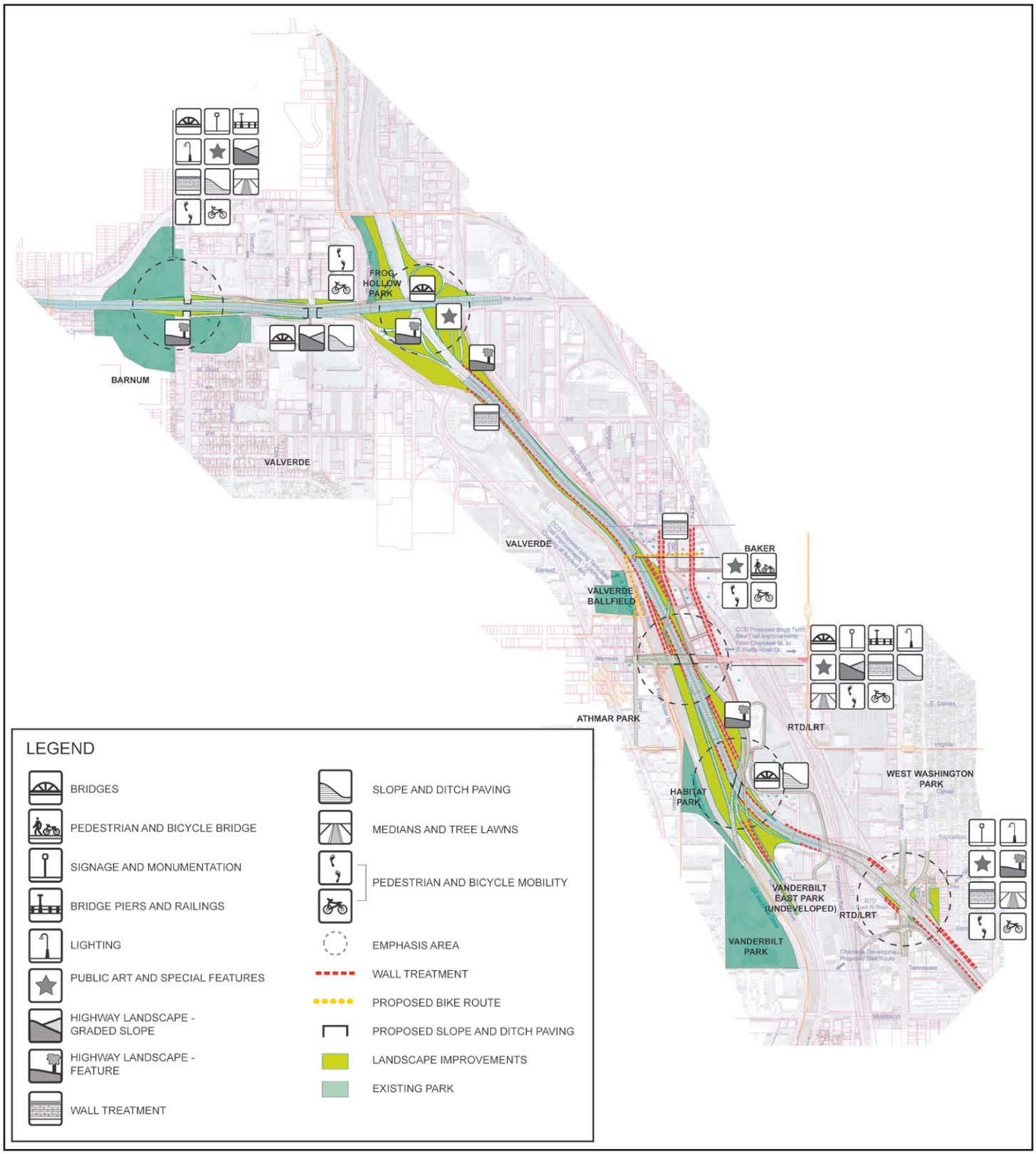


North

System Alternative 3
Recommended Aesthetic Features

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.4-6



North

Preferred Alternative Recommended Aesthetic Features

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.4-7

Retaining walls, required to hold back adjacent grade, would be present throughout the project area. Walls present design opportunities for distinctive color, texture, patterns, and material treatments that would help to break down scale and to create a sense of place. Wall treatments within the linear corridor should be consistent and designed to enhance visual experience for the driver of a car traveling at high speeds. The design of wall treatments at interchanges should be distinctive in order to provide orientation and to reflect the identity and character of adjacent neighborhoods and districts. Where visible both from within the highway corridor and neighboring districts, wall treatments should operate both at the scale of the automobile and the pedestrian (see the *Aesthetics and Urban Design Report* for example applications).

Slope and ditch paving is proposed to retain areas under arterial road bridges that pass over the highway and over the South Platte River corridor. Paving design should use a distinctive, yet simple, palette of materials, colors and textures that are visually stimulating to vehicular traffic traveling at highway speeds. Because it occurs at crossings that interrupt the linear experience of travel on the highway, slope and ditch paving should be different at each interchange to provide orientation and to reflect the identity and character of adjacent neighborhoods and districts (see *Aesthetics and Urban Design Report* for example applications).

Because of the Broadway interchange area's proximity to neighborhoods, transportation connections, and proposed mixed-use developments, the area has a growing pedestrian emphasis. Therefore, its open space plantings and topography should be distinctive from other sections of the highway to provide orientation and reflect the identity and character of this rapidly changing area. Public art and other special sculptural or landscape features should be considered (see *Aesthetics and Urban Design Report* for example applications). Improvements to the Broadway streetscape that are part of the separate I-25 Broadway viaduct replacement project will help to enhance the pedestrian and vehicular experience in an area dominated by transportation-related infrastructure.

In the Santa Fe Drive interchange area, there are opportunities to enhance the design and improve upon the appearance of certain new elements that accompany the proposed changes. As mentioned in the consequences section (see **Section 4.4.2**), the joining of the north- and southbound I-25 lanes, and the moving of the loop ramp connecting Santa Fe Drive to northbound I-25, would create an additional open area in the vicinity of this interchange. These open areas and graded landscape slopes should be vegetated with plants chosen for low-maintenance, drainage enhancement, and visual interest. A water quality pond is proposed for the expanded open area between Kalamath Street and northbound I-25. This area could create a visual interest by using plants that exhibit distinctive seasonal color (see *Aesthetics and Urban Design Report* for example applications).

Two bridges occur in the Santa Fe Drive interchange area—a ramp connecting northbound Santa Fe Drive to northbound I-25 and I-25 crossing over north- and southbound Santa Fe Drive. While their impact is not adverse due to the pre-existence of overhead structures in the area, there are opportunities to design distinctive structures, piers, and railings. If the new flyovers prove to be visible from the South Platte River Trail, additional trees could be planted along the river to increase the vegetated screen already provided by existing riparian vegetation. Slope and ditch paving that is proposed on either side of Santa Fe Drive, as it passes underneath I-25, should enhance visual interest for drivers by incorporating color and texture, or terracing to break down its scale.

Walls that support the ramp connecting northbound Santa Fe Drive to northbound I-25, as well as those that retain the highway as it rises to a bridge over Santa Fe Drive, present design opportunities for distinctive color, texture, and material treatments that would enhance visual interest and help to break down scale (see the *Aesthetics and Urban Design Report* for example applications).

In the Alameda Avenue interchange area, there are opportunities to enhance the design and improve upon the aesthetic qualities of the highway elements that accompany the proposed changes. Because of the Alameda Avenue interchange area's proximity to neighborhoods, transportation connections, and recreation trail systems, this transitional area is developing a more pedestrian emphasis and distinct identity. Therefore, the design of all aesthetic applications to the interchange area should reflect neighborhood character, enhance safe and comfortable pedestrian and bicycle use, and provide orientation.

The design of the structure, piers, rails, and lighting of the Alameda Avenue bridge over I-25, as well as the northbound I-25 on-ramp that departs from the west side of the Alameda Avenue bridge and crosses over the highway, should be strongly identifiable and achieve visual interest through distinctive forms, colors, materials, and details. If the new flyovers prove to be visible from the South Platte River Trail, additional trees could be planted along the river to increase the vegetated screen already provided by existing riparian vegetation. Slope and ditch paving that is proposed on either side of I-25 as it passes underneath Alameda Avenue should enhance visual interest for drivers and provide orientation by incorporating color and texture, or terracing to break down its scale. Walls that retain graded slopes at either side of I-25 as it passes under Alameda Avenue, as well as walls that retain the highway access ramps associated with this interchange should be treated with colors, textures, materials, and patterns that enhance recognition of the surrounding context, and are distinct from other interchanges in the system. Special treatment of highway retaining walls directly across from the Denver Waste Water Management facility should be considered also.

Graded landscape slopes, supporting ramps, and inaccessible open spaces encircled by the loop ramps, present an opportunity for landscape features that enhance visual interest through the use of vegetation with seasonal color or distinctive forms. Medians proposed at the Alameda Avenue bridge should enhance safety, visual appeal, and neighborhood character with distinctive hardscape and vegetation materials. Signage, monuments, or public art should be considered to accentuate neighborhood identity. Possible locations for these applications include the Alameda Avenue bridge and graded landscape slopes at the northeast and southwest quadrants of the interchange.

US 6 Improvements

Avoidance, minimization, and mitigation measures for the US 6 improvements would be the same as those interchange-specific measures identified for the I-25 mainline improvements.

No adverse impacts result from the loop ramp changes at the I-25/US 6 interchange. However, there are opportunities to improve the visual experience of the highway driver passing through the area, as well as bikers passing by on the South Platte River Trail underneath. Graded landscape slopes, supporting ramps and inaccessible open spaces encircled by the loop ramps, present an opportunity for landscape features that enhance visual interest through the use of vegetation with seasonal color or distinctive forms.

Special features such as public art, sculpture, and monuments could provide visual interest and orientation by signaling arrival or departure at this transitional location between the regional US 6 highway and local 6th Avenue, which is a gateway to Denver. All improvements to this area should consider the safety and visual experience of bicyclists and pedestrians on the bike trail, which passes underneath along the South Platte River through Milstein Grove south of US 6 and Frog Hollow Park north of US 6. The visual experience of the highway by bicyclists and pedestrians could be improved with color, textural, and material changes to the undersides of the bridge structures that pass over the area.

No adverse impacts have been identified at the US 6/Federal Boulevard interchange. However, there are opportunities to enhance the design and improve upon the aesthetic qualities of elements that accompany the proposed changes. Because of the proximity of the Federal Boulevard interchange to neighborhoods and recreational facilities, as well as other planned future improvements for the area (such as increased sidewalks), this area would develop a more pedestrian emphasis and distinct identity. Therefore, the design of all aesthetic applications to the interchange area should reflect neighborhood character, enhance safe and comfortable pedestrian and bicycle use, and provide orientation.

The design of the structure, piers, rails, and lighting of the Federal Boulevard bridge over US 6 should be strongly identifiable and achieve visual interest through distinctive forms, colors, materials, and details. Slope and ditch paving that is proposed on either side of US 6 as it passes underneath Federal should enhance visual interest for drivers, provide orientation, incorporate color and texture, or include terracing to break down its scale. Walls that retain graded slopes at either side of US 6 as it passes under Federal Boulevard should be treated with colors, textures, materials, and patterns that enhance recognition of the surrounding context and make them distinct from other interchanges in the system. Medians proposed at the Federal Boulevard bridge should enhance safety, visual appeal, and neighborhood character with distinctive hardscape and vegetation materials. Signage, monuments, or public art should be considered to accentuate neighborhood identity. Possible locations for these applications include the Federal Boulevard bridge (see the *Aesthetics and Urban Design Report* for example applications).

Santa Fe Drive / Kalamath Street Improvements

The greatest impact resulting from the proposed Santa Fe Drive/Kalamath Street improvements at Alameda Avenue is grade-separating Santa Fe Drive and Kalamath Street beneath the railroad tracks. The adverse experience of driving below-grade in a dark canyon-like passage between retaining walls can be mitigated with wall treatments. Design of these treatments should provide a lightening effect, enhance visual interest, and break down the scale of large wall expanses by incorporating a mix of materials, colors, patterns, and textures. They should operate at the scale of the automobile and the pedestrian, and their themes or materials should enhance recognition of surrounding contexts (see the *Aesthetics and Urban Design Report* for example applications).

The proposed pedestrian and bicycle bridge over the highway at Bayaud Avenue to connect the South Platte River Trail on the west side of the river to the Baker neighborhood on its east side presents an opportunity for creating a special feature that provides orientation and neighborhood distinction. The structure and its elements should incorporate unique forms, materials, and colors and incorporate public art and other forms of monuments (see the *Aesthetics and Urban Design Report* for example application).

4.4.4 Mitigation Measures

As described above, the replacement of aging transportation structures with new, more visually appealing structures will have a positive aesthetic effect in many areas. During final design, CDOT will identify appropriate aesthetic design elements and enhancements to ensure compatibility with the surrounding areas and provide a positive visual experience. Future design goals/considerations identified above will provide a guide during final design.

Mitigation measures to soften and enhance the aesthetics character of the project will be detailed in final design and will include the following:

- Provide architectural interest and/or color into retaining wall, bridge, and lighting design.
- Reduce impacts of the overpasses and overhead bridges through careful architectural detailing of the railings and other features. Colors and textures would be compatible with those existing in the corridor.
- Where existing landscaped right-of-way areas are impacted by the project, re-landscape to provide continuity such that the existing landscaped areas do not become fragmented.
- Incorporate landscaping within the right-of-way wherever space is available, including interchange infields and gore areas, in order to screen adjacent neighborhoods and land uses from the highway corridor, as well as to visually enhance the over all corridor.
- Continue coordination with local agencies, communities, and business groups to identify features such as landscaping, slope and ditch paving, signage and monumentation and public art that can be implemented, either by CDOT or in cooperation with others, to add interest and appeal to transportation nodes.

TABLE OF CONTENTS

Page

4.5 Air Quality 4.5-1

4.5.1 Current Conditions 4.5-2

4.5.2 Consequences of System Alternatives 1, 2, 3, and the Preferred Alternative 4.5-4

4.5.3 Mitigation Measures 4.5-13

LIST OF FIGURES

Page

Figure 4.5-1 Predicted National MSAT Emissions 4.5-7

LIST OF TABLES

Page

Table 4.5-1 National Ambient Air Quality Standards 4.5-1
Table 4.5-2 Project Intersection Levels of Service 4.5-2
Table 4.5-3 Maximum Modeled CO Concentrations 4.5-4

4.5 Air Quality

The Clean Air Act and its amendments led to the establishment by the U.S. Environmental Protection Agency (EPA) of National Ambient Air Quality Standards (NAAQS) for six air pollutants: carbon monoxide (CO), sulfur oxide, ozone (O_3), suspended particulate matter (PM_{10}), nitrogen dioxide, and lead (see **Table 4.5-1**). In 1997, EPA added NAAQS for eight-hour O_3 and for very fine particulate matter ($PM_{2.5}$). The one-hour O_3 standard was revoked in 2005.

Table 4.5-1 National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standard
Carbon Monoxide	8 hours	9 ppm
	1 hour	35 ppm
Sulfur Oxide	annual	0.030 ppm
	24 hours	0.14 ppm
Ozone	8 hour	0.08 ppm
	1 hour (revoked)	0.12 ppm (revoked)
Particulate Matter <10 µm	annual	50 µg/m^3
	24 hours	150 µg/m^3
Particulate Matter <2.5 µm	annual	15 µg/m^3
	24 hours	65 µg/m^3
Nitrogen Dioxide	annual	0.053 ppm
Lead	quarterly	1.5 µg/m^3

Source: EPA, 2006
ppm - parts per million
µg/m^3 - micrograms per cubic meter
µm - micrometers

Under the Clean Air Act, cities and regions were required to determine their compliance with the NAAQS. In the early 1970s, the Denver metropolitan area was designated a nonattainment area for CO, $PM_{10,}$ and the one-hour O_3 standard. In 2001 and 2002, the Denver area was redesignated as attainment/maintenance for these pollutants. In 2002 and 2003, the Denver region experienced several exceedances of the new eight-hour O_3 standard. In response to these exceedances, the Denver air quality agencies developed an Early Action Compact (EAC) for reducing O_3 and achieving attainment by 2007. The EAC includes strategies for reducing emissions of ozone-forming precursor pollutants (volatile organic compounds and oxides of nitrogen). In April 2004, EPA designated the Denver region as nonattainment for the eight-hour O_3 standard. However, the nonattainment designation is deferred as long as the region meets the milestones of the EAC.

For several decades, there has been a trend of decreasing emissions nationwide from mobile sources, even when allowing for the growing number of vehicle miles of travel (VMT). These improving results are due to a number of successful emission control regulations. On-road sources account for varying amounts of the overall emissions but tend to be declining even though national VMT more than doubled over the past 30 years.

A large portion of Denver regional CO emissions are from vehicles and this is expected to decrease in the future as vehicles emit proportionally less CO. Vehicles are also a major source

of PM_{10} and these emissions are actually expected to rise due to more road dust from more VMT. Nitrogen oxides and volatile organic compounds are precursors of O_3 and provide an indication of likely O_3 trends. Vehicles are significant sources of nitrogen oxides and volatile organic compounds, and regional emissions of these pollutants are expected to decrease due largely to improvements in vehicles and fuel controls. Other new or pending regulations, such as Tier 2 and the 2007 heavy duty engine regulations, are expected to continue the trend of improvement and further lower vehicle emissions in the future including tailpipe PM_{10} emissions.

Due to past and present air quality difficulties, infrastructure projects that might exacerbate existing air quality problems must meet certain requirements before they can proceed. In general, projects like the Valley Highway Project must be analyzed with respect to their potential impact on air quality at both the regional and local level. An *Air Quality Impact Assessment Report* (FHU, 2005e; CDOT, 2006) has been prepared and provide additional detail.

4.5.1 Current Conditions

The transportation and circulation system evaluated for air quality impacts consists of the major highways and surface streets within the Valley Highway project area. This includes I-25 from Logan Street to 8th Avenue; US 6 from Osage Street to Knox Court; Broadway/Lincoln Street from Mississippi Avenue to the north side of Alameda Avenue; Santa Fe Drive/Kalamath Street between Mississippi Avenue and Cedar Avenue; Alameda Avenue from Lipan Street to Lincoln Street; and Federal Boulevard from 3rd Avenue to 8th Avenue. Data pertaining to traffic volumes and LOS in this section are drawn from traffic data presented in **Chapter 3**, *Transportation Analysis*. LOS values for the various intersections of interest are listed in **Table 4.5-2.**

Table 4.5-2 Project Intersection Levels of Service

Intersection	Intersection Level of Service (AM/PM)					
	2003	2025 No Action	System 1 2025	System 2 2025	System 3 2025	Preferred Alt 2025
Broadway & Alameda	C/F	D/F	D/F	D/F	D/F	D/F
Lincoln & Alameda	E/C	F/F	F/F	F/F	F/F	F/F
Broadway & Ohio	B/B	D/E	D/F	C/C	C/C	B/C
Broadway & Kentucky	C/D	C/F	D/F	C/F	NA	C/F
Santa Fe & Alameda	D/E	F/F	E/F	C/C[a]	C/D[a]	E/F
Kalamath & Alameda	B/D	D/F	C/F	NA[a]	NA[a]	B/F
Lipan & Alameda	B/B	D/B	F/E	E/D	E/D	F/D
Platte River & Alameda	C/D	F/E	NA	NA	NA	NA
Federal & North Ramp	B/C	B/E	B/D	B/D	B/C[b]	B/C
Federal & South Ramp	A/A	B/B	A/A	B/C	NA[b]	C/C

Source: CDOT, 2006

[a]=Santa Fe and Kalamath join and cross Alameda at a single-point urban interchange

[b]=6th and Federal meet at a single-point urban interchange

NA=not applicable

4.5.1.1 ANALYTICAL APPROACH

Air pollution impacts from transportation generally are considered on both regional and local bases. Regional impacts generally are examined by the responsible metropolitan planning organization (DRCOG) through transportation planning activities such as Regional Transportation Plans (RTPs) and Transportation Improvement Plans (TIPs). Localized impacts were assessed through "hot-spot" computer modeling using procedures developed by EPA. There are no approved procedures for hot-spot modeling or other quantitative analysis for pollutants of interest other than CO, so those pollutants have been assessed qualitatively (see **Section 4.5.2**).

A preliminary evaluation of intersections in the region was conducted to identify intersections that could be CO hot-spots. Generally, the need for hot-spot analysis of intersections is assessed with respect to the following criteria, (40 CFR 93.123):

- The project affects locations identified in the State Implementation Plan as sites of actual or potential violations of the CO NAAQS.
- The project intersection is or will be at LOS D, E, or F.
- The project intersection is one of the top three in the State Implementation Plan with respect to traffic volume or worst LOS.

If an intersection does not meet any of the above criteria, it is unlikely to be a hot-spot and need not be assessed further. If the most congested intersections are found not to produce hot-spot problems, less congested intersections would then not be expected to produce hot-spots.

Several project intersections have a LOS of D or worse (see **Table 4.5-2**), which meet the hot-spot selection criteria. The intersections of Broadway with Alameda Avenue and Alameda Avenue with the I-25 complex (Santa Fe Drive to Lipan Street) were selected for hot-spot modeling. These intersections have the worst LOS values combined with the highest traffic volumes.

CO concentrations at the intersections were modeled using the CAL3QHC computer model at representative receptor locations, as suggested in EPA guidance (EPA, 1992). The CAL3QHC program calculates the hourly CO concentrations for each receptor for multiple wind directions. Years 2003 and 2025 vehicle emission factors from MOBILE6 were obtained from the CDPHE Air Pollution Control Division. Meteorological conditions were simulated by using stability class D and low wind speed (one meter per second). The PM peak hour was modeled in all cases as it tended to have worse congestion than the AM peak hour.

4.5.1.2 MODELED CO CONCENTRATIONS

The CO model results for existing (2003) conditions are shown in **Table 4.5-3**. The maximum one-hour PM peak for CO concentrations in 2003 was 23.0 parts per million (ppm), which is below the NAAQS of 35 ppm. The maximum eight-hour concentration at I-25/Alameda Avenue (11 ppm) is predicted to be above the CO standard of 9 ppm (FHU, 2006d). This result reflects an existing situation that is not due to any proposed actions, and this result represents an approximation of a worst-case condition. A more detailed CO model with true eight-hour meteorological data probably would not provide a result this high. The proposed improvements are intended in part to alleviate the traffic congestion that is contributing to CO at this location.

Table 4.5-3 Maximum Modeled CO Concentrations

Model	1-Hour CO Result (ppm)	8-Hour CO Result (ppm)
Broadway & Alameda (2003)	17.8	8.3
I-25 & Alameda (2003)	23.0	11.3
Broadway & Alameda (2025)	11.0	5.2
I-25 & Alameda-No Action (2025)	14.5	7.1
I-25 & Alameda-Alternative 1 (2025)	14.9	7.3
I-25 & Alameda-Preferred Alternative (2025)	15.2	7.5

Source: CDOT, 2006
ppm - parts per million

4.5.2 Consequences of System Alternatives 1, 2, 3, and the Preferred Alternative

The air quality impact analysis consisted of a regional conformity evaluation and local "hot-spot" modeling for CO (see **Section 4.5.1**). Multiple scenarios were evaluated to assess conditions under the system alternatives, which include System Alternatives 1, 2, 3, and the Preferred Alternative, and No Action Alternative. Several air pollutants were evaluated qualitatively. For more information on the system alternatives, including the Preferred Alternative, see **Chapter 2.**

4.5.2.1 REGIONAL CONFORMITY

The regional evaluation of transportation projects is normally carried out by the responsible metropolitan planning organization, which in this case is DRCOG. This organization models transportation systems and air quality to ensure that, in the aggregate, existing and proposed transportation systems will conform to relevant air quality implementation plans, maintenance plans, and the NAAQS.

Individual projects can demonstrate regional conformity by being part of a conforming fiscally-constrained RTP which looks at longer-range transportation planning, or either a TIP, which includes projects likely to proceed in the next few years, or the road network used to demonstrate conformity (TIP Technical Appendix). The transportation improvements must be included in a conforming and fiscally-constrained RTP to fulfill the regional conformity requirements before a Record of Decision can be issued and the improvements constructed.

The Preferred Alternative will need to be funded and built in phases. Several phases of construction have been identified for the Preferred Alternative and are described in **Chapter 7** *Phased Project Implementation*. Phase 1 will be the first phase constructed, as described in *Chapter 7*. Some but not all of the Phase 1 improvements are included in the current 2030 RTP. CDOT has submitted an RTP amendment to DRCOG that will place all of the Phase 1 improvements in the fiscally-constrained RTP, and the entire Preferred Alternative in the Metro Vision (unconstrained) Plan. DRCOG will also perform air quality model runs with the entire Preferred Alternative to provide an indication of likely conformity for the entire project.

The final determination on conformity of the amended RTP is expected in December 2006. Regional conformity will then be demonstrated for Phase 1 of the Preferred Alternative.

Regional conformity for air quality will need to be demonstrated for each subsequent phase before that phase can be constructed. Subsequent phases must be part of a future conforming RTP (generally through future RTP amendments) before regional conformity for those elements

is demonstrated and a Record of Decision can be issued. Preliminary analysis has indicated that the Preferred Alternative will not cause conformity problems.

4.5.2.2 MODELED CO CONCENTRATIONS

Individual projects must also demonstrate that they will not violate the NAAQS in localized hot-spots. The target intersections were modeled for CO using CAL3QHC and the procedures described in **Section 4.5.1**.

Multiple scenarios were evaluated and modeled. Traffic data indicate that conditions at the Broadway/Alameda Avenue intersection would be the same in 2025 for the No Action condition, System Alternatives 1, 2, and 3, and for the Preferred Alternative. Therefore, one model was developed that represents all 2025 alternatives for that intersection. For the I-25/Alameda Avenue/Santa Fe Drive complex, 2025 LOS values of D or worse were predicted for the No Action Alternative, System Alternative 1 and the Preferred Alternative. System Alternatives 2, and 3 included grade separations that significantly improve those LOS values (see **Table 4.5-2**). Therefore, models for the No Action, System Alternative 1, and the Preferred Alternative were developed for the I-25/Alameda Avenue/Santa Fe Drive intersections.

Even with higher traffic volumes, CO concentrations are predicted to decrease in the future at the target intersections (see **Table 4.5-3**), primarily because future vehicles will be emitting less CO. The maximum 2025 one-hour PM peak for CO concentrations is 15.2 ppm, which is below the NAAQS of 35 ppm. The maximum 2025 eight-hour PM peak CO concentration is 7.5 ppm, which is below the NAAQS of 9 ppm. The highest CO concentrations listed are for the Preferred Alternative.

4.5.2.3 PARTICULATE MATTER

Unlike CO pollution, quantitative tools for analysis of PM_{10} pollution have not been developed and approved for mobile sources. Therefore, a qualitative process was used for the analysis.

The air quality monitor nearest the project area is the Gates monitor at 1050 S. Broadway. There have been no exceedences of the PM_{10} NAAQS at any monitor in the Denver region since 1993, which indicates that PM_{10} pollution has been sustainably reduced from previous levels. These reductions included the period from 1995 to 2000 where vehicle miles of travel increased by 8 percent. The most relevant PM_{10} sources for the mobile sources are re-entrained fugitive dust and tailpipe emissions.

The Final Rule redesignating the Denver area from nonattainment to attainment/maintenance status for PM_{10} became effective on October 16, 2002. This redesignation also included approval of a Maintenance Plan for PM_{10} for the Denver area (Colorado Air Quality Control Commission, 2001). These types of plans are required to ensure maintenance of the relevant NAAQS for at least 10 years. The Maintenance Plan included a number of strategies to reduce future PM_{10} emissions to demonstrate maintenance of the NAAQS for 2002 and beyond. These reductions will come mostly from lower tailpipe emissions, better street sanding procedures and ongoing vehicle inspection/maintenance requirements of the AIR Program. Street sanding is controlled by Colorado Air Quality Commission Regulation No. 16 and is expected to be the biggest contributor to PM_{10} control for the Denver area. The Maintenance Plan also includes control of estimated PM_{10} emissions from road construction activities.

Re-entrained road dust from traffic on I-25 has the potential to be the major source of PM_{10} in central Denver. The system alternatives are intended to improve traffic flow on I-25, which by itself could lead to higher PM_{10} emissions. Traffic volumes in the corridor are expected to increase, which also could lead to more PM_{10} emissions. However, PM_{10} is the subject of a comprehensive maintenance plan with PM_{10} control strategies that were designed to ensure continued attainment of the PM_{10} NAAQS throughout the Denver region. Therefore, none of the system alternatives, including the Preferred Alternative, is expected to cause or contribute to violations of the PM_{10} NAAQS. None of the system alternatives are expected to interfere with the maintenance plan or its goals.

4.5.2.4 AIR TOXICS

On February 3, 2006, the FHWA released its interim guidance on when and how to analyze Mobile Source Air Toxics (MSATs) in the NEPA process for highways. The following discussion is in accordance with the interim guidance.

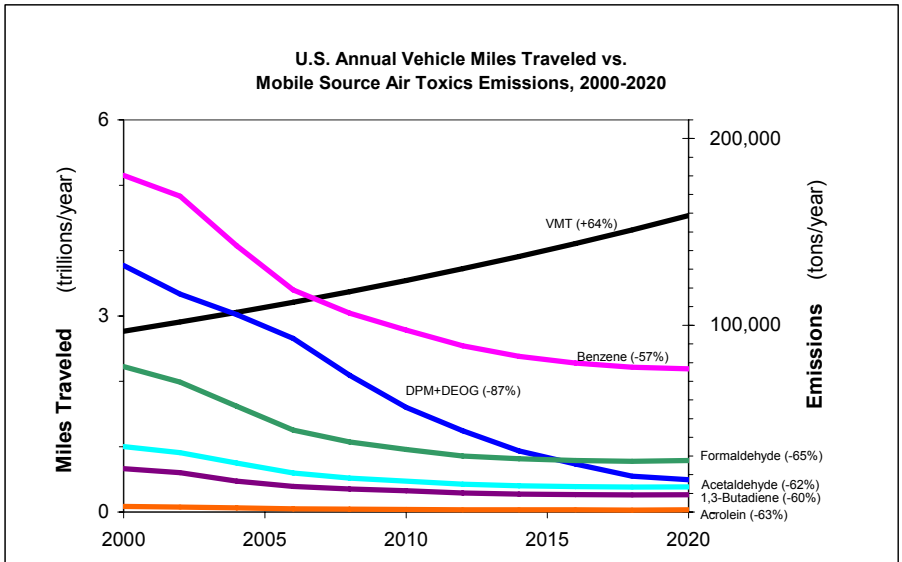
In addition to the criteria air pollutants for which there are NAAQS, EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries). The FHWA has prepared guidance (dated February 3, 2006) on the analysis of mobile source air toxics for highway projects.

MSATs are a subset of the 188 air toxics defined by the Clean Air Act. MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline (EPA, 2000b).

EPA is the lead Federal Agency for administering the Clean Air Act and has certain responsibilities regarding the health effects of MSATs. EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources (EPA, 2001a). This rule was issued under the authority in Section 202 of the Clean Air Act. Through the rule, EPA examined the impacts of existing and newly promulgated mobile source control programs, including the reformulated gasoline program, the national low emission vehicle standards, the Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and the proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Through this rule, EPA identified six priority MSATs: acetaldehyde, benzene, formaldehyde, diesel exhaust, acrolein, and 1,3-butadiene (EPA, 2001a).

Between 2000 and 2020, FHWA projects that even with a 64 percent increase in VMT, these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 percent to 65 percent, and will reduce on-highway diesel PM emissions by 87 percent (see **Figure 4.5-1**). As a result, EPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs. EPA is preparing another rule under authority of Section 202(l) of the Clean Air Act that will address these issues and could make adjustments to the full 21 and the primary six MSATs.

Figure 4.5-1 Predicted National MSAT Emissions



Notes: For on-road mobile sources. Emissions factors were generated using MOBILE6.2. MTBE proportion of market for oxygenates is held constant, at 50%. Gasoline RVP and oxygenate content are held constant. VMT: *Highway Statistics 2000*, Table VM-2 for 2000, analysis assumes annual growth rate of 2.5%. "DPM + DEOG" is based on MOBILE6.2-generated factors for elemental carbon, organic carbon and SO4 from diesel-powered vehicles, with the particle size cutoff set at 10.0 microns.

Unavailable or Incomplete Information for Project Specific MSAT Impact Analysis

This EIS includes a basic assessment of the likely MSAT emission impacts from this project. However, the available technical tools do not allow prediction of the project-specific health impacts of the emission changes associated with the alternatives. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information.

Evaluating the environmental and health impacts from MSATs on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling to estimate ambient concentrations resulting from the estimated emissions, exposure modeling to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps faces technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

1. *Emissions: The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables in the context of highway projects. While MOBILE 6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE 6.2 is a trip-based model–emission factors are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means that MOBILE 6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE 6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects, and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip*

speed. Lastly, in its discussions of PM under the conformity rule, EPA has identified problems with MOBILE6.2 as an obstacle to quantitative analysis.

These deficiencies compromise the use of MOBILE 6.2 to estimate MSAT emissions. MOBILE 6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations.

2. *Dispersion: The tools to predict how MSATs disperse are also limited. EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of CO to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. The NCHRP is conducting research on best practices in applying models and other technical methods in the analysis of MSATs. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.*

3. *Exposure Levels and Health Effects: Finally, even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for EPA's standard 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.*

Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs

Research into the health impacts of MSATs is ongoing. For different emission types, there are a variety of studies that show that some emissions either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, EPA conducted the National Air Toxics Assessment in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates best illustrate the levels of various toxics when aggregated to a national or state level.

EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at http://www.epa.gov/iris. The following toxicity information for the six prioritized MSATs was taken from the IRIS database *Weight of Evidence Characterization* summaries. This information is taken verbatim from EPA's IRIS database and represents the Agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

- **Benzene** is characterized as a known human carcinogen.
- The potential carcinogenicity of **acrolein** cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure.
- **Formaldehyde** is a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals.
- **1,3-butadiene** is characterized as carcinogenic to humans by inhalation.
- **Acetaldehyde** is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.
- **Diesel exhaust** is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is the combination of diesel particulate matter and diesel exhaust organic gases.
- **Diesel exhaust** also represents chronic respiratory effects, possibly the primary non-cancer hazard from MSATs. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by EPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes, particularly respiratory problems (South Coast Air Quality Management District 2000, The Sierra Club 2004, and Environmental Law Institute 2005). Much of this research is not specific to MSATs, but instead surveys the full spectrum of both NAAQS and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, the studies do not provide information that would be useful to alleviate the uncertainties listed above and enable a more comprehensive evaluation of the health impacts specific to this project.

Relevance of Unavailable or Incomplete Information

This section discusses the relevance of unavailable or incomplete information to evaluating reasonably foreseeable significant adverse impacts on the environment, and evaluation of impacts based upon theoretical approaches or research methods generally accepted in the scientific community. Because of the uncertainties described above, FHWA believes assessment of the effects of air toxic emissions on human health cannot be made at the transportation project level. While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects. Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

This air quality analysis provides a qualitative analysis of MSAT emissions relative to the various alternatives, and has acknowledged that all of the project alternatives may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain. Because of this uncertainty, the health effects from these emissions cannot be estimated.

Project Level MSAT Discussion

As discussed above, FHWA believes technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this transportation project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the Preferred Alternative. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions—if any—from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*, found online at: www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm.

For the No-Action Alternative and the Preferred Alternative, the amount of MSATs emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for the Preferred Alternative is slightly higher than that for the No-Action Alternative, because the additional capacity increases the efficiency of the roadway and attracts rerouted trips from elsewhere in the transportation network. The increase in VMT would lead to higher MSAT emissions for the Preferred Alternative along I-25. The emissions increase due to VMT will be offset somewhat by lower MSAT emission rates due to increased speeds; according to EPA's MOBILE6.2 emissions model, emissions of the priority MSATs except for diesel particulate matter decrease as vehicle speed increases. The extent to which these speed-related emissions decreases will offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models.

Because the estimated VMT under each alternative is nearly the same, it is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions will likely be lower in the design year than present levels as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent between 2000 and 2020 (See **Figure 4.5-1**). Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

Because of the specific characteristics of the Preferred Alternative, there may be localized areas where VMT would increase and other areas where VMT would decrease. Therefore, corresponding localized increases and decreases in MSAT emissions may also occur. As described above, increased VMT on I-25 would appear to lead to higher MSAT emissions; however, this increase would be offset by lower emission rates due to improved vehicle speeds. Localized decreases in MSAT emissions would likely be most pronounced along Santa Fe Drive and Kalamath Street due to the grade separation of the consolidated mainline railroad. Regardless of the alternative, emissions will be substantially reduced from current levels in the future due to implementation of EPA's vehicle and fuel regulations. Based on this analysis, it is likely that the Preferred Alternative will result in lower MSAT emissions over the No-Action Alternative.

Sensitive Receptors

Air toxics from mobile sources are most likely to affect receptors close to roads as this is where concentrations of air toxics from mobile sources are likely to be highest. Locations where people spend extended periods of time are likely to be the most sensitive receptors. These types of locations include homes, schools and hospitals. There are several of these types of receptors along roads in the project area that may be modified by the Preferred Alternative.

Part of the West Washington Park neighborhood is near I-25 in the Lincoln Street area. Vanderbilt, East Vanderbilt, Habitat and Valverde Parks are in the vicinity of I-25 and/or Santa Fe Drive. Four homes are along Santa Fe Drive/Kalamath Street near Alameda Avenue. There are numerous homes, a motel and three parks near US 6 from approximately Federal Boulevard to the west.

4.5.2.5 COMPARISON OF SYSTEM ALTERNATIVES 1, 2, 3, AND THE PREFERRED ALTERNATIVE

The overall project area is so large and involves such a range of traffic features that simple air quality impact pronouncements to distinguish between alternatives are difficult. In the broadest terms, the future alternatives (System Alternatives 1, 2, 3, the Preferred Alternative, and the No Action Alternative) are not dramatically different from each other in that major highways, streets, and intersections will be in the same general locations with similar volumes and none are expected to cause exceedences of the NAAQS. However, mainline I-25 LOS would be better under any of the build alternatives than the No Action Alternative and this is a major air quality consideration in the project corridor. All of the system alternatives grade separate the consolidated main line railroad tracks from Santa Fe Drive and Kalamath Street,

and each would provide comparable air quality benefits over the No Action Alternative by eliminating that traffic obstruction. Consequently, any of the build alternatives would offer some air quality advantages over the No Action Alternative.

None of the system alternatives (1, 2, 3, or the Preferred Alternatives) would offer a clear and universal air quality benefit over the others. Each system alternative has aspects at some locations where it appears to benefit local air quality more than the other alternatives. Overall, the results from modeling potential air quality impacts indicate that none of the alternatives being considered would cause violations of federal air quality standards, so any of them would be acceptable in air quality terms.

4.5.2.6 CONSTRUCTION IMPACTS

Construction of a system alternative has the potential to last several years. Adjoining properties in the project area would be near construction activities when the proposed project is built. More information on phasing is located in **Chapter 7** *Phased Project Implementation*.

Construction emissions differ from regular traffic emissions in several ways:

- Construction emissions last only for the duration of the construction period.
- Construction activities generally are short-term, and depending on the nature of the construction operations, could last from seconds (e.g., a truck passing) to months (e.g., constructing a bridge).
- Construction can involve other emission sources, such as fugitive dust from ground disturbance.
- Construction emissions tend to be intermittent and depend on the type of operation, its location, the function of the equipment, and the equipment usage cycle. Traffic emissions are generally present continuously after construction activities are completed.

Construction emission impacts would be minimized somewhat because very little of the project corridor abuts sensitive areas, such as residences or schools. Even so, employees at neighboring commercial areas could be exposed to construction-related emissions. The proposed project is similar in nature to other highway projects and the construction emissions should be representative of projects of this type and magnitude. To address the temporarily elevated air emissions that may be experienced during construction, standard construction mitigation measures should be incorporated into construction contracts. These include following best management practices and relevant CDOT construction specifications.
The requirement should include:

- Keep engines and exhaust systems on equipment in good working order. Maintain equipment on a regular basis, and subject equipment to inspection by the project manager to ensure maintenance.
- Control fugitive dust systematically through diligent implementation of a dust control plan (this would also control potential exposure to contaminated soil dust).
- Prohibit excessive idling of inactive or unnecessary equipment or vehicles.
- Require construction equipment and vehicles to use higher-grade fuel to reduce pollutant emissions.

- Locate stationary equipment as far from sensitive receivers as possible.

4.5.3 Mitigation Measures

Given that air pollutants are not predicted to exceed the NAAQS in the future as a result of implementing any of the system alternatives, including the Preferred Alternative, mitigation measures for air quality are not necessary for the project. Future emissions from on-road mobile sources will be minimized globally through several federal regulations. The Denver area maintenance plans for CO, O_3 and PM_{10} will serve to avoid and minimize pollutant emissions from I-25 and other project roads. Standard emission minimization measures for construction activities are recommended (see **Section 4.5.2.6**).

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TABLE OF CONTENTS

Page

4.6 Noise and Vibration 4.6-1
4.6.1 Current Conditions 4.6-1
4.6.2 Consequences of the Alternatives 4.6-16
4.6.3 Mitigation Measures 4.6-27
4.6.4 Nuisance Noise Considerations 4.6-36

LIST OF FIGURES

Page

Figure 4.6-1 Noise-Sensitive Areas 4.6-2
Figure 4.6-2 Typical Noise Levels 4.6-3
Figure 4.6-3 A-Weighting Adjustments 4.6-3
Figure 4.6-4 Noise Measurement Locations and Results 4.6-6
Figure 4.6-5 Noise Model Receiver Locations 4.6-7
Figure 4.6-6 Existing Conditions: Noise Contours 4.6-8
Figure 4.6-7 Existing Noise-Impacted Areas 4.6-12
Figure 4.6-8 Railroad Corridor Relocation Area 4.6-15
Figure 4.6-9 No Action Alternative: 2025 Noise Contours 4.6-18
Figure 4.6-10 System Alternative 1: 2025 Noise Contours 4.6-20
Figure 4.6-11 System Alternative 2: 2025 Noise Contours 4.6-21
Figure 4.6-12 System Alternative 3: 2025 Noise Contours 4.6-23
Figure 4.6-13 Preferred Alternative: 2025 Noise Contours 4.6-25
Figure 4.6-14 Mitigation Barriers Evaluated 4.6-28
Figure 4.6-15 South Lincoln Street Mitigation Barriers 4.6-32
Figure 4.6-16 West Short Place Mitigation Barrier 4.6-34
Figure 4.6-17 South Platte Trail Mitigation Barrier 4.6-35

LIST OF TABLES

Page

Table 4.6-1 Noise Abatement Criteria 4.6-4
Table 4.6-2 Noise Model Results 4.6-9
Table 4.6-3 Vibration Impact Criteria 4.6-14
Table 4.6-4 FTA Screening Distances 4.6-15
Table 4.6-5 Noise Impact Summary 4.6-17
Table 4.6-6 Vibration Impact Projections without Mitigation 4.6-26
Table 4.6-7 Noise Mitigation Barrier Summary 4.6-29

4.6 Noise and Vibration

An analysis of traffic noise and railroad noise/vibration was conducted to assess existing and future noise and vibration levels at properties near the project corridor. Some land uses, such as residences, schools and parks, are viewed by FHWA and CDOT as being more sensitive to traffic noise than other land uses. **Figure 4.6-1** shows the locations of these more noise-sensitive land uses in the project area. Existing conditions serve as a baseline for comparing any traffic noise impacts that may occur with the various alternatives, which includes System Alternatives 1, 2, 3, and the Preferred Alternative in the future.

This section provides basic noise and vibration information, applicable guiding policy, existing levels within the project corridor, and predicted future levels. More detailed information regarding the noise and vibration analysis can be found in the Noise and Vibration Impact Assessment Report and Addendum (FHU, 2005f; FHU, 2006e).

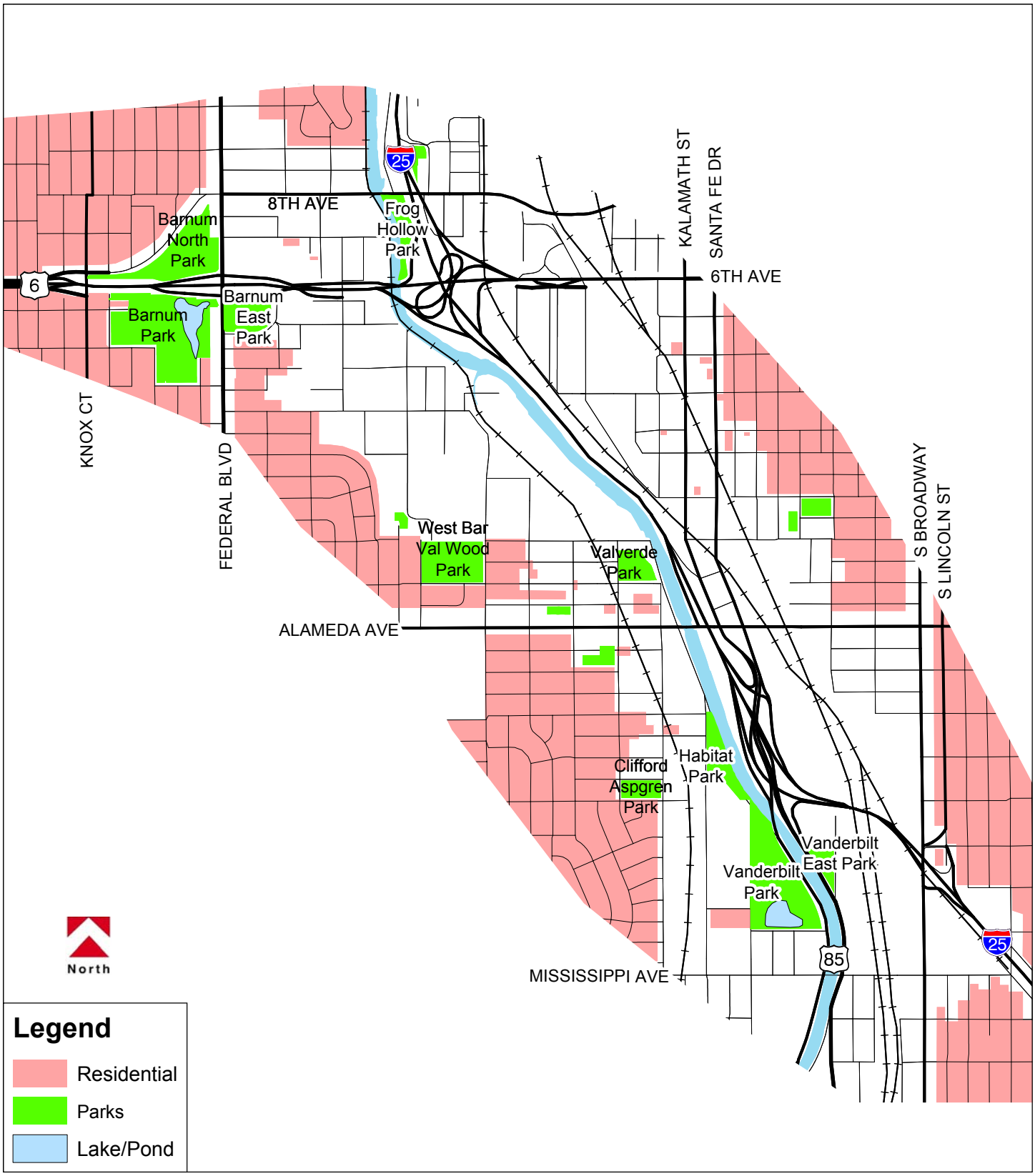
4.6.1 Current Conditions

Sound is created when an object vibrates and radiates part of that energy as acoustic pressure or waves through a medium, such as air, water, or a solid. Sound and noise are measured in units of decibels (dB). The dB scale is logarithmic, not linear. As an example, two identical noise sources, each producing 60 dB, will produce 63 dB when operated together. Likewise, a 10 dB increase in sound levels represents ten times as much sound energy. Some common noise levels are shown in **Figure 4.6-2.**

The human ear is receptive to a wide range of sound energy levels but is not equally receptive to all sound frequencies. A-weighting of sound frequency bands is a method used to approximate how the human ear perceives sound, mostly by reducing the contribution from lower frequencies by a specified amount (see **Figure 4.6-3**). A-weighted sound levels are reported in dBA. Most people will not notice a difference in loudness of sound levels of less than 3-dBA, which is a two-fold change in the sound energy. Most people relate a 10-dBA change in sound levels to a doubling of sound loudness.

Sound levels diminish with distance from the source because of spreading, atmospheric absorption, interference from other objects and ground effects. "Hard" ground (such as asphalt) and "soft" ground (such as grass) transmit sound differently. “Hard” ground is more reflective and will produce louder sound levels farther from the source. With traffic noise, a 3-dBA increase in noise could be caused by doubling the traffic volume or cutting the distance from the roadway in half (for “hard” ground).

Traffic noise tends to fluctuate over time in accordance with traffic volumes, vehicle types, and speeds. This fluctuation makes it difficult to describe the noise impact through a single value. FHWA and CDOT use the one-hour equivalent sound level (L_{eq}) as their metric for assessing traffic noise impacts. The L_{eq} is the “average” of the fluctuating noise levels over a time period, or the continuous noise level that would produce the same sound energy as the fluctuating noise levels over the time period. On congested highways like I-25, the loudest traffic noise generally occurs when the largest traffic volume can travel at the highest speed, which is usually outside periods when traffic becomes overly congested and slows. This condition generally describes LOS C for a highway.



Valley Highway, 02-069, 6/26/2006

0 0.25 0.5 1 Miles

Noise-Sensitive Areas

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.6-1

Figure 4.6-2 Typical Noise Levels

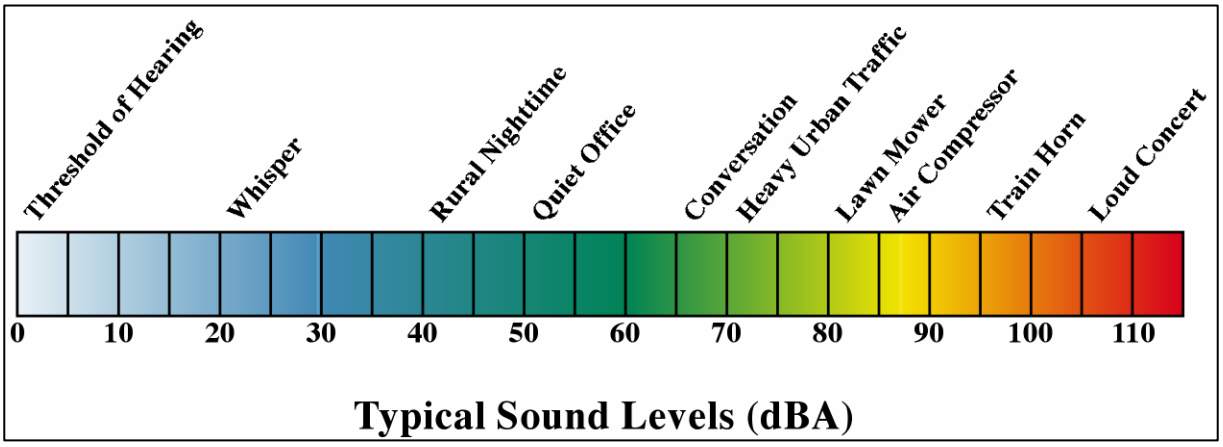
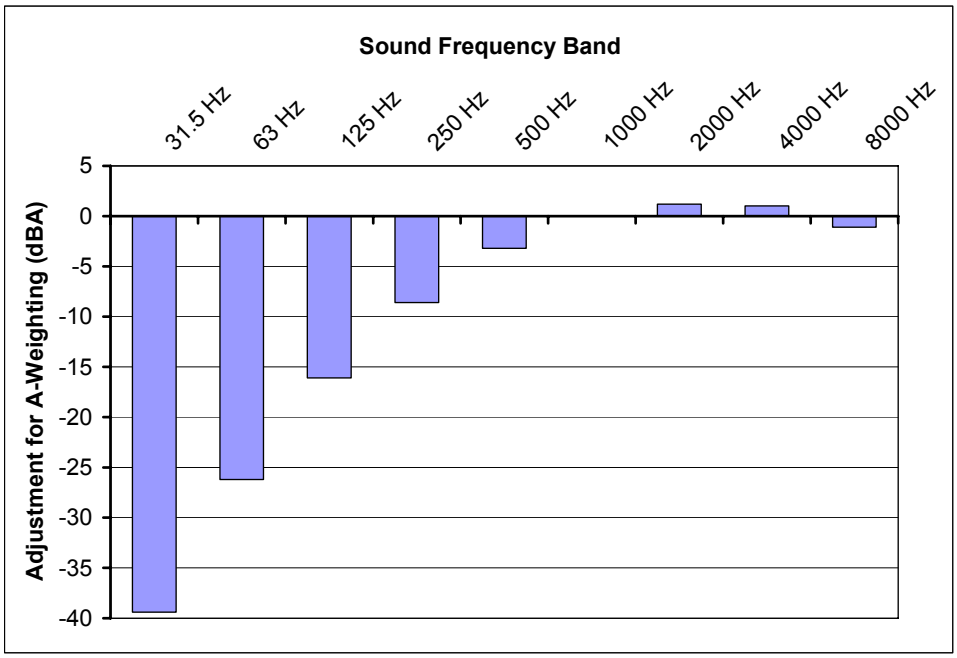


Figure 4.6-3 A-Weighting Adjustments



4.6.1.1 NOISE CRITERIA

Potential impacts from traffic noise were assessed on the basis of the predicted noise levels' relationship to CDOT's implementation of the FHWA Noise Abatement Criteria (NAC). The FHWA NAC for residences and other Category B receivers is a one-hour L_{eq} of 67 dBA, and for commercial areas (Category C) is an L_{eq} of 72 dBA for the peak hour (see **Table 4.6-1**). CDOT has determined that "approaching" the FHWA NACs is a concern that triggers an investigation of noise mitigation measures. "Approaching" the FHWA NACs has been specified by CDOT as noise 1 dBA below each FHWA NAC, which corresponds to 66 dBA for residential or other Category B land uses and 71 dBA for Category C areas. CDOT has established their own NACs

at these levels (see **Table 4.6-1**). CDOT NACs are the more restrictive of these criteria, and are the basis of comparison of impacts.

In addition to exceeding CDOT NACs, an impact from a "substantial" noise increase is indicated if the future noise level is expected to increase by 10 dBA or more over existing levels. This would also lead to evaluation of traffic noise mitigation actions.

4.6.1.2 EXISTING TRAFFIC NOISE LEVELS

Existing traffic noise conditions were evaluated through a combination of noise measurements and computer modeling. Modeling is used because day-to-day variations in traffic or weather conditions that affect noise levels can not be captured or quantified by brief noise measurements alone. The ultimate purpose of the modeling is to show whether future traffic noise levels caused by the proposed project would be high enough to impact neighboring properties, and whether noise mitigation should be considered for any such impacts within the study area. The measurements are helpful in evaluating noise model parameters.

Table 4.6-1 Noise Abatement Criteria

Land Use Category	FHWA NAC (L_{eq}) [1]	CDOT NAC (L_{eq}) [2]	Description of Land Use Category
A	57 dBA Exterior	56 dBA Exterior	Tracts of land in which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks, or open spaces that are recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B	67 dBA Exterior	66 dBA Exterior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, playgrounds, active sports areas, and parks.
C	72 dBA Exterior	71 dBA Exterior	Developed lands, properties, or activities not included in categories A and B above.
D	None	None	Undeveloped lands.
E	52 dBA Interior	51 dBA Interior	Residences, motels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Sources: [1] FHWA, 1995
[2] CDOT, 2002a

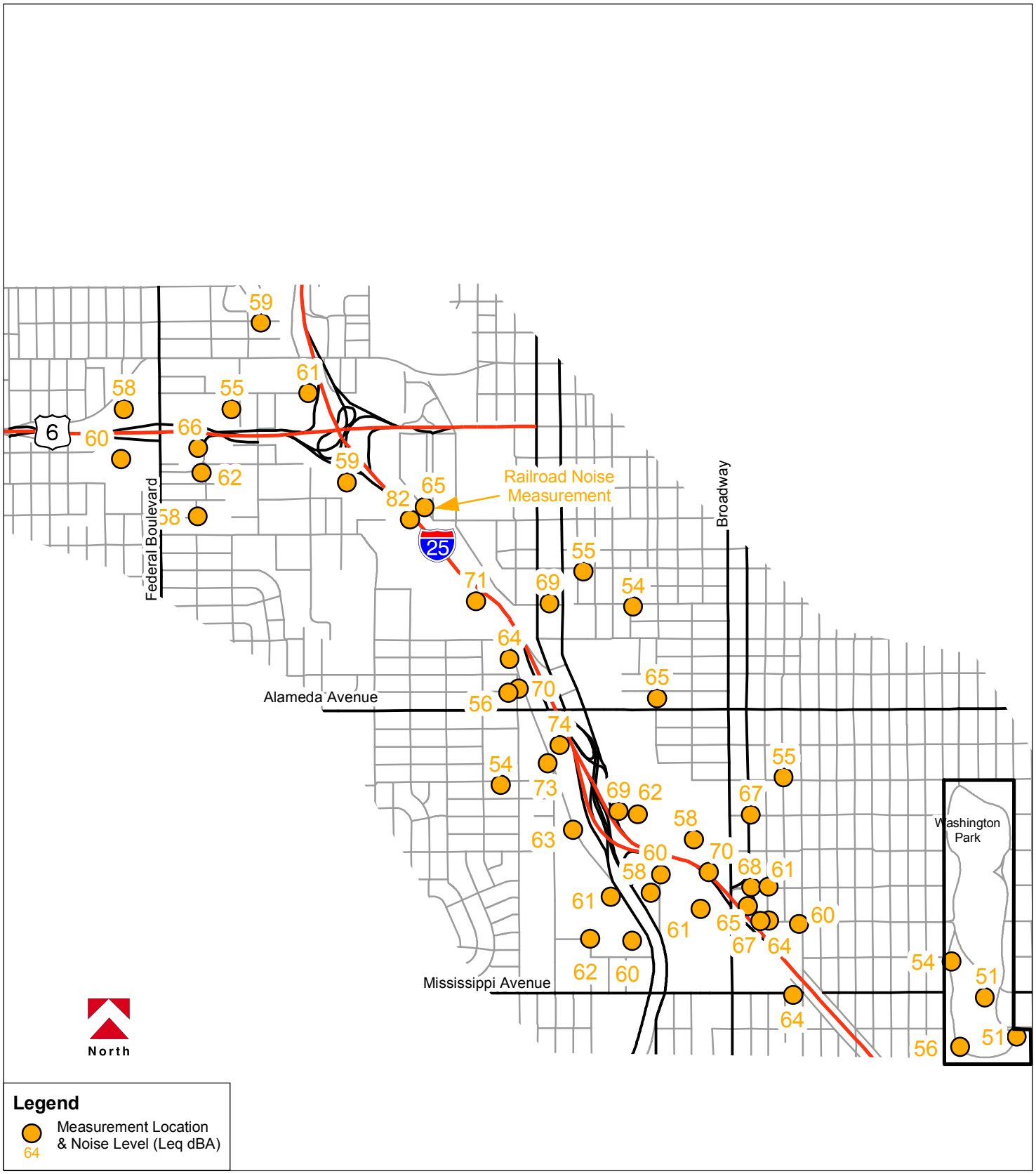
There were 46 short-term (20-minute) traffic noise measurements performed in the study area (see **Figure 4.6-4**) to document ambient conditions (FHU, 2005f; FHU, 2006e). These locations included residential, park, and commercial areas along the project corridor. Traffic counts, including the number of large trucks, were collected when possible during the noise measurement periods. One measurement targeting railroad noise was also made.

The traffic noise modeling software used for the assessment was the implementation of the FHWA-RD-77-108 (i.e., STAMINA) model contained in SoundPlan® Version 6.3 with CDOT vehicle noise emission values. Existing traffic conditions that were modeled included the current road configurations and traffic volumes. The computer noise models require a considerable amount of input data regarding the geometry of the roadways as well as traffic volumes, vehicle

mix, and speeds. Detailed traffic studies were completed for the project corridor (FHU, 2004c; FHU, 2006b) to provide traffic volumes. The existing road/street layout was mapped for existing conditions.

As a check on computer model parameters, the traffic conditions observed during some noise measurement episodes were used to construct a verification model, which was compared to the measured noise levels. Because of the large project area, the verification model consisted of a smaller piece of the project area near the I-25 and Broadway interchange. In general, the results were in close agreement, as the measured and modeled results for the noise measurement locations differed by 2 dBA or less.

Traffic noise levels during an average peak noise hour were modeled at 104 receiver points (see **Figure 4.6-5**) that represent locations within the project corridor. In addition, traffic noise levels were calculated at more than 28,500 grid nodes covering the project area to create detailed noise contours for a larger area than covered by the discrete receivers. The model results are illustrated in **Figure 4.6-6** and listed in **Table 4.6-2**. It should be noted that more receivers were added and the Preferred Alternative was remodeled to provide additional detail for this Final EIS. Those results are described in the noise report addendum (FHU, 2006e).



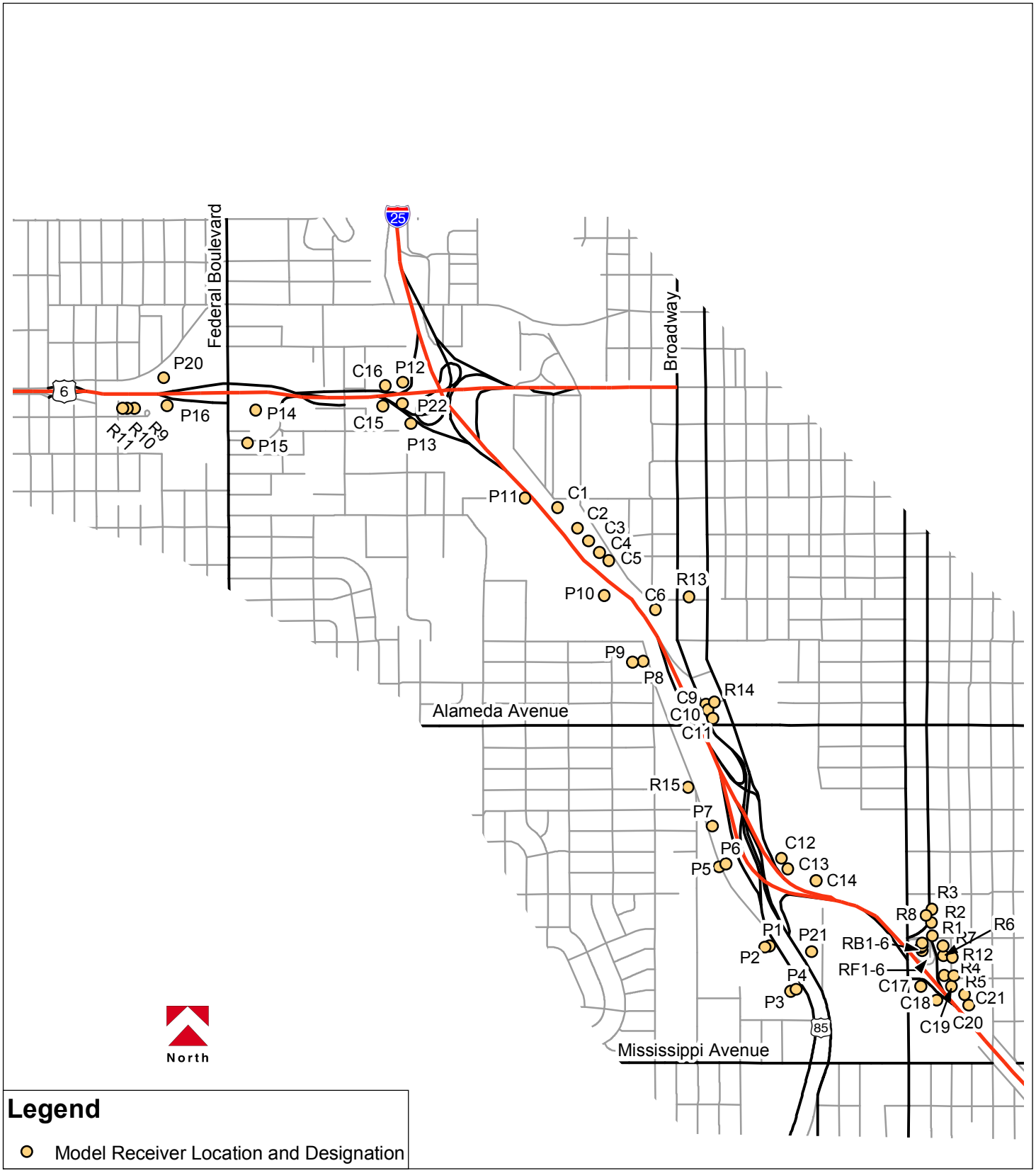
Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Noise Measurement Locations and Results

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.6-4



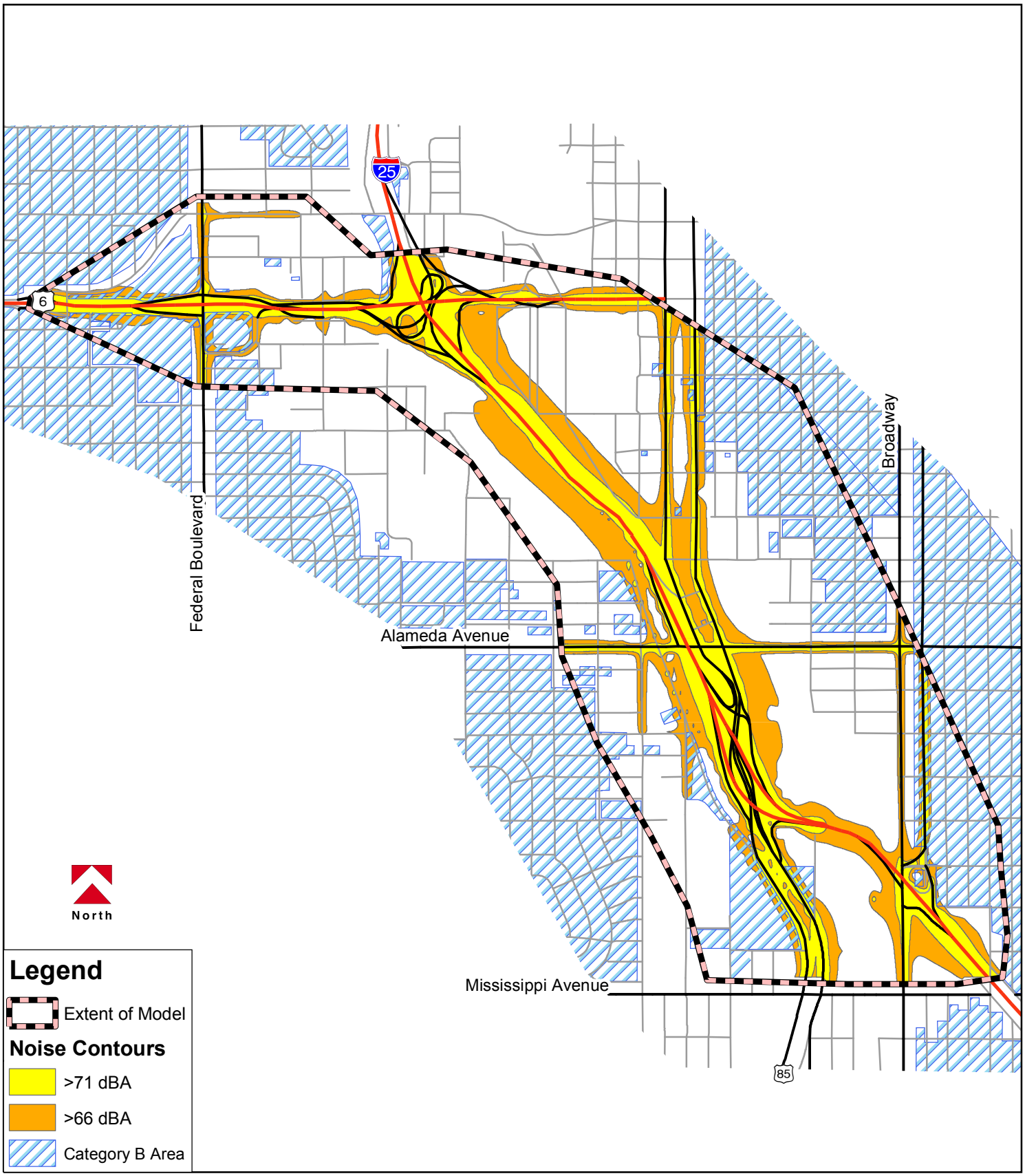
Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Noise Model Receiver Locations

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.6-5



Valley Highway, 02-069, 6/26/2006

0 0.25 0.5 1 Miles

Existing Conditions: Noise Contours

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.6-6

Table 4.6-2 Noise Model Results

Receiver	Predicted Noise Level (dBA)						Land Use[1]
	Existing	2025 No Action	2025 System 1	2025 System 2	2025 System 3	2025 Preferred Alt.	
C1	72	72	73	73	73	71	Com.—1500 W. 3rd
C2	71	71	72	72	72	70	Com.—1500 W. 2nd
C3	71	71	72	72	72	70	Com.—1400 W. 2nd
C4	71	71	72	72	72	70	Com.—1400 W. 1st
C5	71	71	72	72	72	70	Com.—1400 W. 1st
C6	72	72	73	73	73	70	Com.—1100 W. Ellsworth
C7	71	71	NA[2]	71	71	NA[2]	Com.—1100 W. Ellsworth
C8	71	72	NA[2]	74	70	NA[2]	Com.—100 S. Kalamath
C9	71	72	72	70	69	71	Com.—250 S. Kalamath
C10	72	73	73	71	71	72	Com.—250 S. Kalamath
C11	70	72	72	70	70	71	Com.—300 S. Kalamath
C12	70	71	72	73	72	73	Com.—300 W. Center
C13	70	71	73	73	73	74	Com.—300 W. Center
C14	67	68	71	72	71	72	Com.—300 W. Exposition
C15	74	76	76	76	76	76	Com.—2400 W. 6th
C16	70	72	72	72	72	70	Com.—2400 W. 6th
C17	71	73	74	73	73	72	Com.—900 S. Broadway
C18	73	74	75	74	74	72	Com.—900 S. Lincoln
C19	72	74	77	75	75	74	Com.—900 S. Sherman
C20	71	73	75	74	74	72	Com.—900 S. Grant
C21	69	70	73	71	71	69	Com.—1000 S. Grant
P1	69	70	70	70	68	69	Park—Vanderbilt
P2	64	65	65	65	64	64	Park—Vanderbilt
P3	65	66	66	66	66	63	Park—Vanderbilt
P4	70	71	71	71	71	69	Park—Vanderbilt
P5	65	66	67	67	67	66	Park—Habitat
P6	63	63	62	62	62	61	Park—Habitat
P7	65	65	66	66	66	66	Park—Habitat
P8	68	69	69	69	69	70	Park—Valverde
P9	64	64	65	65	65	65	Park—Valverde
P10	69	69	69	69	69	71	Park—Bike Path
P11	77	77	75	75	75	77	Park—Bike Path
P12	70	72	72	72	72	67	Park—Frog Hollow
P13	72	73	73	73	73	71	Park—Phil Milstein
P14	65	66	66	67	66	65	Park—Barnum East
P15	66	67	68	64	64	65	Res.—2900 block W. Short
P16	69	70	71	71	71	69	Park—Barnum
P20	66	68	68	68	68	67	Park—Barnum North
P21	65	66	67	67	67	66	Park—Vanderbilt East
P22	66	67	67	67	67	65	Trail— Platte/Milstein Grove
R1	69	70	71	71	67	66	Res.—700 block S. Lincoln
R2	69	70	71	71	69	69	Res.—700 block S. Lincoln
R3	69	70	70	70	70	69	Res.—700 block S. Lincoln

Table 4.6-2 Noise Model Results (continued)

Receiver	Predicted Noise Level (dBA)						Land Use[1]
	Existing	2025 No Action	2025 System 1	2025 System 2	2025 System 3	2025 Preferred Alt.	
R4	68	68	70	68	68	67	Res.—800 block S. Sherman
R5	63	64	66	64	64	64	Res.—800 block S. Sherman
R6	64	65	67	65	65	64	Res.—800 block S. Sherman
R7	60	61	62	61	61	59	Res.—800 block S. Sherman
R8	71	72	72	72	71	71	Res.—700 block S. Lincoln
R9	66	68	68	68	68	66	Res.—3300 block W. 5th
R10	65	67	67	67	67	64	Res.—3300 block W. 5th
R11	65	66	66	66	66	63	Res.—3300 block W. 5th
R12	58	59	61	59	59	59	Res.—800 block S. Sherman
R13	67	68	67	67	68	64	Res.—900 block W. Ellsworth
R14	68	69	69	71	68	67	Res.—900 block W. Byers
R15	68	68	68	68	68	68	Church—400 S. Platte River
RB1	67	68	72	NA[2]	NA[2]	NA[2]	Res.—800 block S. Lincoln
RB2	66	67	71	NA[2]	72	71	Res.—800 block S. Lincoln
RB3	65	66	70	NA[2]	73	72	Res.—800 block S. Lincoln
RB4	65	66	68	NA[2]	70	69	Res.—800 block S. Lincoln
RB5	67	68	69	NA[2]	71	70	Res.—800 block S. Lincoln
RB6	67	69	75	NA[2]	NA[2]	NA[2]	Res.—800 block S. Lincoln
RF1	65	66	69	NA[2]	NA[2]	NA[2]	Res.—800 block S. Lincoln
RF2	65	67	68	NA[2]	66	NA[3]	Res.—800 block S. Lincoln
RF3	65	67	68	NA[2]	65	NA[3]	Res.—800 block S. Lincoln
RF4	66	67	68	NA[2]	64	NA[3]	Res.—800 block S. Lincoln
RF5	67	69	68	NA[2]	64	NA[3]	Res.—800 block S. Lincoln
RF6	65	67	70	NA[2]	NA[2]	NA[2]	Res.—800 block S. Lincoln

[1] Com. = commercial; Res. = residential
[2] Receiver removed by alternative
[3] Properties were better modeled by receivers RB2-RB5
NA = Not Analyzed
Source: FHU 2006e – includes detailed map of receiver locations

A number of locations in both Categories B and C along the project corridor were either measured or predicted through modeling to equal or exceed their respective CDOT NACs under existing traffic conditions and therefore are impacted by traffic noise. These locations include residential areas, parks, two motels, a church and commercial areas (see **Figure 4.6-7**). The residential areas estimated to exceed the Category B NAC include:

- Three homes on the 800 block of S. Sherman Street
- Homes on the 500 to 800 blocks of S. Lincoln Street
- 900 block of W. Ellsworth Avenue
- 2900 block of W. Short Place
- 3300 block of W. 5th Avenue

- 900 block of W. Byers Place

Of these locations, a new replacement noise barrier has been completed for the 800 block of S. Sherman Street as part of the recently-completed T-REX project.

Essentially, all residential lots on Lincoln Street in the study area are estimated to have portions that exceed the NAC. However, the exceedences on Lincoln Street north of Ohio Avenue are due primarily to vehicles using Lincoln Street. For residences that are more than about 300 feet from I-25 or US 6, local traffic noise generally is louder than highway traffic noise.

It is estimated from the model results that overall approximately 65 residences within the study area are at or above the CDOT NAC. Of these, approximately 44 homes are either on Lincoln Street north of Ohio Avenue or on Sherman Street behind the existing noise barrier. These findings are presented in more detail in the Noise and Vibration Impact Assessment Report and Addendum (FHU, 2005f; FHU, 2006e) and are summarized in **Table 4.6-5**.

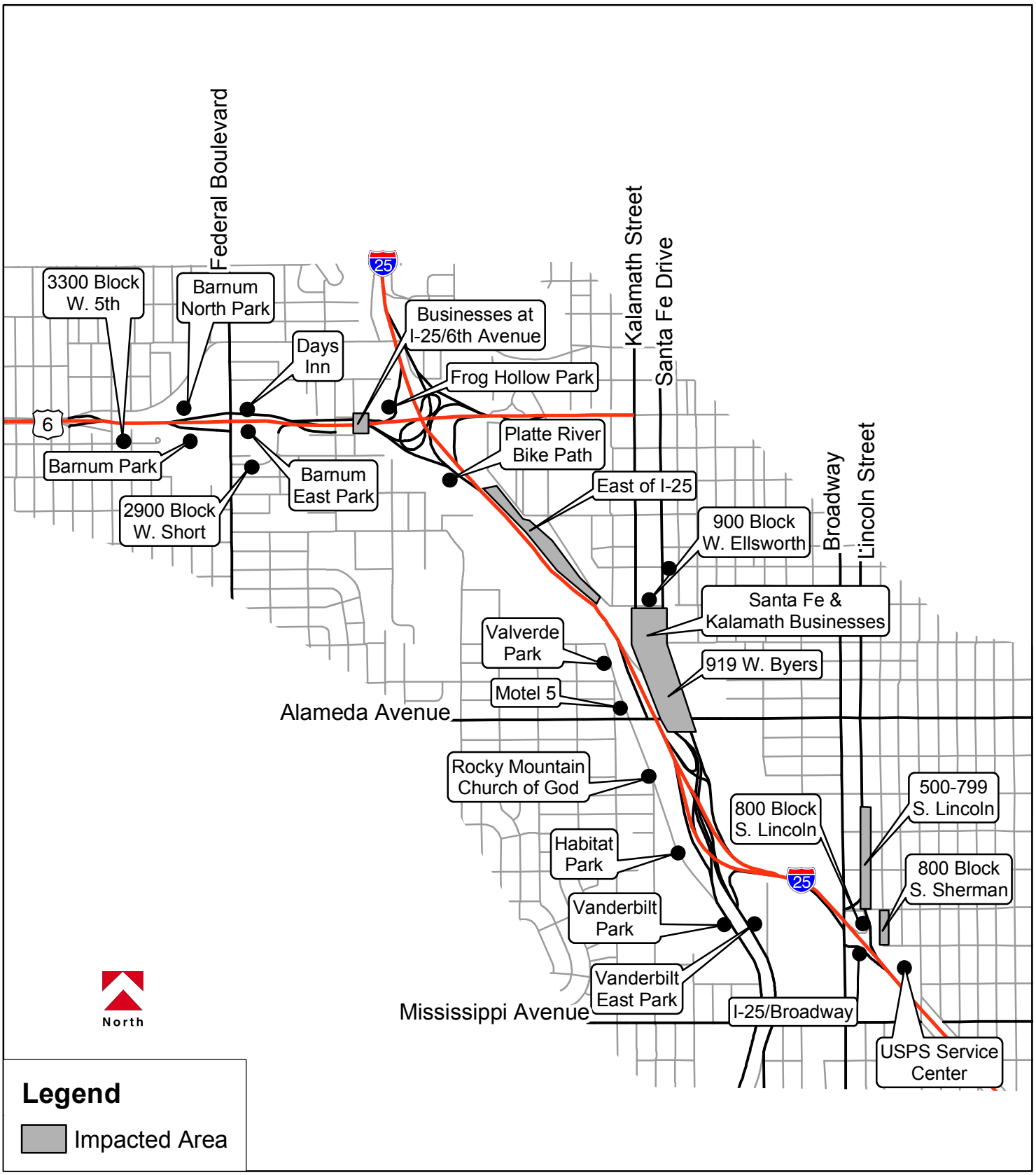
Portions of the following parks (see **Figure 4.6-7**) are estimated to have traffic noise levels above the CDOT NAC for Category B:

- Barnum Park
- Barnum East Park
- Barnum North Park
- Frog Hollow Park
- Valverde Park
- Habitat Park
- Vanderbilt Park
- Vanderbilt East Park
- South Platte River Trail (treated as a park for this evaluation)

Noise levels are also estimated to exceed the CDOT Category B NAC at:

- Motel 5 (1101 W. Alameda Avenue)
- Days Inn Motel (620 Federal Boulevard)
- Rocky Mountain Church of God (455 S. Platte River Drive)

However, none of these locations (see **Figure 4.6-7**) has any exterior facilities (e.g. yards or swimming pools). It should also be noted that all system alternatives, which include System Alternative 1, 2, 3, and the Preferred Alternative, will acquire Motel 5, so it is not a noise impact concern under any of the system alternatives.



Valley Highway, 02-069, 6/26/2006

0 0.25 0.5 1 Miles

Existing Noise-Impacted Areas

Valley Highway - Logan To 6th Ave. Environmental Impact Statement (EIS)

Figure 4.6-7

Finally, there are several commercial properties estimated to reach or exceed the Category C NAC (**Figure 4.6-7**) including:

- One business near the I-25/US 6 interchange
- Several businesses along the east side of I-25 between 4th Avenue and Virginia Avenue
- The U.S. Postal Service vehicle maintenance facility
- Two businesses near the I-25/Broadway interchange
- Several businesses along Santa Fe Drive/Kalamath Street

These results are regarded as being less of a concern than the Category B results because Category C properties are less noise sensitive.

4.6.1.3 RAILROAD NOISE

One noise measurement was made specifically for train noise (see **Figure 4.6-4**). The location was the intersection of Lipan Street and Ellsworth Avenue, about 180 feet from the tracks. One freight train passed during the one-hour monitoring period and an L_{eq} of 65 dBA was measured. It should be noted that this included noise from nearby I-25 traffic as well.

Train noise was assessed using the Federal Transit Administration (FTA) process. FTA uses several noise metrics for assessing noise impacts, but for this analysis the one-hour L_{eq} was used. For the modeling, 2.5 freight trains per hour, consisting of three locomotives and 50 cars moving at 30 miles per hour, were assumed to use the railroad corridor. Pursuant to railroad safety regulations, the trains must sound their horn at crossings at Santa Fe Drive and Kalamath Street.

Most of the land adjacent to the railroad in the project corridor is commercial, so the distance from the railroad line to where an L_{eq} of 71 dBA occurs was used to assess impacts to commercial properties. This noise level corresponds to the CDOT Category C NAC. The distance to the 71 dBA L_{eq} line was calculated for trains with and without locomotive horns sounding. Using the FTA estimation methods, the distance to 71 dBA L_{eq} is 170 feet with train horns and 50 feet without train horns. Between Alameda Avenue and US 6, numerous commercial buildings are presently within the 170-ft zone, and eight commercial buildings appear to be within the 50-ft zone.

The home nearest the rail line in the project area is in the 900 block of W. Byers Place, at a distance of 330 feet. The distance from the railroad to an L_{eq} of 66 dBA was used to assess impacts to residential properties. This noise level corresponds to the CDOT Category B NAC. The distance to the 66 dBA L_{eq} line was calculated for trains with and without locomotive horns. Using the FTA estimation methods, the distance to 66 dBA L_{eq} is 330 feet with train horns (the distance to the nearest home) and 110 feet without train horns.

4.6.1.4 RAILROAD VIBRATION

Vibration from trains has the potential to be noticeable and intrusive. Highway traffic and maintenance facility activities do not generally cause vibration problems. There has been limited research of how people respond to vibration from trains. With greater densification of land use,

more knowledge is being gained on how communities react to various levels of building vibration. The impact criteria for people in buildings subjected to ground-borne vibration and noise from trains is shown in **Table 4.6-3** (FTA, 1995).

Vibration Category 3 includes schools, churches, other institutions and quiet offices that do not have vibration-sensitive equipment but still have the potential for interference of functions. While it is generally appropriate to include office buildings in this category, it is not appropriate to include all buildings that have any designated office space. For example, most industrial buildings contain office space, but buildings primarily industrial in nature are not intended to be included in this category. Industrial buildings are often categorized in the "International Organization for Standardization (ISO) Workshop" environment with a threshold of 90 vibration decibels (Vdb) for impact evaluation (ISO,1984). Although the impact thresholds given in **Table 4.6-3** are based on experience with vibration from rail transit systems, they can be applied to freight train vibrations as well.

Table 4.6-3 Vibration Impact Criteria

Land Use Category	Ground-Borne Vibration Impact Levels (Vdb relative to 1 micro inch/sec)	
	Frequent Events[1]	Infrequent Events[2]
Category 1: Buildings where low ambient vibration is essential for interior operations	65 Vdb[3]	65 Vdb[3]
Category 2: Residences and buildings where people normally sleep	72 Vdb	80 Vdb
Category 3: Institutional land uses with primarily daytime use.	75 Vdb	83 Vdb

Source: FTA, 1995

[1] "Frequent" is defined as more than 70 vibrations per day. Most rapid transit falls into this category.

[2] "Infrequent" is defined as less than 70 vibrations per day. This category includes most commuter rail systems.

[3] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research land uses will require detailed evaluation to define the acceptable vibration levels.

Vdb –Velocity decibels

The vibration analysis was carried out using FTA's preliminary screening and general assessment procedures (FTA, 1995). FTA's guidelines were followed because FHWA does not have specific standards or analytical procedures for addressing vibration from transportation or railroad sources. The vibration assessment focused on the area of track relocation of the CML railroad corridor that is directly east of and parallel to I-25 from Alameda Avenue to the US 6 interchange (see **Figure 4.6-8**). **Table 4.6-4** lists the screening distances from a railroad where ground-borne vibration impacts are possible for various land uses. The buildings that are close enough to the railroad to warrant examination for vibration impact are numbered in **Figure 4.6-8**.

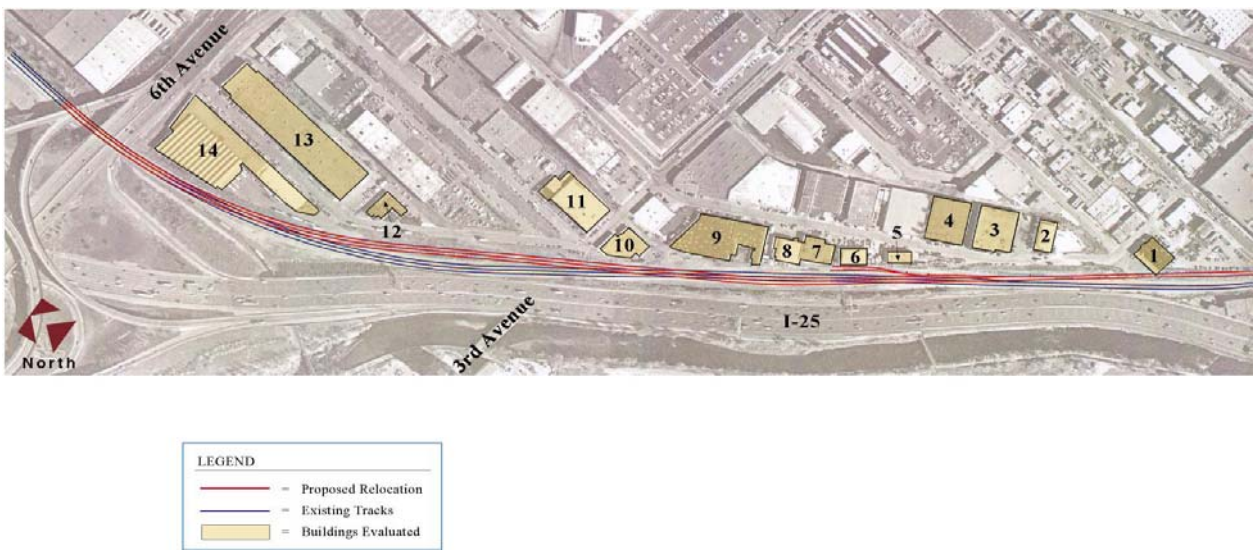
Table 4.6-4 FTA Screening Distances

Land Use Category	Distance to No Impacts
Category 1: Buildings where low ambient vibration is essential for interior operations	600 feet
Category 2: Residences and buildings where people normally sleep	200 feet
Category 3: Institutional land uses with primarily daytime use.	120 feet

Source: FTA, 1995

The 14 numbered buildings in **Figure 4.6-8** are all used as industrial facilities. As noted above, Category 3 does not typically include industrial buildings, but for this analysis, the Category 3 distance of 120 feet was used as the screening distance to be conservative. Three of these 14 buildings (4, 11, and 13) were eliminated from analysis because they were farther than 120 feet from the railroad.

Figure 4.6-8 Railroad Corridor Relocation Area



Following the preliminary screening, a general vibration impact analysis was performed. This general assessment procedure uses distance from the track to estimate vibration impacts. Adjustments were made for site-specific train speed, track structure, site geology, and building coupling according to FTA procedures to assess vibration levels at the 11 industrial buildings within 120 feet of the railroad. The overall finding was that none of the buildings appear to be impacted by railroad vibration.

4.6.2 Consequences of the Alternatives

The noise analysis was conducted to assess whether future noise levels near the project corridor would exceed the relevant CDOT NAC or cause a substantial noise increase. Either of these conditions would constitute a traffic noise impact. Noise models were constructed and run for I-25 and the other major project streets using predicted future (2025) traffic volumes and road layouts. Train noise impacts were assessed using the FTA process. The findings are presented in more detail in the Noise and Vibration Impact Assessment Report and Addendum (FHU, 2005f; FHU, 2006e) and are summarized in **Table 4.6-5**.

4.6.2.1 TRAFFIC NOISE

No Action Alternative

Model results for the No Action Alternative (see **Figure 4.6-9** and **Table 4.6-2**) are very similar to existing conditions results. Not surprisingly, the traffic noise patterns would be similar to existing noise contours pushed out a bit farther from the roads due to increased traffic volumes, so the impacted areas would be slightly larger overall. The impacts are summarized in **Table 4.6-5**. The model results show that for residences more than about 300 feet from I-25 or US 6, local traffic noise generally would be louder than highway traffic noise. The same Category B areas would be affected as under existing conditions (see **Figure 4.6-7**) with approximately 66 residences predicted to be at or above the CDOT Category B NAC. One additional residence on the 800-block of Sherman Street may be above the CDOT NAC. No noise-sensitive areas are expected to experience a 10-dBA increase as the largest increase is predicted to be 3 dBA.

There are several commercial properties with portions estimated to reach or exceed the Category C NAC including the U.S. Postal Service maintenance facility. In addition, two businesses near the I-25/US 6 interchange and many businesses along the east side of I-25 between 4th Avenue and Cherokee Street would exceed Category C NAC. Two businesses near the I-25/Broadway interchange and several businesses along Santa Fe Drive/Kalamath Street would also exceed Category C NAC. These results are similar to existing conditions.

Table 4.6-5 Noise Impact Summary

Location	Land Type	Number of Noise-Impacted Properties (without mitigation)					
		Existing Conditions	No Action	System 1	System 2	System 3	Preferred Alternative
Category B							
800 block S. Sherman Street	Residential	3	4	4	4	4	3
800 block S. Lincoln Street	Residential	9	9	9	0	6	6
500-799 S. Lincoln Street	Residential	41	41	41	41	41	41
900 block W. Ellsworth Avenue	Residential	3	3	3	3	3	3
2900 block W. Short Place	Residential	5	5	5	0	0	0
3300 block W. 5th Avenue	Residential	3	3	3	3	3	1
900 block Byers Place	Residential	1	1	1	1	1	1
Barnum Park	Park	1	1	1	1	1	1
Barnum East Park	Park	1	1	1	1	1	0*
Barnum North Park	Park	1	1	1	1	1	1
Frog Hollow Park	Park	1	1	1	1	1	1
Valverde Park	Park	1	1	1	1	1	1
Habitat Park	Park	1	1	1	1	1	1
Vanderbilt Park	Park	1	1	1	1	1	1
Vanderbilt East Park	Park	1	1	1	1	1	1
South Platte River bike path	Park	1	1	1	1	1	1
Motel 5	Motel	1	1	0	0	0	0
Days Inn	Motel	1	1	1	1	1	1
Rocky Mountain Church of God	Church	1	1	1	1	1	1
Category C							
6th Avenue	Commercial	1	2	2	2	2	1
I-25	Commercial	7	7	7	5	5	2
Post Office Service Center	Commercial	1	1	1	1	1	1
I-25/Broadway	Commercial	2	2	2	2	2	3
Santa Fe Drive/ Kalamath Street	Commercial	37	44	42	27	28	35

*braided ramp provides noise shielding from US 6

Valley Highway, 02-069, 6/26/2006

0 0.25 0.5 1 Miles

No Action Alternative: 2025 Noise Contours

Valley Highway - Logan To 6th Ave. Environmental Impact Statement (EIS)

Figure 4.6-9

System Alternative 1

Model results for System Alternative 1 (see **Figure 4.6-10** and **Table 4.6-2**) are similar to the No Action results, even with the proposed roadway changes. The impacts are summarized in **Table 4.6-5.** The same Category B areas would be affected (see **Figure 4.6-7**) and the same residences would be above the CDOT NAC. A small traffic noise benefit would be realized by grade separating Santa Fe Drive and Kalamath Street under the railroad. The fly-over ramps at I-25/Alameda Avenue and I-25/Santa Fe Drive would not impact any neighboring Category B areas, using CDOT/FHWA criteria.

The model results show that for residences more than about 300 feet from I-25 or US 6, local traffic noise generally would be louder than highway traffic noise. Approximately 66 residences are predicted to be at or above the CDOT Category B NAC for System Alternative 1. Of these 66 residences, 41 are located along Lincoln Street north of Ohio Avenue, in the area where noise from local streets predominates. No noise-sensitive areas are expected to experience a 10-dBA increase; the largest increase is predicted to be 5 dBA.

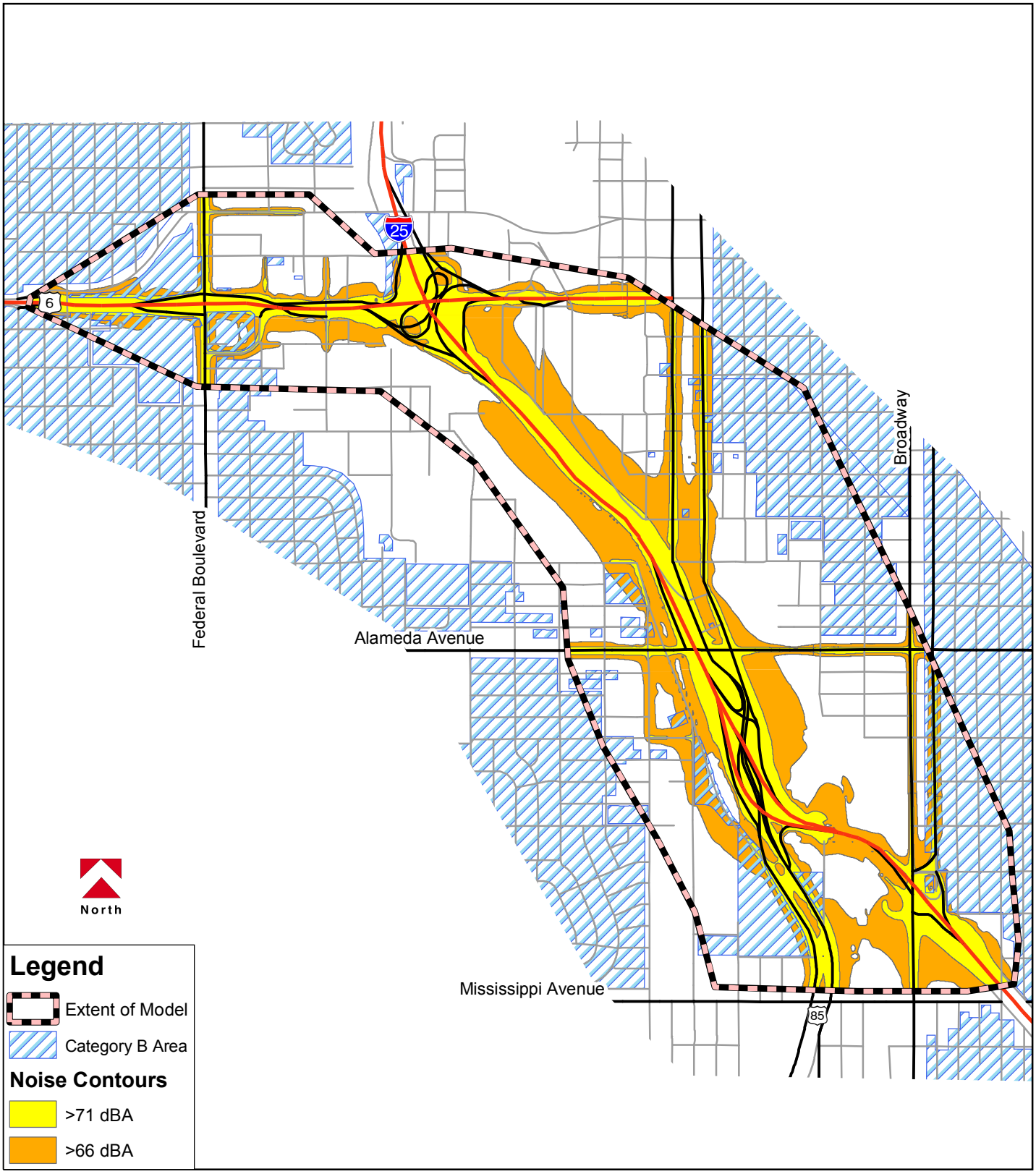
There are several commercial properties with portions estimated to reach or exceed the Category C NAC including the U.S. Postal Service vehicle maintenance facility. Two businesses near the I- 25/US 6 interchange and many businesses along the east side of I-25 between 4thAvenue and Cherokee Street would also reach or exceed the Category C NAC.
Two businesses near the I-25/Broadway interchange and several businesses along Santa Fe Drive/Kalamath Street would reach or exceed the Category C NAC. It should be noted that this alternative may remove two commercial buildings near I-25/Bayaud Avenue.

System Alternative 2

Model results for System Alternative 2 (see **Figure 4.6-11** and **Table 4.6-2**) are similar to the No Action model results, even with the proposed roadway changes. The impacts are summarized in **Table 4.6-5**. The same Category B areas would be affected (see **Figure 4.6-7**). A small noise benefit would be realized by grade separating Santa Fe Drive and Kalamath Street under the railroad. A small noise benefit would be realized by moving the Federal Boulevard-to-eastbound-US 6 ramp closer to US 6. The separation of Santa Fe Drive/Kalamath Street over Alameda Avenue would not impact any neighboring Category B areas, using CDOT/FHWA criteria. The fly-over ramp at I-25/Santa Fe would not impact any neighboring Category B areas, using CDOT/FHWA criteria.

The model results show that for residences more than about 300 feet from I-25 or US 6, local traffic noise generally is louder than highway traffic noise. Approximately 52 residences are predicted to be at or above the CDOT Category B NAC. Of these 52 residences, 41 are located along Lincoln Street north of Ohio Avenue, in the area where noise from local street predominates. No noise-sensitive areas are expected to experience a 10-dBA increase as the largest increase is predicted to be 4 dBA.

Several commercial properties have portions estimated to reach or exceed the Category C NAC including the U.S. Postal Service vehicle maintenance facility. Additionally, two businesses near the I-25/US 6 interchange and many businesses along the east side of I-25 between 4th Avenue and Bayaud Avenue would reach or exceed Category C NAC. Two businesses near the I-25/Broadway interchange and several businesses along Santa Fe Drive/Kalamath Street



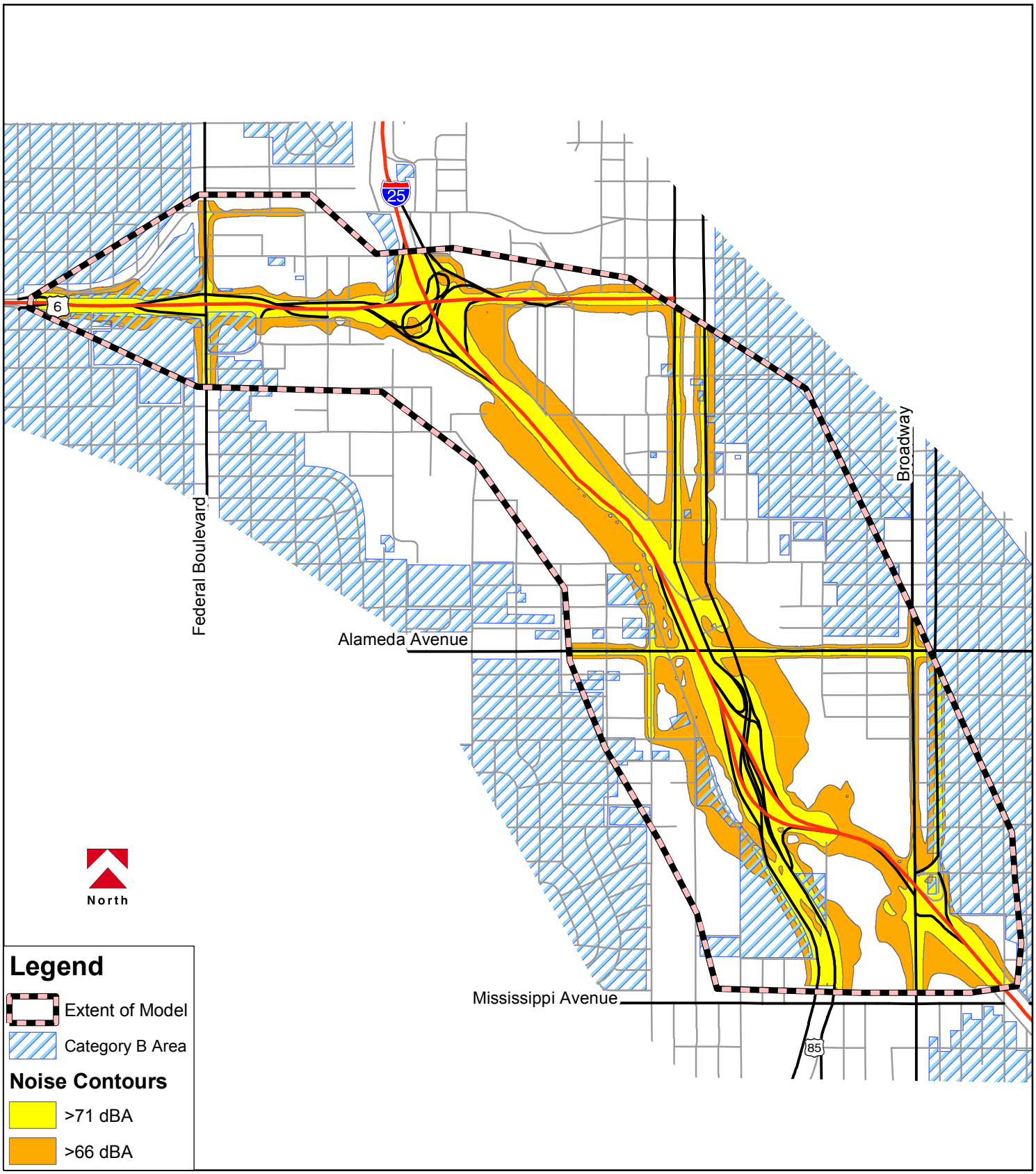
Valley Highway, 02-069, 6/26/2006

0 0.25 0.5 1 Miles

System Alternative 1: 2025 Noise Contours

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.6-10



Valley Highway, 02-069, 6/26/2006

0 0.25 0.5 1 Miles

System Alternative 2: 2025 Noise Contours

Valley Highway - Logan To 6th Ave. Environmental Impact Statement (EIS)

Figure 4.6-11

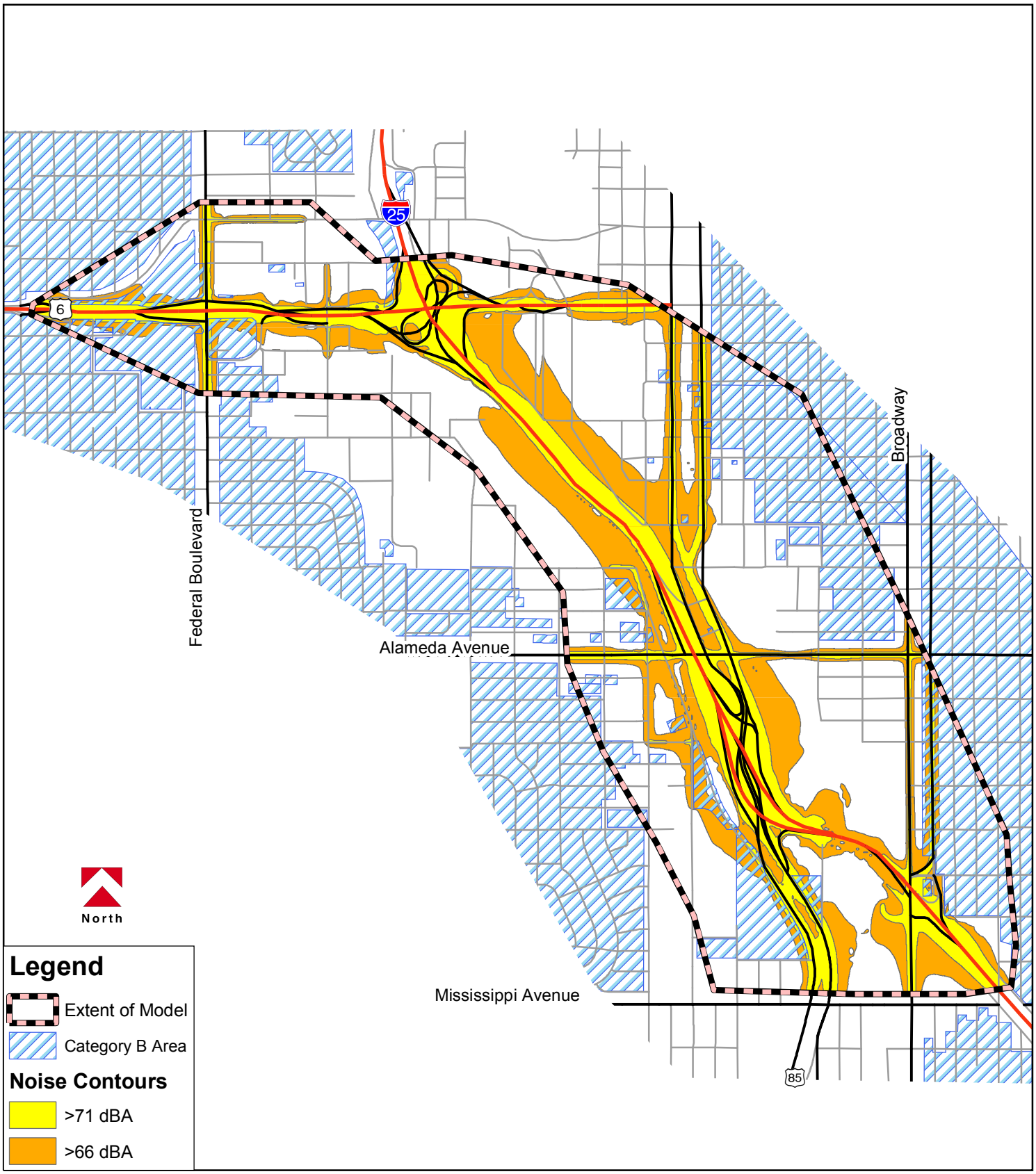
would reach or exceed Category C NAC. It should be noted that this alternative may remove two commercial buildings near I-25/Bayaud Avenue and the buildings between Santa Fe Drive, Kalamath Street, Bayaud Avenue and Dakota Avenue.

System Alternative 3

Model results for System Alternative 3 (see **Figure 4.6-12** and **Table 4.6-2**) are similar to the No Action Alternative model results, even with the proposed roadway changes. The impacts are summarized in **Table 4.6-5.** The same Category B areas are affected (see **Figure 4.6-7**). A larger local noise benefit than either System Alternatives 1 or 2 would be realized by grade separating Santa Fe Drive and Kalamath Street under both the railroad and Alameda Avenue. A small noise benefit would be realized by moving the Federal Boulevard-to-eastbound-US 6 ramp closer to US 6. A localized noise penalty would be realized from a realigned ramp at the I-25/Broadway interchange. The fly-over ramps at I-25/Alameda Avenue and I-25/Santa Fe Drive would not impact any neighboring Category B areas, using CDOT/FHWA criteria.

The model results show for residences more than about 300 feet from I-25 or US 6, local traffic noise generally would be louder than highway traffic noise. Approximately 58 residences are predicted to be at or above the CDOT Category B NAC. Of these 58 residences, 41 are located along Lincoln Street north of Ohio Avenue, in the area where noise from local streets predominates. No noise-sensitive areas are expected to experience a 10-dBA increase, as the largest increase is predicted to be 8 dBA. The maximum noise increase would be greater for System Alternative 3 because System Alternative 3 realigns an I-25 off-ramp closer to the remaining homes on the 800-block of Lincoln Street.

Several commercial properties have portions estimated to reach or exceed the Category C NAC, including the U.S. Postal Service vehicle maintenance facility. Two businesses near the I-25/US 6 interchange and many businesses along the east side of I-25 between 4th Avenue and Bayaud Avenue would reach or exceed Category C NAC. In addition, two businesses near the I-25/Broadway interchange and several businesses along Santa Fe Drive/Kalamath Street that would reach or exceed Category C NAC. It should be noted that this alternative may remove two commercial buildings near I-25/Bayaud Avenue and the buildings between Santa Fe Drive, Kalamath Street, Bayaud Avenue, and Dakota Avenue.



Valley Highway, 02-069, 6/26/2006

0 0.25 0.5 1 Miles

System Alternative 3: 2025 Noise Contours

Valley Highway - Logan To 6th Ave. Environmental Impact Statement (EIS)

Figure 4.6-12

Preferred Alternative

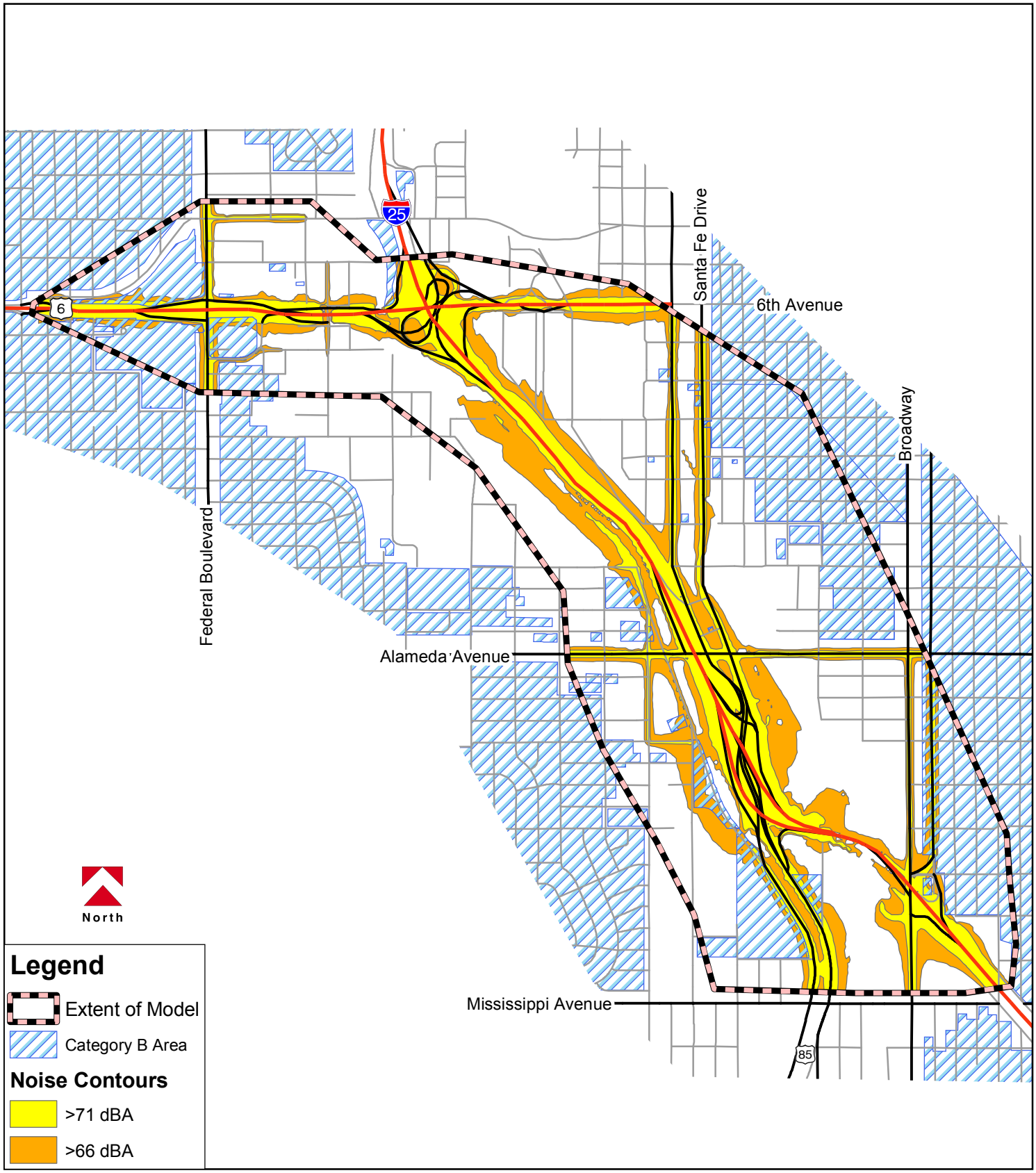
Model results for the Preferred Alternative (see **Figure 4.6-13** and **Table 4.6-2**) are similar to the No Action Alternative model results, even with the proposed roadway changes. The impacts are summarized in **Table 4.6-5.** Generally, the same Category B areas are affected (see **Figure 4.6-7**). A small traffic noise benefit would be realized by grade separating Santa Fe Drive and Kalamath Street under the railroad. A small noise benefit would be realized by moving the Federal Boulevard-to-eastbound-US 6 ramp closer to US 6. A localized noise penalty would be realized for four properties from a realigned ramp at the I-25/Broadway interchange. The fly-over ramps at I-25/Alameda Avenue and I-25/Santa Fe Drive would not impact any neighboring Category B areas, using CDOT/FHWA criteria. The model results show for residences more than about 300 feet from I-25 or US 6, local traffic noise generally would be louder than highway traffic noise. Approximately 55 residences are predicted to be at or above the CDOT Category B NAC. No noise-sensitive areas are expected to experience a 10-dBA increase, as the largest increase is predicted to be 7 dBA. This noise increase would be greater than for System Alternatives 1 or 2 because the Preferred Alternative realigns an I-25 off-ramp closer to the remaining homes on the 800-block of South Lincoln Street.

Several commercial properties have portions estimated to reach or exceed the Category C NAC, including the U.S. Postal Service vehicle maintenance facility. One business near the I-25/US 6 interchange and two businesses along I-25 between 4th Avenue and Bayaud Avenue would reach or exceed Category C NAC. In addition, three businesses near the I-25/Broadway interchange and 35 businesses along Santa Fe Drive/Kalamath Street that would reach or exceed Category C NAC. It should be noted that this alternative may remove two buildings near I-25/Bayaud Avenue and the buildings between Santa Fe Drive, Kalamath Street, Bayaud Avenue, and Dakota Avenue.

4.6.2.2 RAILROAD NOISE

Under all system alternatives, the railroad tracks would be grade-separated from Santa Fe Drive and Kalamath Street, which would eliminate the need for train horns in the project corridor and eliminate the impact zones from them. This would be a net noise benefit of the proposed project. The railroad tracks are also expected to be relocated as far as approximately 50 feet to the east between 4th Avenue and Ellsworth Avenue. These changes would bring the rails closer to some commercial buildings. This move would result in five to seven buildings within the 50-feet commercial impact zone, but the 170-feet zone would be eliminated along with the train horns. The rail relocation will not affect the distance (or the results) to the nearest homes in the corridor; however, the grade separation would eliminate the 330-feet zone along with the train horns, and would substantially reduce the train noise at homes in the larger area.

Overall, the changes in train noise due solely to the proposed relocation of the railroad would be minor because the relocation distance is not great. However, the proposed grade separation would markedly reduce train noise in the larger area through the elimination of locomotive horns. The proposed changes would provide a net noise benefit to the larger railroad corridor and no mitigation actions are necessary.



Valley Highway, 02-069, 6/19/2006

0 0.25 0.5 1 Miles

Preferred Alternative: 2025 Noise Contours

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.6-13

4.6.2.3 RAILROAD VIBRATION

As noted above, FTA's impact thresholds are based on experience with vibration from rail transit systems, but they can be applied to freight rail vibrations as well. These projected vibrations were adjusted for train speed and site geology.

The results of the vibration impact assessment are summarized in **Table 4.6-6**. This table lists the building number from **Figure 4.6-8**, the predicted vibration level and FTA criterion.

As **Table 4.6-6** shows, the predicted vibration for both locomotives and rail cars are less than the ISO 90 Vdb impact level for industrial buildings. In addition, all the buildings analyzed, except for Buildings 1 and 14, satisfy the more restrictive impact level requirements for FTA Category 3. Part of Building 1 must be demolished to accommodate the track relocation. Ballast mats could be used as mitigation near Buildings 1 and 14 to lower the vibration impact to fall within the Category 3 limits, but it is not necessary for these buildings to meet the Category 3 limits.

Table 4.6-6 Vibration Impact Projections without Mitigation

Building	Location	Distance from Near Track (feet)	Rail Car		Locomotive	
			Impact Criterion (Vdb)	Projected Vibration (Vdb)	Impact Criterion (Vdb)	Projected Vibration (Vdb)
1	1030 W. Ellsworth Avenue	25	75	73	83	86
2	50 Rio Grande Boulevard	103	75	63	83	75
3	70 Rio Grande Boulevard	108	75	63	83	74
5	95 Rio Grande Boulevard	55	75	69	83	80
6		52	75	69	83	81
7	123 Rio Grande Boulevard	59	75	68	83	79
8	201 Rio Grande Boulevard	58	75	68	83	79
9	275 Rio Grande Boulevard	54	75	69	83	80
10	1480/1490 W. 3rd Avenue	36	75	72	83	83
12	400 Raritan Way	104	75	63	83	75
14	401 Quivas Street	33	75	72	83	84

Notes:
Buildings 4, 11, and 13, were beyond the screening distance and are not included.
Buildings 5, 6, 7, 8, and 9 are at relatively greater distance from nearest track
Vdb – Velocity decibels

4.6.3 Mitigation Measures

The noise analysis was conducted to assess whether future noise levels near the project corridor would cause a noise impact. Impacted areas are not guaranteed mitigation measures, but mitigation measures must be evaluated. Traffic noise impacts are predicted in the project area (see **Section 4.6.2**); therefore, noise mitigation measures for the impacted areas were considered and evaluated following CDOT guidelines (CDOT, 2002a). The overall feasibility and reasonableness of each noise mitigation measure that provided an acceptable benefit for the impacted receivers were evaluated. Only mitigation measures that are found to be both reasonable and feasible are recommended for implementation (CDOT, 2002a).

Typically, noise barriers are the mitigation action evaluated, but avoidance and non-barrier mitigation were also considered. These findings are presented in the Noise and Vibration Impact Assessment Report and Addendum (FHU, 2005f; FHU, 2006e).

Barriers are the only viable mitigation for providing the required noise reduction in the space available and were the only mitigation considered in detail. To permit evaluation, barriers protecting each impacted area (see **Figure 4.6-14**) were developed for the system alternatives and the models were re-run to assess barrier effectiveness. Following CDOT guidelines, barriers providing 10 dBA and 5 dBA of noise reduction were both evaluated for feasibility and reasonableness. After the minimum barrier parameters were established in a given area for a feasible barrier (if possible) from the model runs, each barrier was processed through a reasonability assessment according to CDOT guidance (CDOT, 2002a). Barriers that were found to be both feasible and reasonable were recommended for implementation (see **Table 4.6-7**).

The impacted areas include multiple geographic areas and multiple land uses. The impacted areas and mitigation evaluations included:

- 800 Block of S. Sherman Street
- 500-899 South Lincoln Street
- 900 Block of W. Ellsworth Avenue
- 2900 Block of W. Short Place
- 3300 Block of W. 5th Avenue
- Barnum Park
- Barnum East Park
- Barnum North Park
- Frog Hollow Park
- Valverde Park
- Habitat Park
- Vanderbilt Park
- Vanderbilt East Park
- Days Inn Motel
- Rocky Mountain Church of God
- South Platte River Bike Path
- 900 block of W. Byers Place
- Various Commercial Areas

Valley Highway, 02-069, 6/19/2006

0 1,000 2,000 4,000 Feet

Mitigation Barriers Evaluated

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.6-14

Table 4.6-7 Noise Mitigation Barrier Summary

Noise Impacted Area	Barrier For 5 dBA Noise Reduction						Barrier For 10 dBA Noise Reduction				
	Barrier Length (feet)	Barrier Height (feet)	Feasible?[1]	Reasonable?[1]	Recommended?	Comment	Barrier Height (feet)	Feasible?[1]	Reasonable?[1]	Recommended?	Comment
Category B											
800 block S. Sherman Street	NA	NA	NA	NA	NA	This area is covered by a new T-REX barrier.	NA	NA	NA	NA	This area is covered by a new T-REX barrier.
800 block S. Lincoln Street-Alternative 1	840	6-8	Yes	Yes	Yes	Cost/benefit is reasonable.		No		No	10 dBA reduction could not be achieved.
800 block S. Lincoln Street-Alternative 3 and Preferred Alternative	360	12	Yes	Yes	Yes	Cost/benefit is high but still recommended.		No		No	10 dBA reduction could not be achieved.
500-799 S. Lincoln Street	NA	NA	No		No	A noise barrier would prohibit access to the homes.		No		No	A noise barrier would prohibit access to the homes.
900 block W. Ellsworth Avenue	NA	NA	No		No	A noise barrier would prohibit access to the homes.		No		No	A noise barrier would prohibit access to the homes.
2900 block W. Short Place-Alternative 1	260	8	Yes	Yes	Yes	For Alternative 1 only.	25	Yes	No	No	This barrier needed to be 420 feet long.
3300 block W. 5th Avenue	300	10	Yes	No	No	Barrier provides relatively little benefit..		No		No	10 dBA reduction could not be achieved.
900 block W. Byers Place	NA	NA	No		No	A noise barrier would prohibit access to the home.		No		No	A noise barrier would prohibit access to the home.
Barnum Park	1200	10-11	Yes	No	No	Barrier provides relatively little benefit.					Not analyzed.
Barnum East Park	NA	NA	No		No	Could not achieve 5-dBA reduction.					Not analyzed.
Barnum North Park	1350	14	Yes	No	No	Barrier provides relatively little benefit.					Not analyzed.
Frog Hollow Park	1500	8	Yes	No	No	Barrier provides relatively little benefit.					Not analyzed.

Table 4.6-7 Noise Mitigation Barrier Summary (Continued)

Noise Impacted Area	Barrier For 5 dBA Noise Reduction						Barrier For 10 dBA Noise Reduction				
	Barrier Length (feet)	Barrier Height (feet)	Feasible?[1]	Reasonable?[1]	Recommended?	Comment	Barrier Height (feet)	Feasible?[1]	Reasonable?[1]	Recommended?	Comment
Valverde Park	550	10	Yes	No	No	Barrier provides relatively little benefit.					Not analyzed.
Habitat Park	NA	NA	No		No	A noise barrier would prohibit access to the park.					Not analyzed.
Vanderbilt Park	2100	6-7	Yes	No	No	Barrier provides relatively little benefit.					Not analyzed.
Days Inn	NA	NA	No		No	No exterior uses in the impacted area.					Not analyzed.
Vanderbilt East Park	1050	14	Yes	No	No	Barrier provides relatively little benefit.					Not analyzed.
Platte River bike path	2100	12	Yes	No	No	Barrier provides relatively little benefit.					Not analyzed.
Platte River bike path at 3rd Avenue	500	9	Yes	No	Yes	Cost/benefit is high but still recommended	13	Yes	No	No	Cost/benefit is too high
Motel 5	NA	NA	NA	NA	NA	All System Alternatives remove this motel					Not analyzed.
Rocky Mountain Church of God	NA	NA	No		No	Barrier conflicts with access; no exterior uses.					Not analyzed.
Category C											
I-25/6th Avenue	750	6-9	Yes	No	No	Cost/benefit is too high.					Not analyzed.
East of I-25	2200	10	Yes	No	No	Cost/benefit is too high.					Not analyzed.
Post Office Service Center	580	9	Yes	No	No	Cost/benefit is too high.					Not analyzed.
I-25/Broadway	725	11-14	Yes	No	No	Cost/benefit is too high.					Not analyzed.
Santa Fe Drive/Kalamath Street	NA	NA	No			Could not get 5 dBA reduction. Barrier blocking noise also blocks property access.					Not analyzed.
S. Santa Fe/I-25	1300	5-12	Yes	No	No	Cost/benefit is too high.					Not analyzed.

[1]According to CDOT guidelines (CDOT, 2002a).
NA - not applicable

The feasibility and reasonableness evaluations for the noise barriers resulted in the recommendation of certain mitigation actions (see **Table 4.6-7**) to be further considered and refined during final design. The barriers for the other traffic noise impacted areas were found to be either infeasible or unreasonable and were not recommended. For brevity, only the recommended noise barriers are described below. More detailed information on the other barriers evaluated can be found in the Noise and Vibration Impact Assessment and Addendum (FHU, 2005f; FHU, 2006e) and **Table 4.6-7**.

4.6.3.1 TRAFFIC NOISE

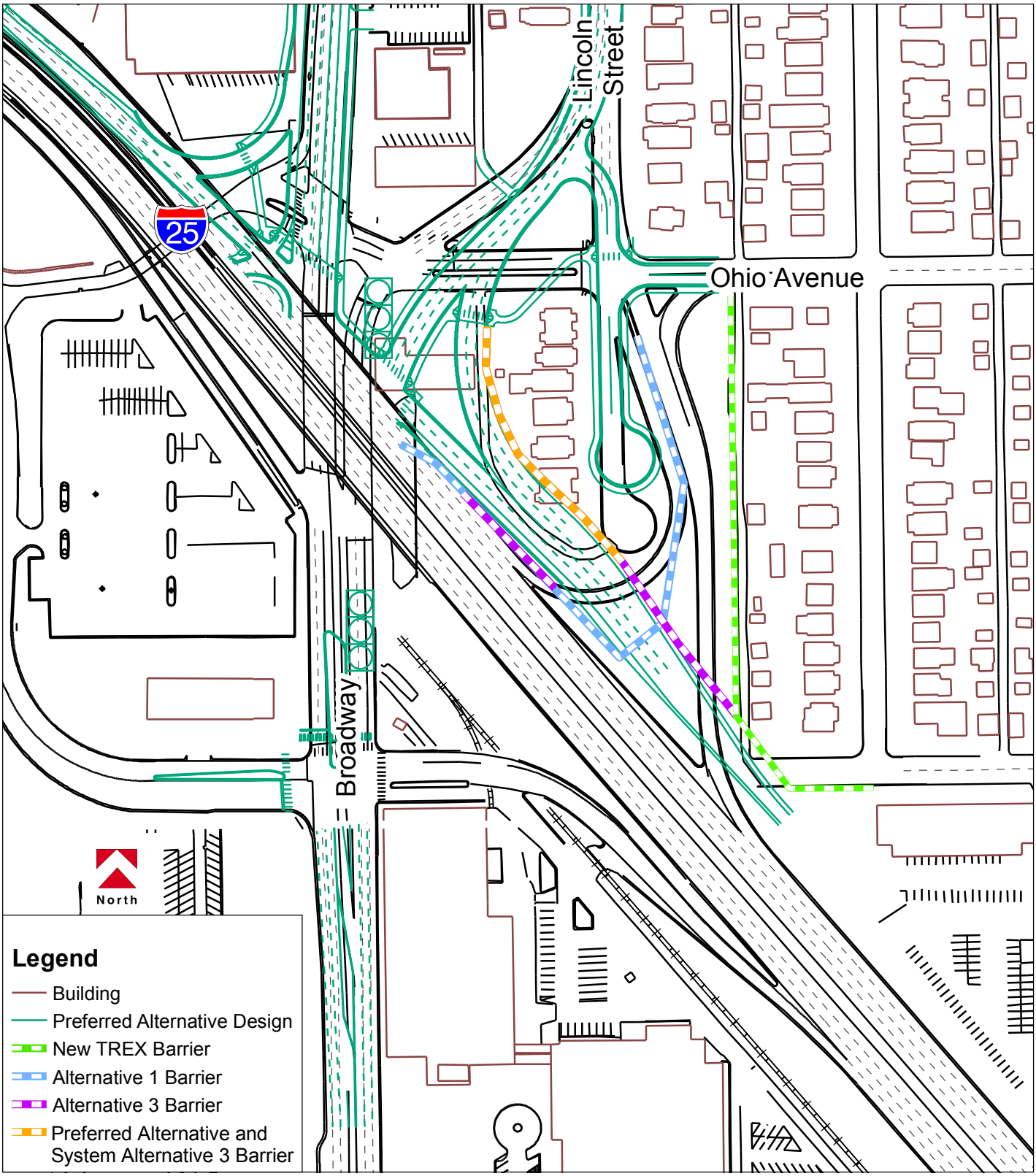
Lincoln Street South of Ohio Avenue

Lincoln Street south of Ohio Avenue in the study area consists solely of the homes on the 800 block. Along with the homes on Sherman Street, these homes are the closest residences to I-25 in the entire project corridor. With the complex traffic noise situation in this area, a 10-dBA noise reduction could not be achieved short of encircling the homes with barriers, which is not feasible. Therefore, mitigation for a 10-dBA noise reduction is not discussed further.

Under System Alternative 1, none of the homes on this block would be physically disturbed. This alternative will leave the future roads similar to the current roads. A barrier was modeled between the homes and both I-25 and the future off-ramp (see **Figure 4.6-15**). With the current understanding of future ground elevations, a continuous barrier varying in height from 6 to 8 feet and 840 feet long would provide a 5-dBA noise reduction for most of the homes on the block. The cost/benefit calculation for this barrier was in the reasonable category following CDOT guidelines. Therefore, the barrier is recommended, especially with these houses being closely surrounded by busy roads.

Under System Alternative 2, all of the homes on this block would be removed. Therefore, no mitigation for this block is necessary under this alternative.

For System Alternative 3 and the Preferred Alternative, the two southernmost homes on this block would be removed; the other homes on the block would remain. The I-25 off-ramp would be relocated from the east to west sides of the homes. With the current understanding of future ground elevations, the barrier would be 12 feet tall and 360 feet long. The cost/benefit calculation for these barriers was in the unreasonable category of CDOT guidelines. However, the noise abatement barriers are still recommended, given the unusual circumstance of these houses being closely surrounded by busy roads.



Valley Highway, 02-069, 6/19/2006

0 125 250 Feet

South Lincoln Street Mitigation Barriers

Valley Highway - Logan To 6th Ave. Environmental Impact Statement (EIS)

Figure 4.6-15

2900 Block of W. Short Place

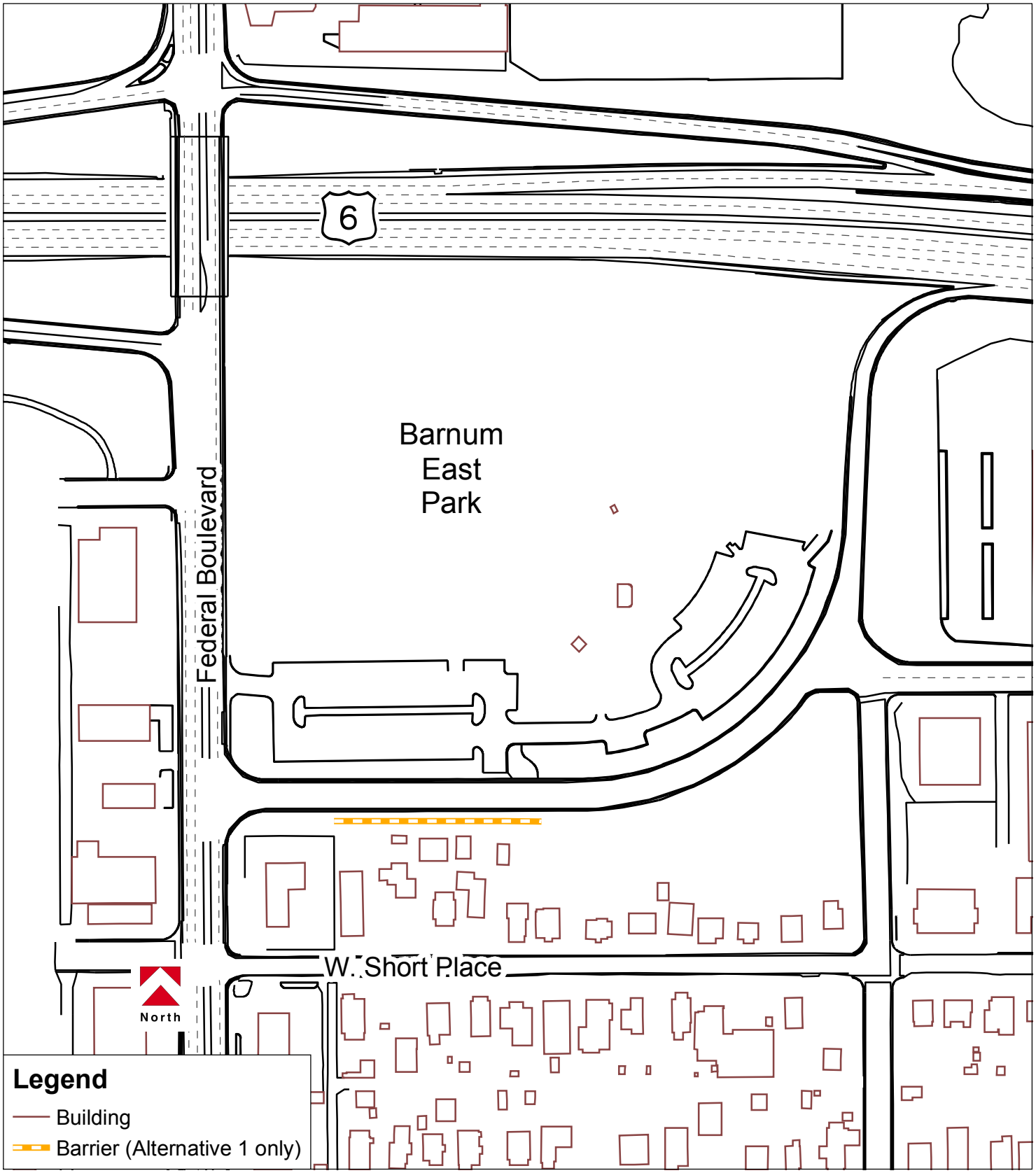
Four residences on Short Place would have noise levels above the NAC due to traffic on the ramp from Federal Boulevard to eastbound US 6. Replacing the rear property fences with a barrier (see **Figure 4.6-16**) approximately 8 feet by 260 feet would provide a 5-dBA noise abatement for these properties and this barrier was found to be both feasible and reasonable. To achieve a 10 dBA noise reduction at this position, a barrier 25 feet tall and 420 feet long was necessary, which was found to be unreasonable according to CDOT guidelines. The 8-feet barrier is being recommended only for System Alternative 1. System Alternatives 2 and 3, and the Preferred Alternative would relocate this ramp closer to US 6 and remove the traffic noise impact from these homes, so this barrier would not be needed for System Alternatives 2, 3, or the Preferred Alternative.

South Platte River Trail

Parts of the South Platte River Trail are predicted to have noise levels that would exceed the Category B NAC. The portion of the trail covered by this evaluation is the section between 6th Avenue and Alameda Avenue. There is a subsegment of the trail at 3rd Avenue (see **Figure 4.6-17**) where the path is at the same elevation as I-25 and as little as 10 feet from I-25 pavement. This segment is very noisy and its current arrangement raises some safety concerns. For this segment of the trail, a barrier 9 feet high by 500 feet long could provide more than 5 dBA of noise reduction and could provide a safety benefit to bicyclists. (A 13-feet barrier could provide 10 dBA of noise reduction on the bike path.) The 9-foot high barrier is recommended. Barriers for other portions of the trail are not recommended (FHU, 2005f; FHU, 2006e).

4.6.3.2 RAILROAD VIBRATION

Neither the applicable FTA nor ISO vibration criteria were exceeded at the buildings analyzed along the rail relocation corridor, so no vibration mitigation is necessary.



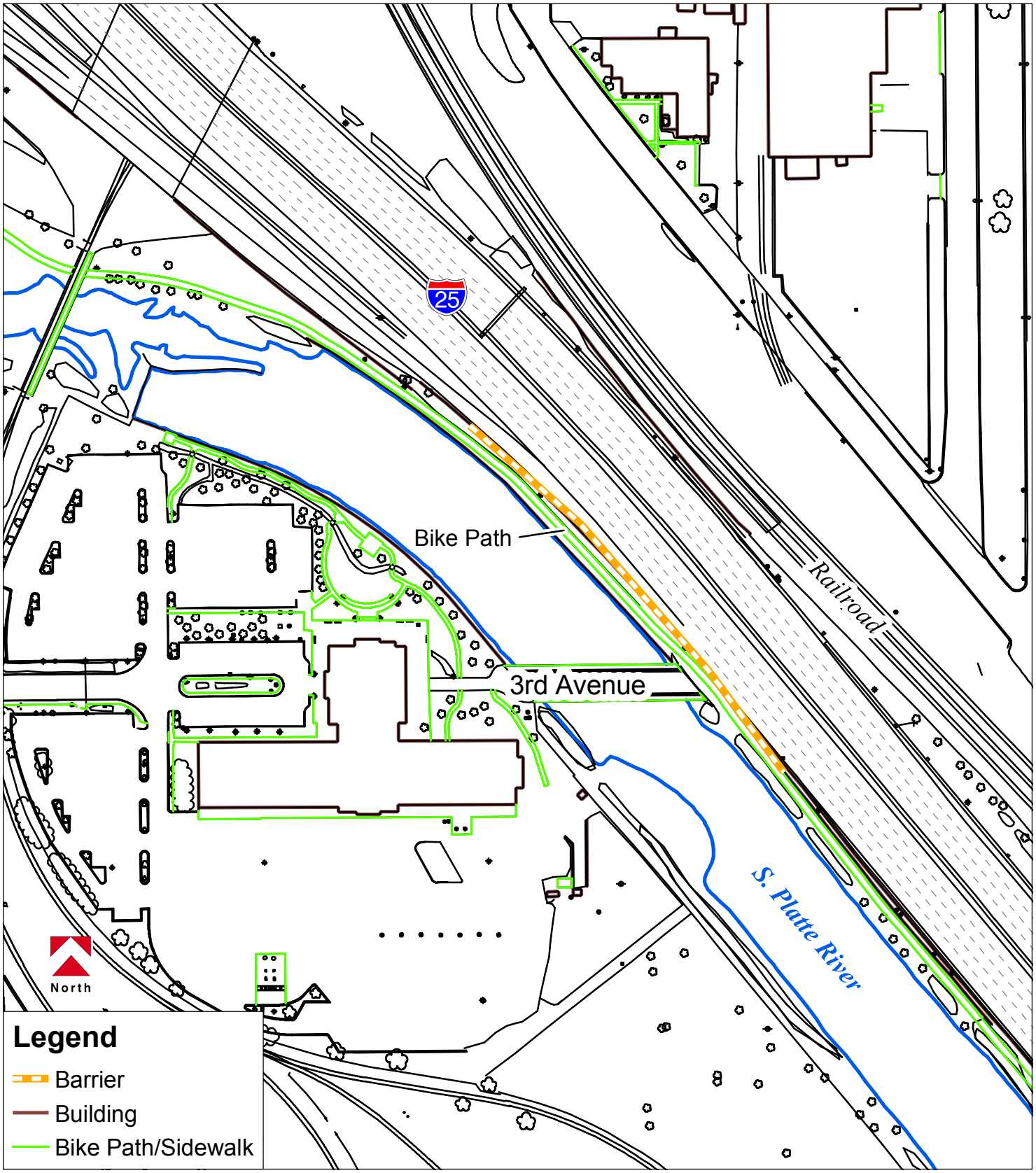
Valley Highway, 02-069, 10/27/2004

0 125 250 Feet

West Short Place Mitigation Barrier

Valley Highway Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.6-16



Valley Highway, 02-069, 6/19/2006

0 125 250 Feet

South Platte Trail Mitigation Barrier

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.6-17

4.6.4 Nuisance Noise Considerations

The Citizen Working Group for noise provided a means for neighbors of the project corridor and interested citizens to express issues and concerns to CDOT. The members of the Citizen Working Group made it clear that noise from the project corridor is a major concern to them.

Noise impacts were examined as a standard part of the EIS in accordance with CDOT/FHWA guidelines. These guidelines specify that a noise impact occurs when a property approaches or exceeds the NAC specific to the property use, or when a property will experience a noise increase of 10 dBA or more. The guidelines further specify that impacted properties are evaluated for noise mitigation measures on the basis of feasibility and reasonableness of the mitigation measure. Specific noise mitigation measures (i.e., barriers) for impacted properties may or may not be recommended based on this mitigation evaluation. Properties that are not predicted to experience a noise impact typically are not considered for noise mitigation.

Members of the Citizen Working Group made it clear that they are bothered by traffic noise from the existing highway corridor, even if the sound levels are less than those specified in the CDOT/FHWA guidance. Working Group members were very interested in trying to reduce this "nuisance noise" that is not captured by the typical CDOT/FHWA noise analysis process. For purposes of this discussion, the "nuisance noise" of interest includes the following characteristics:

- Encompasses noise from traffic
- Is below CDOT/FHWA NAC levels
- Bothers/annoys people
- Interferes with quality of life
- Includes low-frequency sounds not adequately covered by A-weighted sound levels (i.e., C-weighted sound levels)
- Impacts property values

In light of this, the Citizen Working Group developed the following suggestions to be considered to reduce "nuisance noise" and improve the quality of life for neighbors of the project corridor.

- **Alternative Selection –** Consider the alternative or improvement that has the least impacts from a noise perspective as evaluation criteria. (Note: the Preferred Alternative includes the least noise element alternatives for the interchanges at I-25/ Broadway and US 6 /Federal where residential areas are closest to the project highway corridors.)
- **Pavement Type –** Consider the quietest pavement type throughout the corridor that can meet the safety and durability requirements. Stone matrix asphalt, which has been used on the new I-25/Broadway viaduct, was an example cited of a way to implement nuisance noise considerations. CDOT has recently initiated a study to evaluate the long-term relationship between different pavement types/surface textures and traffic noise, and this information may be used in the future to help minimize traffic noise.
- **Taller Barriers –** Use the taller Type 7 barriers or similar in the corridor to maximize noise reduction benefits from these necessary project components.

- **Absorptive Material –** Use sound-absorptive material wherever possible in the project corridor. This includes pavement type and vegetation.
- **Aesthetic Treatment/Landscaping –** Use aesthetic treatments and landscaping in the project to reduce traffic noise where possible. Combine visual treatments with noise-reducing properties, such as rough/uneven surfaces that reflect less sound rather than flat surfaces. Use earthen berms where possible. Use multi-purpose barriers (traffic control and noise reduction) wherever possible. Coordinate planning and design so that noise reduction actions are considered throughout the corridor.
- **Focused Actions –** Focus noise reduction actions to provide the most benefit to the most sensitive noise receptors.

In response to these concerns and suggestions, CDOT has agreed to consider additional noise reduction measures through project design. These are not mitigation actions and are not directed toward the traffic noise impacted properties. These are project enhancements that may be implemented as feasible to address concerns that are beyond the project impacts and project mitigation actions. Therefore, for project enhancement and betterment purposes, CDOT will evaluate the technological and economic feasibility of the following actions in final design of each construction phase of the project:

- Adopt traffic noise reduction as a goal in project development
- Evaluate noise barriers and other noise reduction techniques
- Examine noise impacts from a broader perspective
- Plan for noise reduction actions comprehensively throughout design
- Include noise-reducing technologies systematically

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TABLE OF CONTENTS

Page

4.7 Historic Preservation 4.7-1
4.7.1 Current Conditions 4.7-2
4.7.2 Consequences of the Alternatives 4.7-9
4.7.3 Mitigation Measures 4.7-18

LIST OF FIGURES

Page

Figure 4.7-1 Historic Properties 4.7-3
Figure 4.7-2 Historic Properties – System Alternative 1 ..... 4.7-11
Figure 4.7-3 Historic Properties – System Alternative 2 ..... 4.7-13
Figure 4.7-4 Historic Properties – System Alternative 3 ..... 4.7-15
Figure 4.7-5 Historic Properties – Preferred Alternative 4.7-17

LIST OF TABLES

Page

Table 4.7-1 NRHP-Eligible Historic Resources in the Area of Potential Effects 4.7-4
Table 4.7-2 Impacts to NRHP-Eligible Historic Resources 4.7-9

4.7 Historic Preservation

Historic and archaeological resources encompass man-made features and physical remains of past human activity, generally at least 50 years old. A 45-year age threshold was adopted for the Valley Highway Project to account for the time between design and construction. Historic resources include buildings, bridges, railroads, roads, and other structures. Archaeological resources are often buried and include artifacts and features associated with prehistoric Native American occupation, but can also include historical (Euro-American) artifacts, features, and ruins.

Significant historic and archaeological resources are afforded consideration by Section 106 of the National Historic Preservation Act of 1966, as amended, as well as Section 4(f) of the Department of Transportation Act of 1966. Significant historic and archaeological resources are those that are listed or eligible for inclusion on the National Register of Historic Places (NRHP). Sites qualifying for the NRHP must retain sufficient integrity (of location, design, setting, materials, workmanship, feeling, and association) and meet one or more of the eligibility criteria specified in 36 CFR 60.4. To merit NRHP-eligibility, a site must meet one or more of the following criteria:

A. Be associated with events that have made a significant contribution to the broad patterns of our history

B. Be associated with the lives of persons significant in our past

C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction

D. Have yielded, or may be likely to yield, information important in prehistory or history

Important historic and archaeological resources must be identified and considered during planning for federally-assisted transportation projects, in accordance with Section 106 of the National Historic Preservation Act. The Section 106 review process consists of the following steps:

- Define an Area of Potential Effect (APE)
- Identify historic and archaeological resources through a file search and field surveys
- Evaluate the significance of historic and archaeological resources by applying the NRHP criteria
- Assess impacts to significant (NRHP-eligible or listed) resources by applying the criteria of adverse effects
- Consult with the State Historic Preservation Officer (SHPO) and consulting parties concerning NRHP-eligibility findings and determinations of effect
- Resolve adverse effects, in consultation with the SHPO, consulting parties and the Advisory Council on Historic Preservation

Important historic and archaeological resources are also afforded protection by Section 4(f) of the Department of Transportation Act of 1966 (see **Chapter 5** *Section 4 (f) Evaluation*).

4.7.1 Current Conditions

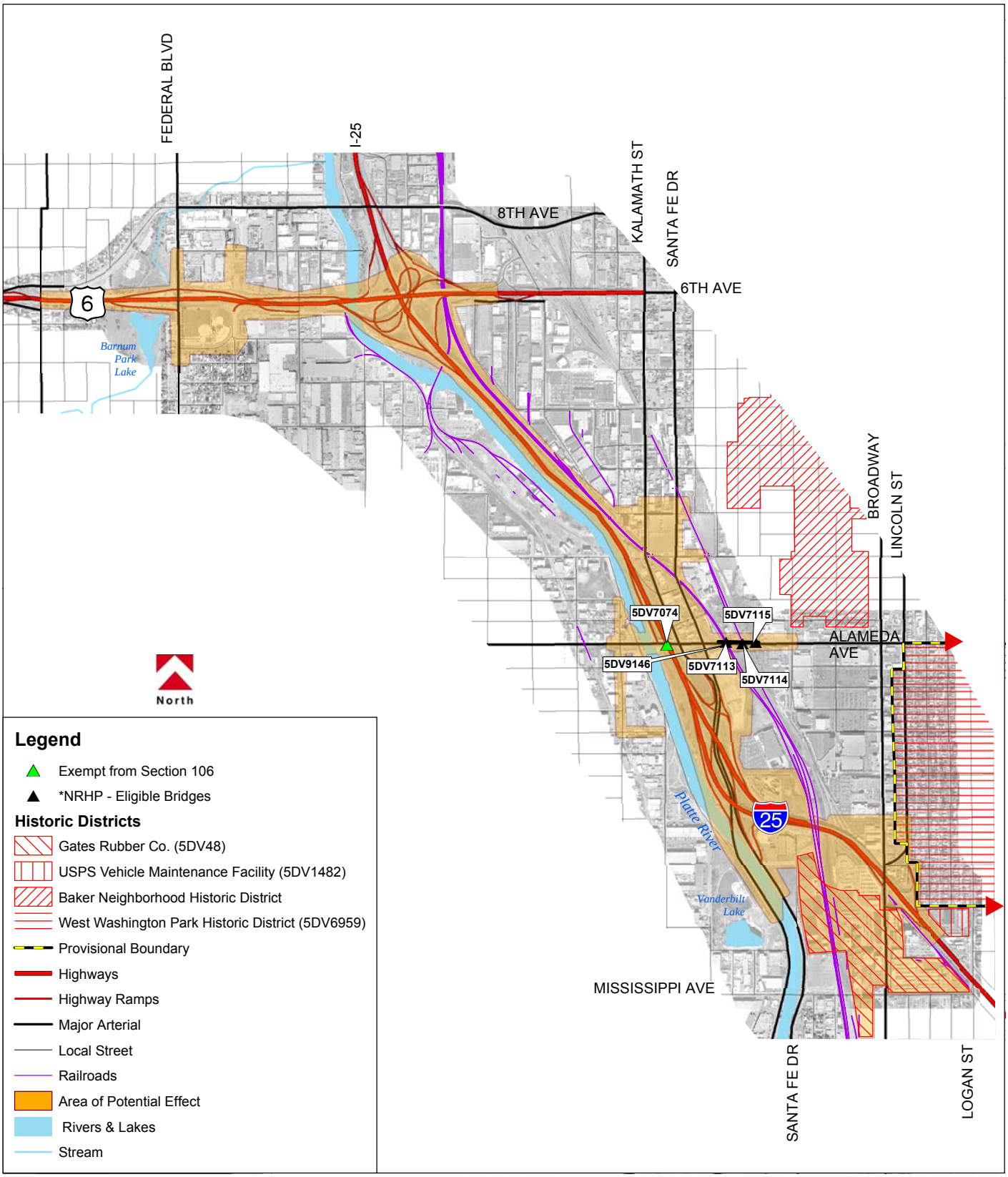
Consultation between CDOT and the SHPO resulted in agreement about the survey methodology to be employed, and general definition of an APE for historic and archaeological resources. This agreement was documented by correspondence between CDOT and the SHPO, including a letter submitted by CDOT to the SHPO on February 12, 2004, explaining the proposed methodology and APE (CDOT, 2004a), and a letter of concurrence issued by the SHPO to CDOT on February 19, 2004 (see **Appendix A**).The APE consists generally of the footprint of the combined alternatives, which include System Alternatives 1, 2, 3, and the Preferred Alternatives, plus a 50-ft buffer to account for possible earthwork along the roadway margins (SHPO, 2004).

The APE was intended to encompass all properties built in or before 1957 located within or directly adjacent to the proposed improvements, which may be subject to direct or indirect impacts. The APE was expanded in one area near the Federal Boulevard and US 6 interchange, to include a row of historical houses on West Short Place, just south of Barnum East Park. Although these properties do not face the proposed improvements and are unlikely to be affected by the project, they are close enough to require documentation and evaluation for the EIS. The APE was also expanded eastward to the alley in the 700 block of Lincoln Street, between Ohio Avenue and Exposition Avenue, to include the entire lots of historical houses in that block.

In response to comments from the SHPO and other Section 106 consulting parties, CDOT expanded the APE to encompass the entire Gates Rubber Company Historic District, although no further survey of buildings and features within the district was deemed necessary since no contributing elements will be affected by any of the build alternatives.

A file search conducted at the SHPO, as well as comprehensive cultural resource field survey, identified 58 previously recorded and 65 newly recorded historic sites within the APE. Due to intensive urban development over the past 140 years, no archaeological sites are known to exist in the APE. The methods and results of this investigation are detailed in the *Cultural Resources Inventory* (FHU, 2004a). The NRHP-eligibility of historic resources in the APE was established through consultation between CDOT and the SHPO. On March 23, 2004, CDOT submitted a Determination of Eligibility to the SHPO for sites inventoried in the APE, and the SHPO officially concurred with these findings in a letter to CDOT dated April 23, 2004 (see **Appendix A**).

There are a total of 36 historic resources within the APE (see **Figure 4.7-1** and **Table 4.7-1**). These include two NRHP-eligible historic districts, three individually eligible bridges, and the NRHP-eligible West Alameda Subway grade separation structure. Thirty additional historic buildings are not individually eligible but have been officially determined to be contributing elements of an undefined NRHP-eligible historic district encompassing the West Washington Park neighborhood. Summary information about each significant historic resource is presented below.



*NRHP: National Register of Historic Places
Sources: FHU, 2004a; SHPO, 2002

0 0.25 0.5 1 Miles

Historic Resources

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.7-1

Table 4.7-1 NRHP-Eligible Historic Resources in the Area of Potential Effects

Site No.	Site ID	Applicable NRHP Criteria	Date Evaluated by SHPO	Remarks
Historic Districts				
5DV48	Gates Rubber Company. (999-1001 S. Broadway)	A, B, C	4/9/1980; 8/12/1993	Spans east and west sides of S. Broadway
5DV1482	USPS Maintenance facility (915 S. Logan Street)	A, C	11/1/1983; 10/25/1999	
50V6959	West Washington Park neighborhood	A, C	10/12/1999	Provisional boundary defined
Bridges				
5DV7113	Alameda Avenue Underpass/ Railroad bridge	A, C	2000	still in use
5DV7114	Alameda Avenue Underpass / Railroad bridge	A, C	2000	still in use
5DV7115	Alameda Avenue Underpass / Railroad bridge	A, C	2000	abandoned
Buildings and Structures				
5DV6167	696 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6168	701/705 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6169	711 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6170	725 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6171	725½ S. Lincoln Street	A, ,	10/12/1999	Contributing to potential West Washington Park district
5DV6172	741/745 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6176	25 E. Exposition Avenue	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6177	29 E. Exposition Avenue	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6178	35 E. Exposition Avenue	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6179	39 E. Exposition Avenue	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6184	690/696 S. Broadway	A, C	10/12/1999	Contributing to a potential Commercial District
5DV6220	700 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6221	706 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6222	712 S. Lincoln Street	A, C	10/12/1999	Contributing. to potential West Washington Park district

Table 4.7-1 NRHP-Eligible Historic Resources in the Area of Potential Effects (Continued)

Site No.	Site ID	Applicable NRHP Criteria	Date Evaluated by SHPO	Remarks
5DV6223	720 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6224	726 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6225	734 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6226	735 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6227	736 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6228	738/740 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6229	742 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6230	746/750 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6231	749 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6233	772 S. Lincoln Street	A, C	10/12/1999	Contributing. to potential West Washington Park district
5DV6234	776 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV6235	782 S. Lincoln Street	A, C	10/12/1999	Contributing. to potential West Washington Park district
5DV6236	794 S. Lincoln Street	A, C	10/12/1999	Contributing to potential West Washington Park district
5DV9004	677 S. Lincoln Street	A, C	4/23/2004	Contributing to potential West Washington Park district
5DV9005	684 S. Lincoln Street	A, C	4/23/2004	Contributing. to potential West Washington Park district
5DV9006	690 S. Lincoln Street	A, C	4/23/2004	Contributing to potential West Washington Park district
5DV9146	West Alameda Subway	A, C	4/23/2004	Spanned by RR bridges (5DV7113-7115)

Sources: SHPO, 2002; SHPO, 2004; FHU, 2004a
NRHP – National Register of Historic Places
SHPO – State Historic Preservation Officer

One additional bridge, the Alameda Avenue (SH 26) Bridge over I-25 (5DV7074) which is shown on Figure 4.7-1, was included in the cultural resources inventory and described in the Draft EIS. It would be replaced under the all of the system alternatives, including the Preferred Alternative.

The Advisory Council for Historic Preservation recently approved an exemption regarding the Section 106 review process for effects from federal agency undertakings on the Interstate Highway System, with the exception of specific Interstate elements that have been determined

by FHWA to embody national or exceptional significance. As a result of a special committee review, nine such elements were identified along the interstate highways within Colorado, including I-25. The Alameda Avenue (SH 26) Bridge over I-25 (5DV7074) does not appear on that list, indicating that this bridge is not considered exceptional. Therefore, the Alameda Avenue Bridge over I-25 has been removed from consideration under both Section 106 and Section 4(f) in accordance with the exemption, and is not discussed further in this section.

4.7.1.1 HISTORIC DISTRICTS

Gates Rubber Company (5DV48)

The Gates Rubber Company plant (999-1001 South Broadway) was initially recorded in 1980 by Vicki Rottman for the Colorado Department of Highways in conjunction with the Mississippi Railroad Grade Separation project. A boundary was delineated by Rottman around the major plant buildings occupying 63 acres both east and west of South Broadway. It was re-recorded in 1993 by Hermsen Consultants. Established in 1911 by industry pioneer Charles C. Gates, the Gates Rubber Company developed into a leading manufacturer of rubber products including garden hoses, tiers, fan belts, and automotive hoses. On September 21, 1993, the Gates Rubber Company property was officially determined eligible for the NRHP under Criteria A, B, and C. In September 2004 a re-evaluation, with SHPO concurrence, concluded that Broadway and the Kentucky park-n-Ride access easement are non-contributing elements of the Gates Historic District.

U.S. Postal Service Vehicle Maintenance Facility (5DV1482)

This complex of brick buildings, located at 915 South Logan Street, was inventoried by Hermsen Consultants in 1999, at which time it was officially determined eligible for the NRHP as a district under Criteria A and C.

West Washington Park Historic District (5DV6959)

The APE includes a portion of the western edge of West Washington Park, a historic district residential area characterized by rows of generally well-preserved, modest-sized (predominantly brick) dwellings built mainly between 1900 and 1930. Approximately 90 historic dwellings in this area were inventoried in 1999 by Centennial Archaeology in conjunction with the I-25 Broadway viaduct replacement project. Centennial's 1999 survey encompassed a portion of the Valley Highway APE, including 26 significant historic houses on South Lincoln Street and East Exposition Avenue, one significant auto garage on South Lincoln Street, and one significant historic commercial building on South Broadway. Centennial did not recommend any of these properties as individually eligible for the NRHP, but evaluated them as contributing to a historic district.

The SHPO officially concurred with Centennial's evaluations of these West Washington Park properties on October 12, 1999, and assigned site number 5DV6959 to the West Washington Park Historic District. An historic context has been developed for the district, but its boundary has not been fully defined (Norgren et al., 2002). For the Valley Highway Project, a provisional boundary based on field review was delineated for the southwestern portion of the district. A comprehensive intensive-level survey and evaluation of the hundreds of homes comprising this

large historic residential district is beyond the scope of the Valley Highway Project.

4.7.1.2 BRIDGES

Three NRHP-eligible historical bridges are located within the APE. All of these were previously inventoried and evaluated for significance during a recently completed statewide survey of historic bridges in Colorado (FraserDesign, 2000). All three NRHP-eligible bridges are located along Alameda Avenue.

Alameda Avenue Underpass / Railroad Bridge (westernmost) (5DV7113)

This bridge is the westernmost of three bolted steel spans designed to carry railroad traffic over a depressed section of Alameda Avenue, between Cherokee Street and Santa Fe Drive. Still in use as a railroad bridge (by the Burlington Northern and Santa Fe Railroad), the structure was determined eligible in 2000 under Criterion A for its association with the railroad industry and its role in the development of Denver, and under Criterion C because it represents a rare example of a bridge in Colorado utilizing built-up steel plate construction in both the spans and the piers.

Alameda Avenue Underpass / Railroad Bridge (middle) (5DV7114)

Bridge 5DV7114 is located between two other, similar railroad bridges (5DV7113 and 5DV7115) spanning the depressed portion of Alameda Avenue between Cherokee Street and Santa Fe Drive. This grade separation structure supports tracks of the Union Pacific Railroad, as well as the RTD Southwest Corridor light rail line. The structure was determined eligible in 2000 under Criterion A for its association with the railroad industry and its important role in the development of Denver, and under Criterion C because it represents a rare example of a bridge in Colorado utilizing built-up steel plate construction in both the spans and the piers.

Alameda Avenue Underpass / Railroad Bridge (easternmost) (5DV7115)

The easternmost railroad bridge (5DV7115) spanning the depressed portion of Alameda Avenue (between Cherokee Street and Santa Fe Drive) is no longer in use. The structure was determined eligible in 2000 under Criterion A for its association with the railroad industry and its important role in the development of Denver, and under Criterion C because it represents a rare and possibly unique example of a bridge in Colorado utilizing built-up steel plate construction in both the spans and the piers.

4.7.1.3 BUILDINGS AND STRUCTURES

West Washington Park Area Properties

Three historic homes in the 600 block of South Lincoln Street were inventoried for the Valley Highway Project between 2002 and 2003 and evaluated as not individually NRHP-eligible but as contributing elements of the West Washington Park Historic District (FHU, 2004a).

Six historic residences (three single-family dwellings and three duplexes), inventoried by Centennial in 1999 and situated on the east side of the 800 block of South Lincoln Street, were re-evaluated for NRHP-eligibility in 2003. These six dwellings are set within a loop off-ramp from I-25. Due to their visual separation and physical isolation from the rest of the historic residential

district, the NRHP-eligibility of the six houses was officially changed by the SHPO in March of 2003, from “contributing” to “noncontributing” to the historic district.

West Alameda Subway (5DV9146)

The West Alameda Subway is a 1,256 ft long grade separation structure consisting of an artificial cut on West Alameda Avenue, the sides of which are supported by massive, formed concrete retaining walls. The roofless subway structure extends from Cherokee Street on the east to Santa Fe Drive. The retaining walls vary in height with the depth of the cut, and at the deepest part, they rise 28 ft high.

The West Alameda Subway was recorded in 2004 by FHU during the cultural resource inventory for the Valley Highway Project. The structure retains good physical integrity, and has been determined officially NRHP-eligible under both Criteria A and C. The subway represents a major engineering work and public works project that provided an important transportation link to southwest Denver. The structure also is significant for its association with a historically significant “pattern of events”: the prolific population growth and geographic expansion of Denver between 1900 and 1920.

4.7.1.4 ARCHAEOLOGICAL SITES

A file search revealed that no prehistoric or historic archaeological sites have been identified to date within the APE. No undisturbed vacant parcels with the potential to contain archaeological remains were identified by the field survey in the project area.

4.7.1.5 NATIVE AMERICAN CONSULTATION

As mandated by Section 106 of the National Historic Preservation Act (as amended) and the revised Advisory Council on Historic Preservation regulations (36 CFR 800), FHWA and CDOT contacted 11 federally recognized Native American tribes with an established interest in the City and County of Denver, Colorado, and invited them to become consulting parties for the project (see **Appendix A**). Consultation with a Native American tribe recognizes the government-to-government relationship between the United States government and sovereign tribal groups.

Federal agencies must be sensitive to the fact that historic (NRHP-eligible) properties of religious and cultural significance to one or more tribes may be located on ancestral, aboriginal, or ceded lands beyond modern reservation boundaries. Consulting tribes are offered the opportunity to identify concerns about cultural resources and comment on how the project might affect them. If it is found that the project will impact cultural resources that are eligible for inclusion on the NRHP and are of religious or cultural significance to one or more consulting tribes, their role in the consultation process may also include participation in resolving how best to avoid, minimize, or mitigate those impacts. By consulting with the Native American community, FHWA and CDOT strive to effectively protect areas important to Native American people.

Tribes invited via letter to participate as consulting parties included the following:

- Cheyenne and Arapaho Tribes of Oklahoma
- Comanche Tribe of Oklahoma
- Northern Cheyenne Tribe
- Crow Creek Sioux Tribe
- Ogallala Sioux Tribe
- Rosebud Sioux Tribe
- Standing Rock Sioux Tribe
- Kiowa Tribe of Oklahoma
- Pawnee Nation of Oklahoma
- Cheyenne River Sioux Tribe
- Northern Arapaho Tribe

Two tribes responded in writing, each indicating a desire to be a consulting party for the undertaking: the Kiowa Tribe of Oklahoma and the Cheyenne and Arapaho Tribes of Oklahoma. These tribes will continue to receive information pertinent to the NEPA and Section 106 documentation process for the duration of the Valley Highway Project. No specific concerns were raised by either tribe regarding the proposed highway improvements or places considered to be of cultural or religious significance.

4.7.2 Consequences of the Alternatives

Impacts from the No Action Alternative and the system alternatives, which include System Alternative 1, 2, 3, and the Preferred Alternative, are summarized in **Table 4.7-2** and detailed below.

Table 4.7-2 Impacts to NRHP-Eligible Historic Resources

Historic Resource	No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Gates Rubber Company historic district (5DV48)	No historic properties affected	No historic properties affected	No historic properties affected	No historic properties affected	No historic properties affected
USPS Vehicle Maintenance Facility (5DV1482)	No historic properties affected	No historic properties affected	No historic properties affected	No historic properties affected	No historic properties affected
West Washington Park Historic District (5DV6959)	No historic properties affected	No historic properties affected	No historic properties affected	No historic properties affected	No historic properties affected
Alameda Avenue Underpass / Railroad Bridge (5DV7113)	No historic properties affected	No historic properties affected	Adverse effect	Adverse effect	No historic properties affected
Alameda Avenue Underpass / Railroad Bridge (5DV7114)	No historic properties affected	No historic properties affected	Adverse effect	Adverse effect	No historic properties affected
Alameda Avenue Underpass / Railroad Bridge (5DV7115)	No historic properties affected	No historic properties affected	Adverse effect	Adverse effect	No historic properties affected
West Alameda Subway (5DV9146)	No historic properties affected	No historic properties affected	Adverse effect	Adverse effect	No historic properties affected
NRHP – National Register of Historic Places					

4.7.2.1 NO ACTION ALTERNATIVE

The No Action Alternative would have no impacts to historic or archaeological resources.

4.7.2.2 SYSTEM ALTERNATIVE 1

The locations of significant historic resources and their proximity to System Alternative 1 improvements are shown in **Figure 4.7-2**.

I-25 Improvements

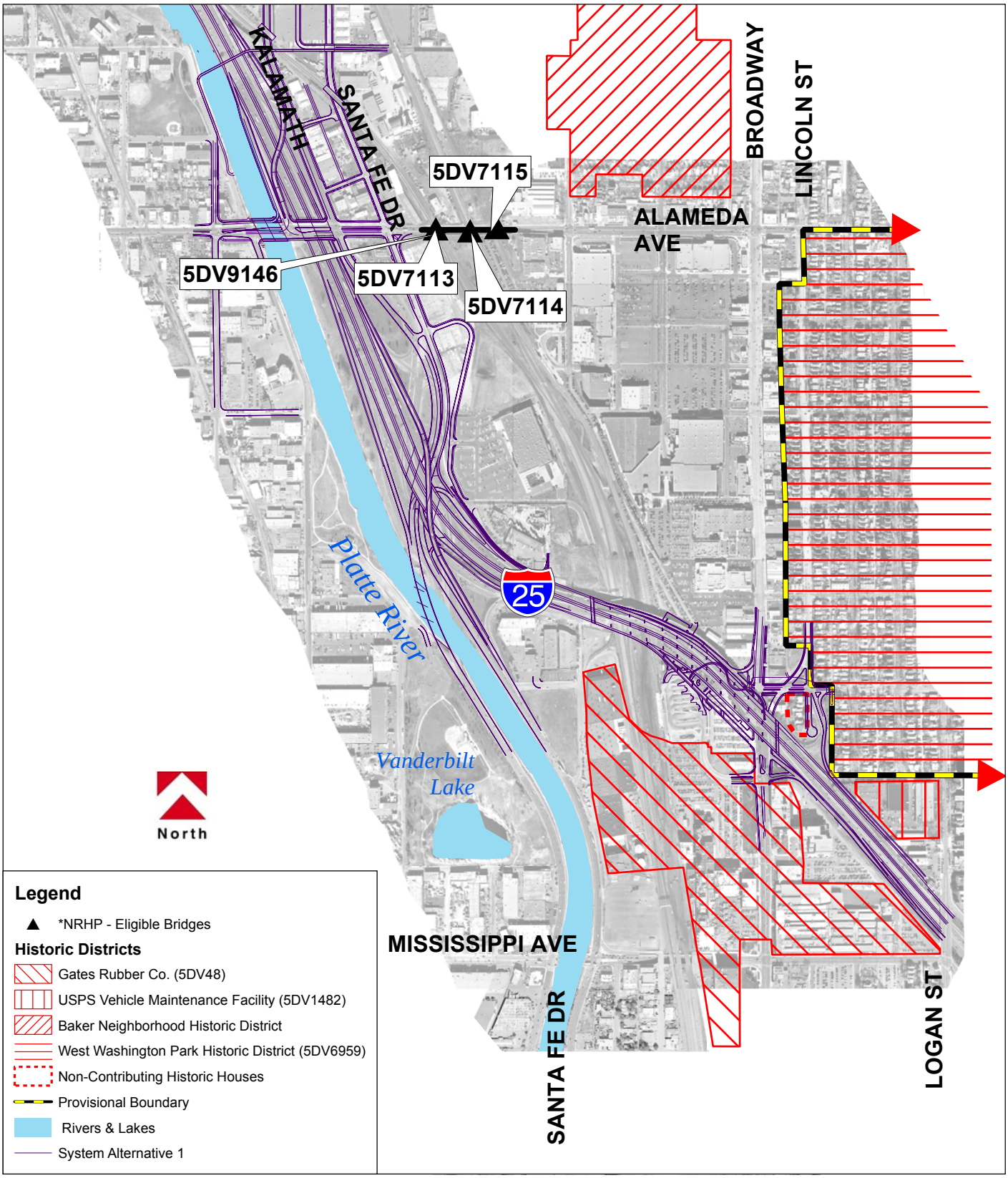
Under System Alternative 1, I-25 would generally follow the existing alignment. No historic properties would be affected in this area. In addition, the roadway alignments within and adjacent to the NRHP-eligible historic districts would remain quite similar to the current configuration, thus, the setting would not be substantially altered.

US 6 Improvements

No historic or archaeological resources were identified along US 6; therefore, there would be no impacts to historic properties under System Alternative 1.

Santa Fe / Kalamath Improvements

Under System Alternative 1, improvements to the Santa Fe Drive/Kalamath Street one-way pair would include some realignments and acquisitions, especially north of Alameda Avenue. The only significant historic resources in this area are located on Alameda Avenue, which would only be improved from Lipan Street to Kalamath Street. No historic properties would be affected in this area. This alternative would not change the West Alameda Subway (5DV9146) and its three historic railroad bridges (5DV7113-5DV7115).



*NRHP: National Register of Historic Places
Sources: FHU, 2004a; SHPO, 2002

0 500 1,000 2,000 Feet

Historic Properties-System Alternative 1

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.7-2

4.7.2.3 SYSTEM ALTERNATIVE 2

The locations of significant historic resources and their proximity to System Alternative 2 improvements are shown in **Figure 4.7-3**.

I-25 Improvements

Under System Alternative 2, I-25 would generally follow the existing alignment. No historic properties would be affected in this area.

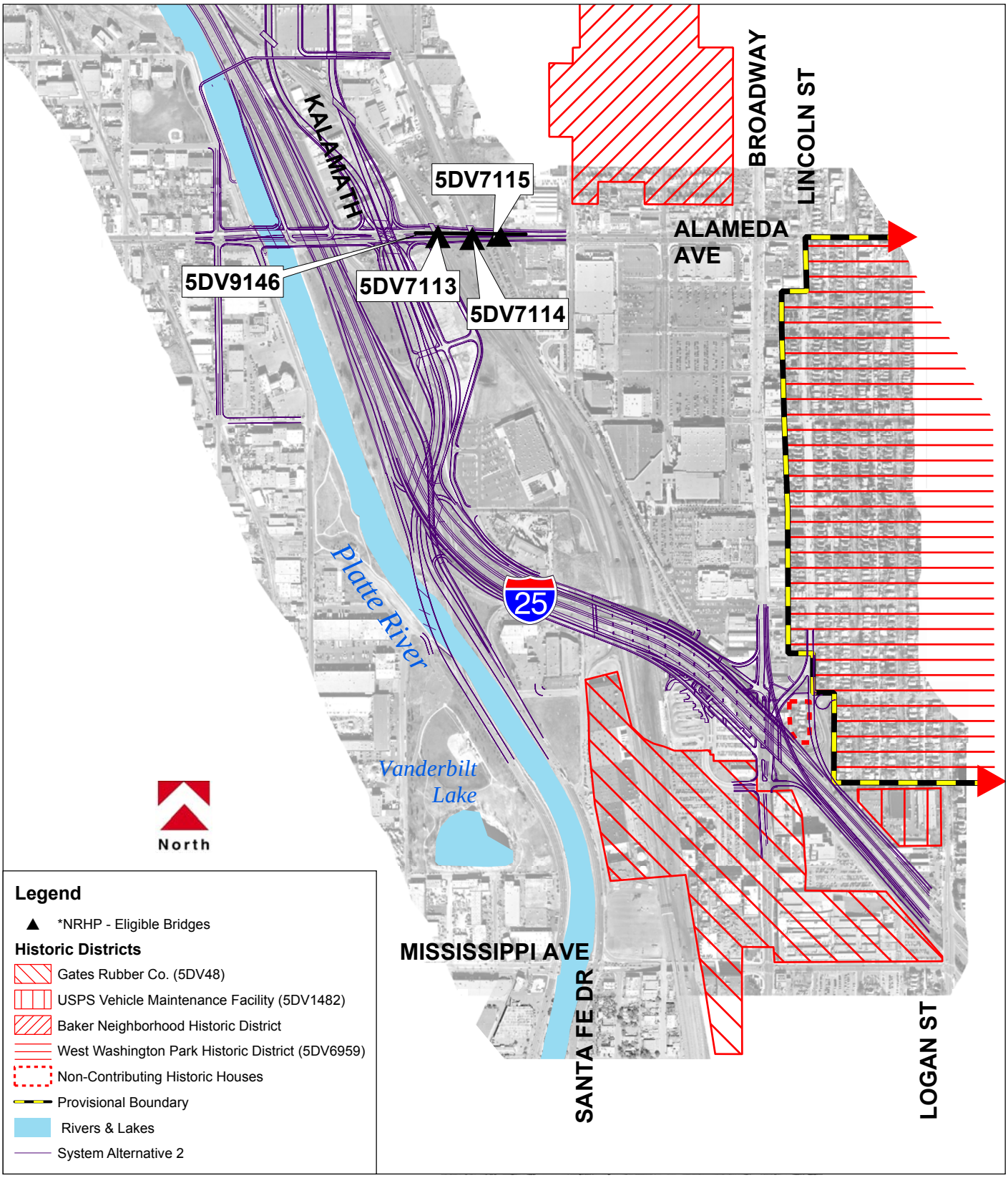
Improvements at the Broadway/Lincoln Street interchange would include reconfiguring the present northbound off-ramp through the 800 block of Lincoln Street and the removal of NRHP-ineligible properties in that block. No significant historic properties would be acquired in this area. In addition, the roadway alignments within and adjacent to the NRHP-eligible historic districts would remain quite similar to the current configuration, thus, the setting would not be substantially altered.

US 6 Improvements

No significant historic or archaeological resources were identified along US 6; therefore there would be no impacts to historic properties under System Alternative 2.

Santa Fe / Kalamath Improvements

Under System Alternative 2, Santa Fe Drive/Kalamath Street would be completely reconfigured in the vicinity of W. Alameda Avenue. This alternative would involve widening of Alameda Avenue, west of Cherokee Street, thereby requiring the enlargement of the existing NRHP-eligible grade separation structure (the West Alameda Subway 5DV9146) and replacement of the existing NRHP-eligible railroad bridges (5DV7113-5DV7115) with longer structures. These changes would result in adverse effects to all four historic properties.



*NRHP: National Register of Historic Places
Sources: FHU, 2004a; SHPO, 2002

0 500 1,000 2,000 Feet

Historic Properties-System Alternative 2

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.7-3

4.7.2.4 SYSTEM ALTERNATIVE 3

The locations of significant historic resources and their proximity to System Alternative 3 improvements are shown in **Figure 4.7-4**.

I-25 Improvements

Under System Alternative 3, I-25 would generally follow the existing alignment. No historic properties would be affected in this area.

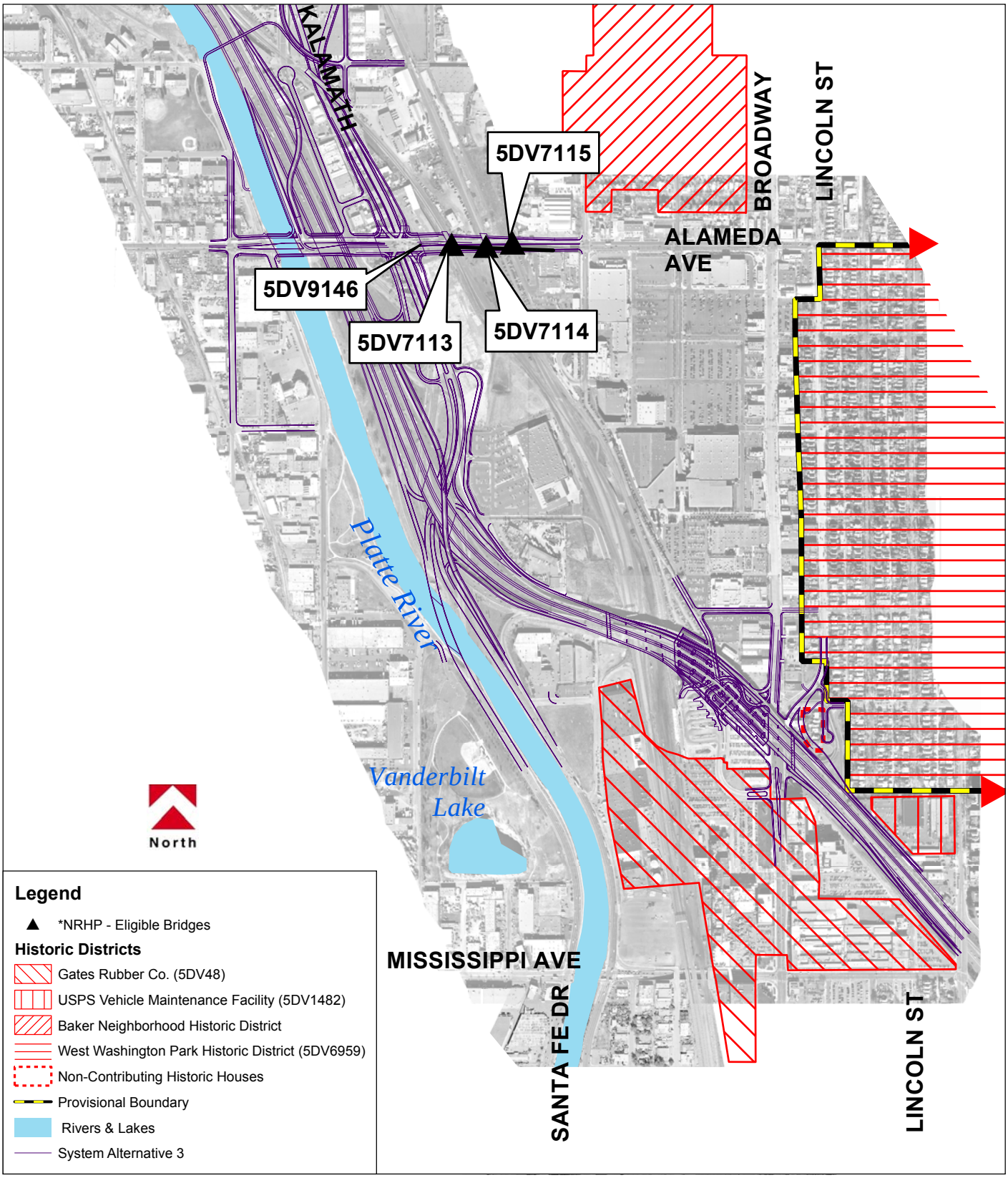
Improvements at the Broadway/Lincoln Street interchange would reconfigure the northbound Lincoln Street off-ramp, and would create a cul-de-sac in the 800 block of Lincoln Street. No significant historic properties would be acquired in this area. In addition, the roadway alignments within and adjacent to the NRHP-eligible historic districts would remain quite similar to the current configuration, thus, the setting would not be substantially altered.

US 6 Improvements

No significant historic or archaeological resources were identified along US 6; therefore, there would be no impacts to historic properties under System Alternative 3.

Santa Fe / Kalamath Improvements

Under System Alternative 3, Santa Fe Drive/Kalamath Street would be completely reconfigured in the vicinity of W. Alameda Avenue. This alternative would require widening of Alameda Avenue west of Cherokee Street, thereby causing adverse impacts to the NRHP-eligible West Alameda Subway (5DV9146) and the three associated NRHP-eligible railroad bridges (5DV7113-5DV7115).



*NRHP: National Register of Historic Places
Sources: FHU, 2004a; SHPO, 2002

0 500 1,000 2,000 Feet

Historic Properties-System Alternative 3

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.7-4

4.7.2.5 PREFERRED ALTERENATIVE

I-25 Improvements

Under the Preferred Alternative, I-25 would generally follow the existing alignment. No historic properties would be affected in this area.

Improvements at the Broadway/Lincoln Street interchange would reconfigure the northbound Lincoln Street off-ramp, and would create a cul-de-sac in the 800 block of Lincoln Street. No NRHP-eligible historic properties would be affected in this area. In addition, the roadway alignments within and adjacent to the NRHP-eligible historic districts would remain quite similar to the current configuration, thus, the setting would not be substantially altered.

US 6 Improvements

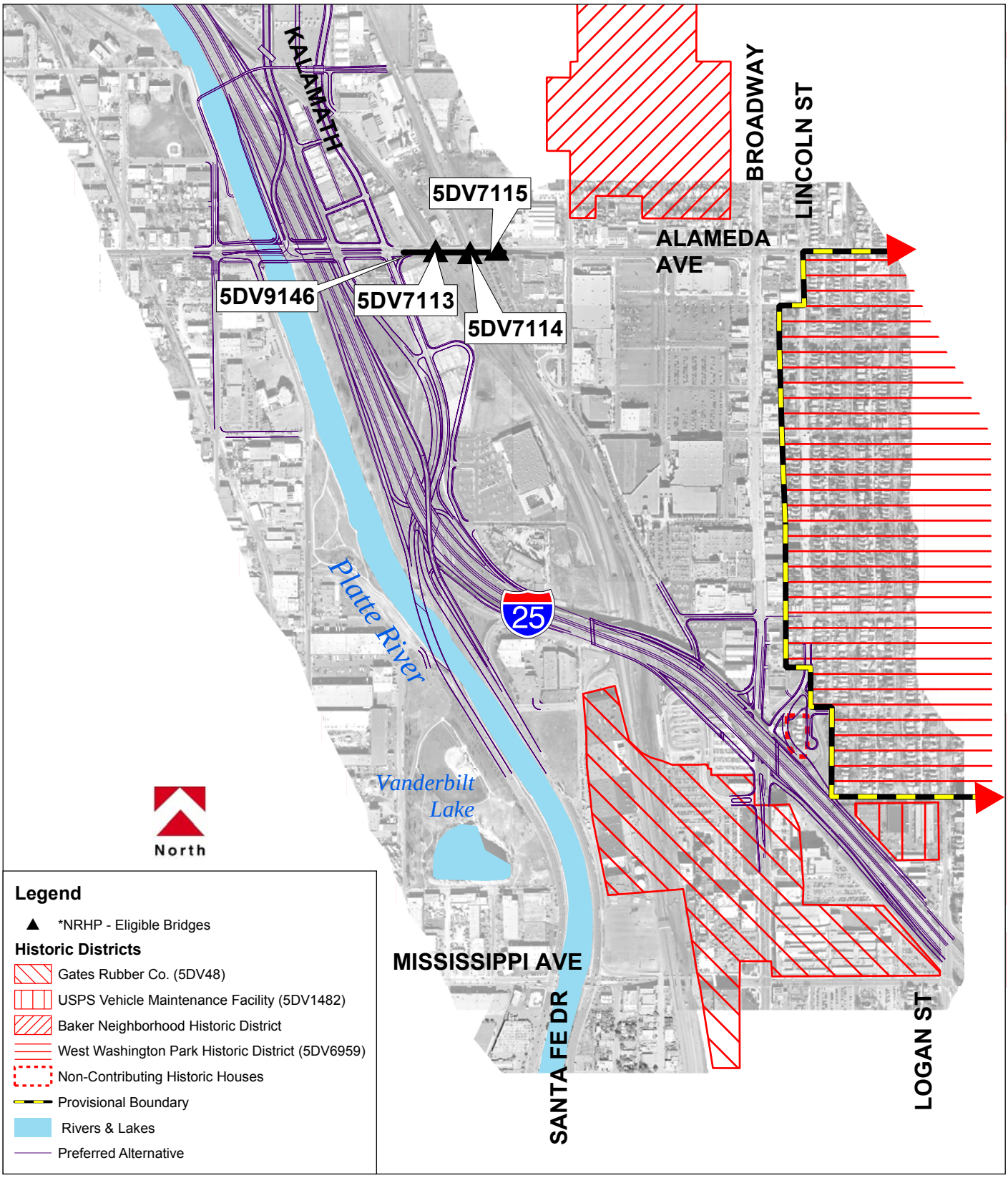
No significant historic or archaeological resources were identified along US 6; therefore there would be no impacts to historic properties under the Preferred Alternative.

Santa Fe / Kalamath Improvements

Under the Preferred Alternative, improvements to the Santa Fe Drive/Kalamath Street one-way pair would include some realignments and acquisitions, especially north of Alameda Avenue. The only significant historic resources in this area are located on Alameda Avenue, which would only be improved from Lipan Street to Kalamath Street. This alternative would not change the West Alameda Subway (5DV9146) and its three historic railroad bridges (5DV7113-5DV7115).

Section 106 Consultation

Section 106 consultation with the SHPO and consulting parties has been completed for the Preferred Alternative. Correspondence, including SHPO concurrence, is presented in **Appendix A** *Agency Coordination*.



*NRHP: National Register of Historic Places
Sources: FHU, 2004a; SHPO, 2002

0 500 1,000 2,000 Feet

Historic Properties-Preferred Alternative

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.7-5

4.7.3 Mitigation Measures

In accordance with Section 106 of the National Historic Preservation Act of 1966, mitigation of adverse effects to significant archaeological and historic resources must be determined through consultation between the lead federal agency (FHWA) or their delegate (CDOT), the SHPO, and the Advisory Council on Historic Preservation. Both Section 106 of the National Historic Preservation Act of 1966 and Section 4(f) of the Department of Transportation Act of 1966 favor the preservation of significant archaeological and historic resources. Therefore, avoidance is the preferred course of action, followed by minimization of impacts. Mitigation of impacts is required if neither avoidance nor minimization lead to a finding of no adverse effect. General mitigation measures are detailed below.

Archaeological Resources. If any archaeological materials (e.g., artifacts, faunal remains) or features are encountered or unearthed during construction, work would be immediately halted in the vicinity of the find, and the CDOT archaeologist and SHPO would be promptly notified. The location of the find would be secured and work would be suspended in that area until it can be evaluated and/or removed by a qualified professional archaeologist. If warranted, additional archaeological testing or data recovery may be necessary before work can be resumed in the vicinity of the find.

If bones of potential human origin are encountered during construction, ground-disturbing work would be halted in the vicinity of the discovery, and the CDOT archaeologist would be promptly notified. The CDOT archaeologist would assess the find, and the county coroner would be summoned if necessary to determine the relative age and ethnicity of the individual(s) represented. Work would not resume in the vicinity of the find until clearance is granted by CDOT.

Historic Resources. Mitigation of impacts to any NRHP-eligible or listed resources will be determined through consultation between CDOT cultural resource staff, the SHPO, and if necessary, the Advisory Council on Historic Preservation. Where there is a finding of adverse effect, mitigation measures would likely include the preparation of graphic and narrative documentation to SHPO Level II or Historic American Buildings Survey/ Historic American Engineering Record (HABS/HAER) standards, and/or the development of public interpretation.

4.7.3.1 NO ACTION ALTERNATIVE

No mitigation would be required under the No Action Alternative.

4.7.3.2 SYSTEM ALTERNATIVE 1

No mitigation would be required under System Alternative 1, because implementation would pose no impacts to significant historic or archaeological resources.

4.7.3.3 SYSTEM ALTERNATIVE 2

This alternative would replace the existing West Alameda Subway (5DV9146) with a larger grade separation structure. Also under this alternative, Santa Fe Drive and Kalamath Street would be reconfigured with a common interchange on Alameda Avenue. New bridge structures would carry the active railroad line over these streets in the vicinity of Bayaud Avenue replacing the three NRHP-eligible railroad bridges (5DV7113-5DV7115). Appropriate mitigation measures would be determined through consultation with the SHPO as described above.

4.7.3.4 SYSTEM ALTERNATIVE 3

This alternative would replace the existing West Alameda Subway (5DV9146) with a larger grade separation structure. Also under this alternative, Santa Fe Drive and Kalamath Street would be reconfigured with a common interchange on Alameda Avenue. New bridge structures would carry the active railroad line over these streets in the vicinity of Bayaud Avenue replacing the three NRHP-eligible railroad bridges (5DV7113-5DV7115). Appropriate mitigation measures would be determined through consultation with the SHPO as described above.

4.7.3.5 PREFERRED ALTERNATIVE

No mitigation would be required under the Preferred Alternative, because implementation would pose no impacts to significant historic or archaeological resources.

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TABLE OF CONTENTS

Page

4.8 Paleontology 4.8-1
4.8.1 Current Conditions 4.8-1
4.8.2 Consequences of the Alternatives 4.8-4
4.8.3 Mitigation Measures 4.8-4

LIST OF FIGURES

Page

Figure 4.8-1 Geologic Map of the Valley Highway Project Area 4.8-3

LIST OF TABLES

Page

Table 4.8-1 Geologic Units within the Project Area and their Paleontologic Sensitivities... 4.8-2
Table 4.8-2 Fossil Localities within the Valley Highway EIS Project Area 4.8-2

4.8 Paleontology

Paleontological resources are the mineralized (fossilized) remains of prehistoric plant and animal organisms, as well as the mineralized impressions (trace fossils) left as indirect evidence of the form and activity of such organisms. These non-renewable resources may be scientifically significant and are protected by the Colorado Historical, Prehistorical and Archaeological Resources Act of 1973.

Paleontological resource investigations of the Valley Highway project area were completed in 2003 by Rocky Mountain Paleontology (RMP, 2003). CDOT's staff paleontologist officially concurred with the findings of the study. Field surveys were conducted on April 28 and July 10, 2003. The field surveys consisted of a combination of drive-by and pedestrian inspections of the study area for 1) surface fossils, 2) exposures of potentially fossilferous (fossil-containing) rocks, and 3) areas in which fossiliferous rocks or younger potentially fossiliferous surficial deposits could be exposed or otherwise impacted during ground-disturbing activities. In advance of the field survey, literature and museum record searches were conducted in order to assess the paleontological sensitivity of the study area and the geologic units present within it. Museums included in the record search included the University of Colorado Museum and the Denver Museum of Nature and Science, the two primary paleontological repositories in the area. The paleontological sensitivity of the study area was evaluated using criteria proposed by Raup (1987), and the probable fossil yield classification (PFYC) developed by the U.S. Forest Service (USFS, 1996).

4.8.1 Current Conditions

The study area includes seven mapped geologic units (Lindvall 1978, Shroba 1980) as well as artificial fill. Surficial deposits include Broadway Alluvium, eolian sand, colluvium, Piney Creek Alluvium, Post-Piney Creek Alluvium, and artificial fill, from roughly oldest to youngest. These units all have low paleontological sensitivity (Type 3 of Raup 1987; Class 2 of PFYC). The only bedrock geologic unit within the study area is the Denver Formation, which contains locally abundant and scientifically significant plant fossils and less common vertebrate fossils, and has moderate to high paleontological sensitivity (Type 2 of Raup 1987; Class 3 of PFYC). Attesting to the paleontologic sensitivity of the Denver Formation, the University of Colorado Museum has over 600 vertebrate fossils from 59 localities in the Denver Formation from around the Denver Basin.

The paleontological sensitivities of the geologic units within the study area are summarized in **Table 4.8-1**, and their approximate locations are shown in **Figure 4.8-1**. With moderate to high paleontologic sensitivity, the Denver Formation underlies the surficial deposits within the survey corridor at various and largely unpredictable depths because of the varying thickness of surficial alluvial, eolian, and colluvial deposits. Isolated and relatively small surface exposures of the Denver Formation were mapped by Lindvall (1978) and Shroba (1980), but none was observed during the field survey.

No fossils were found during the field survey for this study; however, previously documented scientifically significant fossils have been reported from surficial deposits of late Pleistocene age and rocks of the Denver Formation within and near the study area. Those localities occurring within the museum record search area are listed in **Table 4.8-2**.

Table 4.8-1 Geologic Units within the Project Area and their Paleontologic Sensitivities

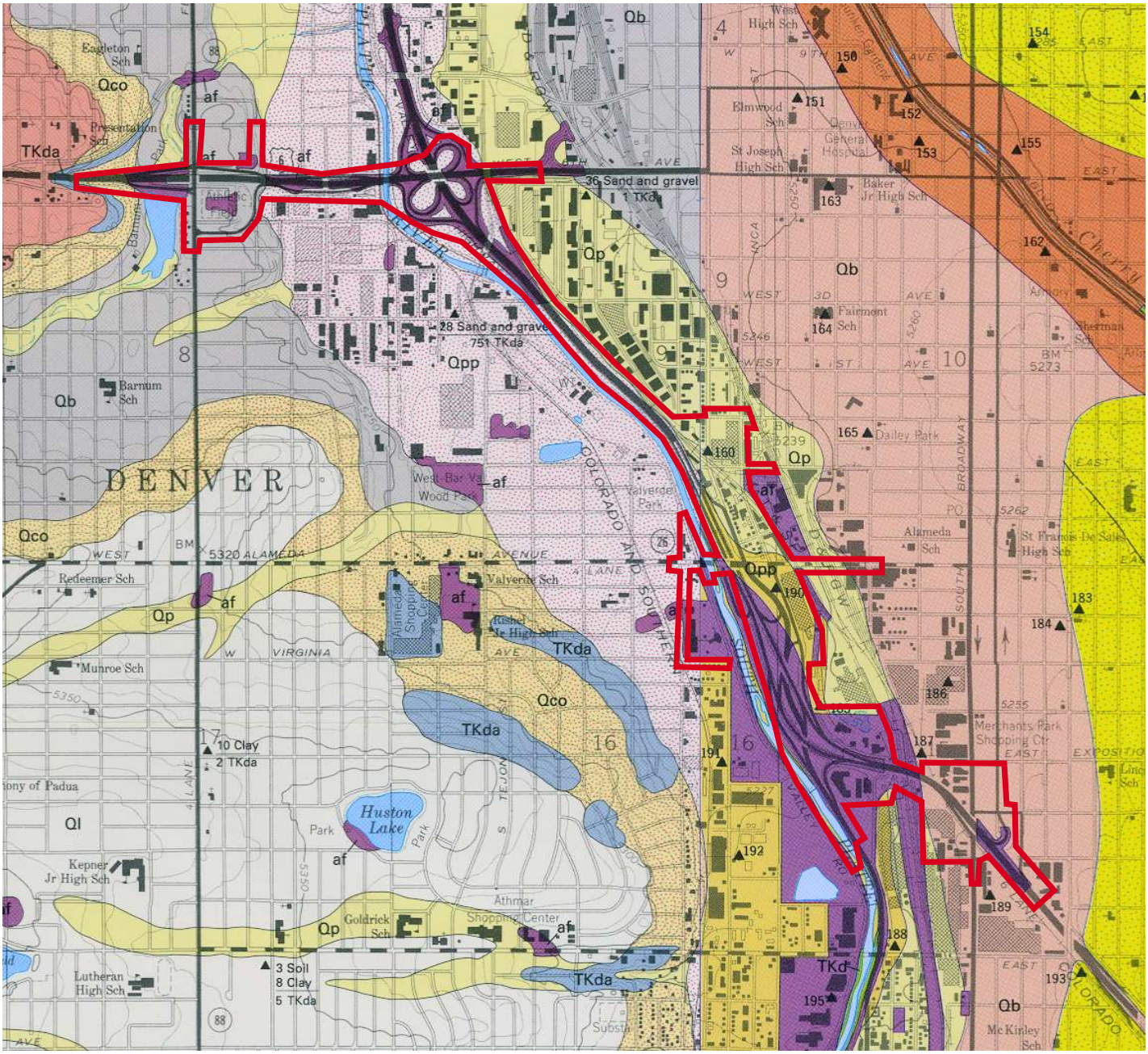
Rock Unit	Reported Thickness	Age	Sensitivity
Denver Formation	N/A (bedrock)	Cretaceous	Moderate to high; Class 3 of PFYC
Broadway Alluvium	~ 18–30 ft	Pleistocene	Low; Class 2 of PFYC
eolian sand	~ 10–30 ft	Holocene to Pleistocene	Low; Class 2 of PFYC
colluvium	< 5 ft	Holocene to Pleistocene	Low; Class 2 of PFYC
Piney Creek Alluvium	~ 18–25 ft	Holocene	Low; Class 2 of PFYC
Post-Piney Creek Alluvium	~ 3–10 ft	Holocene	Low; Class 2 of PFYC
Artificial Fill	~ 5–15 ft	Recent	Low; Class 2 of PFYC

Sources: Lindvall, 1978; Shroba 1980
PFYC – probable fossil yield classification

Table 4.8-2 Fossil Localities within the Valley Highway EIS Project Area

Repository or Data Source	Locality Number or Name	Formation or Age	Location	Fossils Found
DMNS	224	Pleistocene	T. 4 S., R. 68 W., Section 9	Mammoth tooth
DMNS	1086	Pleistocene	T. 4 S., R. 68 W., Section 22	Mammoth teeth and tusk, horse tooth
DMNS	1089	Pleistocene	T. 4 S., R. 68 W., Section 23	Camel vertebrae
DMNS	1091	Pleistocene	T. 4 S., R. 68 W., Sections 16 and 22	Mammoth tooth
DMNS	1096	Pleistocene	T. 4 S., R. 68 W., Section 15	Mammoth tooth
DMNS	1285	Cretaceous	T. 4 S., R. 68 W., Section 22	Plants
DMNS	2029	Cretaceous	T. 4 S., R. 68 W., Section 21	Plants
Rocky Mountain Paleontology	DD040602-01	Cretaceous	T. 4 S., R. 68 W., Sections 21 and 22	Plants

Source: Rocky Mountain Paleontology, 2003
DMNS – Denver Museum of Nature and Science
R - range S - south
T - township W - west



Legend

af	= Artificial Fill	Qp	= Piney Creek Alluvium
Qc	= Colluvium	Qb Qb	= Broadway Alluvium
Qes	= Eolian Sand	TKd&TKda	= Denver Formation
Qpp	= Post-Piney Creek Alluvium		= Project Area

Source : Lindvall, 1978 and Shroba, 1980

North

Geologic Map of the Valley Highway Project Area

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.8-1

4.8.2 Consequences of the Alternatives

4.8.2.1 No Action Alternative

No impacts to paleontological resources would occur under the No Action Alternative.

4.8.2.2 System Alternatives 1, 2, and 3

Ground disturbance from highway construction activities associated with the System Alternatives 1, 2, and 3 may potentially cause direct impacts (damage or destruction) to paleontological resources. It is not possible to predict the extent of such impacts due to the unknown specific distribution of fossils within the geologic units in the study area. The fossiliferous Denver Formation bedrock is of greatest concern but impacts would have to be evaluated on a project-specific basis because of the varying and unpredictable thickness of the Pleistocene and Holocene sediments which cover it. Pleistocene surface deposits may also contain small quantities of important fossils subject to project impacts from ground disturbance during construction, but their spatial distribution cannot be predicted.

4.8.2.3 Preferred Alternative

As with System Alternatives 1, 2, and 3, ground disturbance from highway construction activities associated with the Preferred Alternative may potentially cause direct impacts (damage or destruction) to paleontological resources. It is not possible to predict the extent of such impacts due to the unknown specific distribution of fossils within the geologic units in the study area. The fossiliferous Denver Formation bedrock is of greatest concern but impacts would have to be evaluated on a project-specific basis because of the varying and unpredictable thickness of the Pleistocene and Holocene sediments which cover it. Pleistocene surface deposits may also contain small quantities of important fossils subject to project impacts from ground disturbance during construction, but their spatial distribution cannot be predicted.

4.8.3 Mitigation Measures

Construction monitoring of areas where Denver Formation rocks may be disturbed will be conducted, as appropriate. As project design plans are finalized, the CDOT paleontologist will review them to evaluate the extent of impacts to the Denver Formation, and the scope of monitoring work, if any, which is required.

Although the paleontologic sensitivity of the surficial deposits (primarily alluvium) within the study area is low because they typically contain few fossils, construction personnel will be made aware of the potential to encounter fossils while excavating. If any sub-surface bones, leaf impressions, or other potential fossils are found during construction, the CDOT paleontologist will be notified immediately to assess their significance and make further recommendations.

TABLE OF CONTENTS

Page

4.9 Water Resources 4.9-1
4.9.1 Current Conditions 4.9-1
4.9.2 Consequences of the Alternatives 4.9-22
4.9.3 Mitigation Measures 4.9-29

LIST OF FIGURES

Page

Figure 4.9-1 South Platte River Basin 4.9-2
Figure 4.9-2 South Platte River Segments 14 and 15 ....4.9-4
Figure 4.9-3 Surface Waters....4.9-7
Figure 4.9-4 Existing Basins – US 6 Area 4.9-18
Figure 4.9-5 Existing Basins – 6th Avenue Interchange Area 4.9-19
Figure 4.9-6 Existing Basins – Alameda Area 4.9-20
Figure 4.9-7 Existing Basins - Broadway Area 4.9-21
Figure 4.9-8 Water Quality Ponds (BMPs) 4.9-25

LIST OF TABLES

Page

Table 4.9-1 Summary of Historical Water Quality Events....4.9-5
Table 4.9-2 Summary of Key Pollutants in Segment 14 ....4.9-9
Table 4.9-3 General Water Quality Conditions for South Platte River....4.9-10
Table 4.9-4 State of Colorado Groundwater Standards 4.9-14
Table 4.9-5 Existing Basin Information....4.9-16
Table 4.9-6 Existing Major Flooding Areas....4.9-17
Table 4.9-7 BMP Summary 4.9-27

4.9 Water Resources

This section discusses water resources within the project area including the physical, chemical, and biological characteristics of the South Platte River. The South Platte River is an important resource to the local residences in the project area and the Denver Metropolitan Area. The South Platte River and the surrounding corridor provide important urban wildlife habitat, recreation, park areas, and aesthetics that improve quality of life. This section also addresses storm sewer drainage and groundwater resources within the project area that directly influence the water quality of the South Platte River.

This section provides an overview of the existing water resources conditions (surface and groundwater) and the potential impacts from the system alternatives, which include System Alternatives 1, 2, 3, and the Preferred Alternative. Key elements in the understanding of the South Platte River include the South Platte River Drainage Basin, a historical perspective of the river, designated water uses, existing water quality conditions, and water quality regulations.

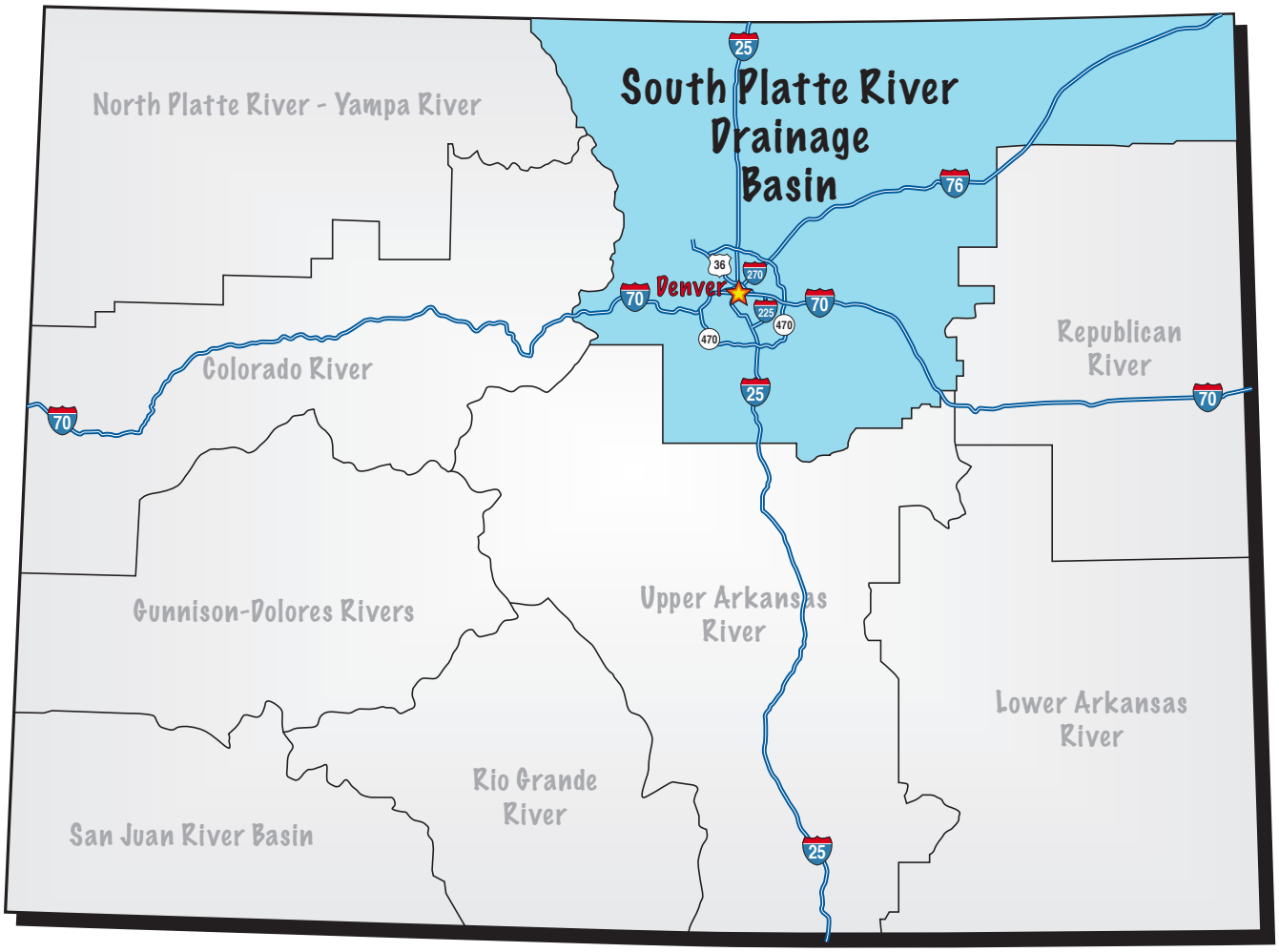
4.9.1 Current Conditions

This section describes the environmental setting and provides a historical overview of water resources in the Denver area. It also describes surface water and groundwater resources and storm sewer drainage within the project area. Drainage information, including runoff flow rates, is provided for key segments of the project area, including the areas along US 6, the I-25/US 6 interchange, Alameda Avenue, and the I-25/Broadway interchange. More detailed information is provided in the *Water Resources Report* and Addendum (FHU and Muller Engineering, 2005g; 2006f), which are available at the locations identified in **Chapter 9** *Availability of Technical Reports*.

4.9.1.1 Environmental Setting and Historical Overview

South Platte River Basin

The Valley Highway project area lies within the South Platte River Basin of Colorado, and the mainstem of the South Platte River lies immediately adjacent to the I-25 mainline through a portion of the project area. The physical and cultural characteristics of the South Platte River Basin are diverse. The headwaters of the basin start at an altitude of more than 14,000 feet along the Continental Divide near Fairplay, Colorado. Between the mountains and the plains is a transition zone, where the largest population centers of the basin are located, including the Denver Metropolitan Area. The basin extends eastward across the Great Plains, where agriculture is both the predominant land use and water consumer (U.S. Geological Survey [USGS], 1998). On the plains, the basin continues 270 miles to Nebraska to the Platte River and ultimately to the Missouri River. Overall, the South Platte River Basin drains 24,300 square miles in parts of three states; 79 percent of the basin is located in Colorado (see **Figure 4.9-1**).



North

South Platte River Basin

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.9-1

The South Platte River Basin is characterized by a continental-type climate having a wide temperature range (-30°F to 100°F) and irregular seasonal and annual precipitation patterns. Precipitation patterns across the basin depend upon altitude, where the greatest amount of precipitation falls as snow in the mountain areas (greater than 30 inches annually). Annual precipitation on the plains is less than 15 inches; most precipitation on the plains is from thunderstorm events from April to September (USGS, 1998). The Denver area generally receives 12 to 16 inches of rain per year (EPA, 2002).

There are three main aquifer systems in the South Platte River Basin: the South Platte Alluvial System, the High Plains Aquifer, and the Denver Basin Aquifer System (which includes the Dawson, Denver, Arapahoe, and Laramie-Fox Hills aquifers) (USGS, 2002a). Groundwater levels in the alluvial aquifers in the plains fluctuate in response to the application of irrigation water to fields, which result in the highest levels between July and September.

Water quality in the South Platte River Basin is a result of the environmental setting and hydrologic conditions. Environmental conditions that affect water quality include natural factors such as geology, climate, physiography, and soil type. Water quality is also affected by human factors such as land use, urban drainage, population, water use, and water management practices. Approximately 65 percent of the population of Colorado is concentrated in a 30 mile wide strip along the South Platte River, beginning 18 miles south of Denver and extending 80 miles northwest (EPA, 2002). Because of the high population centers in the semi-arid portions of the basin, human activity can have an especially high impact on water quality.

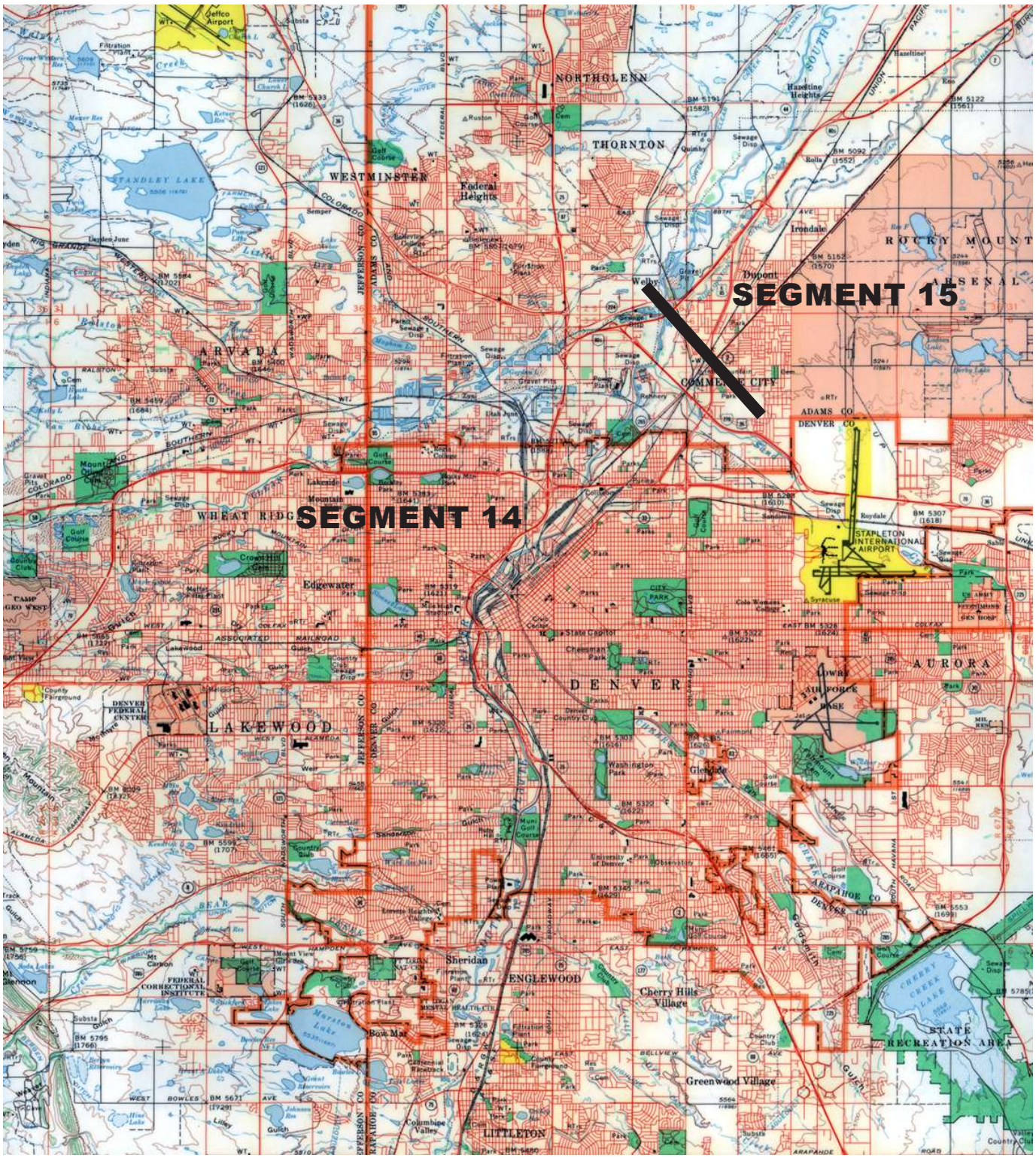
The demand on water resources in the basin is very high and general overappropriation of available water supply involves the following issues (USGS, 1998):

- Allocating water between urban and agricultural uses
- Managing growth without impacting water quality
- Restoring degraded riparian areas
- Developing future water supplies without impacting water quality
- Protecting existing drinking water supplies

The South Platte River is a critical water resource for the State of Colorado. The South Platte River in the plains is dominated by irrigation but is also used as a drinking water source (USGS, 1998). Snowmelt from the mountains is collected and stored by several reservoirs to support drinking water demands in the metropolitan areas. Chatfield Reservoir, built and operated by the U.S. Army Corps of Engineers, is the main reservoir in the Denver Metropolitan Area that contains and stores the South Platte River for flood control. Low-flow conditions are most common from July to October and high flows generally occur during the spring from May to June (EPA, 2002).

The Colorado Water Quality Control Commission defines two South Platte River segments in the Denver area:

- Segment 14 (see **Figure 4.9-2**) begins at Bowles Avenue in Littleton (just downstream of Chatfield Reservoir) and extends through the Valley Highway project area north to the Burlington Ditch Headgate in Commerce City
- Segment 15 flows north from the Burlington Ditch to Fort Lupton, Colorado



North

South Platte River
Segments 14 and 15

Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Figure 4.9-2

History of the South Platte River Corridor

Table 4.9-1 summarizes historical events associated with the South Platte River. The South Platte River corridor is rich in history that encompasses the arrival of early French trappers who named the river "Riviere la Platte" (broad shallow river), the Pawnee Native Americans who settled on its river banks, and the railroads that dramatically changed the City of Denver to the now thriving metropolitan area. Native Americans called the river "Nithbaska" meaning "river that spreads out in flatness." The river was characterized by intermittent flow with little or no flow during summer to fall months (Camp, Dresser, McKee [CDM], 1994).

In the late 1800s, the railroads reached the Denver area, spurring economic growth near the South Platte River. Dams, reservoirs, and irrigation ditches were constructed in an effort to provide sufficient water for farming. The irrigation systems turned arid land into productive farmland. At that time, the South Platte River began to experience extreme water pollution problems (Jefferson County, 2001). Also at that time, the South Platte River began to flow continuously throughout the year, due to an increase in impervious surfaces, a high number and volume of waste discharges, and massive irrigation.

From 1860 until the late 1930s, the South Platte River received large amounts of raw domestic and industrial waste. The main corridor of the South Platte River was occupied by slaughter houses, smelters, and rail yards, which used the river as a convenient sewer. Health concerns prompted some action by imposing certain restrictions on waste discharges. Separate sewer systems were established in the 1880s primarily to control odor.

Table 4.9-1 Summary of Historical Water Quality Events

Date	Historical Event
1600	Native Americans (Pawnee) occupy South Platte River area
1739	South Platte River "discovered" by French traders
1850	Gold discovery in Colorado leads to a substantial increase in European-American population
1872	Separate sewer systems developed in Denver to control odor
1900	Railroads extend into Denver area, helping to spur industrialization within the area
1933	Funding for the Denver Northside Treatment Plant is approved
1938	Denver Northside Treatment Plant operational
1947	Colorado Department of Health established
1958	Valley Highway completed; short section of the South Platte River relocated
1965	South Platte River floods Denver area
1970	Chatfield Reservoir and Cherry Creek dams constructed by U.S. Army Corps of Engineers
1976	South Platte River Greenway Foundation formed
1980	Water quality control commissions set numeric standards for South Platte River
1987	Metropolitan Denver Sewage Disposal District central treatment system operational

Sources: Gibson, 2003; CDM,1994

The Valley Highway was conceptualized and designed in the 1940s, just before World War II. Due to the war effort, construction did not commence until the early 1950s. The Valley Highway was located near the South Platte River, due to the availability of land and close proximity to industry and commercial businesses.

In 1965, the South Platte River flood occurred. This was the worst disaster in the history of Denver. The flood killed 23 people and caused $325 million in damage, destroying 2500 homes and 750 businesses. The flood was a turning point in the cleanup of the South Platte River. The

City and County of Denver and the Greenway Foundation led the way to improve the quality of the river corridor. Trash and debris were removed from the stream bank areas, and park areas were established (Gibson, 2003).

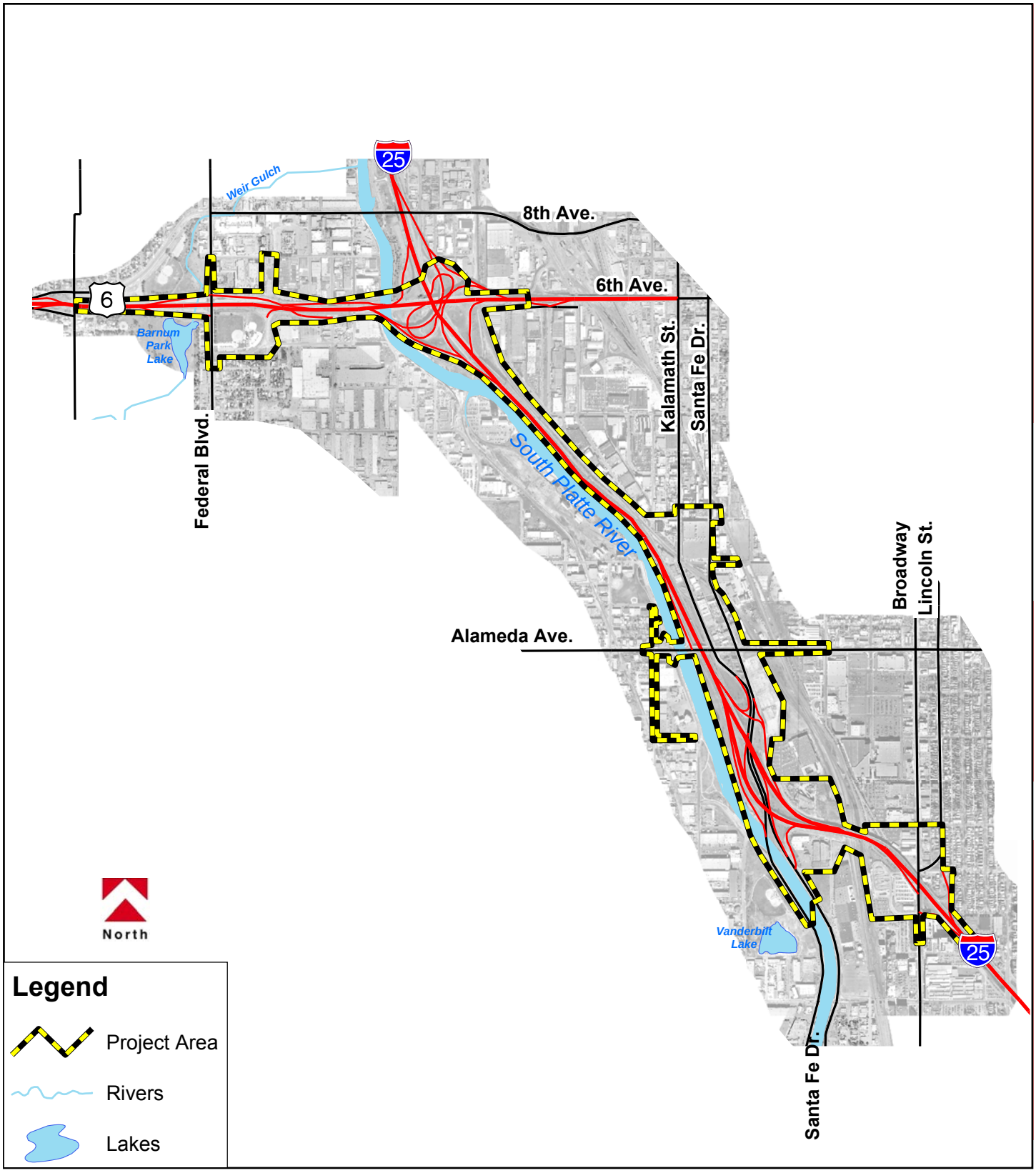
The South Platte River Commission was established to develop and implement a vision to renovate the river. The commission made vast improvements to the corridor by developing new parks and recreation areas, improving the bike path system, establishing natural riparian vegetation, and improving streamflow conditions in the summer months (Mueller, 1999). The South Platte River Greenway Preservation Trust, formed in 1974, was instrumental in restoring several stream locations and establishing new recreation areas along the river, including Confluence Park (Shoemaker, 2000).

Improvements in waste treatment have been realized since the 1930s. Larger and more efficient waste treatment facilities were constructed to meet more stringent water quality standards. New river management approaches were put into place, which attempt to take into account water quality, water quantity, aquatic resources, and aquatic and riparian wildlife habitats, as well as flood control and streambank stabilization. Water quality management approaches also took into account the overriding factor of water rights and water appropriation. The development of the arid west was built on the necessity to share and manage the limited water resources of the South Platte River (CDM, 1994).

4.9.1.2 SURFACE WATER RESOURCES

The South Platte River is an important water resource to the Denver metropolitan area and to local residences in the project area (see **Figure 4.9-3**). The river corridor provides a recreational resource in terms of urban park aesthetics and recreation. The South Platte River Trail parallels the river through the project area. The river contributes to the quality of life for local residents by providing a place to view and enjoy the river, riparian vegetation, and urban wildlife. The river corridor also supports urban wildlife that depends upon the wetlands and riparian habitat for survival.

The City and County of Denver continues to improve the recreational value of the corridor by establishing and implementing management plans to enhance urban wildlife, improve recreation, and protect water quality (City and County of Denver [CCD], 2000a). At present, there are no additional plans for in-stream or stream corridor improvements to the portion of the South Platte River within the project area.



Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Surface Waters

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.9-3

South Platte River Classification

Segment 14 of the South Platte River passes through the Valley Highway project area. Under *Water Quality Control Commission Regulation 38*, the Colorado Water Quality Control Commission has established the following specific stream classifications and water quality standards for Segment 14 (CDPHE, 2002a):

- **Class 1 Warmwater Aquatic Life** - Designates that the stream is able to support a wide range of aquatic life that can withstand warmer temperatures in the lower plains. Segment 14 of the South Platte River has the potential of sustaining limited trout populations, especially near Chatfield Reservoir where the discharge water is colder. Downstream, the temperature increases and fish populations become dominated by warmwater species.
- **Recreation 1a** - Designates the water is suitable for recreational activities that require body contact with the water, including swimming, kayaking, canoeing, and rafting. Water quality limits for this designation are less than 126 fecal coliforms per 100 milliliters (CDPHE, 2002a).
- **Water Supply** - Designates that the water is suitable for domestic drinking water supplies.
- **Agriculture** - Designates that the surface water is suitable for livestock drinking water.

In the project area, there are no major tributaries entering the South Platte River. Inputs to the river are dominated by storm sewer discharges during storm events.

Existing Water Quality Conditions

The stream channel of the South Platte River has been altered over the years to accommodate railroad development, flood prevention measures, and I-25 construction. To improve storm sewer drainage and reduce potential flooding, the South Platte River has been channelized. As a result, the South Platte River has become an urban type river that does not support a high quality recreational fishery or a swimming recreational resource. Storm sewer outfalls and hydrologic modification structures are located throughout the river corridor. Flood control activities, such as channelization, cementing of banks, and grade control structures (hard-lining) designed to facilitate the transport of storm flows, affect the growth and function of in-stream habitat and riparian vegetation (CCD, 2003d).

Fish present in Segment 14 include red shiner, bigmouth shiner, and brassy minnow. Some game fish are present in Segment 14 near Bowles Avenue (upstream of the project area). It is believed that no game fish spawn in the project area due to high temperatures (CDPHE, 2002a). Ammonia, which is toxic to fish, is a concern in the river from nitrogenous waste discharged from wastewater treatment plants. The largest National Pollutant Discharge Elimination System (NPDES) permitted discharger in Segment 14 is the upstream Littleton/Englewood Wastewater Treatment Plant. Since 1994, Littleton/Englewood Wastewater Treatment Plant began using a denitrification process, and nitrate is currently the largest concern.

Ambient Water Quality Conditions and Studies

A number of studies have been performed on Segment 14 to establish ambient water quality conditions for physical, chemical, and biological parameters. These include broad-based watershed studies, local water quality management monitoring, and stream total maximum daily load (TMDL) studies.

Stream impairment studies on the South Platte River (Segments 14 and 15) were performed as part of the *Metropolitan Denver TMDL/Watershed Project Draft Work Plan* (Brown and Caldwell, 1994b). **Table 4.9-2** provides information about key pollutants identified in Segment 14, based on historical monitoring studies.

Table 4.9-2 Summary of Key Pollutants in Segment 14

Pollutant	Major Source	Stream Impairment Potential
Oxygen	WWTP, storm sewer	High
Unionized ammonia	WWTPs	Low
Nitrate	WWTPs, groundwater	Medium
E. coli.	Storm sewer	High
Copper, lead, zinc and cadmium	WWTPs, storm sewer, upstream sources	High
Silver, mercury and selenium	Storm sewer	Medium
Chromium, nickel, arsenic, manganese and beryllium	WWTPs, storm sewer	Low
Suspended solids	Storm sewer	Medium
Organic priority pollutants (pesticides, volatiles, PAHs)	Storm sewer	Low
In-stream flow	Storm sewer diversions, channelization	Low
Sedimentation	Storm sewer diversions, channelization	Medium
In-stream habitat	Storm sewer diversions, channelization	Low

Source: DRCOG, 1983
WWTP - wastewater treatment plant

DRCOG developed a *Clean Water Plan* for the South Platte River (DRCOG, 1994) to serve as a water quality management planning document for the Denver Metropolitan Region. The plan evaluated water quality conditions for Segment 14 and predicated that water quality standard violations would occur for ammonia, which would limit fish populations in the segment. The report warned that the lack of consistent control of nonpoint source pollution in a rapidly growing area could lead to serious problems in Segment 14.

A non point assessment report identified increasing concentrations of sediment, phosphorus, and nitrates in Segment 14 (Brown and Caldwell, 1994a). Consistent with many urban areas studied under the National Urban Runoff Program in the late 1970s, concentrations of lead, copper, zinc, and cadmium exceeded water quality criteria in Segment 14 during storm events (DRCOG, 1983).

Stormwater data compiled by the Urban Drainage and Flood Control District (UDFCD) in Segment 14 and 15 indicate elevated concentrations of several water quality constituents. These concentrations are above ambient or baseline conditions. Water quality parameters of most are total suspended solids, fecal coliform, phosphorus, and nitrogen compounds (UDFCD, 2003).

The USGS regularly samples the South Platte River Basin as part of the National Water Quality Assessment Program, a long-term water quality program to identify regional and national water quality trends. USGS has performed numerous other water quality studies on the South Platte River. Fish tissue analysis showed elevated concentrations of dichlorodiphenyltrichloroethane (DDT) and chlordane in the lower South Platte River as opposed to the concentrations found in the mountainous portions of the watershed. Concentrations of these pesticides are related to land use practices in the lower portions of the river (USGS, 2002b).

Water quality data were collected from Segments 14 and 15 as part of the South Platte River water quality study performed by the City and County of Denver Department of Environmental Health from 1995 to 2002. **Table 4.9-3** provides a summary of the general water quality conditions, based on results of that study.

Table 4.9-3 General Water Quality Conditions for South Platte River Segment 14 (1995-2002)

Water Quality	Approximate Median	General Range
Temperature	16°Celsius	10-22°Celsius
Dissolved oxygen	9 mg/L	5-13 mg/L
pH	7.6	7.4 to 8.5
Conductivity	700 µS/cm	300-1000 µS/cm
Total ammonia	0.5 mg/L as nitrogen	2-.2 mg/L as nitrogen
Nitrate	8 mg/L as nitrogen	1-14 mg/L as nitrogen
Alkalinity	140 mg/L as $CaCO_3$	100-180 mg/L as $CaCO_3$
Hardness	220 mg/L as $CaCO_3$	140-290 mg/L as $CaCO_3$

Sources: CCD, 2003d; CCD, 1997
$CaCO_3$ – calcium carbonate
mg/L – milligrams per liter
µS/cm – micro-Siemens per centimeter

USGS studies from 1980-1992 indicate that total suspended solids concentrations increase downstream from Littleton (Segment 14) to Henderson (Segment 15). The range of sediment loading ranged from 3 to 40 tons per day (8 tons per day median) in Segment 14 near Littleton. Total suspended solids loading in Segment 15 (Henderson) ranged from 10 to 100 tons per day, with a median of 20 tons per day (USGS, 1995a).

Biological monitoring data were collected to determine the results from improved ammonia removal by the Littleton/Englewood Wastewater Treatment Plant in the upper portions of Segment 14. Results concluded that in-stream biota improved downstream in Segment 14 after implementation of the upgrade.

The City and County of Denver's Department of Environmental Health has conducted a water quality monitoring program on the South Platte River since approximately 1984 to identify and remove illicit connections at storm sewer outfall points. The study currently focuses on identifying direct storm sewer discharge conveyances (culverts, storm sewer outfalls) and on detecting contaminated groundwater entering the South Platte River, either directly or through storm sewer lines. These groundwater plumes become evident during dry weather and low-flow conditions (CCD, 1997). Chemical and biological testing is being used to identify "hot spot" areas and assess potential impacts.

The South Platte River receives contaminated groundwater from the General Chemical hazardous waste site, which is undergoing remediation as part of the CDPHE Voluntary Clean-up Program. General Chemical is located adjacent to the South Platte River just north of Alameda Avenue. According to the City and County of Denver, there is believed to be a direct discharge of a contaminated groundwater plume to surface water at this site. The plume discharges high concentrations of pollutants into the South Platte River. Surface water samples collected in March 2001 (Harding ESE, 2001) identified the presence of total aluminum (21.0 milligrams per liter [mg/L]), barium (0.05 mg/L), cadmium (0.01 mg/L), chromium (0.003 mg/L), copper (0.48 mg/L), lead (0.007 mg/L), and zinc (2.19 mg/L). This site is considered to be one of the highest priorities for CDPHE for groundwater investigations and sampling efforts (CCD, 1997). Moderate impacts to biological communities in this immediate area were found by the City and County of Denver during hot spot monitoring.

Water quality sampling was conducted by the City and County of Denver under a Section Grant from EPA between 1993 and 1996. The study established various types of chemical and biological baseline data. The *319 Nonpoint Source Grant Final Report* provided a number of conclusions, some of which are directly relevant to Segment 14 and the Valley Highway Project area along the South Platte River (CCD, 1997):

- Impacts from petroleum products and metals on macroinvertebrates need more study
- Aquatic habitat was found not to be a limiting factor for the low biological survey results (using rapid biological protocols established by EPA)
- Groundwater contamination may be the cause for low biological survey results
- Hot spots were identified and prioritized for future water quality monitoring
- Groundwater may be the primary nonpoint source that impacts the South Platte River
- Continued biological sampling will be used to isolate potential hot spots to improve water quality conditions in the South Platte River

Water quality monitoring on the South Platte River is also conducted by the South Platte Coalition for Urban River Evaluation (CURE). This group is made up of municipal, industrial wastewater treatment providers, municipal stormwater agencies, local health departments, and municipal drinking water providers. CURE performed water quality monitoring and modeling studies to support TMDL studies and long-term water quality management.

Total Maximum Daily Loading

TMDL analysis is a water quality study that is required under the Clean Water Act to be performed on surface waters failing to meet water quality standards. CDPHE is responsible for performing TMDL studies to determine how impacted streams can be improved to achieve water quality standards. These TMDL studies are reviewed and approved by EPA. In the 1990s, TMDL studies were performed on the South Platte River (Segment 14 and 15) by DRCOG and the South Platte River Watershed TMDL Advisory Committee. Additional TMDL studies continue to be performed by CDPHE for E. coli. and fecal coliform.

Segment 14 achieves water quality standards for most of the stream classification designated uses. Segment 14 fails to meet water quality standards for nitrate (drinking water use), fecal coliform (Recreation 1a), and e-coli (Recreation 1a). The State of Colorado has placed Segment

14 on the TMDLs Colorado 303(d) List (water quality limited segment) and listed Segment 14 as a high priority for TMDL analysis (CDPHE, 2002b). Stream parameters on the 303(d) List requiring TMDL studies on Segment 14 are not associated with highway operations.

The Colorado 303(d) List (*Water Quality Limited Segment Still Requiring TMDLs)* also lists surface waters that may be impaired, but for which supporting documentation does not meet the standards for credible evidence. Stream segments on this list require additional water quality monitoring and analysis to determine if water quality standards are being met. Segment 14 of the South Platte River is on this list for copper (CDPHE, 2002b).

The sources of copper in Segment 14 have not been extensively studied. Some stormwater studies performed have suggested that the sources of copper are wastewater treatment plants and storm sewers. Concentrations above the copper water quality standard have been identified during storm events (Brown and Caldwell, 1994a). A water effects ratio has been applied to copper in Segment 14 indicating that there is not an exceedence during non-storm events. Storm sewer discharges from highway surfaces may contribute to increased stream concentrations of copper (Kayhanian et al., 2003), although no specific stormwater monitoring for copper has been performed in the project area. Automobiles are a known source of heavy metals, including copper from braking systems and from other mechanical parts. It is difficult to estimate potential water quality impacts from copper when concentrations in stormwater are unknown and when mass loading (pounds of copper per day) cannot be determined.

Water Resource Issues Associated with CDOT Highway Operations

The Alameda Pump Station is located at the southwest quadrant of the I-25/Alameda Avenue interchange and is maintained by CDOT. The sump within the pump station collects stormwater through a drainage system below the underpass where I-25 passes beneath Alameda Avenue. The drainage system also collects some groundwater that bypasses or seeps through a buried sheet pile cofferdam that encircles the depressed portion of I-25. Water quality of the discharge into the South Platte River from the sump is not well characterized, and no discharge permit currently exists. Analytical data from sump samples collected in 1988 indicate the presence of arsenic, cadmium, chromium, lead, and mercury in sludge/solid material (Arvada Pump, 2003).

The South Platte River also receives chemical input from CDOT highway maintenance operations. To maintain transportation safety along the I-25 corridor during winter months, CDOT uses anti-icing and deicing chemicals. During the 2002 to 2003 winter months, CDOT maintenance personnel used approximately 13,000 gallons of 30% magnesium chloride, 7,300 gallons of cold-weather magnesium chloride, and 839 tons of Ice-Slicer in the project area. Anti-icing and deicing agents have been extensively used by CDOT to reduce the usage of traction sand, which contributes to the formation of fine air particulates, causing air pollution problems. Traction sand increases the sediment load to the South Platte River and clogs inlets and storm sewer pipes.

Anti-icing and deicing agents contain salt material (magnesium and chloride ions). Some chemical agents are modified with corn-processing byproducts. Anti-rusting additives are also incorporated into these chemicals. Anti-icing/deicing chemical agents are required to conform to CDOT magnesium chloride specifications for heavy metals and nutrients (CDOT, 2002b). No water quality impacts have been noted or observed in the South Platte River from these chemical agents during winter or spring streamflow periods.

CDOT Phase I Municipal Separate Stormwater Sewer System (MS4) Permit

CDOT received authorization from the CDPHE-Water Quality Control Division to discharge stormwater under the Colorado Discharge Permit System (CDPS) in accordance with the Colorado Water Quality Control Act (CDPHE, 2001a). The permit, dated January 15, 2001, allows for discharge of stormwater from the municipal separate storm sewer system (MS4) owned and maintained by CDOT.

The CDOT Phase I MS4 permit authorized new or existing discharges composed entirely of stormwater and allowable non-stormwater discharges from CDOT's MS4. The permit authorizes the discharge of stormwater commingled with flows contributed by process wastewater and stormwater associated with industrial activity, provided these discharges are permitted under separate CDPS permits. The CDOT Phase I MS4 permit covers areas with a population greater than 100,000, which include Denver, Aurora, Colorado Springs, and Lakewood.

The MS4 permit required CDOT to develop several stormwater management programs. Development and implementation of these eight management programs help prevent future exceedances of water quality standards.

The New Development and Redevelopment Planning Program and the Construction Sites Program are the CDOT Stormwater Management Program elements most directly relevant to the Valley Highway Project. According to the MS4 permit, CDOT will develop and implement a program that ensures that new highway projects and significant modifications are reviewed for the need to include permanent stormwater best management practices (often called BMPs).The purpose of this program is to ensure that permanent BMPs to protect surface water are included in appropriate highway projects.

The New Development and Redevelopment Planning Program is required of any project that requires an EIS or EA, will disrupt greater than one acre, or will result in water quality impacts that will affect the chemical, biological, or physical integrity of any state water, especially sensitive waters. The Construction Sites Program is responsible for reducing the discharge of pollutants from CDOT construction sites.

4.9.1.3 GROUNDWATER RESOURCES

General Groundwater Conditions

Groundwater resources in the project area consist of both shallow alluvial aquifers and deeper bedrock aquifers including the Denver, Arapahoe, Laramie-Fox Hills, and Dawson formations. Shallow alluvial groundwater in the main South Platte River valley generally flows in a north-northwest direction, parallel to the general direction of surface flow of the South Platte River. However, more localized studies have shown a possible relationship between the water table elevation and the bedrock surface elevation. Local groundwater conditions may be influenced by the position of underlying valleys within the bedrock surface.

The alluvial aquifer, which is historically recharged by precipitation and tributaries, is unconfined and hydraulically connected to the South Platte River. Groundwater recharge has been enhanced by reservoirs, irrigation ditch leakage, and infiltration of applied irrigation water.

The uppermost bedrock aquifer underlying the project area is the Denver Aquifer, which is formed by the water-yielding part of the Denver Formation. The primary water-bearing zones of the Denver Formation are moderately consolidated sandstone and siltstone layers ranging in thickness from a few inches to 50 feet. Although the Denver Formation is an aquifer in some parts of the Denver area, the upper portion of the formation generally yields little water in the corridor area due to its low permeability, as compared to the overlying coarse-grained alluvial materials. This low permeable material forms a confining layer below the overlying alluvial materials.

All groundwaters in the State of Colorado are classified and are expected to support basic designated uses such as domestic drinking water, agriculture surface water protection, potentially useable quality, and limited use quality. The water quality in alluvial aquifers within the project area is generally poor. Groundwater water quality standards for drinking water and agricultural uses are shown on **Table 4.9-4**.

Table 4.9-4 State of Colorado Groundwater Standards

Parameter	State Groundwater Standards Drinking Water (mg/L)	State Groundwater Standards Agricultural (mg/L)
Arsenic	0.05	100
Barium	2.0	-
Cadmium	0.005	10
Chromium	0.1	100
Copper	-	200
Iron	-	5,000
Lead	0.05	100
Manganese	-	200
Molybdenum	-	-
Selenium	0.05	20
Uranium	0.002	-
Zinc	-	2,000
Total Radium 226/228 [1]	5	-
Gross Alpha [1]	15	15
Gross Beta [1]	50	0.01

Source: CDPHE, 2001d
[1] Concentrations in picocuries per liter (pCi/L) for radionuclides.
mg/L – milligram per liter

Groundwater Studies

Data collected during the I-25/Broadway Viaduct Replacement project were summarized in the *Site Investigation Summary Report* (Balloffet - Entranco, 2001b). Groundwater was generally encountered near the bedrock interface in the area of the Broadway interchange at depths from 14 to 26 feet. Such data may indicate that lower permeability bedrock acts as an aquitard, slowing the downward movement of groundwater from the more permeable unconsolidated upper aquifer zone. Although shallow groundwater flow in the vicinity of the site was found to flow toward the north/northwest, which is generally consistent with the regional flow direction, groundwater in the area east of Broadway and north of the I-25 South on-ramp was found to flow to the northeast. This local flow pattern could be the result of the influence of variations in the bedrock surface or localized recharge.

Surface water is the primary water source for the City and County of Denver. Water pumped from the alluvial aquifer sees limited use for commercial and industrial purposes. The alluvial groundwater is particularly vulnerable to human activities due to the shallow groundwater table and high permeability of the soils. Groundwater samples collected during the Southeast Corridor Project EIS (Carter-Burgess, 1999) and during the I-25/Broadway Viaduct Replacement Project investigations (Balloffet - Entranco, 2001b) indicate a localized area of contamination apparently originating from commercial and industrial activities. Additional discussion on groundwater contamination is included in **Section 4.13** *Hazardous Waste*.

Important Groundwater Issues in the Project Area

Local groundwater quality has been impacted by historical industrial practices in the area. Groundwater contamination is an important consideration for the Valley Highway project. Risks associated with groundwater contamination include exposure from highway construction and maintenance activities. Material management plans, health and safety plans, CDOT 250 construction specifications, or other CDOT procedures will be required during construction to minimize risks from existing groundwater contamination in the vicinity of the project. Additional information regarding contaminated groundwater can be found in **Section 4.13** *Hazardous Waste*.

4.9.1.4 STORMWATER DRAINAGE

The drainage basin in the vicinity of the project area is almost entirely developed with industrial, commercial, and residential uses. Stormwater runoff throughout the project corridor and tributary drainage basins flows overland, in storm sewers, and by open channel to the South Platte River. Runoff east of I-25 flows from east to west and is intercepted by storm sewer systems and conveyed to the river. Runoff west of I-25 and the South Platte River flows from west to east towards the river. Stormwater runoff from land west of Federal Boulevard flows to Weir Gulch which flows to the South Platte River north of 8th Avenue.

The City and County of Denver's *Phase I Stormwater Drainage Master Plan* for the Denver Metro Area encompasses the project corridor and contains the framework for future city storm sewer projects in the project area. Several storm drainage improvements are proposed in or near the project area. Denver's master plan and subsequent drainage improvements should be considered with each phase of final design for the Valley Highway Project. Offsite drainage information and peak discharge calculations for the Valley Highway Project were based on the information provided in the *Phase I Stormwater Drainage Master Plan* and in the *Draft Floodplain and Drainage Assessment (*Muller Engineering, 2000).

There are four general areas (basins) with similar drainage patterns and outfall systems: the US 6 area, the I-25/US 6 interchange, Alameda Avenue, and the I-25/Broadway area. **Table 4.9-5** provides a summary of key data for the existing basins. Locations susceptible to localize flooding are provided in **Table 4.9-6**. More detailed information on drainage studies, drainage basins and drainage patterns can be found in the *Water Resources Report* (FHU and Muller Engineering, 2005g).

Table 4.9-5 Existing Basin Information

Basin Name	Area	Percent Impervious	100-Year (Flow Rate)
US 6 Area			
US 6 – West	26 acres	64%	81 cfs
US 6 – East	17 acres	50%	55 cfs
US 6 – South Platte River	7.8 acres	90%	47 cfs
CCD – 7th Avenue West	47 acres	75%	NOT CALCULATED
CCD – 5th Avenue West	39 acres	75%	NOT CALCULATED
I-25/US 6 Interchange Area			
I-25 – US 6 Interchange	37 acres	43%	100 cfs
I-25 – 3rd Avenue	17 acres	100%	59 cfs
CCD – 6th Avenue East	263 acres	80%	840 cfs
CCD – 3rd Avenue	187 acres	62%	570 cfs
Alameda Avenue Area			
I-25 – Alameda Avenue	25 acres	94%	126 cfs
I-25 – Low Point	2.6 acres	100%	18 cfs
Santa Fe Drive/Kalamath Street	13 acres	90%	51 cfs
CCD – Virginia Avenue	726 acres (plus 610 acres in 100-year)	48%	2560 cfs (includes extra acres)
CCD – Alameda Avenue	99 acres	80%	400 cfs
CCD – Bayaud Avenue	310 acres	55%	950 cfs
CCD – Ellsworth Avenue	9.3 acres	65%	70 cfs
I-25/Broadway Area			
I-25 – T-REX	6.3 acres	100%	22 cfs
I-25 – Broadway	20 acres	82%	56 cfs
CCD – 42" Outfall	49 acres	86%	200 cfs

Source: FHU and Muller Engineering, 2005g
Note : Values not calculated were deemed not relevant to the project area.
CCD – City and County of Denver
cfs – cubic feet per second

Table 4.9-6 Existing Major Flooding Areas

Location	Basin(s) Contributing To Flooding	Flooding Extent On I-25	Affected Structures / Land Use
I-25 near 3rd Avenue	CCD – 3rd Avenue	4.5 inches of ponding	City streets, railroad tracks, building foundations
I-25 near Ellsworth Avenue	CCD – Ellsworth Avenue	4 inches of sheet flow	City streets, railroad tracks
I-25 near Bayaud Avenue	CCD – Bayaud Avenue	9 inches of sheet flow	City streets, railroad tracks, building foundations
I-25 under Alameda Avenue	I-25 and CCD – Alameda Avenue	Up to 20 feet of ponding possible	City streets, railroad tracks, building foundations

Source: FHU and Muller Engineering, 2005g
CCD – City and County of Denver

US 6 Area

Figure 4.9-4 shows the US 6 area, which encompasses approximately 143 acres of roadway, grassy right-of-way, parks, residential, and light industrial uses. This drainage area is defined by the highpoint west of Federal Boulevard to the east edge of the South Platte River, the tributary areas, and nearby drainage. Runoff from west of Federal Boulevard flow from west to east and is intercepted by Weir Gulch, located west of Federal Boulevard. Runoff east of Federal Boulevard also flows to the east and is collected in storm sewer systems that convey it to the South Platte River. There are five basins in this drainage area.

I-25 / US 6 Interchange Area

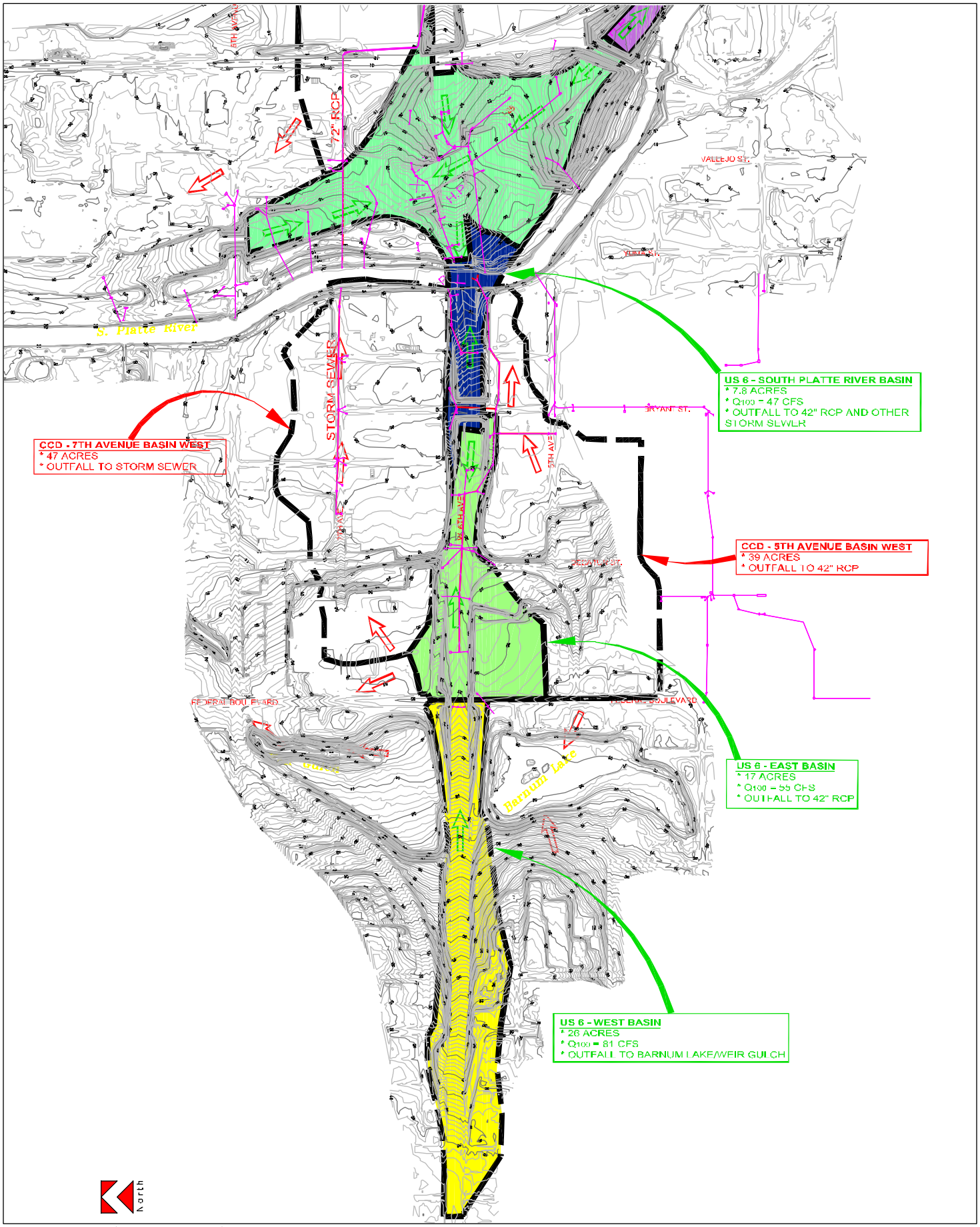
I-25 / US 6 interchange area consists of runoff from the I-25 and US 6 interchange, I-25 – 3rd Avenue Basin, and some City and County of Denver runoff east of I-25 (see **Figure 4.9-5**). This drainage area contains four drainage basins in the northern portion of the project area.

Alameda Avenue Area

This drainage area consists of several basins, most of which are offsite and produce severe flooding on I-25. The onsite areas consist of some runoff from Santa Fe Drive/Kalamath Street and a basin on I-25. The Alameda Avenue area is shown on **Figure 4.9-6**. There are seven basins in the Alameda Avenue drainage area.

I-25 / Broadway Area

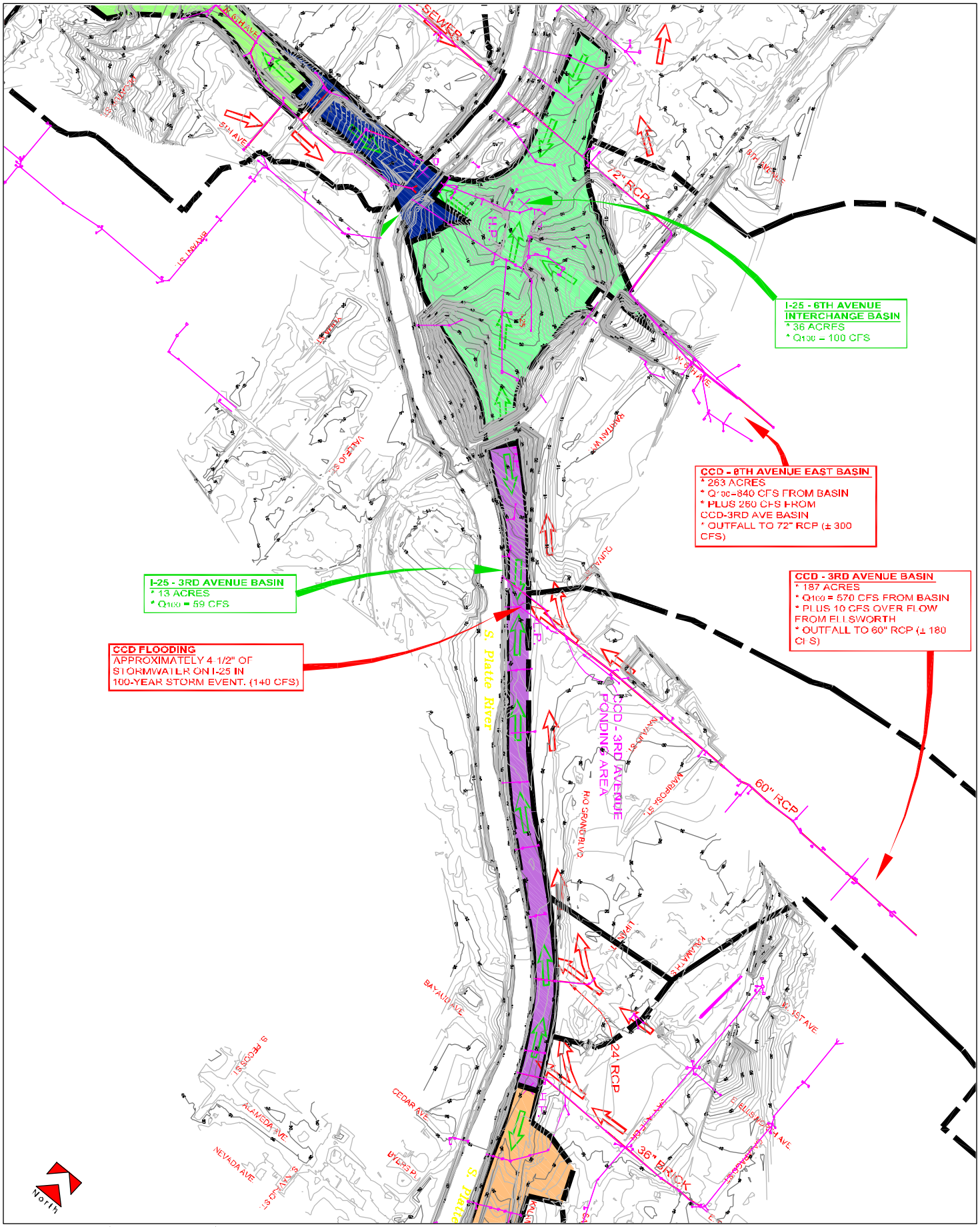
The I-25/Broadway area extends from the Santa Fe/Kalamath Basin southern boundary to the I-25 underpass of Logan Street (see **Figure 4.9-7**). Part of this area is the Broadway Viaduct Replacement Project area. The Broadway Viaduct Replacement Project consists of removing, replacing, and realigning the existing viaduct over Broadway, the railroad, and light rail tracks and includes re-construction of various on- and off-ramps. There are three drainage basins in this southern portion of the project area.



0 ¼ ½ Miles

Existing Basins - US 6 Area

Figure 4.9-4



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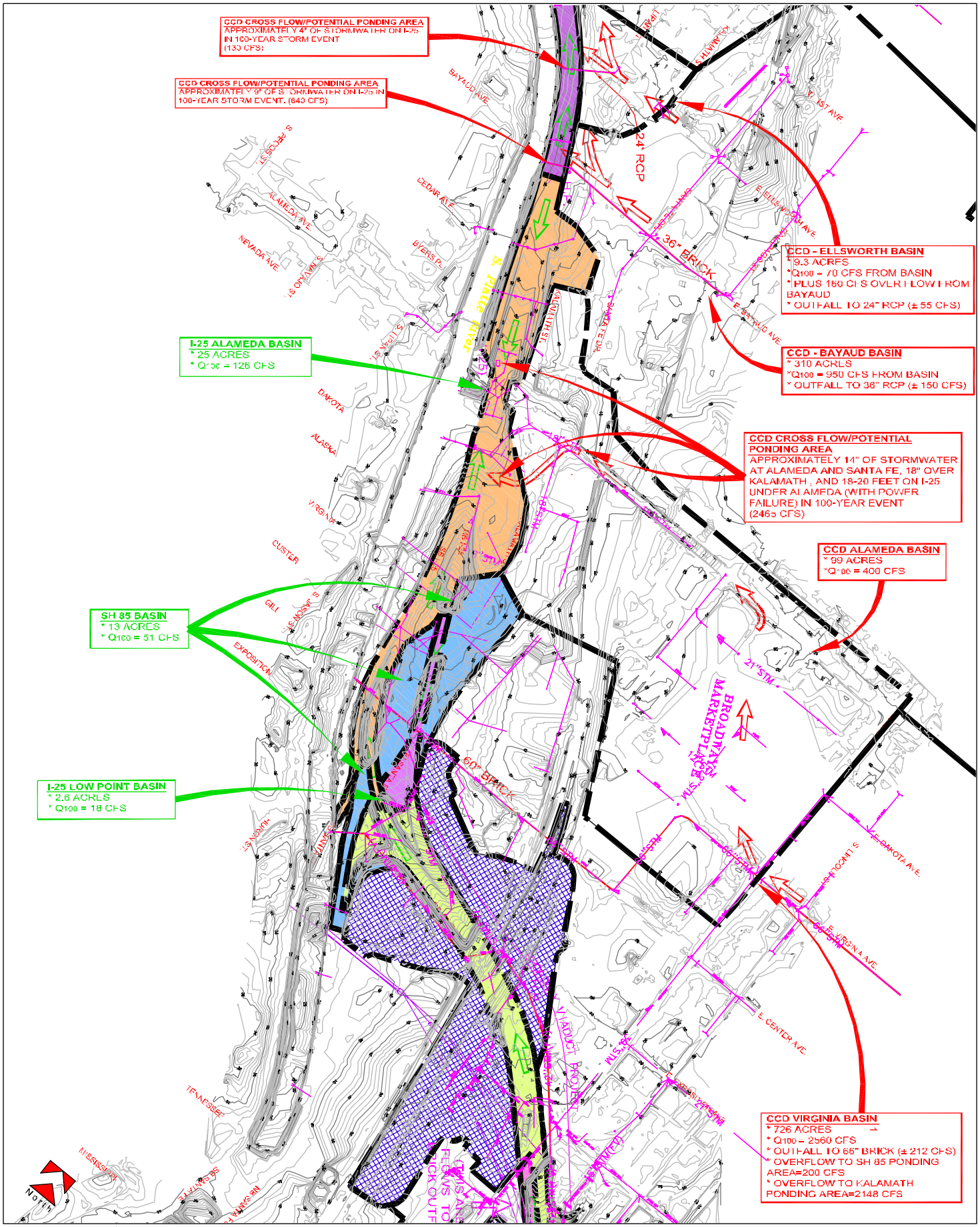
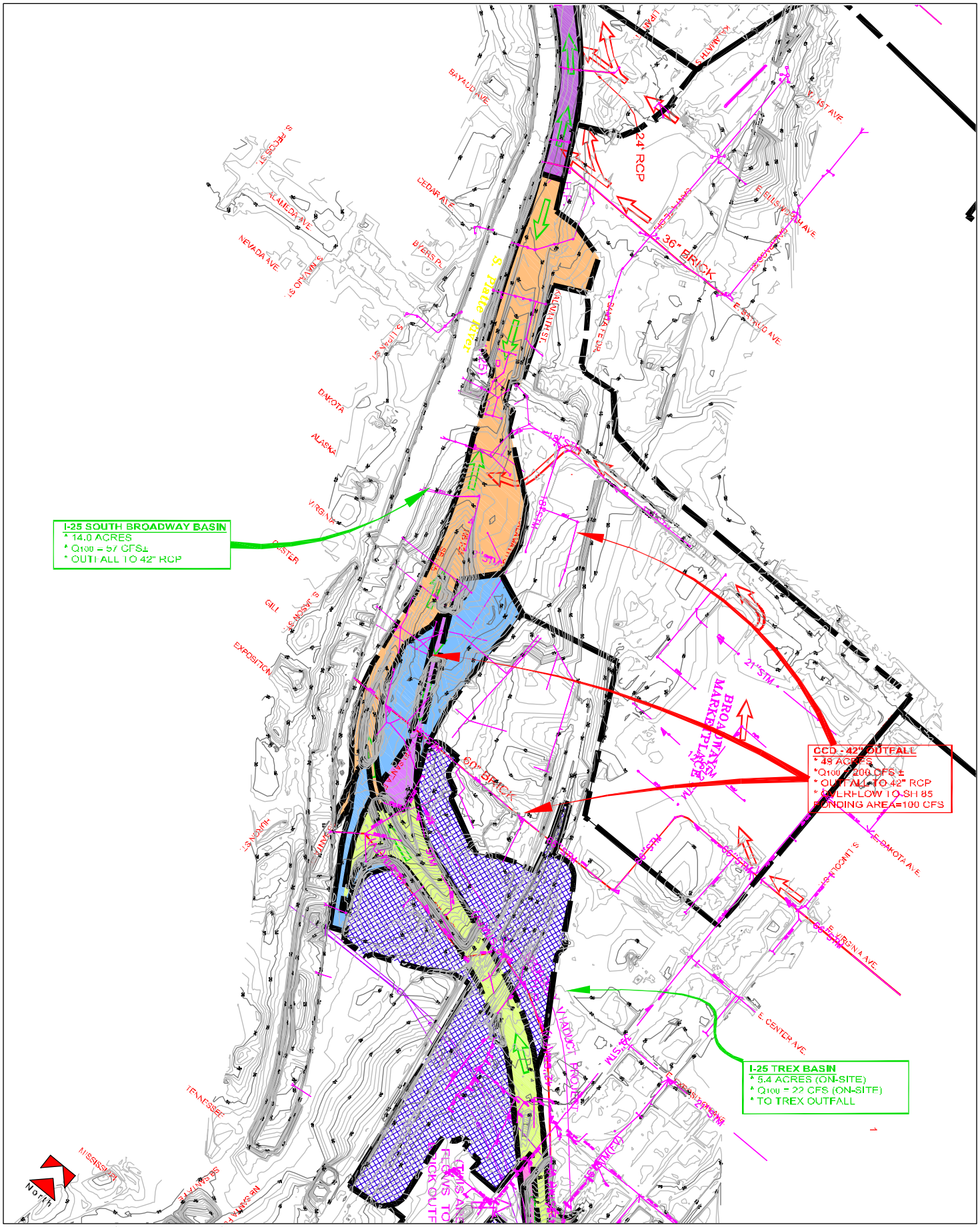
Existing Basins - 6th Avenue Interchange Area

Figure 4.9-5



Existing Basins - Alameda Area



0 ¼ ½ Miles

Existing Basins - Broadway Area

Figure 4.9-7

4.9.2 Consequences of the Alternatives

Water resources impacts have been identified for the No Action Alternative and for the system alternatives.

4.9.2.1 NO ACTION ALTERNATIVE

Stormwater runoff from I-25 and the surrounding City and County of Denver Drainage Basin discharges directly into the South Platte River. There are no structural BMPs located near I-25 to collect and passively treat stormwater. The No Action Alternative would continue to allow direct discharges of stormwater directly into the South Platte River without collection and treatment. Pollutant pulses would continue to occur from storm and snowmelt events.

The City and County of Denver is continuing to improve their stormwater quality management and controls within their drainage basins, which would improve the water quality of runoff tributary to the South Platte River. The South Platte River drinking water designation and other designated uses would remain vulnerable to highway spills and discharges from accidents. The number of outfalls would not be reduced and the outfall structures would not be aesthetically improved. Drainage improvements would not be realized and the potential for significant standing water (ponding) on I-25 and local streets would continue to exist. The Alameda sump discharging collected groundwater and stormwater into the South Platte River would not be modified.

4.9.2.2 SYSTEM ALTERNATIVES 1, 2, 3, AND THE PREFERRED ALTERNATIVE

Overall, adverse impacts to water resources caused by the system alternatives, which include System Alternatives 1, 2, 3, and the Preferred Alternative, are considered to be minor. The system alternatives avoid direct impacts to the river by moving I-25 to the east, provide best management practices (BMPs) to capture previously uncollected and untreated stormwater, and improve drainage systems, thereby reducing the potential for flooding on local streets and I-25. Adverse impacts to the river are mostly temporary, such as sediment transport from bridge, pier, and storm sewer outfall structure construction.

An increase in the Valley Highway's impervious area with each system alternative has the potential of accumulating more copper and other heavy metals on the road surface and ultimately into the South Platte River via stormwater runoff. Heavy metals are water pollutants that are associated with highway operations. Metals, such as copper, lead, zinc, nickel, chromium, and cadmium, come from automobile brake systems, mechanical part movements, and tires. Copper is of concern in the South Platte River since it is on the State of Colorado's monitoring and evaluation list and may be adding to stream impairment. No stormwater data exist for copper and other heavy loading into the South Platte River from I-25 or from other Denver metropolitan road surfaces. Proposed stormwater BMPs would aid in reducing the amount of copper and total suspended solids entering the river from I-25.

Groundwater encountered from dewatering during construction activities, or longer term actions required due to grade separations or tunnel development could eventually impact the South Platte River. Groundwater that is encountered and/or removed over either the short- or long-term must be managed according to Clean Water Act and CDPS regulations. Contaminated groundwater will need to be contained, conveyed, and treated before any discharge to surface

or groundwater. A Section 402 permit (Clean Water Act/Colorado Discharge Permit System) will be required from the Water Quality Control Division in order to discharge treated groundwater. A permit is also required to discharge groundwater or stormwater from sumps. Treatment systems will require routine monitoring and reporting to the Water Quality Control Division along with routine operation and maintenance activities.

In accordance with the CDOT Phase I MS4 permit, BMPs would be designed, constructed, and maintained in the South Platte River corridor as a part of each of the system alternatives. BMPs are methods to improve and/or maintain existing water quality by treating stormwater to the maximum extent practical. Three main types of BMPs are structural, nonstructural, and construction. Structural BMPs remain in place and require routine maintenance to ensure their functionality. Grass buffers, water quality/sedimentation ponds, riprap outlet protection, and wetland channels are examples of structural BMPs. Nonstructural BMPs are intended to reduce or eliminate the pollutants that impact stormwater runoff (UDFCD, 2002). Examples of these are street sweeping and spill containment. Examples of construction BMPs are silt fences, straw bale barriers, and temporary check dams. Construction BMPs are used to reduce erosion of disturbed soil and often remain in place until vegetation is established. The project will employ a combination of all three BMP types.

Currently, there are very minimal BMPs being used within the project corridor for highway runoff. Two nonstructural BMPs, street sweeping and using a deicing agent instead of using sand or salt for snow and ice treatment, are being used on I-25 and US 6 as standard operating procedures. Product quality control checks exist for the use and application of deicing chemicals to reduce the risk of water quality impacts.

The New Development and Redevelopment Program states that 100 percent of water quality capture volume (WQCV) must be provided for the project area or 80 percent of total suspended solids should be removed (CDOT, 2004b). There are many different BMPs that are approved for use for CDOT projects that can meet these requirements. Those most suitable for use on this project include extended detention ponds with micropools, extended detention shallow wetlands, and dry swales. The appropriate BMPs will be determined during later design phases. BMPs would require maintenance on a regular basis and would need adequate maintenance access. CDOT maintenance will review all final designs for BMPs to ensure the access and maintainability of such designs. In addition, BMPs will be designed to be aesthetically pleasing for trail users, home and business owners, and vehicle occupants.

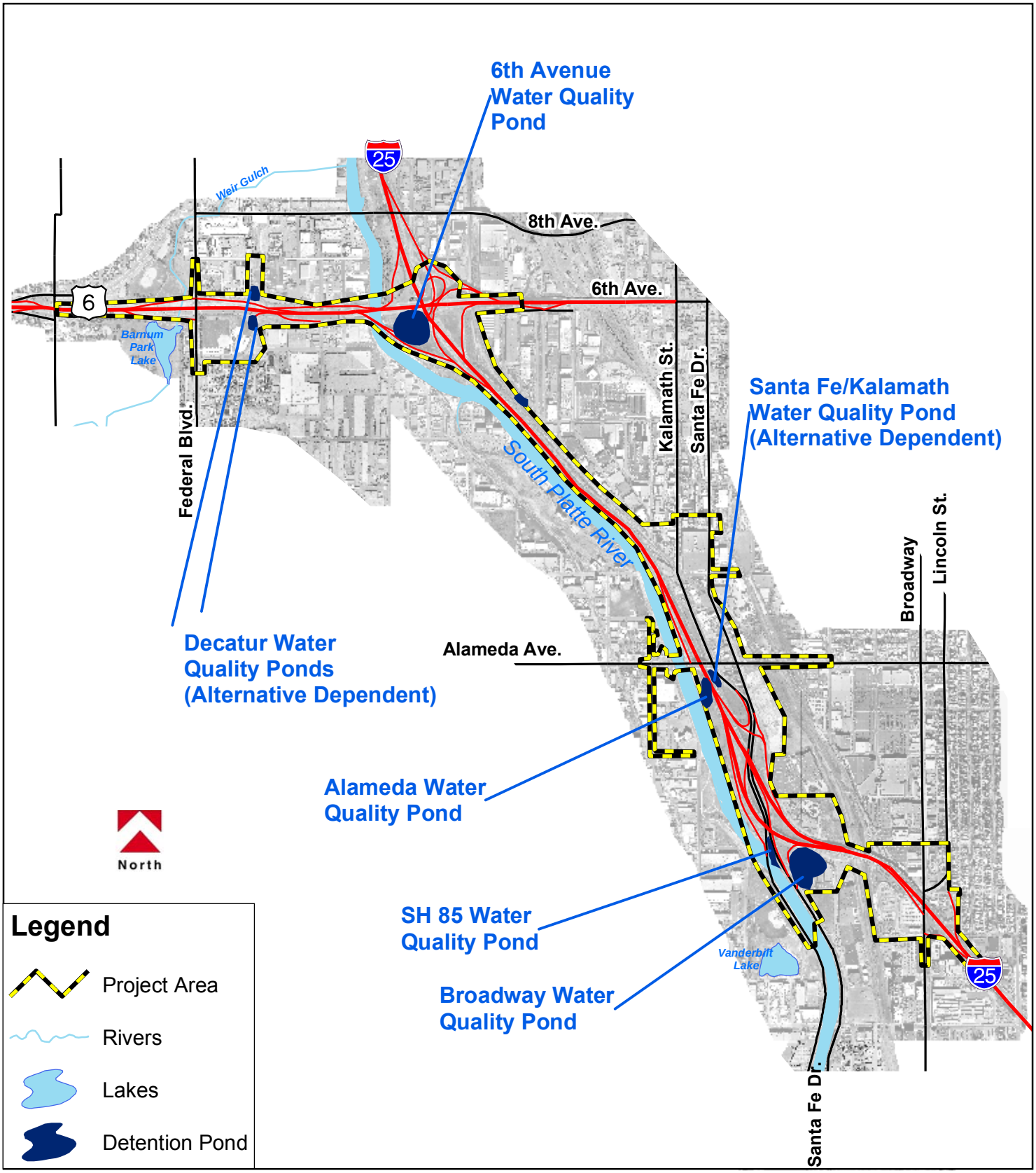
An extended detention pond with micropool BMP consists of two stages, an upper pre-sedimentation forebay and a lower micropool. The upper stage consists of a solid driving surface that serves to remove much of the larger sediment and debris in the stormwater runoff. The lower stage serves as the main collection place for smaller sediment by providing a pool for sediment to settle while allowing runoff to filter through an orifice plate before flowing to the river. In larger storms, an outlet structure will permit large volumes of runoff to flow to the river untreated, while the smaller storms will be held for approximately 40 hours to allow time for sediment settling. The pond also consists of a trickle channel to convey small flows from the upper to lower stages of the pond. Copies of fact sheets, which illustrate the conceptual design from the New Development and Redevelopment Program, are included in the *Water Resources Report* (FHU and Muller Engineering, 2005g).

The extended detention shallow wetland BMP is similar to the extended detention pond, in that they both have two stages and a similar outlet configuration. The difference is that instead of a trickle channel, runoff filters through a shallow constructed wetland between the upper and lower stages. Wetlands can provide added water quality enhancement through the biological uptake of pollutants. Dry swale BMPs are open-channels, lined with grass or vegetation, which filter pollutants as runoff moves through the swale. If constructed and designed properly, a dry swale can function as a stand-alone BMP but is also beneficial in combination with other BMPs.

A secondary benefit of using extended detention ponds and other detention pond-type BMPs is that they can aid in the collection of contaminations from spills on I-25 and US 6. While this aid is not automatic, CDOT could have maintenance crews block the pond outlets until they could remove the contaminated material, preventing spills from flowing to the river. In fact, gates could be installed onto the outlet structures to enable their blockage when spills occur. Even if contaminants filter into the ground in the ponds, it is easier to remove contaminated soil and treat contaminated water. Shortly after or during a storm event, the ponds would contain water, which would reduce the ability to collect spills and prevent flow to the river.

There are six major outfall locations in the project corridor where BMPs would be implemented. **Figure 4.9-8** shows the locations of these BMPs. For more detailed information, consult the *Water Resources Report* (FHU and Muller Engineering, 2005g).

1. **Decatur** – US 6 East Basin runoff would be collected by inlets and conveyed to an extended dry detention basin, located near Decatur Street, which would provide 100 percent of the required WQCV for this basin. From the Decatur water quality pond, runoff would be conveyed to the South Platte River.
2. **US 6 interchange** - The US 6 interchange water quality pond would be located in the southwest infield of the interchange. Dry swales would be used in combination with other BMPs near the US 6 interchange and as a stand-alone BMP north of the I-25/Alameda interchange. The pond would provide water quality enhancements for runoff coming from three basins - the I-25 – US 6 Interchange Basin with a WQCV requirement of 0.75 acre-feet, the I-25 – 3rd Avenue Basin, which requires 0.86 acre-feet, and the US 6 – South Platte River sub-basin that requires 0.18 acre-feet WQCV. Access to the pond in this area for maintenance would be important as specifics of the design are detailed. Roadway and drainage improvements in this location are consistent in each of the three system alternatives.
3. **SH 85** – The SH 85 water quality pond would be located in the open space between the South Platte River and Santa Fe/Kalamath. The specific location and geometry of the pond would vary depending on the alternative configuration in this area. In all alternatives, the pond would be located to minimize conflicts with existing utilities and future storm sewer systems planned by the City and County of Denver. This pond would serve the SH 85 basin and provide 100 percent of the WQCV.
4. **Alameda** - The Alameda water quality pond would be located between I-25 and the South Platte River. It would provide the required WQCV for the basin and would either be an extended detention shallow wetland or extended detention pond. Citizens expressed a desire for habitat expansion and pleasing aesthetics for the BMPs. A shallow wetland could meet both of these citizen preferences. A 240-foot swale would also be included as a BMP.



Source: FHU, 2005g

Valley Highway, 02-069,

0 0.25 0.5 1 Miles

Water Quality Ponds (BMPs)

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.9-8

5. **Broadway** – The Broadway water quality pond would be an extended detention pond. The I-25 – Broadway Basin is approximately 0.67 acre-feet. Adequate WQCV would be provided for the entire area. The pond could then be built with an invert elevation of approximately 5222.0 feet at the outlet. At this elevation, the pond would be approximately six feet higher than the existing groundwater table.
6. **Santa Fe / Kalamath** – The Santa Fe/Kalamath Grade Separation water quality ponds would be located between Kalamath Street and I-25 at Bayaud Street in System Alternatives 1 and 2. It would be located south of Alameda Avenue between Kalamath Street and I-25. This pond would serve the water captured in the Santa Fe Drive/Kalamath Street sump prior to discharge into the South Platte River.

Most of the post-construction acreage would be routed through BMPs. The post-construction onsite area consists of 172 acres. Of this, 162 acres, or 94 percent, would be routed through a BMP to enhance water quality. In addition, 30 offsite non-highway acres would be routed through the Santa Fe/Kalamath and Broadway water quality ponds and 5 to 24 acres would be routed through the Santa Fe / Kalamath water quality pond. These are basins managed by the City and County of Denver that traditionally drain directly to the South Platte River. These accommodations have been made in partnership with the City and County of Denver, in an attempt to improve overall corridor water quality enhancement independent of the projects requirements, where possible. BMP ponds would be sized to have a minimum of 100 percent of the project-required WQCV, but could be upsized to provide further water quality volume. CDOT and the City and County of Denver will continue conversations to explore opportunities for shared use, costs, and maintenance for these ponds.

Table 4.9-7 summarizes basin information, identifies the structural BMP requirements, and suggests an appropriate BMP. These ponds have been conceptually designed and details are available in the *Water Resource Report*.

Table 4.9-7 shows the percentage WQCV provided by the ponds. Two percentages are shown – “As Shown” and “At Pond Embankment.” The “As Shown” percentage represents the pond capacity to meet the project WQCV requirements. The “At Pond Embankment” percentage represents reserve capacity available should the pond be upsized. For example, the WQCV required for the US 6 interchange area is 1.67 acre-feet. The volume of the pond shown on figures in the *Water Resources Report* would be 1.67 acre-feet (100% WQCV), but if the design were modified, it could probably have a volume of 4.2 acre-feet. The increased volume of a pond could provide room for larger storms to be treated, instead of the normal two-year design storm or accommodate some of the off-site basin needs, as discussed above.

Table 4.9-7 BMP Summary

Contributing Basin and Area	Contributing Area (acres)	Required WQCV (acre-feet)	Structural BMP Type	Provided Size	% WQCV Provided	
					as shown	at pond embankment
US 6 - Decatur	43	1.08	EDB	1.08 acre-feet	100%	
US 6 - South Platte River (excluding sub-basin tributary to I-25 – 6th Avenue Interchange)	4.6	0.20	None	NA	0%	
I-25 - 6th Avenue Interchange, I-25 - 3rd Avenue, US 6 – South Platte River Sub-basin	57	1.67	EDB	1.67 as shown, up to 4.2 acre-feet at pond embankment	100%	251%
CCD – K-S, SF-S, SB-4, SB-14 (alternative dependent)	5-24 (off-site)	0.07-0.78 (CCD)	EDB	0.07-0.78 acre-feet	100%	
I-25 - Alameda SB 31	5.3	0.15	DS	230 LF of swale (if designed to UD criteria, it meets 100% WQCV)	Assume 100%	
I-25 - Alameda SB 22, SB 23	20	0.52	SW	0.98 as shown, up to 5.2 acre-feet at pond embankment*	188%	1000%
SH-85, I-25 Broadway SB 31	17	0.69	EDB	0.71 as shown, up to 2.3 acre-feet at pond embankment	103%	333%
I-25 - Broadway SB 32, SB 33, CCD - 42" Outfall	50 (including 30 off-site acres)	2.15 (including1.74 for CCD)	EDB	2.3 as shown, up to 5.1 acre-feet at pond embankment	107%	237%
I-25 - TREX	6.3	0.32	None	NA	0%	
Totals:	173 plus 35-54 off-site for CCD	5.08 plus 1.81-2.52 for CCD		6.96-7.67 as shown, up to 18.8 at pond embankments	101%	247-262%
					(weighted percentages)	

* If this BMP were to provide volumes with depth greater than 2-3 feet, an EDB would be used instead of an SW.
BMP: Best Management Practice
DS: Dry Swale
EDB: Extended Detention Basin
SW: Shallow Wetland Basin
UD: Urban Drainage (and Flood Control District)
WQCV: Water Quality Capture Volume

Six percent of the onsite area is located in such a way that implementing a structural BMP would be extremely difficult or would require subsurface structures along the US 6 and I-25 drainage basins. Subsurface structures are difficult to maintain and their use is highly discouraged by maintenance personnel. With the at-grade structures, the ability to determine if BMPs are operating properly or need maintenance can be completed by simple surface observations. Subsurface structures are not as easy to visually inspect to confirm operation or maintenance needs. In many cases, confined-space entry procedures are required for personnel entry, which can increase maintenance costs and time. In addition, below-grade BMPs are easily overlooked because there are no negative visual impacts if improperly maintained. If subsurface BMPs are not maintained, the system may become septic or a high amount of sediment may be flushed into the receiving stream. Locations where implementation of structural BMPs are impracticable include:

- The US 6 – South Platte River Basin is located along US 6 and touches the banks of the South Platte River. The basin low point is located on the bridge over the river, and runoff that is collected is currently conveyed directly into the river. Approximately 3.2 acre of the basin would be routed to the 6th Avenue water quality pond. The steep banks of the river, the wetlands, and the floodplain location all limit access to the area and the ability to inspect and maintain a structural BMP. Additionally, any new BMP structures in this area would be a floodway encroachment and would likely impact wetlands as well. There is neither sufficient room for a water quality pond nor the right conditions for other at-grade BMPs in this area. Runoff from the US 6 bridge and part of the US 6 – South Platte River Basin would be collected and routed to the US 6 interchange water quality pond. However, the remainder of the basins runoff would directly drain to the South Platte River as it does today.
- Runoff from the I-25 T-REX Basin within the Valley Highway project flows to the T-REX concrete box culvert located underneath Mississippi Avenue. The runoff is but a small percentage of the total runoff and was accounted for during the design of the outfall underneath Mississippi Avenue. Furthermore, roadway and transit improvements in the corridor and the close proximity of residences on the north side of the highway limit opportunities to implement BMPs in this area. This project, therefore, would not incorporate additional water quality BMPs into this area.

Wherever possible, grassed medians or buffer zones will be established along the roadway to increase pervious area and will assist in water quality enhancement. Discharge from BMPs, such as extended detention ponds, have the potential of increasing streambank erosion and potentially disrupting wetlands, due to high velocity flows. To mitigate this impact, discharges from BMPs would use erosion control techniques to reduce sediment loading into South Platte River. BMP discharges outlets will have outfall protection, such as rip-rap conveyance channels or rock/rip-rap structures, to reduce stormwater velocities prior to stream discharge. It is possible that wetland impacts may be realized during the construction of temporary new discharge outlets and erosion control BMPs.

4.9.3 Mitigation Measures

Avoidance of adverse impacts to the South Platte River was identified very early in the alternatives screening process and was carried through identification of the Preferred Alternative. The widening of I-25 especially north of the Alameda Avenue interchange had the potential for stream movement/channelization, new bridge piers, or cantilevered structures over the South Platte River. A priority was placed on avoidance of the South Platte River and on widening the road towards the east.

As previously mentioned, BMPs will be used to collect stormwater from I-25 and portions of the City and County of Denver Basin. Water quality of stormwater runoff that is routed through BMPs will be improved prior to flowing to the South Platte River. BMPs will be important in preventing the majority of copper and other heavy metals from entering the South Platte River. Heavy metals have a high affinity to adsorb onto suspended solids in the water column in the BMPs identified in this EIS. BMPs will allow stormwater sediment to be collected and settle out before water is discharged into the South Platte River. Heavy metals will stay adsorbed on to the sediments and will be removed during routine maintenance. Water quality impacts to the South Platte River from highway operation are expected to be minimal as long as BMPs are functional and well maintained, and any impacts that will result will be within the CDOT MS4 requirements.

Appropriate application of the BMPs will be further defined during the final engineering phase of this project. Additional mitigation measures may be developed during final design, as appropriate. Additional discussion on sustainable construction and designs is provided in **Section 4.17** *Irreversible and Irretrievable Commitments of Resources***.**

The construction of storm sewer outfalls will temporarily impact wetland and riparian vegetation in the area and water quality in the South Platte River. Erosion and sediment control construction BMPs will be critical in this area, due to the close proximity of construction activities to the South Platte River. Any wetland or riparian vegetation that is temporarily and permanently lost, due to construction of the outfalls, would need to be mitigated as described in **Section 4.11** *Wetlands, Waters of the U.S. and Open Water.*

Implementation of any of the system alternatives will be done in accordance with the programs established under CDOT's MS4 permit. These include:

1. The Maintenance of Structural Controls Program outlines the routine maintenance activities of CDOT BMPs (structural controls) to reduce pollutants in discharges from the MS4.
2. The New Development and Redevelopment Planning Program is responsible for developing and implementing comprehensive planning procedures and controls designated to reduce the discharge of pollutants from areas of new highway development or significant redevelopment and associated drainages, once construction is complete.
3. The Public Street Maintenance Program is responsible for operating and maintaining public streets and roads in such a manner as to reduce the discharge of pollutants associated with maintenance activities (road repair, street sweeping, snow removal, and sanding operations).

4. The Herbicide, Pesticide, and Fertilizer Program is responsible for implementing activities to reduce discharge of herbicide-, pesticide-, and fertilizer-related pollutants in the vicinity of stream and wetland systems.
5. The Illicit Discharges Program is responsible for identifying and eliminating illegal and un-permitted discharges throughout the MS4 system.
6. The Industrial Facilities Program is responsible for tracking industries discharging stormwater in to the CDOT MS4 and addressing potential water quality issues associated with these types of discharges
7. The Construction Site Program is responsible for reducing the discharge of pollutants from CDOT construction sites.
8. The CDOT Facility Runoff and Control Program is responsible for reducing stormwater quality discharge impacts from CDOT-owned or-operated facilities, such as maintenance facilities. It also is responsible for developing plans to manage stormwater run-on and runoff to protect the area surface waters.

The New Development and Redevelopment Program requires that CDOT evaluate the need to develop special requirements for projects that have the potential to discharge stormwater into identified sensitive waters (impaired waters, domestic drinking water, High Quality Class I or a High Quality Class 2, or Aquatic Life Cold Water Class 1). This special requirement dictates that additional stormwater BMPs must be identified and implemented beyond the 100% water quality capture volume design criteria to improve or protect existing water quality conditions. This program was initiated by CDOT May, 2004. The additional BMPs that will be considered for this requirement on this project are as follows (CDOT, 2004b):

- Work with City and County of Denver to provide public signs requesting the public to pick up fecal material from their dogs. Dispensers for plastic bags and trash receptacles to collect this material could also be provided. The South Platte River currently is not meeting water quality standards for E. coli., and pets could be one of many sources.
- The use of deicing chemicals (magnesium chloride and other products) reduces the amount of traction sand that has been used historically. Deicing chemicals eliminate the need to add a sediment/salt mixture on to the road to improve safety conditions for the driving public. This maintenance activity reduces the amount of sediment that would enter the drainage system and ultimately enter the South Platte River. Standard operating guidance has been established for the efficient application and management of the deicing chemicals.
- Sweeping of I-25 would help reduce the amount of sediment and debris that would enter the South Platte River. This action is currently being performed in the area as part of Air Quality Regulation No. 16.
- Post-construction monitoring program to ensure that the BMPs are operating as designed and being maintained in a timely fashion. Indicator parameters can be used to determine the post-construction effectiveness of the BMP.
- CDOT and City and County of Denver could work together to improve the South Platte River in the project area and in Denver Metropolitan Area. Possible improvements could include pubic education, landscape enhancements, improved riparian vegetation, and water quality monitoring programs.

A key component in the success of the CDOT Stormwater Program is maintenance. Trained CDOT Maintenance personnel will be performing several important inspection functions concerning proper BMP operation, outfall discharges and erosion protection, detention pond sediment removal. In accordance with CDPHE Regulation No. 61, sufficient equipment, financial support and manpower must be provided to the CDOT Maintenance Department to properly manage stormwater in the project area (CDPHE, 2004).

A general stormwater construction permit will need to be acquired by CDOT from CDPHE before construction activities begin. A stormwater management plan (Section 208) must be developed, updated, and followed. CDOT program requirements and construction specifications must be followed by the contractor.

Discharge permits will be needed for dewatering and sump discharges during and after construction to protect water quality. This will involve initial water quality characterization, monitoring, and reporting to CDPHE.

There is also potential for several temporary impacts to the river due to the demolition and construction activities of the bridge. Actions identified below will be taken to avoid such impacts:

- If lead paint is present, this material must not be allowed to flake off and enter the South Platte River. (Section 402 Clean Water Act, CDPHE Regulation 61)
- If cranes and other equipment are used for bridge demolition within the river or streambank area, the equipment would be kept out of the river to the greatest extent possible, and all work shall minimize temporary impacts to the river. (State regulation Senate Bill 40). A crane pad would be built, if cranes or other equipment can not be kept out of the river.
- Sediment may enter the river from land disruption and subsequent erosion. Construction BMPs would be implemented and maintained as per the CDPHE General Construction Permit; the project must develop and adhere to a stormwater management plan. (Section 402 Clean Water Act, CDPHE Regulation 61)
- An energy dissipation device or material, such as riprap, would be used to control post-construction erosion near the bridge. If riprap is used above the ordinary high water level of the river, it must be covered with topsoil and vegetated. Vegetation or other erosion control techniques (as per CDOT erosion control practices) must be established to prevent sediment loading as per the general storm water construction permit.
- Caissons used to create bridge piers may require groundwater dewatering. A discharge permit and a possible treatment strategy will be needed before dewatering activities can occur.

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TABLE OF CONTENTS

Page

4.10 Floodplains 4.10-1
4.10.1 Current Conditions 4.10-1
4.10.2 Consequences of the Alternatives 4.10-5
4.10.3 Mitigation Measures 4.10-6

LIST OF FIGURES

Page

Figure 4.10-1 Floodplains 4.10-2

LIST OF TABLES

Page

Table 4.10-1 Existing Major Flooding Areas 4.10-4
Table 4.10-2 Drainage Basin Area 4.10-6
Table 4.10-3 Summary of Mitigation Measures for System Alternatives 4.10-8

4.10 Floodplains

Governmental policy guides the actions for construction in or near floodplains. *Executive Order 11988, Floodplain Management*, requires federal agencies to avoid, to the extent possible long-term and short-term adverse impacts associated with the modification of floodplains and to avoid floodplain development wherever there is a practicable alternative. Federal agencies shall, *"take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains."* The agency shall further *"evaluate the potential effects of any actions it may take in a floodplain to ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplain management and to prescribe procedures to implement the policies and requirements of this Order."*

The Federal Highway Administration's 23 CFR 650, Subpart A provides guidelines for floodplain and construction interaction, which included:

- Avoid longitudinal and significant encroachments, where practicable
- Minimize impacts of highway agency actions that adversely affect base floodplains
- Restore and preserve the natural and beneficial floodplain values that are adversely impacted by highway agency actions

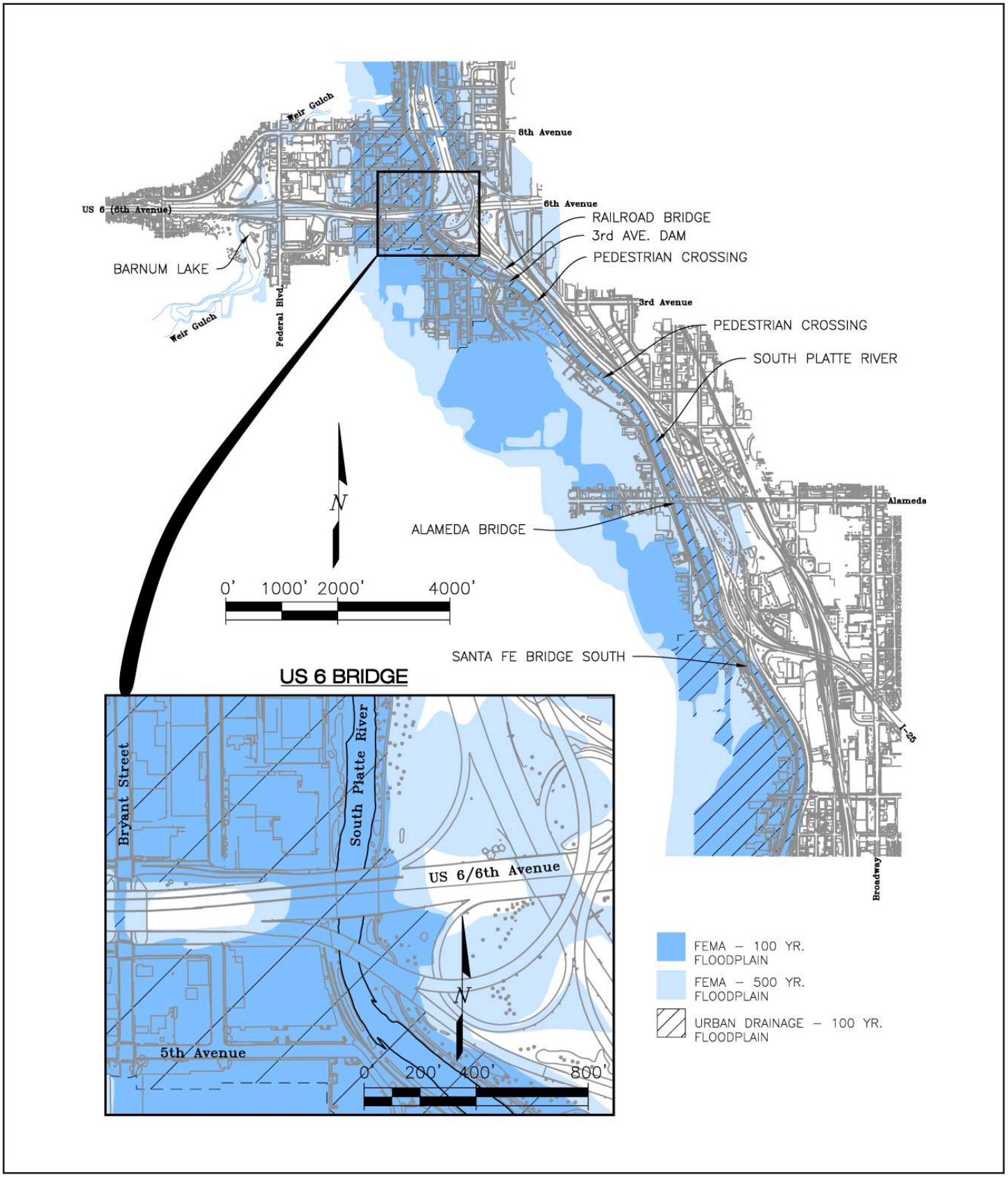
The base flood, which is defined as a flood that has a one percent or greater chance of occurrence in any given year (100-year flood) is the regulatory standard used by most federal and state agencies to administer floodplain management programs.

4.10.1 Current Conditions

4.10.1.1 FLOODPLAIN EXTENT

Floodplain and stormwater drainage studies have been completed for much of the project area. In 1990, the Federal Emergency Management Agency (FEMA) identified 100- and 500-year floodplains for the South Platte River, including those within the project area. More detailed floodplain information is available in FEMA's *Flood Insurance Study Volumes 1 and 2,* (FEMA, 1990).

The Urban Drainage and Flood Control District (UDFCD), in agreement with several city and county agencies, published a *Flood Hazard Area Delineation and a Major Drainageway Planning Study for the South Platte River* in 1985, which encompass the project area. In addition, in 1972, UDFCD published a major drainageway planning study for Weir Gulch, a small stormwater tributary to the South Platte River (Frasier & Gingery, 1972). This tributary flows under US 6, near Federal Boulevard prior to its confluence with the South Platte. These floodplains can be seen in **Figure 4.10-1**, which includes a digital schematic of FEMA flood insurance rate map, community panel numbers 0800460013C and 0014C and the UDFCD Flood Hazard Area Delineation.



Floodplains

Figure 4.10-1

4.10.1.2 SIGNIFICANT HISTORICAL FLOOD EVENTS

The South Platte River watershed, including the project corridor, has a long history of flooding. The river basin has flooded from large snowmelts in the mountains, storms covering large areas with continuous rainfall, as well as localized storms with high rainfall intensities. The majority of flooding in the project corridor is caused by summer thunderstorms that drop great amounts of rain in short time intervals, causing flash floods where the runoff exceeds the capacity of storm sewers and drainage channels.

There is a great detail of information available regarding the flooding history of the South Platte River and its tributaries; however, due to the size of the drainage basin, available information is not specific to localized areas of flooding. The following is a representative sample of the flooding history on the South Platte River including a range of flooding causes and results (Matrix Design Group, 2003):

- **May 1942 –** Heavy rains caused extensive damage along the South Platte River. The high water destroyed five bridges, including those at West Evans and West Mississippi.

- **June 16, 1965 –** The largest and most damaging natural disaster in the history of Denver occurred June 16 and 17, 1965, when a cloudburst dumped 15 inches of water on tributary basins near Larkspur. Flooding occurred throughout the South Platte River Basin with estimated damages of $500 million, of which $300 million occurred in the Denver area (FEMA, 1990). Since that time, Chatfield and Bear Creek dams have been constructed, greatly reducing the flood threat to Denver from precipitation over major sub-drainage basins.

- **July 7, 1967 –** A storm of cloudburst proportion caused damage from flooding in southwest and south Denver. Unofficial reports indicated rainfall of 2.0 inches in 30 minutes and more than 3.0 inches total from the storm. Streets and buildings were flooded by the heavy runoff. Hail in some areas contributed to flooding by blocking storm drains. Water reached a depth of 5 feet in the street.

- **June 8, 1969 –** Heavy rain flooded streets and underpasses throughout metro Denver. The heaviest amounts of rain fell in south Denver and Englewood, where unofficial totals of 5 to 6 inches were reported. Mud, debris, and hail carried by the heavy runoff clogged drains and increased the amount of flooding. Approximately 40 cars and a large truck were inundated at an underpass on I-25, and several more were inundated or buried in mud in other areas.

4.10.1.3 EXISTING CONDITIONS IN THE PROJECT CORRIDOR

The Valley Highway Project area is situated in the southern portion of the Denver metropolitan area along the South Platte River. The drainage basin near the project area is almost entirely developed with industrial, commercial, and residential uses. It has undergone a change of land use over the last decade. The industrial properties to the west of older established neighborhoods have been converted to shopping centers, restaurants, and commercial facilities to provide employment, retail shopping, and some recreational activities to the adjacent area.

The South Platte River in the project area is mostly channelized but some obstructions exist. The 3rd Avenue and US 6 bridges cause the 100-year water surface elevation of the river to increase. The US 6 bridge is overtopped by the 100-year flood, resulting in an almost 2-foot rise in the 100-year flood elevation. When combined with the west bank upstream of the bridge, extensive flooding occurs on the left bank from Vallejo Street to the US 6 bridge. The flooded area includes warehouses, retail stores, and small fabricating shops (Wright Water Engineers, 1985). Depth of flooding is generally less than 2 feet but may extend as much as 2400 feet wide (Wright Water Engineers, 1985). Currently, the Santa Fe Drive (south) and Alameda Avenue bridges do not affect the water surface elevation of the river.

There are some serious existing drainage concerns for I-25. As previously mentioned, the project corridor has been subject to both major and minor flooding events. The project corridor experiences heavy flooding at the underpass of Alameda Avenue and receives offsite runoff from the City and County of Denver. This area, I-25 under Alameda Avenue, is located at a lower elevation than the South Platte River, requiring a pump for stormwater discharge. City and County of Denver runoff has a varied effect on I-25, causing flooding from 4 inches of sheet flow in some places to as much as 20 feet of ponding in others. The Valley Highway intercepts the historic drainage path from the east, causing City and County of Denver runoff to combine with the runoff from the highway to make flooding locations worse. Overall, the highway drainage system is undersized, but the most substantial flooding occurs with the combined runoff of City and County of Denver and highway flows. **Table 4.10-1** contains a list of the most significant flooding problems in the project area.

No substantial flooding occurs within the project area along Weir Gulch. Channel improvements along Weir Gulch have been constructed from West Alameda Avenue to the confluence with the South Platte River. Improvements include the regrading of Barnum Lake and construction of an additional outlet culvert under west US 6 (U.S. Highway 6), designed to reduce the extent of 100- and 500-year flooding below Barnum Lake (FEMA, 1990). Additional floodplain and drainage details are provided in the *Water Resources Report* (FHU and Muller Engineering, 2005g).

Table 4.10-1 Existing Major Flooding Areas

Location	Flooding Extent on CDOT Roadways	Affected Structures/Land Use
US 6 near South Platte River	1 to 2 feet of river flow across US 6 bridge over the South Platte River	City and County of Denver roads, many building foundations
I-25 near 3rd Avenue	4.5 inches of ponding on I-25	City and County of Denver roads, railroad tracks, four (+/-) building foundations
I-25 near Ellsworth Avenue	4 inches of sheet flow across I-25	City and County of Denver roads, railroad tracks
I-25 near Bayaud Avenue	9 inches of sheet flow across I-25	City and County of Denver roads, railroad tracks, several building foundations
I-25 under Alameda Avenue	Up to 20 feet of ponding possible on I-25	City and County of Denver roads, railroad tracks, three (+/-) building foundations

Source: FHU and Muller Engineering, 2005g

4.10.2 Consequences of the Alternatives

4.10.2.1 No Action Alternative

The No Action Alternative would have no impact on the floodplain. It would not increase or reduce any volume of runoff on streets or in the river and it would not increase or reduce any volume of flow in the cross section in the river. The No Action Alternative would not raise or lower the base flood elevation. The locations identified in **Table 4.10-1** would remain flooded and continue to negatively impact traffic and the river. In short, there would be no additional adverse or beneficial impacts to existing floodplain conditions. However, with the expected increase in traffic, more vehicles would be inconvenienced by the existing flooding conditions and safety concerns would be compromised.

4.10.2.2 System Alternatives 1, 2, 3, and The Preferred Alternative

Construction of any of the system alternatives, which include System Alternatives 1, 2, 3, and the Preferred Alternative, would affect the floodplain, either through direct changes of the cross section of the river channel, which would affect the flow pattern of the rivers, or through indirect changes via increased impervious surfaces and additional water volume added to the floodplain.

Direct impacts to the floodplain are realized through the bridge replacements along the river or ramp encroachment within the floodplain. Each system alternative would replace three roadway bridges, including the Santa Fe Drive, Alameda Avenue, and US 6 and would add one new bicycle/pedestrian bridge near Bayaud Avenue. Bridge replacements would require temporary modifications in the floodplain to accommodate bridge demolition and construction of new structures. This could include river flow diversion, temporary embankment additions to provide access for construction, or excavations to facilitate construction. These impacts would be only temporary and the area would be restored upon construction completion.

The floodplain is currently affected by the US 6 bridge over the South Platte River. The low structure acts as a dam and raises the floodplain water surface elevation by approximately 2 feet. This backwater flows out of the river banks, flooding nearby areas. The floodplain crosses US 6 near Bryant Street and continues to flow overland until it gets back to the river to the north. All system alternatives include replacement of this bridge to provide a higher and potentially wider structure, providing the required freeboard above the base flood elevation. This would result in an overall drop in floodplain elevation because the raised bridge would no longer act as a dam and raise the floodplain elevation.

System Alternatives 1, 2, 3, and the Preferred Alternative reflect ramp configurations at Alameda that encroach on the eastern bank of the South Platte River and the associated floodplain and realign the southbound I-25 ramp to southbound Santa Fe encroaching on a portion of the overbank floodplain that extends beyond the river channel limits.

A localized floodplain impact could occur from roadway improvements near Alameda Avenue and Santa Fe Drive in System Alternative 2. Under this alternative, the Santa Fe Drive/Kalamath Street overpass of Alameda Avenue would cause runoff to be channelized along Alameda under Santa Fe/Kalamath, instead of allowing it to flow along its historic path southwesterly across Kalamath Street. The reduced flow area on Alameda Avenue would cause runoff to flow to a depth of approximately 2 feet under Santa Fe Drive/Kalamath Street, which is not

acceptable to the City and County of Denver. Additional inlets and storm sewer capacity would need to be added to the existing system in Alameda Avenue to mitigate this impact.

This project would provide additional highway lanes, resulting in increased impervious surface area within the drainage basins and increased runoff volumes into the South Platte River. System Alternative 3 would result in the greatest additional impervious drainage area (13 acres) to the project corridor. **Table 4.10-2** identifies the size of the drainage basin area for each system alternative.

Table 4.10-2 Drainage Basin Area

Location	No Action Alternative (Existing Conditions)	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
US 6	51 acres	51 acres	51 acres	51 acres	51 acres
I-25	109 acres	115 acres	115 acres	116 acres	116 acres
Santa Fe Drive/ Kalamath Street	1144 acres	1145 acres	1144 acres	1150 acres	1145 acres
Total	**1304 acres**	**1311 acres**	**1310 acres**	**1317 acres**	**1312 acres**

Source: FHU and Muller Engineering, 2005g; 2006f

Often with new construction and redevelopment, detention ponds are used to detain runoff and release it at historic rates, so there is no increase in runoff. Detention ponds are not being considered for this project, although BMP ponds for water quality purposes are being proposed. This decision is supported by the fact that the additional runoff would be relatively small, the ponds would be located very close to the downstream drainageway (the South Platte River), and the detention might increase the overall peak to the river, resulting in a negative impact.

Several areas exist where historic localized flooding has occurred due to stormwater drainage within the project area. Ponding areas that reach a depth of 18 inches or more in the 100-year storm event have been identified as “Potential Ponding Areas” in the City and County of Denver 100% *Stormwater Drainage Master Plan* (Matrix Design Group, 2003). The storm sewer improvements implemented with the system alternatives would not worsen these ponding conditions and might, in fact, reduce localized flooding.

4.10.3 Mitigation Measures

In developing system alternatives for the Valley Highway Project, several measures were identified to help avoid, minimize, or mitigate potential adverse impacts to the floodplain. The system alternatives, including the Preferred Alternative, were designed to avoid direct and indirect support of floodplain development whenever practicable as required by *Executive Order 11988*. All system alternatives would avoid impacts to the river by keeping most improvements in the existing roadway location or, in the I-25 improvement area, by moving them to the east, away from the river, wherever possible. Impacts to the floodplain would be minimized by

reducing the overall number of storm sewer outfalls to the river. Mitigation would be provided for adverse floodplain impacts with implementation of permanent BMPs.

With the construction of any of the system alternatives, including the Preferred Alternative, there would be an overall reduction in the number of outfalls in the project area. The project would increase the amount of stormwater runoff, but consolidate it into fewer outfalls. On average, each outfall would therefore discharge more runoff into the river than under the No Action Alternative. Adequate outlet protection would be installed at the outfalls, as a BMP, to reduce erosion potential. Current UDFCD requirements for outfalls will be considered during final design in order to implement the most current outlet protection system. The fewer number of outfalls would result in fewer locations of continuous maintenance impact to the river and associated floodplain. Removing and constructing outfalls would temporarily disturb the river banks, but would provide fewer disturbances in river vegetation and a more aesthetically pleasing appearance for trail and river corridor users. The construction BMPs identified in CDOT's *Erosion Control and Stormwater Quality Guide* (CDOT, 2002e) would guide the specific BMPs used in final design and construction.

Under the any of the system alternatives including the Preferred Alternative, as much of the runoff in the "first flush" as possible would be conveyed from the post-construction onsite area through water quality ponds or other BMPs before discharging to the river, to mitigate sediment-laden runoff. The first flush is approximately equivalent to the 2-year storm. As runoff is collected in the water quality ponds, sediment would settle to the bottom and debris would be collected in the pond, leaving improved water quality to flow to the river. Runoff would be released from the ponds over approximately 40 hours. A more detailed discussion of the use of BMPs to enhance water quality from stormwater runoff is provided in **Section 4.9** *Water Resources*.

Under any of the system alternatives including the Preferred Alternative, demolition or/and construction of the bridges over the South Platte River would require mitigation. Three roadway bridges would be reconstructed and one new pedestrian bridge would be constructed. Bridge replacements would require some temporary modifications in the floodplain to facilitate the construction. These impacts would only be temporary and the area would be restored upon construction completion. In all cases, care would be taken to disturb the least amount of floodplain area. Construction BMPs, such as netting to collect bridge demolition debris and temporary sediment ponds, would be used to reduce temporary impacts. Construction BMPs identified in CDOT's *Erosion Control and Stormwater Quality Guide* (CDOT, 2002e) would guide the specific temporary and construction BMPs used in this area.

Reconstruction of the US 6 bridge could result in changes in the flow characteristics of the river, and local increase in velocity. The design for the new bridge would meet the requirements of FHWA's *Non-Regulatory Supplement Regarding 23 CFR 650 A, Location and Hydraulic Design of Encroachments on Flood Plains* (FHWA, 1992). Detailed modeling and bridge design are required to confirm the ultimate configuration. However, implementation of these improvements would result in improved public safety and a reduction in flooding in adjacent areas. Bridge design considerations would include streambed stability and protection against scour. Potential wetland impacts associated with the US 6 bridge are discussed in the **Section 4.11** *Wetlands*.

Construction of the Alameda ramps in System Alternatives 1, 2, 3, and the Preferred Alternative would encroach on the floodplain. To accommodate this encroachment, an equivalent volume

would be cut from the channel bank to maintain floodplain elevation. Similarly, the Santa Fe Drive ramps on the west side of I-25 would protrude into the floodplain. The ramps would not impact the main channel of the river, but only a portion of the overbank area. Final design will include a more detailed assessment of hydraulics and include design modifications, as appropriate, to mitigate these flood plain encroachments. Design refinements could include a longer bridge structure at Alameda over the river or the Alameda ramp could be realigned to the east, consist of a built on structure, or be integrated with the adjacent structures to reduce impact to the river. Additional flow capacity could be provided in the Santa Fe Drive area.

Common mitigation elements to the system alternatives, including the Preferred Alternative, are summarized in **Table 4.10-3**. US 6, Alameda Avenue, Broadway, SH 85, and Decatur water quality ponds (BMPs) would provide water quality enhancement for approximately 92 percent of the project area.

Table 4.10-3 Summary of Mitigation Measures for System Alternatives

	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
US 6 Bridge Replacement	Temporary BMPs; Lower Floodplain Elevation; Permanent Erosion Protection			
Alameda Bridge Replacement	Temporary BMPs; Remains out of Floodplain			
Alameda Ramp Construction	Temporary BMPs; Provide Additional Volume in Channel Cross Section for Overall "No Rise" in Floodplain			
Santa Fe Drive/Kalamath Street Bridge Replacement	Temporary BMPs; Remains out of Floodplain			
Santa Fe Ramp Construction	Temporary BMPs; Additional Volume in overbank area overall " no rise" in floodplain			
Overall Increased Imperviousness	Permanent BMPs for 100% Water Quality Capture Volume for 91% of Land; New Storm Sewers with Additional Capacity			
Storm Sewer Outfalls	Energy dissipation device or material protection; Reduced Number of Outfalls			

BMPs – Best Management Practices

Location-specific mitigation measures for the alternatives are described below.

I-25 Improvements

Floodplain mitigation efforts in this area would consist of providing water quality ponds and riprap protection. I-25 storm drainage improvements would consist of consolidating the existing storm sewer system and routing it to four water quality ponds and consolidating the existing number of outfalls in I-25 to only five. The ponds are located at the I-25 and US 6 interchange, Alameda and I-25, and Santa Fe/Kalamath and I-25. Specifics of the location and capacity of the ponds are provided in **Chapter 4.9** *Water Resources*.

The first flush of runoff from the I-25 – US 6 interchange and I-25 – 3rd Avenue Basins would be collected at their respective basin low areas and conveyed to the I-25 - US 6 interchange water

quality pond, before discharging to the South Platte River. Runoff in excess of the first flush would flow directly to the South Platte River.

All runoff from the I-25 – Alameda Basin would be collected and conveyed to BMPs. A small portion of area north of Alameda Avenue would be conveyed to a grassy swale BMP. The remainder would be conveyed either directly to the Alameda water quality pond or to the pump station near the Alameda Avenue overcrossing, where it would then be conveyed to the pond.

City and County of Denver and I-25 runoff collected in the existing 42-inch outfall would be intercepted by a proposed Broadway water quality pond, (located in the grassy area created by I-25, Santa Fe Drive/Kalamath Street, and northbound Santa Fe/Kalamath to southbound I-25 ramp) or by a proposed Santa Fe Drive/Kalamath Street water quality pond (located west of I-25 and north of Santa Fe Drive/Kalamath Street). The existing 42-inch outfall in this area has several smaller tributary pipes, which would be diverted to the SH 85 water quality pond, while the remaining runoff in the 42-inch pipe would be routed through the Broadway water quality pond, using the existing 42-inch outfall to the South Platte River as the pond outfall.

Currently, stormwater runoff from the City and County of Denver 3rd Avenue Basin collects in the area where 3rd Avenue meets I-25 near Raritan Way and floods the local area and the interstate. A small ponding area, with inlets and a 48-inch pipe, would provide drainage for the runoff from this basin to the river. This cross culvert would have adequate outlet protection to reduce erosion potential.

US 6 Improvements

Water quality ponds would be used to mitigate the additional area, imperviousness, and/or runoff in this area, while riprap protection would mitigate the increased flow velocity in the river due to the replaced US 6 bridge. Most of the runoff from US 6 would be collected by inlets and conveyed to the Decatur water quality ponds, located north and south of Decatur Street. From the Decatur water quality ponds, runoff would be conveyed to the South Platte River. Routing runoff from a small portion of US 6, near the river, through a BMP would be difficult, so it would flow directly to the river. More runoff from the project corridor would be routed through BMPs after the system alternatives than under the No Action Alternative.

Santa Fe Drive / Kalamath Street Improvements

Two types of BMPs would be used in this area - water quality ponds and energy dissipating outlet protection. Approximately 1.5 acres of land is tributary to the sump on Santa Fe Drive and Kalamath Street as they cross under the consolidated railroad line. A pump would be required to convey the runoff to the Santa Fe/Kalamath water quality pond, which would be drained by gravity to the river. Although storm sewer improvements would be made in this area, there may not be a reduction in the number of outfalls. However, two box culverts would be constructed with adequate outlet protection. The Ellsworth box culvert is located along the Ellsworth Avenue roadway alignment and would reduce existing flooding on local streets and I-25. To prohibit this flow from encroaching I-25, a small ponding area with inlets would collect and convey runoff to the box and to the river. The Alameda box culvert would convey City and County of Denver runoff under I-25 to reduce flooding on I-25 under Alameda Avenue and would have adequate outlet protection.

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TABLE OF CONTENTS

Page

4.11 Wetlands, Waters of the U.S., and Open Water 4.11-1
4.11.1 Current Conditions 4.11-1
4.11.2 Consequences of the Alternatives 4.11-8
4.11.3 Mitigation Measures 4.11-11

LIST OF FIGURES

Page

Figure 4.11-1 Wetlands, Waters of the U.S., Open Water – Northern Project Area 4.11-3
Figure 4.11-2 Wetlands, Waters of the U.S., Open Water – Central Project Area 4.11-4
Figure 4.11-3 Wetlands, Waters of the U.S., Open Water – Southern Project Area 4.11-5

LIST OF TABLES

Page

Table 4.11-1 Area and Jurisdictional Status of Wetlands.....4.11-6
Table 4.11-2 Area and Jurisdictional Status of Open Water.....4.11-8
Table 4.11-3 Preliminary Estimates of Direct Impacts to Wetlands.....4.11-10
Table 4.11-4 Preliminary Estimates of Direct Impacts to Open Water 4.11-11

4.11 Wetlands, Waters of the U.S., and Open Water

This section describes wetland resources and other waters of the U.S. within the project area. Wetland resources are protected under Section 404 of the Clean Water Act and Executive Order 11990, *Protection of Wetlands*. The Clean Water Act requires coordination with the U.S. Army Corps of Engineers (USACE) and resource agencies such as the EPA and the U.S. Fish and Wildlife Service (USFWS) when impacts occur to wetlands that are considered waters of the U.S. The U.S. Department of Transportation Order 5660.1A, *Preservation of the Nation's Wetlands* (U.S. Department of Transportation, 1978), provides guidance on wetland mitigation assessment. CDOT has incorporated this and other FHWA environmental guidance into its *Environmental Stewardship Guide* (CDOT, 2003d), which emphasize efforts to avoid and minimize all wetland impacts.

Before initiating field studies as part of the Valley Highway EIS process, previous studies conducted in the area were collected and reviewed. These included National Wetland Inventory mapping (USFWS, 2004b) and Natural Resource Conservation Service (NRCS) soil mapping reports (NRCS, 1971; and NRCS, 1980), covering the project area. During field work, National Wetland Inventory maps were reviewed to locate areas for further investigation and to ensure that all previously mapped areas were documented in this study.

Wetlands and open water in the project area were delineated from January 7 through January 13, 2004. Wetland determinations were based on documenting the presence of diagnostic environmental characteristics for vegetation, hydrology, and soils as outlined in the *U.S. Army Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987). Routine Wetland Delineation Forms for representative wetlands in the project area were completed and are contained in the I-25 Valley Highway EIS *Wetland Delineation Report* (FHU and ERO Resources, 2004b). Since the wetland delineation was conducted during the winter, the area was reassessed the week of June 7, 2004 during the growing season to verify wetland boundaries. No significant deviations were identified between the winter mapping and growing season conditions.

The boundaries of wetlands, open water, and ditches in the project area were mapped using one of two methods: digitizing boundaries drawn in the field by hand on 1"=200' orthographically rectified aerial photographs or via data gathered with a global positioning system (GPS) unit.

4.11.1 Current Conditions

The majority of vegetation communities in the project area are upland communities associated with undeveloped areas of highway right-of-way or with public parks. Riparian communities along the South Platte River, typically dominated by Siberian elm *(Ulmus pumila)*, are limited to narrow strips of vegetation on the margin of open water areas. Narrower strips of wetland communities create a fringe along shore lines of lakes and stream channels. Open water area consists of lakes in public parks and the South Platte River channel.

4.11.1.1 Uplands / Riparian Areas

The upland areas tend to be dominated by drought-tolerant, non-native, and weedy species. Annual weeds such as kochia (*Kochia scoparia*) and cheatgrass (*Bromus tectorum*) dominate vacant lots, disturbed areas, and other undeveloped areas in the project area. Kentucky

bluegrass (*Poa pratensis*) and landscape trees and shrubs typically dominate the irrigated parts of the project area. Upland communities are described in more detail in **Section 4.12** *Vegetation and Wildlife*.

Throughout the project area, the South Platte River has been channelized and straightened. The banks are generally steep and protected by riprap. Riparian vegetation occurs along the banks of the river, sometimes growing in a thin layer of soil over and between the riprap stones. Vegetation on the steep banks (in non-wetland areas) is dominated by Siberian elm and smooth brome (*Bromus inermis leyss*). Other species that occur along the upper banks of the river include crested wheatgrass *(Agropyron cristatum),* cheatgrass, kochia, dogbane *(Apocynum cannabinum)*, poison hemlock *(Conium maculatum)*, showy milkweed *(Asclepias speciosa)*, diffuse knapweed *(Centauria diffusa)*, and whitetop *(Cardaria draba)*. Snowberry *(Symphoricarpos occidentalis)*, rabbitbrush *(Chrysothamnus nauseosus)*, Russian olive *(Elaeagnus angustifolia)*, and sandbar willow *(Salix exigua)* are occasionally present understory (i.e., vegetation beneath trees). A few scattered plains cottonwoods *(Populus deltoides)* and peach-leaf willows *(Salix amygdaloides)* are also present along the banks of the river.

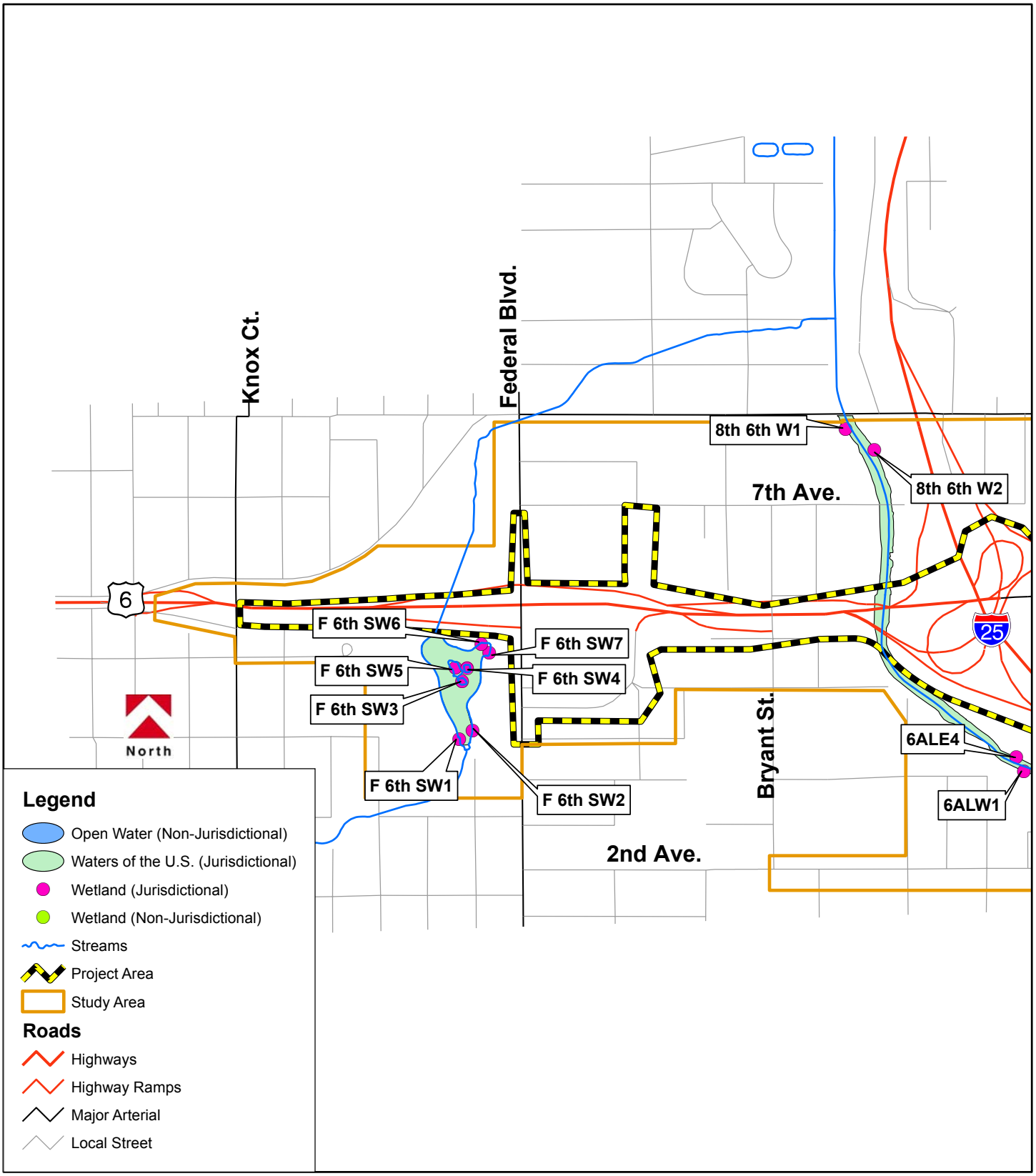
4.11.1.2 WETLANDS

A total of 2.01 acres of wetlands in the project area were identified and delineated during field investigations. The areas include shrub wetlands and herbaceous wetlands. Locations of these wetlands are shown in **Figures 4.11-1**, **4.11-2**, and **4.11-3** for the northern, central, and southern project areas, respectively. Detailed maps of the wetlands are contained in the I-25 Valley Highway EIS *Wetland Delineation Report*. Area wetlands were classified according to the wetland classification system outlined in *Classification of Wetlands and Deepwater Habitats of the United States* (USFWS, 1979).

Wetlands in the project area fall into one of three Cowardin classification systems:

- Lacustrine, littoral, emergent, (LLE) – the wetland fringes around lakes and a detention pond in the project area fall into this class.
- Palustrine, scrub-shrub wetland (PSS) – wetlands along the South Platte River that are dominated by sandbar willow fall into this class.
- Palustrine, emergent, persistent wetland (PEP) – wetlands along the South Platte River that are dominated by herbaceous species, such as reed canarygrass and poison hemlock, fall into this class.

In places, there is a narrow bench or terrace at the bottom of the riprap banks. This terrace is typically about 2 to 3 feet above the ordinary high water mark and generally lacks wetland characteristics except for a narrow 1 to 2 feet wide fringe immediately adjacent to the river. These areas were generally mapped as having a 1 to 2 feet wide fringe of wetlands. Wetland vegetation along the river is dominated by Emory's sedge *(Carex emoryi)*, reed canarygrass *(Phalaris arundinacea)*, and sandbar willow. Other species that occur less frequently include bulrush *(Scripus lacustris)*, broad-leaf cattail *(Typha latifolia)*, poison hemlock, dogbane, Baltic rush *(Juncus balticus)*, barnyard grass *(Echinochloa crus-galli)*, Canada thistle (*Cirsium arvense*), meadow fescue *(Festuca pratensis)*, and curly dock *(Rumex crispus)*.



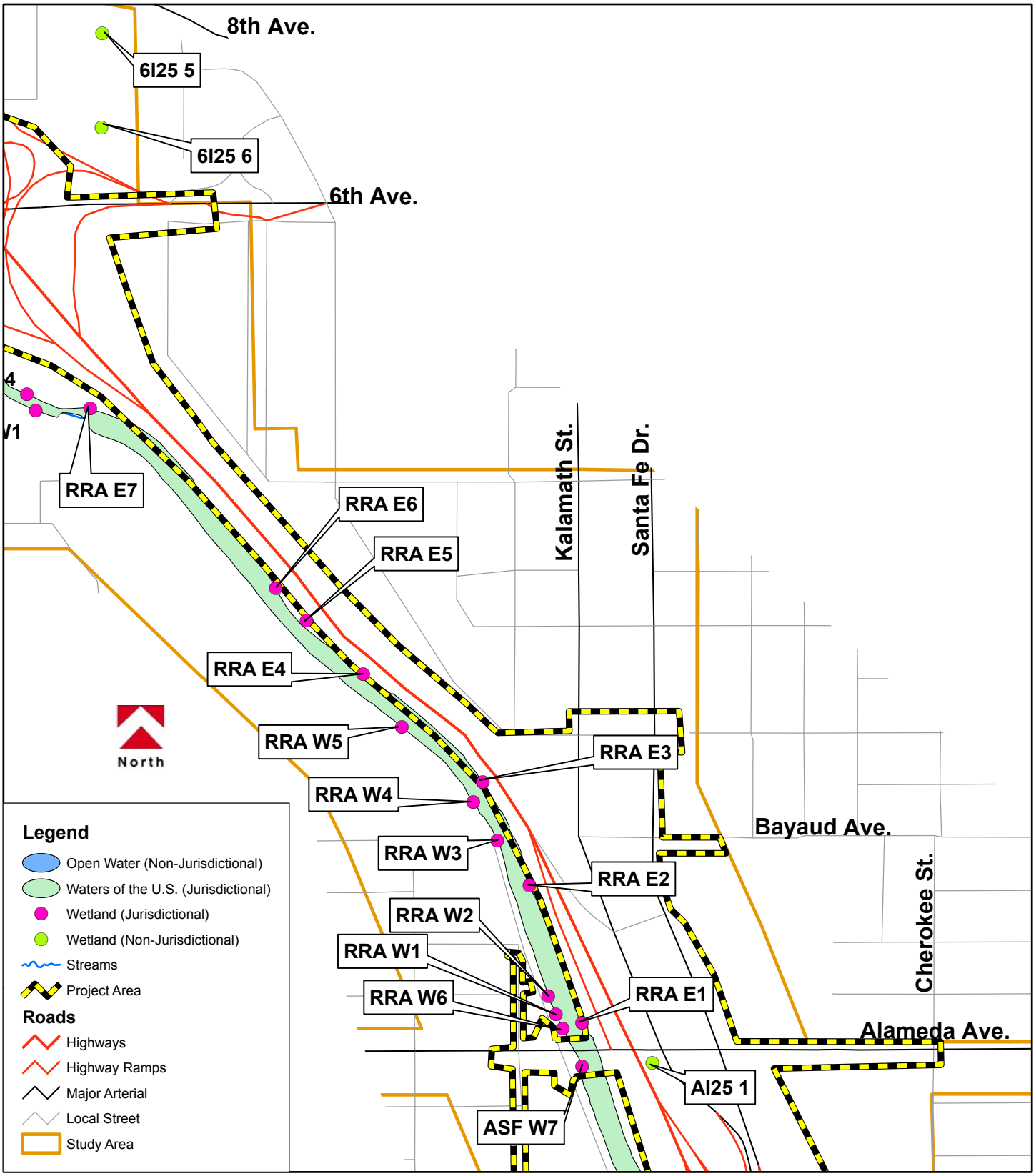
Valley Highway, 02-069, 10/05/2004

0 250 500 1,000 Feet

Wetlands, Waters of the U.S., Open Water-Northern Project Area

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.11-1



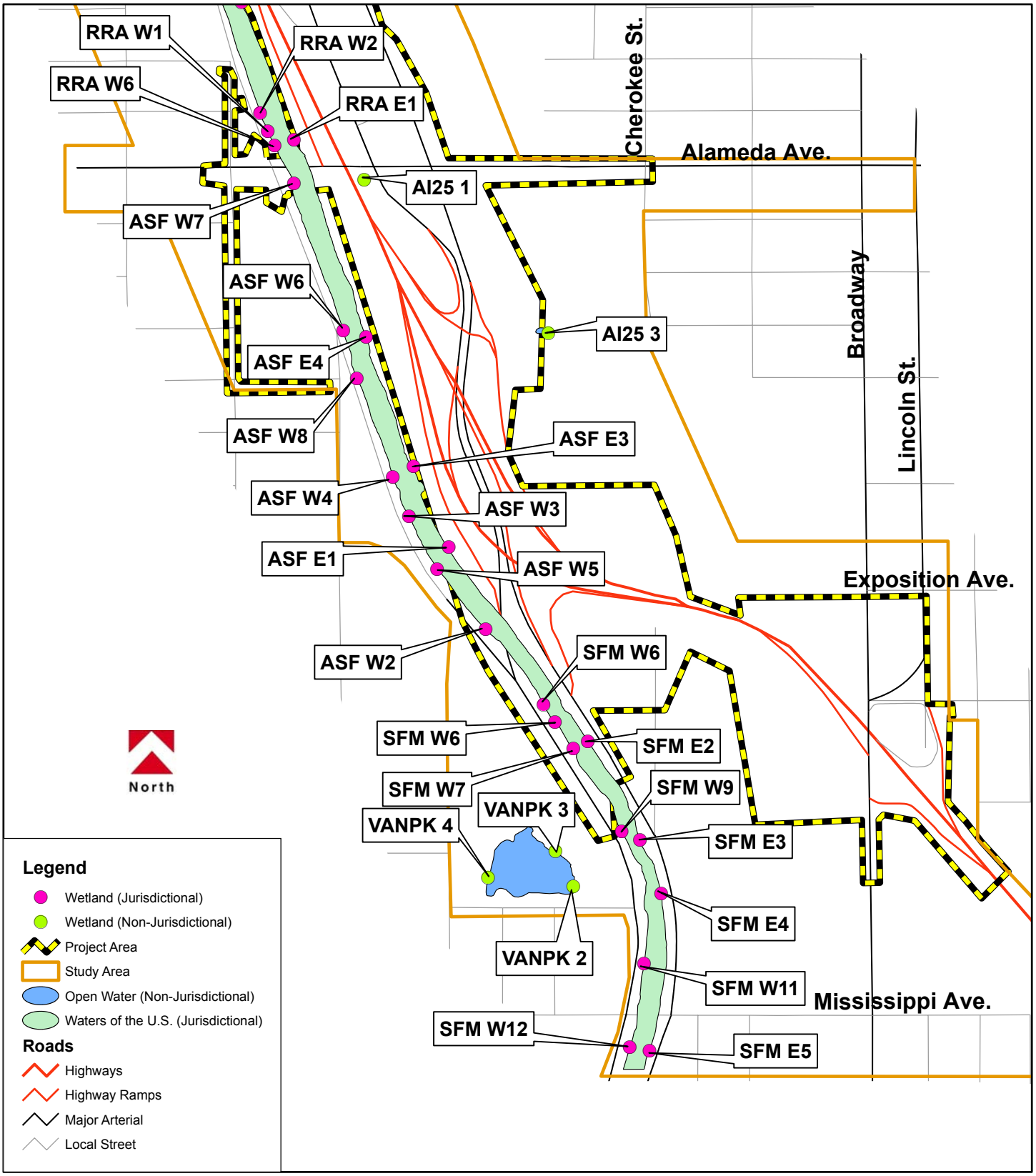
Valley Highway, 02-069, 10/27/2004

0 250 500 1,000 Feet

Wetlands, Waters of the U.S., Open Water-Central Project Area

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.11-2



Valley Highway, 02-069, 10/05/2004

0 250 500 1,000 Feet

Wetlands, Waters of the U.S., Open Water-Southern Project Area

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.11-3

There are approximately 45.33 acres of open water areas in the project area. Areas of open water in the project area include the channel of the South Platte River, Vanderbilt Lake, Barnum Park Lake, and a detention pond near Home Depot at 500 S. Santa Fe Drive. The preliminary determination of whether these areas are considered waters of the U.S. is discussed in the following section. As with the wetlands, open waters were classified according to the Cowardin classification system (USFWS, 1979) and included in one of two classes:

- **Lacustrine, limnetic, unconsolidated bottom (LLU)** – The deep portions of Vanderbilt Lake and Barnum Park Lake fall into this class. Generally, this classification system is found below the ordinary high water mark. The depth of Vanderbilt Lake is 12 feet (City and County of Denver, 2004c) and the depth of Barnum Lake is assumed to be similar.
- **Riverine, unconsolidated bottom (RU)** – The South Platte River falls into this class. These areas are typically unvegetated and are subject to scour and sediment deposition.

4.11.1.3 PRELIMINARY DETERMINATION OF JURISDICTION

The I-25 Valley Highway *Wetlands Delineation Report* (FHU and ERO Resources, 2004b) was submitted to the USACE for review on March 8, 2004. USACE provided a preliminary jurisdictional determination in a letter dated March 27, 2004, a copy of which is included in **Appendix A,** *Agency Coordination*. Within the project area, USACE has made a preliminary determination that the South Platte River, Weir Gulch, Barnum Park Lake, and their adjacent wetlands are considered to fall under USACE jurisdiction. The South Platte River is a water of the U.S. since it is a tributary to the Platte River, which is navigable. Barnum Park Lake is a water of the U.S. since it is on Weir Gulch, a tributary to the South Platte River. Four other water/wetlands, including Vanderbilt Lake, a detention pond near Home Depot, a drainage ditch between US 6 and 8th Avenue, and a seep at I-25 and Alameda do not have apparent surface connections to the South Platte River; therefore, the USACE considers these waters isolated and not under USACE jurisdiction. **Tables 4.11-1** and **4.11-2** summarize the classification, surface area, and jurisdictional status for wetlands and open water in the project area.

Although certain wetlands may not fall under USACE jurisdiction and therefore are not afforded protection under the Clean Water Act and Executive Order 11990, CDOT policy requires that impacts to all wetlands be avoided and minimized to the greatest possible extent. Therefore, unavoidable impacts to all wetlands will be mitigated under this project.

Table 4.11-1 Area and Jurisdictional Status of Wetlands

Wetland	Classification	Jurisdictional (Y/N)	Area	
			Acres	Square Feet
6ALE4	PSS	Y	0.019	828
6ALW1	PSS	Y	0.018	784
8TH 6TH W1	PSS	Y	0.051	2,222
8TH 6TH W2	PEP	Y	0.006	261
ASF E1	PSS	Y	0.440	19,166
ASF E3	PEP	Y	0.057	2,483

Table 4.11-1 Area and Jurisdictional Status of Wetlands (continued)

Wetland	Classification	Jurisdictional (Y/N)	Area	
			Acres	Square Feet
ASF E4	PEP	Y	0.018	784
ASF W2	PEP	Y	0.008	348
ASF W3	PEP	Y	0.007	305
ASF W4	PEP	Y	0.003	131
ASF W5	PEP	Y	0.005	218
ASF W6	PEP	Y	0.003	131
ASF W7	PEP	Y	0.005	218
ASF W8	PEP	Y	0.003	131
F 6TH SW 1	LLE	Y	0.009	392
F 6TH SW 2	LLE	Y	0.016	697
F 6TH SW 3	LLE	Y	0.053	2,309
F 6TH SW 4	LLE	Y	0.050	2,178
F 6TH SW 5	LLE	Y	0.162	7,057
F 6TH SW 6	LLE	Y	0.005	218
F 6TH SW 7	LLE	Y	0.003	131
RRA E1	PEP	Y	0.012	523
RRA E2	PSS	Y	0.049	2,134
RRA E3	PEP	Y	0.097	4,225
RRA E4	PEP	Y	0.020	871
RRA E5	PEP`	Y	0.110	4,792
RRA E6	PEP	Y	0.012	523
RRA E7	PSS	Y	0.018	784
RRA W1	PEP	Y	0.003	131
RRA W2	PEP	Y	0.006	261
RRA W3	PSS	Y	0.002	87
RRA W4	PSS	Y	0.029	1,263
RRA W5	PSS	Y	0.012	523
RRA W6	PSS	Y	0.002	87
SFM E2	PEP	Y	0.003	131
SFM E3	PSS	Y	0.015	653
SFM E4	PSS	Y	0.011	479
SFM E5	PSS	Y	0.009	392
SFM W11	PEP	Y	0.018	784
SFM W12	PEP	Y	0.010	436
SFM W4	PEP	Y	0.003	131
SFM W6	PEP	Y	0.002	87
SFM W7	PSS	Y	0.009	392
SFM W9	PSS	Y	0.092	4,008
		Subtotal Jurisdictional	1.485	64,689
AI25 1	PEP	N	0.010	436
AI25 3	LLE	N	0.070	3,049
6I25 5	PSS	N	0.130	5,663
6I25 6	PSS	N	0.198	8,625
VANPK 2	LLE	N	0.014	610
VANPK 3	LLE	N	0.105	4,574
VANPK 4	LLE	N	0.002	87
		Subtotal Non-Jurisdictional	0.529	23,044
		Total	**2.014**	**87,733**

Source: FHU and ERO Resources, 2004b

LLE - lacustrine, limnetic, unconsolidated bottom PEP – palustrine, emergent, persistent wetland

PSS – palustrine, scrub-shrub wetland

Table 4.11-2 Area and Jurisdictional Status of Open Water

Open Water	Classification	Jurisdictional (Y/N)	Area	
			Acres	Square Feet
F6thSW WUS 1	LLU	Y	4.15	180,774
SPR WUS	RU	Y	37.530	1,634,807
		Subtotal Jurisdictional	41.683	1,815,711
VANPK OW 1	LLU	N	3.604	156,990
AI25 OW1	LLU	N	0.045	1,960
		Subtotal Non-Jurisdictional	3.649	158,950
Total			**45.332**	**1,974,662**

Source: FHU and ERO Resources, 2004b

LLU – lacustrine, limnetic, unconsolidated bottom RU – riverine, unconsolidated bottom

4.11.1.4 WETLAND FUNCTIONS

An understanding of wetland functions can assist in the analysis and mitigation of potential impacts. A variety of studies have recognized that wetlands provide particular functions to the environment (Adamus et al., 1991; FHWA,1983; Smith et al., 1995). Wetland functions are the physical, chemical and biological processes or attributes vital to the integrity of wetland systems (Adamus et al., 1991). Various researchers and methods recognize a variety of wetland functions that typically are related to water quality, biodiversity, hydrological, and ecological processes. All wetlands do not perform all functions, nor do wetlands perform all functions equally.

Wetland values, such as recreation and uniqueness, are attributes not necessarily important to the integrity of wetland systems; however, these values are perceived as being valuable to society (Adamus et al., 1991). Similar to functions, all wetlands do not provide all values and the values that are provided are not provided equally.

Most of the wetlands in the project area are palustrine wetlands that occur along the South Platte River and are supported by surface water. Although many of the plant species in the wetlands are considered noxious weeds (e.g., Canada thistle, cheatgrass, and Russian olive), all the wetland types have a high functional rating for general wildlife habitat because streams and rivers and their associated riparian communities provide diverse habitat types for a variety of species. Many of the wetlands have a functional rating of moderate to low because of the restricted nature of the wetlands. For example, flood attenuation and storage is low in areas with a wetland fringe only 1 or 2 feet wide. A detailed functional assessment of wetlands in the project area, including functional assessment data sheets, is provided in the *Wetland Delineation Report* (FHU and ERO Resources, 2004b).

4.11.2 Consequences of the Alternatives

4.11.2.1 NO ACTION ALTERNATIVE

The No Action Alternative would result in no direct impacts such as water quality degradation, since untreated stormwater runoff would continue at historic levels.

4.11.2.2 SYSTEMS ALTERNATIVES 1, 2, AND 3

Given the small size of wetlands that would be impacted and given the level of preliminary design completed to date, it is difficult to quantify potential temporary impacts. In order to avoid underestimating the amount of necessary compensatory mitigation, all impacts are considered to be permanent for this EIS. Impacts to wetlands and open water from the systems alternatives, including the Preferred Alternative, are summarized in **Tables 4.11-3** and **4.11-4,** respectively and are detailed below.

The types of impacts associated with the system alternatives would be very similar and are discussed together. Construction of the proposed system alternatives would potentially result in wetland impacts that are either direct or indirect. Direct impacts include temporary or permanent filling or draining. Indirect impacts include an increase in nonpoint source pollution such as petroleum products, de-icer, and sediment into wetlands and streams or changes to supportive hydrology of wetlands not directly impacted. Water quality impacts are discussed in **Section 4.9** *Water Resources.*

Direct impacts to wetlands and other waters of the U.S. associated with the system alternatives would result from construction on existing or new bridges over the South Platte River, from stormwater drainage outfalls to the South Platte River, and from roadway and interchange reconfiguration. Estimated acreages of potential impacts associated with system elements were determined by overlaying the conceptual designs for the system alternatives with the wetland and waters of the U.S. maps. Several small outfalls are located along the South Platte River, just outside of the project limits shown in the project diagrams. Potential impacts associated with these outfalls were included in the analysis.

For roadway bridges across the South Platte River, impacts were assumed to extend no more than 50 feet upstream and downstream of the bridge and roadway footprint. For the pedestrian bridge, impacts were assumed to extend 25 feet upstream and downstream of the bridge footprint. Outfalls to the South Platte River were assumed to impact a 25 ft^2 area centered on the end of the culvert. These assumptions were made to ensure that potential temporary impacts associated with equipment access and other construction activities would not be underestimated during the EIS process.

4.11.2.3 Preferred Alternative

Because the Preferred Alternative combines elements of the other system alternatives, the types of impacts associated with the Preferred Alternative would be essentially the same as those previously discussed for System Alternative 1, 2, and 3. Given the small size of wetlands that would be impacted and given the level of preliminary design completed to date, it is difficult to quantify potential temporary impacts. In order to avoid underestimating the amount of necessary compensatory mitigation, all impacts are considered to be permanent for this EIS. Impacts to wetlands and open water from the Preferred Alternative and the other alternatives are summarized in **Tables 4.11-3** and **4.11-4,** respectively and are detailed below.

Construction of the Preferred Alternative would result in wetland impacts that are either direct or indirect. Direct impacts include temporary or permanent filling or draining. Indirect impacts include an increase in nonpoint source pollution such as petroleum products, de-icer, and

sediment into wetlands and streams or changes to supportive hydrology of wetlands not directly impacted. Water quality impacts are discussed in **Section 4.9** *Water Resources.*

Direct impacts to wetlands and other waters of the U.S. associated with the Preferred Alternative would result from construction on existing or new bridges over the South Platte River, from stormwater drainage outfalls to the South Platte River, and from roadway and interchange reconfiguration. Estimated acreages of potential impacts associated with the Preferred Alternative were determined by overlaying the conceptual design with the wetland and waters of the U.S. maps. Several small outfalls are located along the South Platte River, just outside of the project limits shown in the project diagrams. Potential impacts associated with these outfalls were included in the analysis.

For roadway bridges across the South Platte River, impacts were assumed to extend no more than 50 feet upstream and downstream of the bridge and roadway footprint. For the pedestrian bridge, impacts were assumed to extend 25 feet upstream and downstream of the bridge footprint. Outfalls to the South Platte River were assumed to impact a 25 square foot area centered on the end of the culvert. These assumptions were made to ensure that potential temporary impacts associated with equipment access and other construction activities would not be underestimated during the EIS process.

Table 4.11-3 Preliminary Estimates of Direct Impacts to Wetlands

Jurisdictional Wetlands	Jurisdictional (Y/N)	Area of Impacts							
		Alternative 1		Alternative 2		Alternative 3		Preferred Alternative	
		Acres	Square Feet	Acres	Square Feet	Acres	Square Feet	Acres	Square Feet
ASF E1	Y	0.197	8,500	0.197	8,500	0.197	8,500	0.197	8,500
ASF W2	Y	0.007	300	0.007	300	0.007	300	0.007	300
ASF W7	Y	0.004	150	0.004	150	0.004	150	0.004	150
RRA E1	Y	0.012	500	0.012	500	0.012	500	0.012	500
RRA E2	Y	0.043	1,850	0.043	1,850	0.005	200	0.043	1,850
RRA W4	Y	0	0	0	0	0.004	150	0	0
RRA W6	Y	0.001	50	0.001	50	0.001	50	0.001	50
Jurisdictional Wetland Subtotal		0.264	11,350	0.264	11,350	0.230	9,850	0.264	11,350
Non-Jurisdictional Wetlands	Jurisdictional (Y/N)	Area of Impacts							
		Alternative 1		Alternative 2		Alternative 3		Preferred Alternative	
		Acres	Square Feet	Acres	Square Feet	Acres	Square Feet	Acres	Square Feet
AI25 1	N	0.010	400	0.010	400	0.010	400	0.010	400
AI25 3	N	0	0	0.007	300	0	0	0	0
Non-Jurisdictional Wetland Subtotal		**0.010**	**400**	**0.017**	**700**	**0.010**	**400**	**0.010**	**400**
Total Wetlands		**0.274**	**11,750**	**0.281**	**12,050**	**0.240**	**10,250**	**0.274**	**11,750**

Table 4.11-4 Preliminary Estimates of Direct Impacts to Open Water

Jurisdictional Open Water	Jurisdictional (Y/N)	Area of Impacts							
		Alternative 1		Alternative 2		Alternative 3		Preferred Alternative	
		Acres	Square Feet	Acres	Square Feet	Acres	Square Feet	Acres	Square Feet
SPR WUS	Y	0.45	19,600	0.45	19,600	0.45	19,600	0.45	19,600
Jurisdictional Open Water Subtotal		**0.45**	**19,600**	**0.45**	**19,600**	**0.45**	**19,600**	**0.45**	**19,600**
Non-Jurisdictional Open Water	Jurisdictional (Y/N)	Area of Impacts							
		Alternative 1		Alternative 2		Alternative 3		Preferred Alternative	
		Acres	Square Feet	Acres	Square Feet	Acres	Square Feet	Acres	Square Feet
AI25 OW1	Y	0.045	1,950	0.045	1,950	0.045	1,950	0.045	1,950
Non-Jurisdictional Open Water Subtotal		**0.045**	**1,950**	**0.045**	**1,950**	**0.045**	**1,950**	**0.045**	**1,950**
Total Open Water		**0.495**	**21,550**	**0.495**	**21,550**	**0.495**	**21,550**	**0.495**	**21,550**

Note: Estimates are based on bridge footprint. Actual impacts due to pier placement will be much less.

4.11.3 Mitigation Measures

During development of the system alternatives, FHWA and CDOT advanced a single I-25 mainline alternative because it best avoided the South Platte River (See **Chapter 2.0** *Alternatives)*. The result is that none of the system alternatives would cause major impacts to the South Platte River. Smaller unavoidable impacts, as previously described, would result from the system alternatives.

FHWA and CDOT policy requires compensatory mitigation for permanent impacts to both jurisdictional and non-jurisdictional wetlands. Wetland mitigation is typically done on a 1:1 basis; however, a Clean Water Act Section 404 permit that is issued by the USACE for jurisdictional impacts may require higher ratios if unique or high quality wetlands are impacted. Preliminary estimates of direct impacts to wetlands are summarized in **Table 4.11-3**. More accurate estimates of temporary and permanent impacts to wetlands will be made during final design and permitting. The Wetland Finding is presented in Appendix C.

During final design, additional efforts will be taken to minimize permanent wetland impacts, such as minimizing culvert lengths and minimizing the use of riprap for stream bank protection and stormwater outfalls. Wetland mitigation design will be determined during final design. It is likely that use of a wetland bank will be the appropriate mitigation method.

Temporary and indirect impacts to wetlands will be mitigated through the use of construction BMPs, which will include the following:

- Erosion prevention, including temporary soil stabilization measures (surface roughening, terracing, mulching, and blankets) and structures such as berms or swales, with or without a diversion channel, to prevent and/or slow runoff across disturbed areas and/or divert runoff to sediment basins
- Sediment control measures, including straw bales, silt fences, sediment traps and/or sediment basins
- Water quality treatments measures to capture and treat runoff and to prevent runoff from entering the South Platte River, including water quality ponds (See Section 4.9 Water Resources)
- Use of designated areas for vehicle staging to minimize disturbance of vegetated areas
- Revegetation of disturbed areas as quickly as possible with native vegetation throughout phases of construction
- Installation of temporary fencing around areas of vegetation and wetlands not to be disturbed
- No dewatering will be allowed in wetland areas
- Keep cranes and other equipment for bridge demolition out of the river or streambank area to the greatest extent possible
- Construction of a crane pad if cranes or other equipment cannot be kept out of the river

Post-construction BMPs are identified in **Section 4.9** *Water Resources* and would adequately protect wetlands and waters of the U.S.

TABLE OF CONTENTS

Page

4.12 Vegetation and Wildlife 4.12-1

4.12.1 Current Conditions 4.12-1

4.12.2 Consequences of the Alternatives 4.12-11

4.12.3 Mitigation Measures 4.12-13

LIST OF FIGURES

Page

Figure 4.12-1 Vegetation and Wildlife – Northern Project Area 4.12-2
Figure 4.12-2 Vegetation and Wildlife – Central Project Area 4.12-3
Figure 4.12-3 Vegetation and Wildlife – Southern Project Area 4.12-4

4.12 Vegetation and Wildlife

This section describes vegetation and wildlife resources within the project area. Information for this section was gathered from three sources. First, resource management agencies were contacted for information regarding the general area. Agencies contacted include the U.S. Fish and Wildlife Service (USFWS), Colorado National Heritage Program (CNHP), and the Colorado Division of Wildlife (CDOW). Second, both published and unpublished literature was used to supplement the agencies' information. Third, site-specific surveys of the study area to assess vegetation communities and wildlife habitat were conducted between April and June 2004.

The information gathered was used to identify impacts to vegetation and wildlife resources and to develop mitigation measures for these impacts. Impact assessment and mitigation measures were based on applicable federal and state statutes including:

- Executive Order 13112 Invasive Species
- Colorado Noxious Weed Act
- Endangered Species Act

4.12.1 Current Conditions

The project area is located in the plains grassland ecosystem. However, because of the high level of human development within the project area, little of this ecosystem remains. Most of the project area contains a mixture of industrial and residential areas with parks scattered throughout the area. The South Platte River generally flows northward throughout the project area. Because of the urbanized nature of the project area, wildlife habitat and wildlife are primarily limited to the South Platte River corridor.

Information on general wildlife habitat and species occurrences in the project area was provided by CDOW (CDOW, 2004; NDIS, 2004). Information about threatened and endangered species in the area was provided by the USFWS (USFWS, 2004a).

4.12.1.1 VEGETATION

Vegetative resources were categorized and mapped in the field by a qualified and experienced botanist. The botanist categorized vegetation in the study area into vegetation types appropriate for this analysis using best professional judgment. Five vegetation types were identified in the project area: industrial, urban landscape, xeric landscape, mixed grasslands, and riparian (i.e.; along rivers and streams). Locations of these vegetation types are shown on **Figures 4.12-1, 4.12-2,** and **4.12-3** for the northern, central, and southern portions, of the project area, respectively. A discussion of each vegetation type is provided below. Humans have influenced all of these vegetation types to one degree or another, from the mostly disturbed, weedy industrial areas to the woody riparian banks of the South Platte River dominated by non-native vegetation.

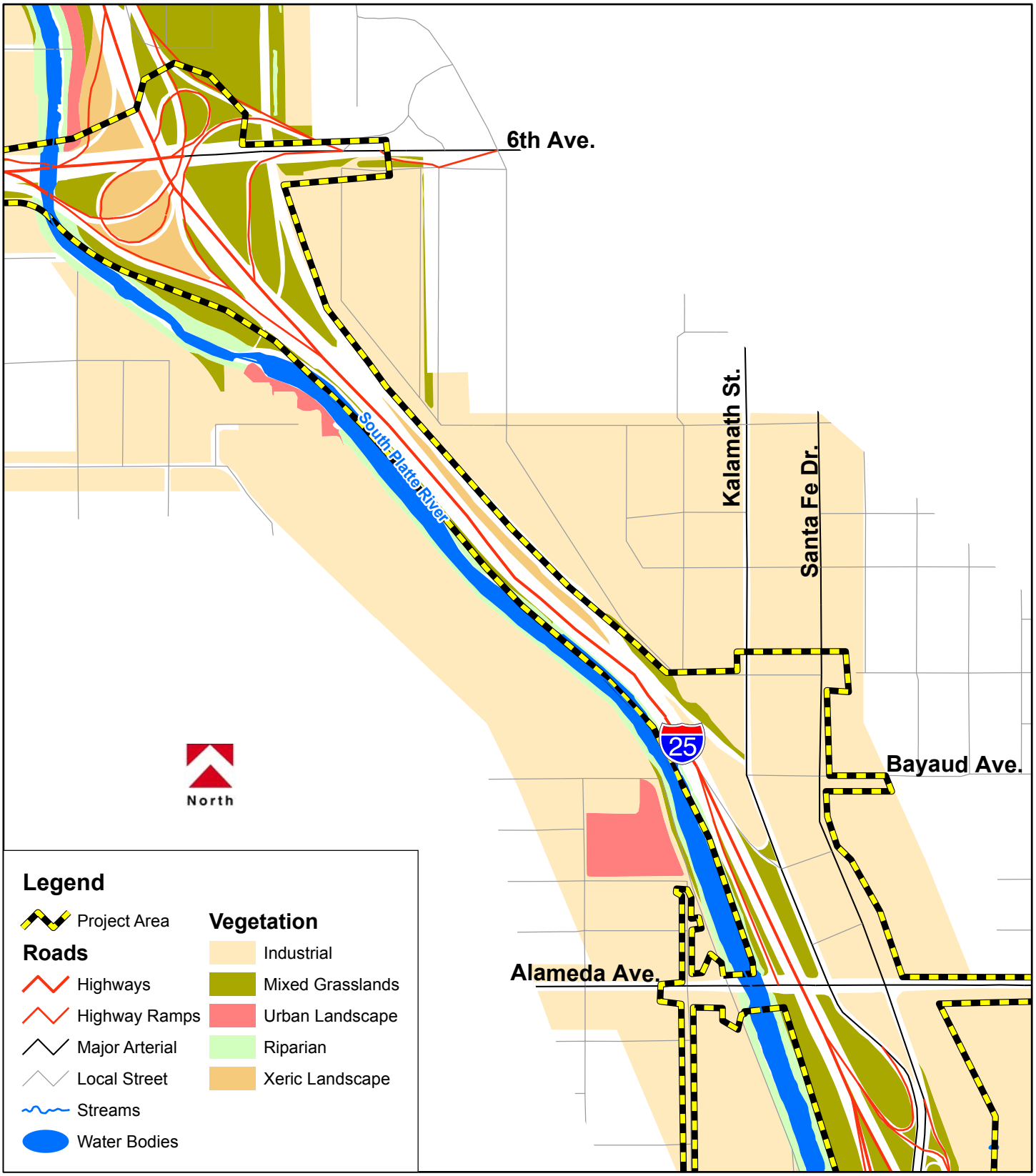
Valley Highway, 02-069, 10/27/2004

0 375 750 1,500 Feet

Vegetation and Wildlife-Northern Project Area

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.12-1



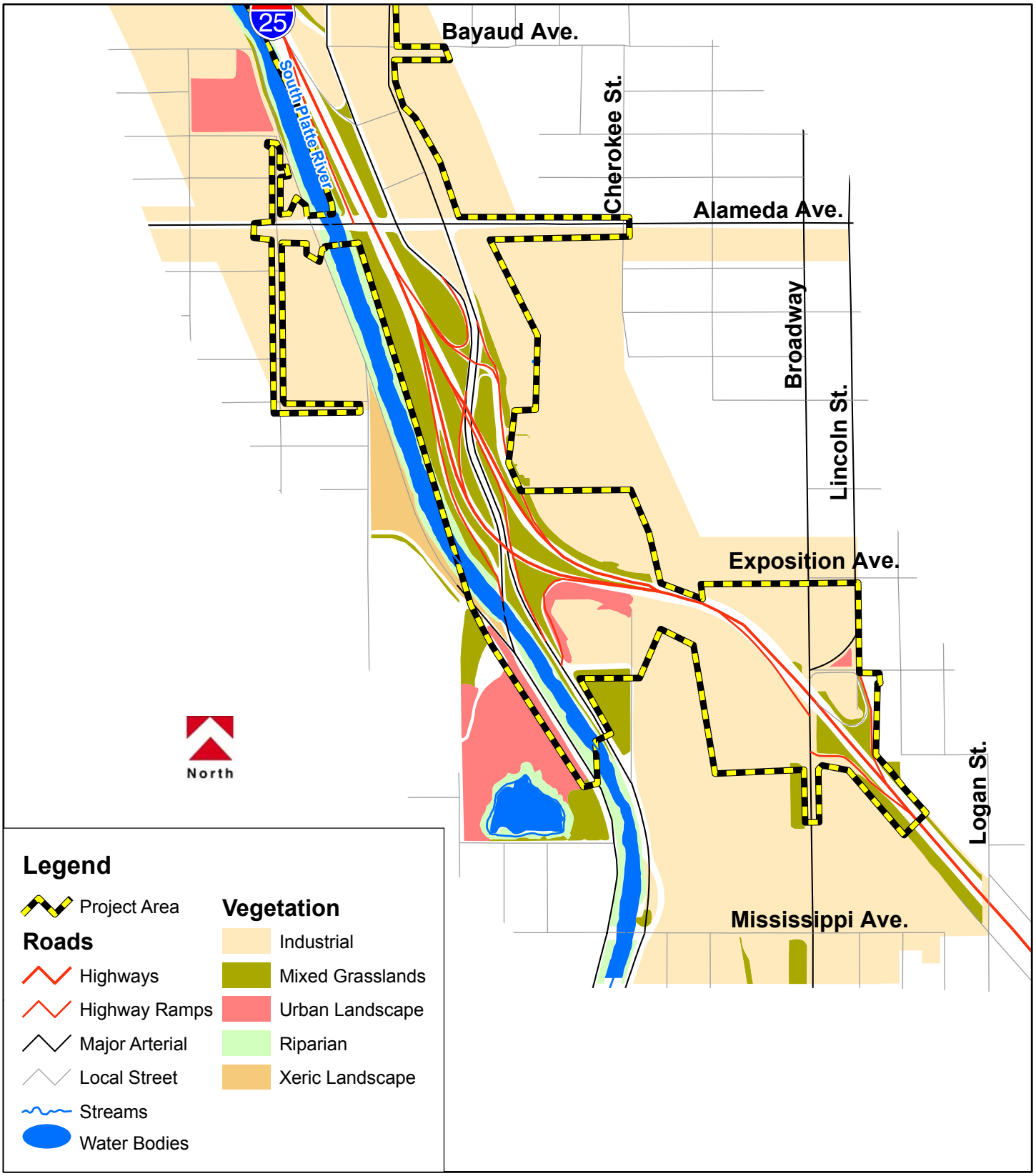
Valley Highway, 02-069, 10/27/2004

0 375 750 1,500 Feet

Vegetation and Wildlife-Central Project Area

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.12-2



Valley Highway, 02-069, 10/27/2004

0 375 750 1,500 Feet

Vegetation and Wildlife-Southern Project Area

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.12-3

Industrial

Railroads, factories, warehouses, and other industrial sites occur within the project area. Surrounding the buildings and other structures are sparsely vegetated weed patches dominated by kochia *(Kochia scoparium)*, cheatgrass *(Bromus tectorum)*, and other annual weeds. Small patches of irrigated Kentucky bluegrass *(Poa pratensis)* lawn, as well as planted ornamental trees and shrubs, are also scattered around the buildings.

Urban Landscape

This vegetation type mostly occurs in urban parks and neighborhoods consisting of mostly single-family houses. This maintained, irrigated landscape is dominated by Kentucky bluegrass lawns and ball fields and widely spaced ornamental trees such as Siberian elm (*Ulmus pumilus*).

Xeric Landscape

Some of the highway right-of-way areas and urban parks have been planted with xeric (drought-tolerant) species. These areas are dominated by native grasses, such as blue grama *(Bouteloua gracilis)* and western wheatgrass *(Pascopyrum smithii)*, which are planted in formal patterns within the area. Some of these areas include limited irrigation for trees and shrubs. Irrigated areas are located at the 6th Avenue/I-25 interchange. Fully landscaped areas around this interchange include the western half, the southeast portion, and areas north of the interchange. Non-native grasses, such as smooth brome *(Bromus inermis)* and weeds such as kochia and cheatgrass also occur within this vegetation type.

Mixed Grasslands

Most of the I-25 and US 6 right-of-way areas and areas along other major roadways are covered with introduced pasture grasses such as smooth brome and crested wheatgrass *(Agropyron cristatum).* This vegetation type also occurs along the upper banks of the South Platte River and other areas throughout the project area. Annual weeds, such as kochia and cheatgrass, also occur in the area. The non-native Russian olive *(Elaeagnus angustifolia)* and other native and non-native trees are scattered throughout the grasslands. The native shrub, rubber rabbitbrush *(Chrysothamnus nauseosus)*, is common along the upper banks of the South Platte River.

Riparian

Riparian vegetation occurs along the banks of the South Platte River and other waterways within the project area. Non-native trees, such as Siberian elm and Russian olive, dominate the riparian areas. Native trees, such as plains cottonwoods *(Populus deltoids)* and shrubs, such as snowberry *(Symphoricarpos occidentalis)* and sandbar willow *(Salix exigua)*, are also common. Mostly introduced pasture grasses, such as smooth brome, dominate the understory (or vegetation below trees) on the upper banks. In some areas, the lower banks are dominated wetland vegetation such as reed canarygrass *(Phalaris arundinacea)* and cattails *(Typha latifolia).* Wetlands also occur in small, scattered patches around ponds and in the smaller drainageways. Wetlands are described in more detail in **Section 4.11** *Wetlands, Waters of the U.S., and Open Water*.

4.12.1.2 NOXIOUS WEEDS

Noxious weeds are non-native plant species that have been introduced into an environment with few, if any, natural biological controls. This gives them a competitive advantage in dominating and crowding out native plant species and can threaten the integrity of native plant communities. Noxious weeds are aggressive, spread rapidly, reproduce profusely, and resist control and management measures. Noxious weeds infestations can degrade wildlife habitat and forage for livestock, and are difficult and expensive to control once they are established (CNAP, 2000). Because of the adverse environmental effects of weeds, both the federal and state governments have issued regulation regarding noxious weeds, as described below.

Executive Order 13112 – Invasive Species

The purpose of *Executive Order 13112, Invasive Species*, is to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that result from invasive species. This order directs federal agencies (including FHWA) to prevent the introduction of invasive species, control and monitor invasive species, and restore native species and habitats that have been invaded (FHWA, 1999).

Colorado Noxious Weed Act

The Colorado Noxious Weed Act (effective May 3, 2004) states that all landowners must manage noxious weeds that may be damaging to adjacent landowners. Rules pertaining to administration of the Act include three lists of noxious weed species (Colorado Department of Agriculture, 2004a). The A List contains noxious weed species targeted for eradication within Colorado. If individuals or populations of A List species are found, the local governing body (in this case CDOT) must provide the State Weed Coordinator with mapping that includes information on location and density of the infestation. The B List contains species that the State of Colorado has targeted for control rather than eradication. The C List contains species for which the State will provide support and funding for local control efforts. In addition, most counties in Colorado, including the City and County of Denver have established its own list of targeted species, which may not be on the state lists.

Due to federal, state, and local laws, all CDOT projects are surveyed for state- and county-listed noxious weeds. Additionally, CDOT has its own list of noxious weeds for which it monitors and controls as part of its maintenance program (CDOT, 2000). If listed noxious weeds are identified within the project area, an integrated noxious weed management plan must be developed to manage weeds before, during, and after project construction and to prevent them from spreading. Weed management plans identify, map, and prioritize the targeted noxious weed species and provide recommended treatments for control.

A reconnaissance-level survey for noxious weeds on the Colorado A, B, and C lists; the CDOT maintenance list (CDOT, 2004c); and the City and County of Denver list (Colorado Department Agriculture, 2004b) was conducted in May 2004 as part of this EIS. Nine listed species were found during the survey. No species on the A list were found. The species and the lists on which they are found are as follows:

- Diffuse knapweed (*Centaurea diffusa*) – State B, CDOT and the City and County of Denver Lists: Diffuse knapweed is scattered along the upper banks of the South Platte River and within the grasslands and industrial areas throughout the project area.
- Canada Thistle (*Cirsium arvensis*) – State B, CDOT and the City and County of Denver Lists: This noxious weed occurs in small to large patches along the South Platte River and other drainage ways and in moist areas scattered throughout the project area.
- Russian olive (Elaeagnus angustifolia) – State B, CDOT and the City and County of Denver Lists: This large thistle occurs in patches scattered around the South Platte River and other areas.
- Red-stem filaree (Erodium cicutarium) – State B List: This weed is very common in disturbed portions of industrial areas and mixed grasslands in the project area.
- Whitetop/hoary cress (*Cardaria draba)* – State B List: This weed occurs along the upper banks of the South Platte River.
- Downy brome (Brome tectorum) – State C Lists: Downy brome is common in disturbed portions of industrial areas and mixed grasslands in the project area.
- Poison hemlock (Conium maculatum) – State C List: Scattered pockets of poison hemlock are found along the South Platte River.
- Puncturevine (Tribulus terrestris) – State C List: Puncturevine is scattered along the South Platte River Greenway recreation trail.
- Common mullein (Verbascum thapsus) – State C List: Scattered individuals of common mullein are found on slopes leading to the South Platte River, generally in unmaintained areas.

More detailed noxious weed surveys and mapping (i.e; percent, coverage, dominance, etc.) will be performed during the preparation of the Integrated Weed Management Plan during the final design. The surveys and mapping will be performed at that time to ensure that the most up-to-date information is available for development of the Integrated Weed Management Plan and mitigation areas.

4.12.1.3 WILDLIFE

Many of the wildlife species that currently use the project area are primarily urban adapted and introduced species commonly associated with human development (Jones et al., 2003). Few studies of wildlife have been conducted in urban areas. The South Platte River corridor through Denver has received little scientific attention, and wildlife studies are limited. This area of the South Platte has been heavily impacted by development, industrialization, and recreation facilities, and as a result, the plant communities and associated wildlife communities have been altered. Even in the midst of this heavy urbanization, the South Platte River still provides habitat shelter, nesting, forage, denning, and breeding for many species of wildlife.

Wildlife habitats within the project area are correlated with vegetation communities. Because wildlife will use a variety of vegetation communities, several communities have been combined for the evaluation of wildlife habitat. Mixed and xeric grasslands have been combined into a single grassland habitat, and residential and urban landscape communities have been combined into an urban/residential landscape habitat. Wildlife habitats within the project area

include: aquatic/open water, riparian woodlands (including wetlands), grasslands, urban/residential landscapes, and industrial areas.

The aquatic/open water habitat provides habitat for fish [common carp *(Cyprinus carpio)*, white sucker *(Catostomus commersoni),* fathead minnow *(Pimephales promelas)*], reptiles [snapping turtle *(Chelydra serpentine),* painted turtle (Chrysemys picta)], and a variety of waterfowl and shore birds. This habitat is more critical during the winter months as an open-water habitat for wintering or migrant waterfowl than during the summer. It is common to find Canada goose *(Branta Canadensis)*, horned grebes *(Podlceps auritus),* double-crested cormorants *(Phalacrocorax auritus),* gadwalls *(Anas strepera),* green-wing teal *(Anas crecca),* northern shovelers *(Anas clypeata)*, and American coots *(Fulica americana)* swimming in the South Platte River (Jones et al., 2003). Shore birds, such as killdeer *(Charadrius vociferous)*, American avocets *(Recurvirostra americana)*, and western sandpiper *(Calidris mauri),* are occasionally observed along the South Platte River (Jones et al., 2003).

The riparian habitat along the South Platte River provides the most diverse and productive habitat within the project area. Mammals found along the riparian corridor include eastern fox squirrels *(Sciurus niger),* cottontail rabbits *(Sylvilagus flordians),* common raccoon (Procyon lotor), striped skunks *(Mephitis mephitis),* red fox *(Vulpes vulpes),* domestic dogs and cats, and mule deer *(Odocoileus hemionus).* The corridor provides habitat for rodents such as deer mice *(Peromyscus maniculatus),* house mouse *(Mus musculus)*, and meadow vole *(Microtus pennsylvanicus).* Studies conducted along the South Platte River through City and County of Denver found a relatively low diversity of rodents similar to that reported for other urban areas (Jones et al., 2003). Avian species found along the riparian corridor include: northern flicker *(Colaptes auratus),* America robin *(Turdus migratorius),* European starling *(Sturnus vulgaris),* lark sparrow *(Chondestes grammacus)*, song sparrow *(Melospiza melodia)*, great horned owl (*Bubo virginianus*), and the American goldfinch *(Carduelis tristis)*.

Both native (blue grama) and non-native (smooth brome, cheatgrass, and crested wheatgrass) plant species dominate the grassland habitat. This area primarily provides a habitat for fossorial (ground-dwelling) rodents such as the deer mouse and voles and foraging areas for wildlife that breed or winter in the adjacent riparian or aquatic habitats, such as geese, red fox, and northern flicker.

4.12.1.4 WILDLIFE CORRIDORS

The South Platte River is mapped by the Colorado Natural Diversity Information Source (NDIS) as a mule deer migration corridor (NDIS, 2004). The river also provides a travel corridor for numerous bird and mammal species, including coyotes *(Canis latrans),* red fox *(Vulpes vulpes)*, raccoons, cottontail rabbits, eastern fox squirrel, waterfowl, and waders (Jones et al., 2003).

4.12.1.5 AQUATIC LIFE

The South Platte River has been impacted by past and current human disturbances. Low species diversity indicates that poor water quality and habitat degradation are impairing the health of the aquatic communities (USGS, 2002). The metro Denver section of the river contains primarily warm water and introduced species. Surveys conducted by the USGS (2002) between 1993 and 1995 found ten species of fish, dominated by common carp, white sucker, longnose sucker *(Catostomus catostomus)*, creek chub *(Semotilus atromaculatus)*, and fathead minnow.

The river also supports crawfish, painted turtles, snapping turtles, and numerous aquatic insects.

4.12.1.6 THREATENED AND ENDANGERED SPECIES

Federally threatened and endangered species of vegetation or wildlife are protected under the Endangered Species Act of 1973 as amended (16 U.S.C. 1531 et seq.). Significant adverse effects to a federally listed species or its habitat resulting from a federal action would require consultation with the USFWS under Section 7 of the Endangered Species Act. There are no federal regulations that require consultation for effects to candidate species, but if the species were to become listed during construction, consultation with the USFWS would be required. Because the status of candidate species may change over the course of a project, CDOT policy requires addressing candidate species during the environmental clearance process.

Following a review of relevant literature, a wildlife biologist visually assessed the project area for the presence of potential habitat for species listed as threatened or endangered and for species considered to be candidates for listing under the Endangered Species Act by the USFWS. The following list of threatened, endangered, and candidate species (listed species) with potential to occur in the project area was provided by the USFWS (2004a).

- *Whooping crane *(Grus americana)*, Endangered
- *Least tern, interior population *(Sterna antillarum)*, Endangered
- *Piping plover *(Charadruis melodus)*, Endangered
- *Western prairie fringed orchid *(Platanthera praeclara)*, Threatened
- Bald eagle (*Haliaeetus leucocephalus*), Threatened
- Ute ladies'-tresses orchid *(Spiranthes diluvialis)*, Threatened
- Colorado butterfly plant *(Gaura neomixcana coloradensis)*, Threatened

The USFWS states that actions that result in new water depletions to the Platte River System may affect listed species downstream as well as designated critical habitat for whooping crane and piping plover in Nebraska. Listed species impacted only by water depletions of the Platte River are identified by an asterisk (*). No water-depleting actions would occur from the proposed project. Additionally the whooping crane, least tern, piping plover, pallid sturgeon, and western prairie fringed orchid do not occur in the City and County of Denver and the project area completely lacks any potential habitat to support these species.

The project area is located within an area identified as a "block clearance zone" for the Ute ladies'-tresses orchid. This block clearance was recently renewed for another three years, until October 2008, by the USFWS (USFWS, 2005). A block clearance zone is an area that is exempted from assessment and trapping requirements for a listed species under the Endangered Species Act because studies have shown that the species or adequate habitat for the species does not exist. The project area is also within the block clearance zones for two other species: the Preble's meadow jumping mouse and black-footed ferret, which were not included on the USFWS list because the project area is in block clearance zones for these species. Since there would be no water depletions associated with this project and because there are no plover, pallid sturgeon, and western prairie fringed orchid or potential habitat for

these species in the project area, these species are not addressed further. Species with potential habitat in the project area are discussed below.

Bald Eagle

The bald eagle is a large North American bird with a historical distribution throughout most of the United States (USFWS, 1983). The bald eagle was listed as an endangered species in 1978. Population declines are attributed to habitat loss, the use of organochlorine pesticides, and mortality from shooting. Since its listing, the bald eagle population has been increasing. The bald eagle was down-listed from endangered to threatened in 1995 and USFWS is proposing to de-list the bald eagle due to population recovery. If the bald eagle is removed from the list of the threatened and endangered species, it will continue to be protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Bald eagles are primarily winter residents in Colorado. They typically roost in large trees near water bodies or prairie dog towns where prey is abundant. Nesting bald eagles generally select large cottonwood trees along rivers or near lakes. According to CDOW (NDIS, 2004), known nest sites nearest to the project area are at Barr Lake State Park (20 miles), Rocky Mountain Arsenal (22 miles), and Standley Lake (12 miles). The nearest known winter roost sites are at Bluff Lake near the Stapleton redevelopment (7 miles) and along the South Platte River near 104th Street (8 miles). Bald eagles may occasionally forage or perch in the project area, but the area contains no suitable nesting or winter roost habitat.

Colorado Butterfly Plant

The Colorado butterfly plant is a short-lived perennial herb found in moist areas of the floodplains within a small area in southeastern Wyoming, western Nebraska, and north-central Colorado. Its historical and current distribution includes Boulder, Douglas, Larimer, and Weld counties. The USFWS has no definition of suitable Colorado butterfly plant habitat or survey criteria, but colonies are often found in low depressions or along bends in wide, active, meandering stream channels a short distance upslope of the actual channel (Spackman et al., 1999). Typical Colorado butterfly plant habitat is relatively open without dense or overgrown vegetation. No Colorado butterfly plant habitat is present in the project area.

Raptors and Migratory Birds

The Migratory Bird Treaty Act commits to the protection *"of the many species of birds that traverse certain parts of the United States and Canada in their annual migration."* Unless permitted by regulations, the Migratory Bird Treaty Act provides that it is unlawful to *"pursue, hunt, take, capture or kill; attempt to take capture or kill; possess, offer to or sell, barter, purchase, deliver, or cause to be shipped, exported, imported, transported, carried or receive any migratory bird, part, nest, egg or product, manufactured or not."* In Colorado, all birds except for the European starling *(Sturnus vulgaris)*, house sparrow *(Passer domesticus),* and feral rock dove pigeon are protected under the Act. Because migratory songbirds, raptors, and waterfowl are protected, any active nests that are disturbed by the proposed project would require obtaining a nest depredation permit from the USFWS.

One potential inactive raptor nest adjacent to the South Platte River was identified during an April 2004 site reconnaissance survey within the project area. A study conducted along the South Platte River by the Denver Museum of Nature and Science (Jones et al., 2003) identified 65 species of birds using the river through urban Denver. Thirty-two species were identified at Habitat Park located within the project area. The industrial and urban/residential landscape habitats primarily provide habitat for urban-adapted and introduced birds and species such as the rock dove (pigeon), European starling *(Sturnus vulgaris)*, and house sparrow *(Passer domesticus)*; species not protected by the Migratory Bird Treaty Act. Barn swallows are known to use artificial structures, such as bridges or highway overpasses, and their nests are located on bridges in the project area.

Most migratory birds within the project area occupy open water habitat associated with ponds and the South Platte River, riparian/wetland habitats, and grasslands. Common nesting migratory bird species in the project area include mallard *(Anas platyrhynchos)*, Canada goose *(Branta Canadensis)*, common grackle *(Quiscalus quiscula),* American robin *(Turdus migratorius)*, northern flicker *(Colaptes auratus)*, black-capped chickadee *(Poecile atricapilla)*, and house finch *(Carpodacus mexicanus)*.

4.12.2 Consequences of the Alternatives

Impacts to vegetation and wildlife habitat from the No Action Alternative as well as the system alternatives, which include System Alternative 1, 2, 3, and the Preferred Alternative, are summarized below.

4.12.2.1 VEGETATION

The No Action Alternative would result in no direct impacts to vegetation.

Given the level of preliminary design and the mixture of industrial, commercial, and residential land use within the project area, it is difficult to quantify vegetation impacts by vegetation type. Direct permanent impacts to vegetation would result from the increased footprint of the highway facilities in each system alternative, including the Preferred Alternative, through widened bridges, reconfigured interchanges, and the widening of I-25 and US 6. Temporary impacts to vegetation will occur throughout the project area during construction due to equipment movement, material storage, and staging area disturbances.

Of the five vegetation types identified, the majority of disturbance will occur in the industrial and riparian areas. Industrial impacts will occur throughout the project area. Impacts to riparian areas will occur at the 6th Avenue, Alameda Avenue, and Santa Fe Drive bridges over the South Platte River and at storm water outfalls. Impacts to mixed grassland vegetation will occur in the areas of the Santa Fe/I-25 and 6th Avenue/I-25. Xeric landscape vegetation will be impacted along the I-25 mainline and in the area of the 6th Avenue/I-25 interchange. Urban landscape vegetation impacts are discussed in **Section 4.3** *Parks and Recreation* and **Section 4.4** *Aesthetics and Urban Design*.

An indirect impact to vegetation in the project area is the introduction and spread of noxious weeds associated with ground-disturbing activities. As a result of construction disturbance, existing noxious weeds in the project area may spread and new noxious weeds may be introduced. Noxious weeds frequently invade disturbed areas, establish quickly, and out-compete native species if left unchecked.

4.12.2.2 WILDLIFE

The No Action Alternative would cause the fewest adverse impacts to wildlife species in general as no new construction or disturbance to wildlife habitats is proposed. However, this alternative also would offer the fewest potential benefits for wildlife since bridges would not be raised, and visual screen would not be constructed.

The major wildlife impacts, in the form of alteration of habitat, under all system alternatives, including the Preferred Alternative, would be temporary construction impacts during construction/improvement of the US 6, Alameda Avenue, Santa Fe Drive, and new pedestrian bridges.

Under all system alternatives including the Preferred Alternative, the western edge of the existing I-25 highway would be maintained as the western construction limit, thereby avoiding any new construction impacts to the South Platte River and its riparian corridor. Several bridge replacements/improvements are proposed under all system alternatives that would temporarily disturb some wetland, riparian, and other open water habitat.

All system alternatives, including the Preferred Alternative, also would provide some benefit to wildlife. Improvements to US 6 and Santa Fe Drive bridges would improve the horizontal and vertical clearances over the South Platte River, moving traffic farther away from wildlife habitat. This could reduce noise and light disturbance, providing a minor benefit for wildlife using the river as a travel corridor. Screening I-25 from the pedestrian trail between 2nd and 3rd Avenues would also provide an improved sound barrier between traffic and South Platte River wildlife habitat areas.

4.12.2.3 MIGRATORY BIRDS

Under all system alternatives including the Preferred Alternative, most construction would occur within the industrial and urban/residential habitats. These areas provide limited, poor quality habitat for nesting migratory birds, primarily providing habitat for unprotected pigeon, starlings, and house sparrow populations. Higher quality bird habitat associated with open water, riparian, and mixed/xeric grasslands would largely be avoided. Bridge construction/improvements over the South Platte River could potentially result in a take, or loss of, active migratory bird nests, such as barn swallows. The barn swallow is not threatened or endangered but is protected by the Migratory Bird Treaty Act. No permit from the USFWS is required for removal of inactive nests, and USFWS generally will not permit removal of an active nest unless justifiable to protect human health and safety.

4.12.2.4 WILDLIFE CORRIDORS

All system alternatives, including the Preferred Alternative, would retain the western edge of the existing I-25 highway; thus, there would be no long-term impacts to the South Platte River migration corridor. Minor temporary impacts would occur during bridge construction/ improvements to the US 6, Alameda Avenue, Santa Fe Drive, and new pedestrian bridges. Wildlife inhabiting or migrating along the river through metropolitan Denver have adapted to constant human presence and disturbance; therefore, any temporary construction disturbance would be of relatively low magnitude and short duration.

4.12.2.5 AQUATIC LIFE

Bridge construction/improvements also could adversely impact fish and other aquatic life in the South Platte River. Direct disturbance of spawning beds or increased sedimentation during construction activities could reduce breeding success and productivity over the short-term.

4.12.2.6 THREATENED AND ENDANGERED SPECIES

As discussed earlier (**Section 4.12.1.6**), no potential habitat for any federal threatened or endangered plant species occurs within the project area, nor is there any suitable breeding, wintering, or important foraging habitat for any federally listed threatened or endangered animal species. Since no water depletions of the South Platte River would occur under the proposed project, there would be no impacts to downstream South Platte River species or critical habitat. Therefore, neither the No Action Alternative nor any of the system alternatives, including the Preferred Alternative, would adversely impact any threatened or endangered species.

4.12.3 Mitigation Measures

4.12.3.1 VEGETATION

Under all of the system alternatives including the Preferred Alternative, improvements are proposed primarily along the east side of the South Platte River, thus avoiding potential impacts in many places to riparian vegetation and aquatic wildlife habitat.

To minimize the adverse effects of disturbance to vegetation, the Preferred Alternative will follow CDOT revegetation practices. Disturbed areas will be seeded in phases throughout construction with a CDOT landscaped architect-approved native seed mix. Seeding will occur during appropriate seeding windows. If out of season, the slopes will be temporarily protected from erosion with mulch and mulch tackifier.

Permanent seeding will occur throughout the project, bringing areas to completion as soon as possible. Mitigation for impacts to riparian areas will be coordinated with CDOW as required by Senate Bill 40 (33-5-101-107 CRS 1973) as amended. Replacement ratio for trees greater than 2 inches diameter in breast height will be one-to-one. Existing shrubs will be replaced with native species to their pre-construction area/coverage. Existing irrigation systems will be maintained and/or modified appropriately such that existing landscape features are preserved.

Impacts to existing landscaped areas (irrigated and otherwise) will be mitigated by incorporating replacement landscaped areas into the final design. Where existing landscaped areas are impacted, the design will include re-landscaping such that the existing landscape does not become fragmented. This landscape design will be coordinated with urban design elements discussed in **Section 4.4** *Aesthetics and Urban Design*.

To address the requirements of Executive Order 13112 and the Colorado Noxious Weed Act, an Integrated Weed Management Plan will be prepared and implemented under any system alternative. The plan will include a variety of control methods depending on species found, size of the populations, and the surrounding landscape. Some of these methods may include cutting and removing the noxious weeds, mowing, and using carefully selected herbicides that are targeted for the particular species and growth stage (for example, Canada thistle at bud stage).

The Integrated Weed Management Plan will be prepared during final design and will include the following steps to control weeds in the project area:

- Construction vehicles must be cleaned of soil and plant parts before entering the construction site to avoid the spreading of noxious weeds.
- Disturbance to existing vegetation will be limited as much as practicable.
- Topsoil salvaged from the project area for reuse will be from areas free of noxious weeds. Areas free of weeds will be identified in the Integrated Weed Management Plan and project drawings.
- Temporary fences will be installed to limit construction traffic in an effort to reduce erosion and weed invasion.
- If topsoil remains stockpiled for more than one month, the stockpile will be seeded with annual oats.
- Only certified weed-free mulch will be used. The mulch must be certified under the Colorado Department of Agriculture Weed Free Forage Certification Program and inspected, as regulated by the Weed Free Forage Act, Title 35, Article 27.5, CRS.
- A weed specialist will survey the area just before, during, and immediately after construction.
- The Integrated Weed Management Plan will be reviewed and updated during construction as needed.
- Appropriate control methods for sensitive areas, such as wetlands and riparian corridors will be identified.

Following construction, the site will be monitored for the need for follow-up weed control at least twice after the first growing season.

4.12.3.2 WILDLIFE

There would be no impacts to threatened or endangered species under any of the system alternatives, including the Preferred Alternative. Since the majority of the impacts to wildlife habitats would be low quality grasslands, the Preferred Alternative would result in only minor disturbance to wildlife. Strategies to maintain wildlife corridors will be further considered during final design, and could include constructing sound/visual barriers (including earthen berms) or vegetation screens.

To avoid disturbing or “take” of a migratory bird nest, any trees or structures, such as bridges or highway overpasses, that would be removed during the nesting season will be surveyed for the presence of active bird nests. If no active nests are observed, the trees can be removed. No permit from the USFWS is required for removal of inactive nests and the USFWS generally will not permit the removal of an active nests unless justifiable to protect human health and safety; however, if active nests are present, habitat-disturbing activities, such as tree removal, grading, scraping, grubbing, etc, will be conducted in the riparian area along the South Platte River during the non-breeding season (August-March). Where practicable, construction of bridges over the South Platte River will be conducted during the non-breeding season (August-March) to avoid impacts to spawning fish and spawn beds.

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TABLE OF CONTENTS

Page

4.13 Hazardous Waste 4.13-1

4.13.1 Current Conditions 4.13-3

4.13.2 Consequences of the Alternatives 4.13-15

4.13.3 Mitigation Measures 4.13-30

LIST OF FIGURES

Page

Figure 4.13-1 Sites with Environmental Conditions – Northern Project Area 4.13-4
Figure 4.13-2 Sites with Environmental Conditions – Central Project Area.....4.13-5
Figure 4.13-3 Sites with Environmental Concerns – Southern Project Area 4.13-6
Figure 4.13-4 Historical Fill / Landfill Areas 4.14-14

LIST OF TABLES

Page

Table 4.13-1 Summary of Sites with Potential and Recognized Environmental Conditions 4-13-8
Table 4.13-2 Recommendations for Additional Assessment / Investigation – System Alternative 1 .....4.13-19
Table 4.13-3 Recommendations for Additional Assessment / Investigation – System Alternative 2 .....4.13-22
Table 4.13-4 Recommendations for Additional Assessment / Investigation – System Alternative 3 .....4.13-25
Table 4.13-5 Recommendations for Additional Assessment / Investigation – Preferred Alternative 4.13-28

4.13 Hazardous Waste

This section discusses the potential for soil and groundwater contamination to be encountered in the project area. Areas of contaminated soil and groundwater must be identified so they can be avoided, if reasonably possible. Encountering soil and groundwater contamination during construction without prior knowledge may affect a project in terms of worker safety, cost, schedule, and agency and public relations. In addition, it is important to protect CDOT from liability for existing contamination that they may unknowingly acquire. Therefore, assessment and investigation of contamination concerns in the project area are an integral part of the CDOT project planning process.

The potential presence of soil and groundwater contamination has been considered during the screening of System Alternatives 1, 2, 3, and identification of the Preferred Alternative, to help in alternative selection and will be further considered during final design and right-of-way acquisition. As part of the final design, specific materials management procedures and controls will be developed for use during construction to ensure the protection of human health and the environment (CDOT, 1999).

A *Modified Environmental Site Assessment* (MESA) was performed in support of the Valley Highway EIS process (FHU, 2005h). The MESA was prepared based on the American Society for Testing and Materials (ASTM) *Standard Practice for Environmental Site Assessments* (ASTM, 2000), CDOT guidance (CDOT, 2002d), and through consultation with CDOT and CDPHE (FHU, 2003b). The purpose of the MESA is to identify recognized and potential environmental conditions in the project area that could adversely affect the project, to aid in effectively screening and evaluating the feasibility of system alternatives and aid in the right-of-way process.

ASTM defines ***recognized environmental conditions*** as *"the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property"* (ASTM, 2000). The term ***potential environmental conditions,*** as used in this EIS, identifies properties where recognized environmental conditions may be present but could not be confirmed without additional inspection or investigation.

The methodology for conducting the MESA included:

- Performance of a limited reconnaissance of sites within the project area for readily identifiable site activities
- Review of readily available documents identifying historical uses of the sites within the project area
- Review of readily available local, state, and federal environmental agency databases within a maximum distance of one mile of the centerline of the project footprint of the combined alternatives as dictated by CDOT guidance (CDOT, 2002d) and ASTM Standard E1527-00 (ASTM, 2000)
- Screening of sites identified in the local, state, and federal environmental agency databases by distance and expected groundwater flow

- Ranking of sites identified in the local, state, and federal environmental agency databases based on known environmental site conditions
- Review of previous CDOT investigations and other available records from local, state, and federal agencies for sites within the project area
- Interviews with relevant agency and regulatory staff regarding the potential for historical releases of hazardous substances or petroleum products on sites within the project area
- Identification of sites requiring additional evaluation or investigation to assist in project alternative feasibility assessment, project design, right-of-way acquisition, and development of specific-materials management or institutional controls required during construction

Site reconnaissance was conducted in October, November, and December 2003, focusing on identifying visual areas of chemical and petroleum usage, storage, and discharges (FHU, 2005h). The visual reconnaissance of sites within the project area was conducted from public right-of-way. The interior of buildings, fenced areas, and rear lots were not inspected during the site reconnaissance due to limited access.

The records review (FHU, 2004j) was performed of a variety of historical data resources including Sanborn Fire Insurance Company maps, USGS topographical maps, and aerial photographs. Sanborn Fire Insurance Company maps have been produced since the late 1800s and provide a record of land use throughout the project area. USGS topographical maps also have been prepared since the late 1800s and were useful in identifying topographic and cultural features and changes in site development over a period of time. Aerial photographs have been collected since the 1930s and allow for direct observation of site conditions over a period of time.

Sites were also reviewed for local, state, and federal environmental agency database records (Environmental Data Resources, Inc. [EDR], 2003). Approximately 1500 sites were identified within one mile of the centerline of the alternatives. These sites were then screened to determine if they were likely to have had an adverse impact on the project area. The initial screening process consisted of distance from the project area (within 1000 feet) and expected direction of groundwater flow. Sites that were located within 1000 feet, potentially upgradient or cross-gradient to the combined project footprint, or with a high possibility of having impacted the project area based on site conditions were included in the screening and ranking process.

Following the initial site screening, sites were identified with the possibility of having impacted the project area based on distance and expected groundwater flow. Next, these sites were ranked based on known environmental site conditions. Sites with minimal indications of an existing release, past release, or material threat of a release of any hazardous substances or petroleum products into the ground (soil), groundwater, or surface water were ranked as “low.” Sites with moderate indications of an existing release, past release, or material threat of a release of any hazardous substances or petroleum products into the ground (soil), groundwater, or surface water were ranked as “medium.” Sites with a medium ranking included Resource Conservation and Recovery Act (RCRA) generators with violations, Emergency Response Notification System (ERNS) sites, and leaking underground storage tank (LUST) sites. Sites with the possibility of large-scale contaminant migration and a known existing or past release of a hazardous substance or petroleum product were ranked as “high.”

Following the environmental site ranking, the sites were screened again based on distance. Sites were identified within 100 feet, from 100 feet to 500 feet, and from 500 feet to 1000 feet of the project area. A detailed review was conducted for sites located within 100 feet of the project area with an environmental condition ranking of either “high” or “medium” and sites from 100 feet to 500 feet with a “high” environmental ranking. The site screening and ranking process is discussed further in the *Modified Environmental Site Assessment* (FHU, 2005h).

4.13.1 Current Conditions

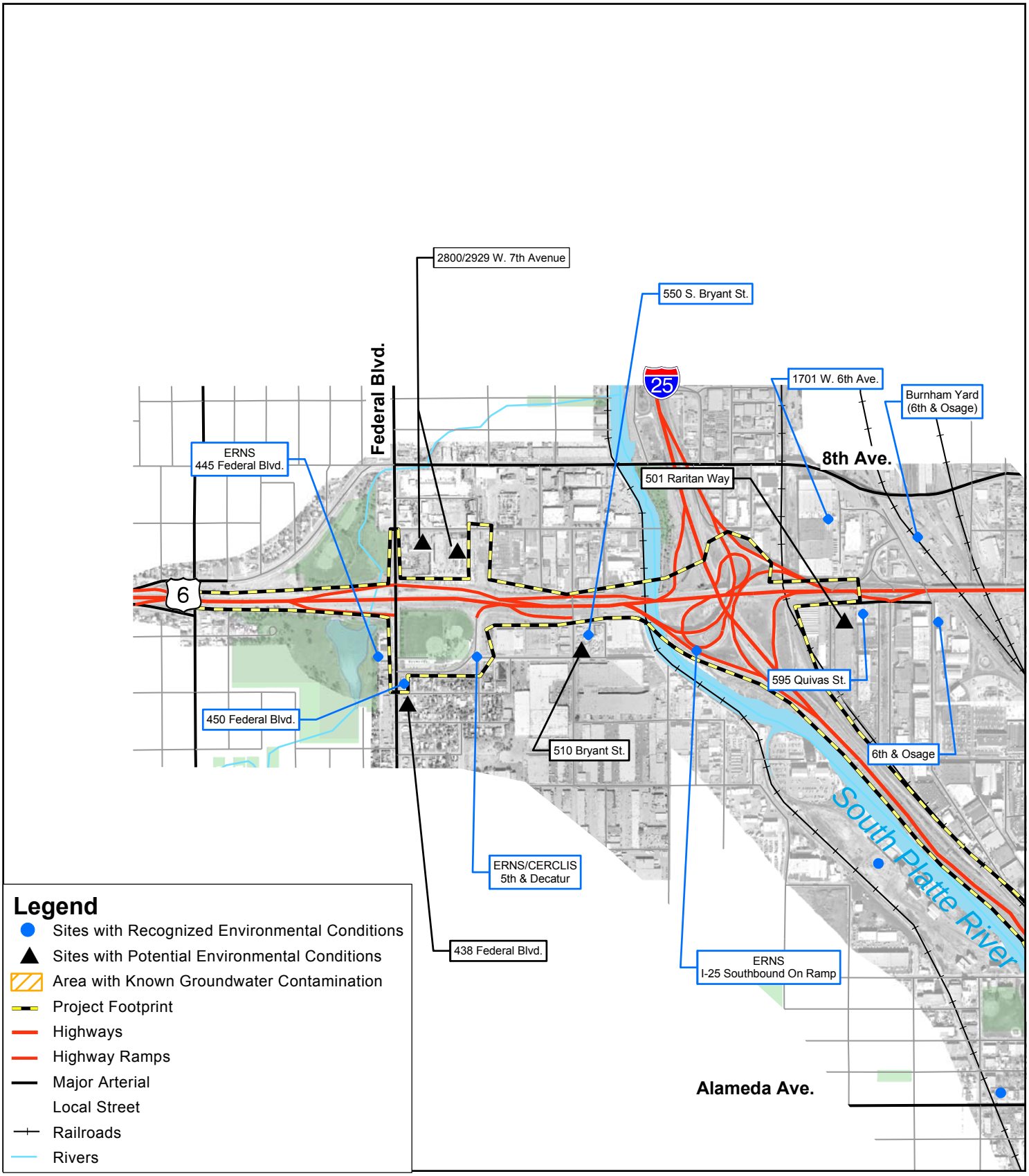
The project is located in an area with a long history of industrial and commercial land use. A total of 74 sites with recognized or potential environmental conditions were identified within or adjacent to the project area. Seventeen sites with potential environmental conditions were identified during the site reconnaissance, and 12 sites with potential environmental conditions were identified during the review of historical use information. Forty-five sites with either potential or recognized environmental conditions were identified during the database screening, and an additional two sites are identified during the detailed review. These sites are identified on **Figures 4.13-1, 4.13-2,** and **4.13-3.**

Railroads were constructed through the project area in the 1870s and 1880s. Several railroad lines, including the Consolidated Main Line railroad corridor and numerous railroad sidings are located in the project area. As part of this EIS process, no evidence of potential soil and groundwater contamination was identified associated with the railroad tracks; however soil and groundwater contamination may exist along the railroad corridor due to undocumented events and an accumulation over time of drips, leaks, spills, and hydrocarbon exhaust residues from rail traffic.

Industrial and commercial facilities have been located in the project area since construction of the railroads. Industrial and commercial land uses have included, but are not limited to, rubber manufacturing, vehicle maintenance, mineral processing, aggregate mining, petroleum processing, fueling facilities, petroleum storage, lubricant manufacturing, lumber milling, coal storage, and warehouse distribution. Abandoned aggregate quarries along the South Platte River were historically used as landfills. Due to the long history of industrial and commercial land use, soil and groundwater contamination may be present throughout the project area.

Several areas of known contaminated soil and groundwater are located in the project area. Chlorinated solvent and petroleum contaminated soil and groundwater are located in the vicinity of the Broadway and I-25 interchange. Petroleum contaminated soil and groundwater are also present east of the I-25 and US 6 interchange. Several active LUST sites, RCRA corrective action sites (CORRACTS), and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites are located in the project area.

Known petroleum, chlorinated solvent, radionuclide, and heavy metals contaminated soil and groundwater are present along Santa Fe Drive and Kalamath Street in the vicinity of Alameda Avenue. Several active LUST sites are located south of US 6 along Federal Boulevard and Bryant Street and along Alameda Avenue near Cherokee Street and Lipan Street. Areas of known groundwater contamination are identified on **Figures 4.13-1, 4.13-2,** and **4.13-3.**



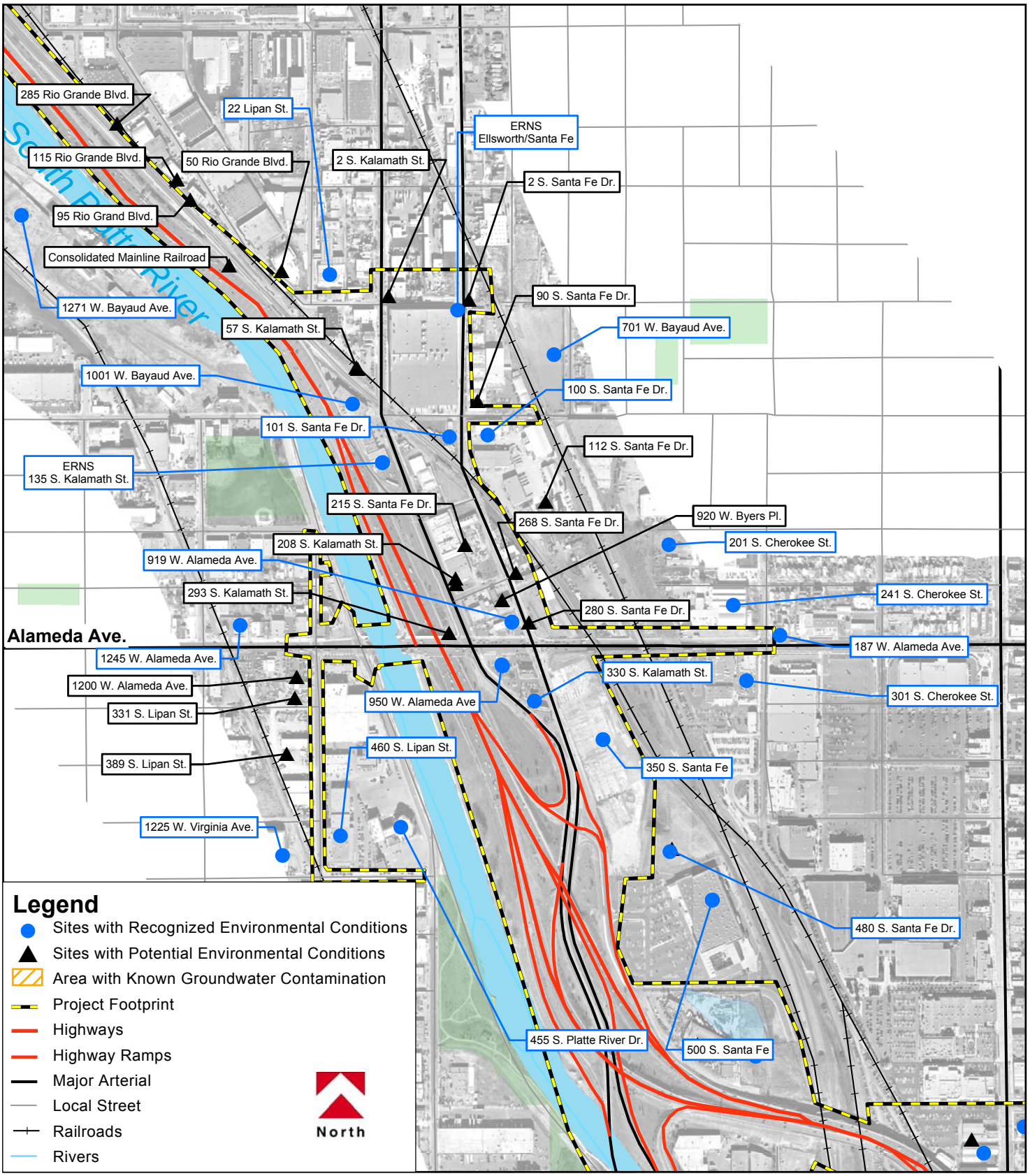
0 500 1,000 2,000 Feet

Sites with Environmental Conditions

Northern Project Area

Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

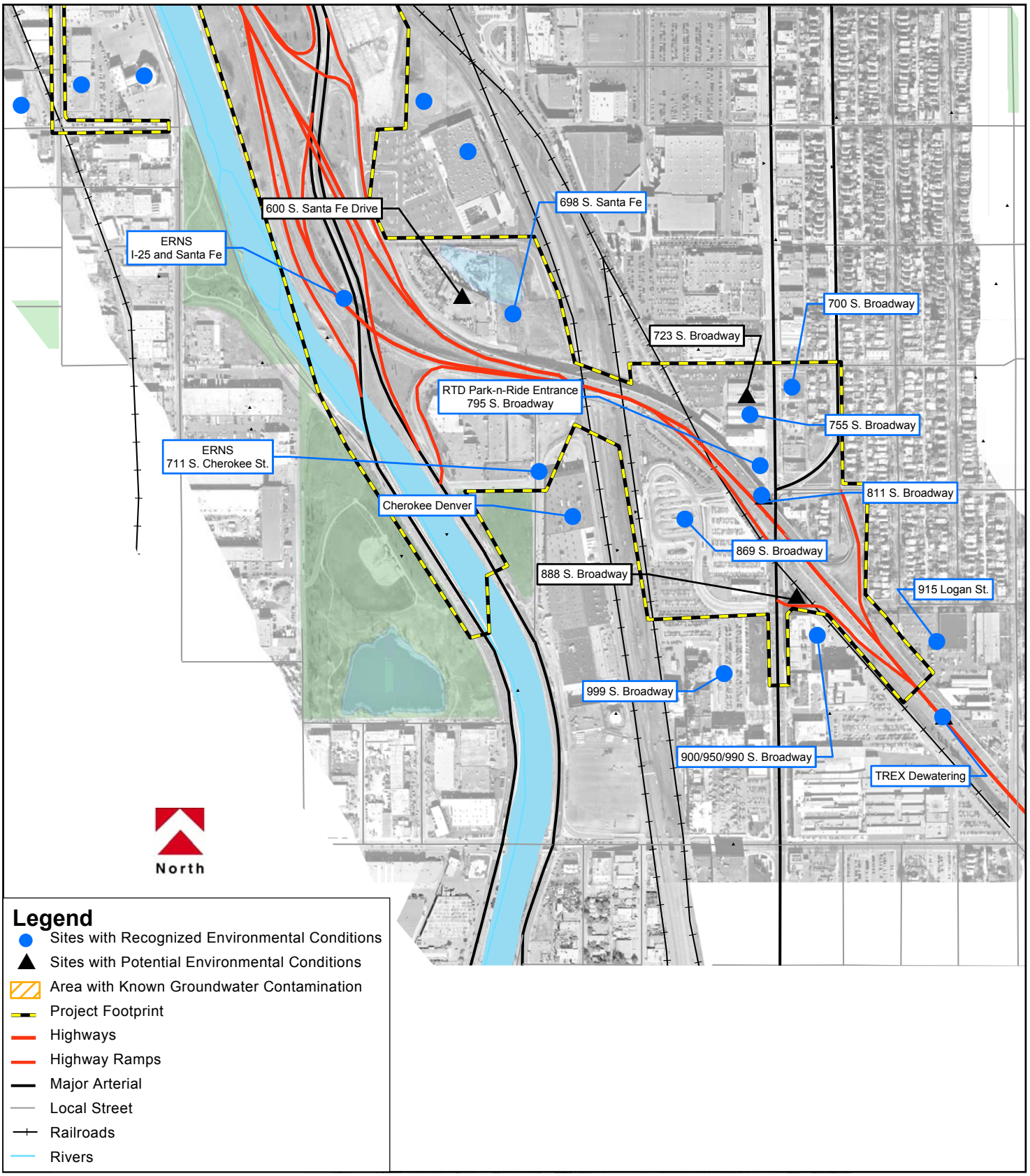
Figure 4.13-1



Sites with Environmental Conditions
Central Project Area

Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Figure 4.13-2



0 500 1,000 2,000 Feet

Sites with Environmental Conditions

Southern Project Area

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.13-3

Five historical fill and landfill areas identified in the database search and during the detailed file review are included in **Table 4.13-1**. An additional potential fill/landfill area, the former Lake Archer reservoir and canal, is not included in **Table 4.13-1** because it has not been identified as an environmental condition by local, state, and federal environmental agencies. Lake Archer was constructed in 1878 to provide water to Denver. Water was diverted from the South Platte River through a ditch that extended from approximately southeast of the existing I-25 and Alameda Avenue interchange to Lake Archer. Lake Archer was bounded on the north by 7th Avenue, on the south by Bayaud Avenue, on the east by 7th Street (later Osage Street), and on the west by the Denver & Rio Grande and the Atchison, Topeka, and Santa Fe railroad tracks.

In the late 1930s/early 1940s, Lake Archer and the canal were in-filled, and Rio Grande Boulevard, Raritan Way, and Quivas Street were platted. The content of the fill material for Lake Archer and the canal is unknown; however, it may have included municipal and industrial debris. Several known historical landfills are located in the area of the former Lake Archer and the canal, as depicted on **Figure 4.13-4**.

Table 4.13-1 Summary of Sites with Potential and Recognized Environmental Conditions

Type of Environmental Condition	Property Address	Environmental Conditions
Potential [1]	600 S. Santa Fe Drive	Manufacturing facility. USTs and ASTs. No leaks or spills reported. Unknown material handling and disposal practices.
Potential	50 Rio Grande Boulevard.	Construction supply. Fenced yard with a variety of vehicles, heavy equipment, and materials stored. No leaks or spills reported. Unknown site conditions.
Potential	95 Rio Grande Boulevard	Construction company. FINDS. RCRA Small Quantity Generator - no violations reported. Fenced yard with a variety of vehicles, heavy equipment, and materials stored. No leaks or spills reported. Unknown site conditions.
Potential	115 Rio Grande Boulevard	Commercial building. UST permanently closed at property. No leaks or spills reported. Unknown site conditions.
Potential	285 Rio Grande Blvd.	Commercial building. FINDS. RCRA Small Quantity Generator - no violations reported. USTs permanently closed at property. No leaks or spills reported. Unknown site conditions.
Potential	Consolidated Main Line Railroad tracks parallel I-25 from Ellsworth Avenue to US 6	No leaks or spills reported. Impacts to soil and groundwater along the railroad corridor due to undocumented events and an accumulation of drips, leaks, and spills over time.
Recognized	811 S. Broadway	Existing Northbound I-25 Broadway Viaduct. Historical gasoline filling station. USTs discovered and removed in June 2006. Residual petroleum impacted soil and chlorinated solvent and petroleum impacted groundwater may be on site.
Potential	888 S. Broadway	Vacant lot (formerly Jimmy Java's). Historical gasoline filling station. Located in area with known chlorinated solvent and petroleum impacted groundwater.
Potential	293 S. Kalamath St.	Existing Northbound I-25 at Alameda Avenue. Historical gasoline filling station. Area excavated during construction of existing I-25 in the 1950s.
Potential	723 S. Broadway	Retail building. Historical automotive-related use in the 1950s. Unknown hazardous material management.
Recognized [2]	Area between Bayaud Avenue and Alameda Avenue, east of Consolidated Main Line railroad	Landfill. Artificial fill. Unknown groundwater contamination or potential methane. Identified as 4S-68W-10SW on **Figure 4.13-4**.
Recognized	Area between Quivas and Osage Streets along 4th Avenue	Landfill. Unknown use or contents. Unknown site conditions (potential groundwater contamination and methane). Identified as 4S-68W-09NE on **Figure 4.13-4**.
Potential	57 S. Kalamath	Vacant lot. Formerly Tetrault Iron Works Co. (manufactured crushers, stamp mills, and concentrators). Located adjacent to the Consolidated Main Line railroad tracks. Unknown site conditions.
Recognized	915 S. Logan Street	United States Postal Service. USTs. LUST. Unknown material handling and disposal practices.
Recognized	755 S. Broadway	Automotive repair and service facility. Former United Engineers & Contractors and 723 Co. LUST. Residual petroleum impacted soil on site.

Table 4.13-1 Summary of Sites with Potential and Recognized Environmental Conditions (Continued)

Type of Environmental Condition	Property Address	Environmental Conditions
Recognized	900/950/990 S. Broadway	Former Gates Rubber Company, Ford Motor Company, and Shwadyer Trunk (Samsonite) manufacturing facilities. FINDS. RCRA Large Quantity Generator-violations reported. ERNS. UST. LUST. Known chlorinated solvent contamination of soil and groundwater. VCUP recently initiated. In the 1948 aerial photo a potential materials storage/landfill area is located on the northern portion of the property.
Recognized	999 S. Broadway	Former Gates Rubber Company manufacturing facility. VCUP. Known chlorinated solvents and petroleum impacted soil and groundwater on the property and in the vicinity of I-25.
Recognized	698 S. Santa Fe Drive	Former Prest-O-Lite company and Linde Gases of the West (manufacturers of acetylene gas). FINDS. RCRA Small Quantity Generator - no violations reported. UST. LUST. Unknown site conditions.
Recognized	869 S. Broadway	RTD park-n-Ride. Former Burkhardt Storage Facility. FINDS. RCRA Small Quantity Generator-no violations reported. LUST. Petroleum and lead contaminated soil and chlorinated solvent impacted groundwater on the property.
Recognized	795 S. Broadway	RTD park-n-Ride Entrance. FINDS. RCRA Small Quantity Generator-no violations reported. UST. LUST. Residual petroleum impacted soil and chlorinated solvent and petroleum impacted groundwater may be on site.
Recognized	700 S. Broadway	Automotive service facility. Former Econo Lube-N-Tube. FINDS. RCRA Small Quantity Generator-no violations reported. UST. LUST. Residual impacted soil may be located on the property.
Recognized	22 Lipan Street	Laboratory. FINDS. RCRA Conditionally Exempt Small Quantity Generator-no violations reported. UST. LUST. Residual impacted soil may be located on the property.
Recognized	1271 W. Bayaud Avenue	Former General Chemical. UST. LUST. RCRA-Small Quantity Generator. ERNS. VCUP. Known heavy metal contaminated soil and groundwater on the site.
Recognized	Area of the Santa Fe Drive and I-25 Interchange 800 S. Cherokee Street	Landfill. Artificial fill. Unknown groundwater contamination or potential methane. Identified as 64S-68W-15SW3 and 4S-68W-15SW4 on Figure **4.13-4**.
Recognized	135 S. Kalamath Street	ERNS.
Recognized	I-25/Santa Fe Drive	ERNS.
Recognized	711 S. Cherokee Street	ERNS.
Potential	501 Raritan Way	Commercial building. USTs permanently closed at property. No leaks or spills reported. Unknown site conditions.

Table 4.13-1 Summary of Sites with Potential and Recognized Environmental Conditions (Continued)

Type of Environmental Condition	Property Address	Environmental Conditions
Potential	510 Bryant Street	Gas station. USTs currently in use at property. No leaks or spills reported. Unknown site conditions (located adjacent to a LUST site).
Potential	438 Federal Boulevard	Gas station. USTs currently in use at property. No leaks or spills reported. Unknown site conditions (located adjacent to a LUST site).
Potential	2800/2929 W. 7th Avenue	Denver Public Schools Hilltop Bus Terminal. USTs. No leaks or spills reported. Unknown material handling and disposal practices.
Recognized	500 Julian Street	Landfill. Unknown use or contents. Unknown site conditions (potential groundwater contamination and methane). Identified as 4S-68W-08NW on **Figure 4.13-4.**
Recognized	500 Alcott Street	Landfill. Unknown use or contents. Unknown site conditions (potential groundwater contamination and methane). Identified as 4S-68W-08NE2 on **Figure 4.13-4.**
Recognized	450 Federal Boulevard	Automotive repair and supply facility. Former gas station. Former location of Charles Yamaguchi Property/KOK Auto Repair & Body Shop. UST. LUST. Known petroleum impacted soil and groundwater on the property.
Recognized	550 Bryant Street	Rental truck facility. FINDS. RCRA Conditionally Exempt Small Quantity Generator - no violations reported. UST. LUST. Known petroleum impacted soil and groundwater on the property.
Recognized	595 Quivas Street	Commercial building. Former location of Conrads Inc. UST. LUST. Residual petroleum impacted soil may be located on the property.
Recognized	1701 W. US 6	Warehouse. LUST. UST. ERNS. Known petroleum impacted soil and groundwater on site.
Recognized	UPRR - Burnham Yard	US 6 & Osage Street. ERNS. Known petroleum impacted groundwater in area and vicinity of US 6/I-25 interchange.
Recognized	5th Avenue & Decatur Street	PCB-Capacitor Cleanup. CERCLIS. RCRA Small Quantity Generator-no violations reported. FINDS. ERNS. No additional information available. Unknown site conditions.
Recognized	Southbound Ramp US 6 to I-25	ERNS.
Recognized	In alley behind 445 Federal Boulevard	ERNS.
Recognized	490 Osage Street	Landfill. Unknown use or contents. Unknown site conditions (potential groundwater contamination).
Recognized	500 Osage Street	Manufacturing facility. FINDS. UST. LUST. Related to the US 6 & Osage UPRR-Burnham Yard ERNS site. Known petroleum impacted groundwater and soil in area and vicinity of US6/I-25 interchange.

Table 4.13-1 Summary of Sites with Potential and Recognized Environmental Conditions (Continued)

Type of Environmental Condition	Property Address	Environmental Conditions
Potential	268 S. Santa Fe Drive	Automotive repair and supply facility. FINDS. No leaks or spills reported. Unknown material handling and disposal practices.
Potential	208 S. Kalamath Street	Former Heavenly Daze restaurant. FINDS. RCRA Small Quantity Generator - no violations reported. USTs permanently closed at property. No leaks or spills reported. Unknown site conditions.
Potential	331 S. Lipan Street	Commercial building. Fenced yard with a variety of vehicles, heavy equipment, and materials stored. No leaks or spills reported. Unknown site conditions.
Potential	389 S. Lipan Street	Commercial building. FINDS. RCRA Small Quantity Generator - no violations reported. UST. Fenced yard with a variety of vehicles, heavy equipment, electrical transformers, and materials stored. No leaks or spills reported. Unknown site conditions.
Potential	920 West Byers Place #A	Former Shamrock Ind. Laundry & Dry Cleaning. Historical laundry and dry cleaning operations. Unknown material handling and disposal practices.
Recognized	1001 W. Bayaud Avenue	Light industrial/commercial building. FINDS. RCRA Small Quantity Generator-violations reported. Landfill. Unknown use or contents. Unknown site conditions. Former location of the Crauel Manufacturing and Vinegar Co./Leo Vinegar & Sales Co. Unknown site conditions. Located adjacent to the Consolidated Main Line railroad.
Recognized	166 S. Kalamath Street	Landfill. Unknown use or contents. Unknown site conditions (potential groundwater contamination and methane).
Potential	1200 W. Alameda Avenue	Automotive dealer. FINDS. RCRA Small Quantity Generator - no violations. Historical automotive-related use in the 1920s. Unknown hazardous material management. Historical gasoline filling station in the 1940s. Unknown site conditions.
Potential	2 S. Kalamath Street	Commercial building. Historical paint dealership, National Lead Company, in the 1950s/1960s. Unknown hazardous material management.
Potential	80 S. Santa Fe Drive	Former location of Monument Works. Unknown site conditions.
Potential	280 S. Santa Fe Drive.	Construction supply. Former location of Six Star Lubricants Co. (a lubricant manufacturer). Unknown site conditions.
Recognized	101 S. Santa Fe Drive	Vacant lot [former gasoline filling station and Barter Machinery & Supply (Lot B)]. Barter Machinery & Supply (Lot B) CERCLIS. NFRAP. RCRA CORRACTS. Potential PCB and lead contaminated soil along railroad. Historical gasoline filling station.
Potential	112 S. Santa Fe Drive	Manufacturing facility. FINDS. RCRA Small Quantity Generator-violations reported. UST. No leaks or spills reported. Unknown site conditions.

Table 4.13-1 Summary of Sites with Potential and Recognized Environmental Conditions (Continued)

Type of Environmental Condition	Property Address	Environmental Conditions
Recognized	100 S. Santa Fe Drive. 701 W. Bayaud Avenue	Manufacturing facility. Former location of S.A.D. Holford (manufactured grease traps and ash pits) Clean Heat Fuel Co. (a coal yard), and Barter Machinery & Supply. CERCLIS-NFRAP. RCRA CORRACTS. Potential PCB and lead contaminated soil along railroad. UST. LUST. Residual petroleum soil contamination may be present.
Recognized	2 S. Santa Fe Drive	Commercial building. Former Consolidated Cut Stone & Granite Co. FINDS. RCRA Small Quantity Generator-violations reported. ERNS. Unknown site conditions.
Potential	215 S. Santa Fe Drive	Commercial building. Fenced yard with a variety of vehicles, heavy equipment, and materials stored. No leaks or spills reported. Unknown site conditions.
Recognized	241 S. Cherokee Street	Studio. Former Oswald Machine Co. (general machinists), Eversman Manufacturing (land level manufacturers), Davis and Son Manufacturing (oil fountain manufacturers), Continental Can Company (can producer), and Colorado Paint Co. FINDS. RCRA Small Quantity Generator-no violations reported. CERCLIS-NFRAP. UST. Unknown site conditions.
Recognized	. 301 S. Cherokee Street	Pharmaceutical company. Former William Russel Coal Yard and Chevrolet Motor. FINDS. RCRA Large Quantity Generator-violations reported. UST. ERNS. Unknown site conditions.
Recognized	480 S. Santa Fe Drive	Automotive repair and service facility. Former United States Gasoline Corporation (oil reclaiming plant) and Robinson Brick Company/Denver Radium –CERCLA. FINDS. RCRA Small Quantity Generator-no violations reported. UST. LUST. Known heavy metal and radionuclide contaminated soil and groundwater in the vicinity.
Recognized	500 S. Santa Fe Drive	Retail center. CERCLA. FINDS. RCRA Small Quantity Generator-no violations reported. UST. LUST. Known heavy metal and radionuclide contaminated soil and groundwater.
Recognized	350 S. Santa Fe Drive	Vacant lot (former RTD Alameda facility). FINDS. RCRA Small Quantity Generator-no violations reported. UST. AST. LUST. Residual petroleum soil and groundwater contamination may be present.
Recognized	330 S. Kalamath Street	Gas station. (former Total Petroleum). FINDS. UST. LUST. Known petroleum contaminated soil and groundwater on the property.
Recognized	950 W. Alameda Avenue	Restaurant (former Chevron gas station). LUST. Known petroleum contaminated soil and groundwater on the property.
Recognized	919 W. Alameda Avenue	Former Amoco gas station. Historical gasoline filling station. FINDS. RCRA Conditionally Exempt Small Quantity Generator-no violations reported. UST. LUST. Known petroleum contaminated soil and groundwater on the property.
Recognized	201 S. Cherokee Street	Manufacturing facility. (former Cherokee Solvents). FINDS. RCRA Small Quantity Generator. CERCLIS-NFRAP. ERNS. Unknown site conditions.
Recognized	187 W. Alameda Avenue	Automotive repair and service facility. (former KOK Oil Co./KOK Phillips). FINDS. UST. LUST. Known petroleum contaminated soil and groundwater on the property.

Table 4.13-1 Summary of Sites with Potential and Recognized Environmental Conditions (Continued)

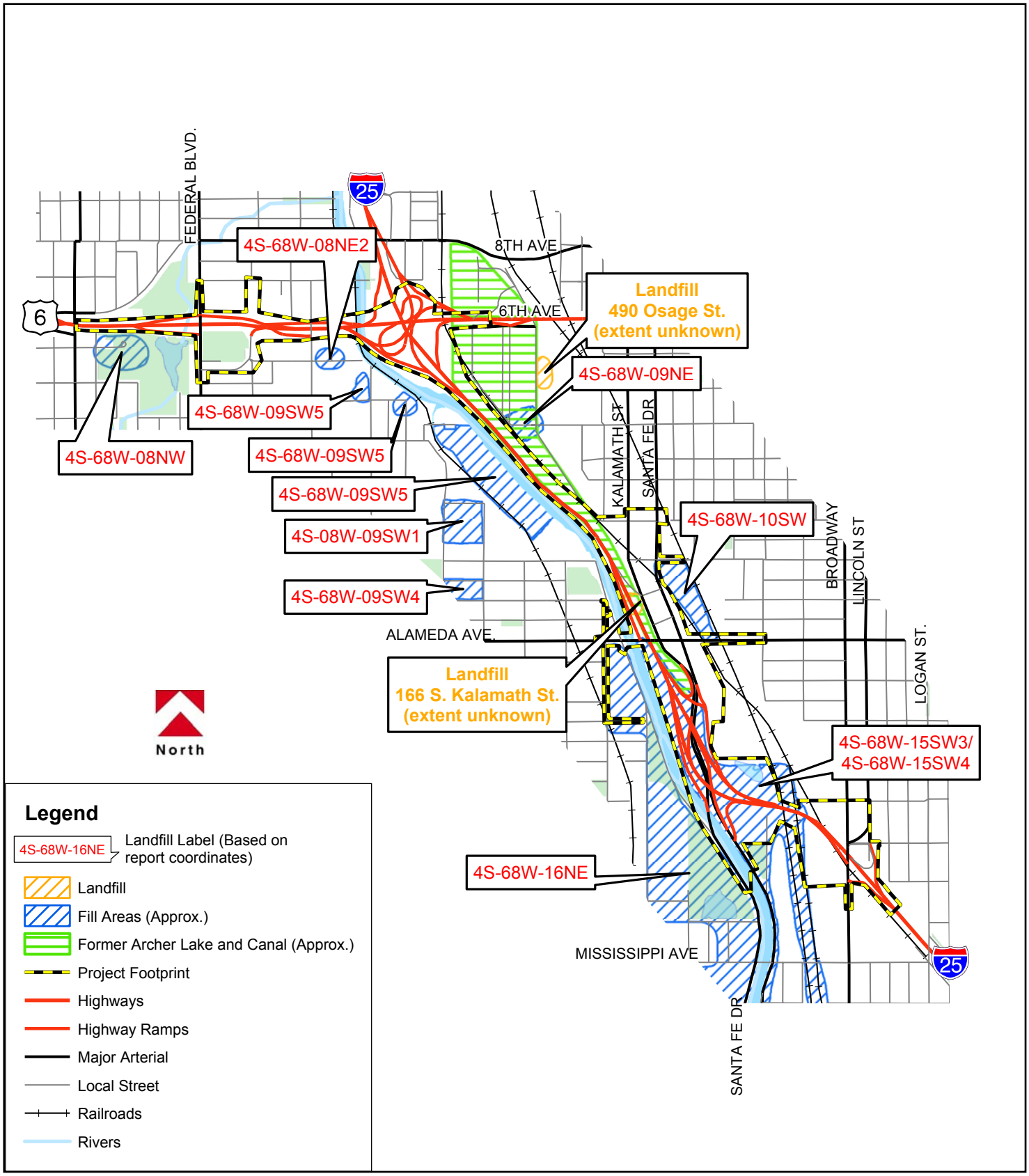
Type of Environmental Condition	Property Address	Environmental Conditions
Recognized	1245/1253 W. Alameda Avenue	Gas station. (former A-B Petroleum and U-Gas-UM). ERNS. UST. FINDS. LUST. Known petroleum contaminated soil and groundwater on the property.
Recognized	460 S. Lipan Street	Automotive repair and service facility. FINDS. RCRA Small Quantity Generator-no violations reported. LUST. Potential landfill. Unknown site conditions.
Recognized	1225 W. Virginia	Manufacturing facility. UST. LUST. Residual petroleum impacted soil and groundwater may be present.
Recognized	Ellsworth and Santa Fe	ERNS.
Recognized	455 South Platte River Drive	Church (former Happy Church). CERCLIS-NFRAP. Former municipal landfill. Known high levels of methane present. Unknown groundwater conditions. Identified as 4S-68W-16NE on **Figure 4.13-4.**

Source: FHU, 2004j

[1] A ***recognized environmental condition*** is " the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicated an existing release, a past release, or conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property" (ASTM, 2000).

[2] A ***potential environmental condition*** identifies a property where recognized environmental conditions may be present but could not be confirmed without additional inspection or investigation.

AST – aboveground storage tank
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS – Comprehensive Environmental Response, Compensation, and Liability Information System
CORRACTS – corrective action
ERNS – Emergency Response Notification System
FINDS – facility index system
LUST – leaking underground storage tank
NFRAP – no further remedial action planned
PCB – polychlorinated biphenyls
RCRA – Resource Conservation and Recovery Act
UST – underground storage tank



Source: Pinyon Engineering , 1997

0 0.25 0.5 1 Miles

Historical Fill/Landfill Areas

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.13-4

4.13.2 Consequences of the Alternatives

Sites with potential and recognized environmental conditions were identified throughout the project area. These sites included National Priority List (NPL) sites, Comprehensive Response Compensation and Liability Information System (CERCLIS) sites, Resource Conservation and Recovery Information System (RCRIS) sites CORRACTS sites, ERNS sites, CDPHE Voluntary Cleanup Program (VCUP) sites, as well as sites containing aboveground storage tanks, underground storage tanks, LUSTs and landfills.

4.13.2.1 No Action Alternative

The No Action Alternative would not result in construction affecting sites with potential or recognized environmental conditions.

4.13.2.2 Consequences Common to System Alternatives 1, 2, 3, and the Preferred Alternative

This section discusses hazardous waste impacts common to each of the System Alternatives 1, 2, 3, and the Preferred Alternative.

I-25 Improvements

The I-25 mainline portion of the Valley Highway Project extends from Logan Street to US 6 and includes the Broadway, Santa Fe Drive, and Alameda Avenue interchanges. Sites with recognized or potential environmental conditions in the area of the I-25 and Broadway interchange include four closed LUST sites, two historical gasoline filling stations, the RTD park-n-Ride (former Burkhardt Steel facility), and the former Gates site. Soil in the vicinity of the interchange is known to be contaminated with petroleum products, trichloroethylene (TCE), arsenic, and lead. Groundwater in the vicinity of the interchange is known to be contaminated with TCE, benzene, and toluene. As shown on **Figure 4.13-4**, the interchange is also located on a historical fill area with potential soil and groundwater contamination and methane concerns. It is anticipated that soil contaminated with petroleum, chlorinated solvent, and heavy metals and groundwater contaminated with chlorinated solvent and petroleum would be encountered during construction in the area of the Broadway and I-25 interchange.

The I-25 and Santa Fe Drive interchange is located west of Broadway near the South Platte River. One closed LUST site, two ERNS sites, the Cherokee Denver CDPHE VCUP site, and the facility at 600 S. Santa Fe Drive (a site with potential environmental conditions) are located in the vicinity of the interchange. In addition, the interchange is located on a historical fill area with potential soil and groundwater contamination and methane concerns (see **Figure 4.13-4**). Contaminated soil and groundwater could be encountered during construction in the area of the Santa Fe Drive and I-25 interchange.

The I-25 and Alameda Avenue interchange is located west of Santa Fe Drive and Kalamath Street. Three active LUST sites, two closed LUST sites, and the Denver Radium CERCLA site (formerly Robinson Brick) are located east of the interchange. The interchange is also located in the vicinity of a historical fill area and the Lake Archer canal with potential soil and groundwater contamination and methane concerns. The fill material for the Lake Archer canal is unknown but may have included municipal and industrial debris. Soil in the vicinity of the interchange is

known to be contaminated with petroleum products and arsenic, lead, and zinc. Groundwater in the vicinity of the interchange is known to be contaminated with benzene, ethylbenzene, toluene, xylenes, cadmium, manganese, uranium, zinc, and radionuclides. Contamination is expected to be encountered during replacement of the I-25 and Alameda Avenue interchange and the coffer dam along I-25 including, soil contaminated with petroleum, heavy metals, and landfill debris, and groundwater contaminated with petroleum, heavy metals, and radionuclides.

The Consolidated Main Line railroad tracks parallel the existing I-25 highway from approximately Ellsworth Avenue to US 6. As part of System Alternatives 1, 2, 3, and the Preferred Alternative these tracks will be relocated toward the east. Although no evidence of potential soil and groundwater impacts were identified, contaminated soil and groundwater may exist due to undocumented events and an accumulation over time of drips, leaks, spills and hydrocarbon exhaust residue from rail traffic. Contaminated soil and groundwater may be encountered during relocation of the railroad.

As shown on **Figure 4.13-4**, the former Lake Archer reservoir and canal were located east of the existing I-25 highway. The canal extended from approximately southeast of the existing I-25 and Alameda Avenue interchange to Lake Archer. Lake Archer was bounded on the north by 7th Avenue, on the south by Bayaud Avenue, on the east by Osage Street, and on the west by the Consolidated Main Line railroad tracks. The Lake Archer reservoir and canal were potentially used as municipal and industrial landfills. Several known landfills are located in the area of the former reservoir and canal. A landfill was identified at 1001 W. Bayaud Avenue and another landfill is located near the intersection of 3rd Avenue and Quivas Street. Contaminated soil and groundwater contamination may be located east of the existing I-25 highway in the area of the former Lake Archer reservoir and canal.

The Santa Fe Drive viaduct and the Alameda Avenue bridges over I-25 would be replaced as part of System Alternatives 1, 2, 3, and the Preferred Alternative. A lead-based paint survey was not conducted for these structures. Given the age of these structures, lead-based paint may be present. Lead-based paint is a worker and public safety concern.

US 6 Improvements

The US 6 portion of the Valley Highway Project extends from Quivas Street in the east across I-25 and Federal Boulevard to Knox Court in the west. The US 6 portion of the project includes improvements to the I-25, Bryant Street, and Federal Boulevard interchanges.

The I-25 and US 6 interchange is located west of the Union Pacific Burnham Shops (the former Denver & Rio Grande rail yard), the Rio Grande LUST site, and the former Lake Archer. Three closed and one active LUST sites and the active Union Pacific–Burnham Shops ERNS spill are located in the vicinity of the interchange. The interchange is also located near the Lake Archer reservoir with potential soil and groundwater contamination and methane concerns. The fill material for the Lake Archer reservoir is unknown but may have included municipal and industrial debris. A diesel-contaminated groundwater plume is located west of the interchange. Landfill debris, contaminated soil and groundwater, and methane may be encountered in the area of the I-25 and US 6 interchange.

The US 6 and Bryant Street interchange is located north of a closed LUST site with known soil and groundwater contamination, and an UST site. Soil and groundwater contaminated with petroleum are located southeast of the US 6 and Bryant Street interchange.

The US 6 and Federal Boulevard interchange is located north of an active LUST site, a second UST along Federal Boulevard, and an ERNS/CERLIS site at 5th Avenue and Decatur. Soil and groundwater contaminated with petroleum are known to occur south of the US 6 and Federal Boulevard interchange. Contaminated soil and groundwater may also be encountered in the area of 5th Avenue and Decatur.

Several known landfill areas are located south of US 6 along the 500 block between 5th Avenue and US 6. The contents of these landfills are unknown, and soil and groundwater contamination and methane concerns exist.

The US 6 bridge over the South Platte River would be replaced as part of each alternative, including the Preferred Alternative. A lead-based paint survey was not conducted for this structure. Given the age of the structure, lead-based paint may be present.

Santa Fe / Kalamath Improvements

The Santa Fe/Kalamath improvements portion of the Valley Highway Project includes improvements to Santa Fe Drive, Kalamath Street, Alameda Avenue, Lipan Street, and Virginia Avenue, installation of a collector-distributor road south of Alameda Avenue and east of Santa Fe Drive, and construction of grade separations along Santa Fe Drive and Kalamath Street at the Consolidated Main Line railroad tracks.

The Santa Fe/Kalamath improvements are located in an area with a long history of industrial and commercial land use. Along Santa Fe Drive and Kalamath Street from I-25 north to Ellsworth Avenue, and west from Cherokee Street to I-25 are two CERCLIS – No Further Remediation Action Planned (NFRAP) sites, the Denver Radium CERCLA site (formerly Robinson Brick), two closed LUST sites, three active LUST sites, one RCRA CORRACTS site, a RCRA large-quantity generator, several ERNS sites, and various sites with potential environmental conditions. Soil south of Alameda Avenue is known to be contaminated with petroleum products and arsenic, lead, and zinc. Groundwater in the vicinity of the Kalamath and Santa Fe Drive intersections with Alameda Avenue is known to be contaminated with benzene, ethylbenzene, toluene, xylenes, cadmium, manganese, uranium, zinc, and radionuclides.

The improvements west of I-25 along Alameda Avenue, Lipan Street, and Virginia Avenue are located in an area with one active LUST site, two closed LUST sites, a CERCLIS site, several sites with potential environmental conditions, and a known landfill area with methane concerns. Contaminated soil and groundwater may be encountered in this area.

The collector-distributor road south of Alameda Avenue and east of Santa Fe Drive is located adjacent to the Denver Radium CERCLA site (formerly Robinson Brick), which includes the an automobile service facility and the former RTD bus maintenance facility. Within the parking lot of the Home Depot store, heavy metals-impacted soils have been capped and remain in-place on the site. The area north of the Home Depot parking lot and west of the automobile service facility contains an area of consolidated thorium-impacted soils that is demarcated by a

geotextile barrier. These areas may be encountered during installation of the collector-distributor road.

The Santa Fe Drive and Kalamath Street grade separations under the Consolidated Main Line railroad tracks would require soil excavation and potentially encounter contaminated groundwater. Petroleum, polychlorinated biphenyls (PCBs), and lead-contaminated soil are known to be located along the railroad tracks east of the proposed grade separation and may be encountered at the grade separation. (Information about groundwater in the area is limited, however it may be contaminated.)

4.13.2.3 SYSTEM ALTERNATIVE 1

System Alternative 1 would involve the relocation of 25 businesses. An asbestos survey was not conducted of structures to be demolished following right-of-way acquisition. Asbestos is a worker and public safety concern.

Of the properties to be partially or completely acquired for System Alternative 1 right-of-way, 14 properties have potential or recognized environmental conditions (see **Table 4.13-2)**. Additional property-specific information on potential and recognized environmental conditions is included in the MESA report (FHU, 2004j).

As part of System Alternative 1, Decatur Street would extend north from US 6 to 7th Avenue. Decatur Street is located east of the Denver Public Schools Service Building and Denver Public Schools Hilltop Bus Terminal. Although no spills or leaks were reported at this facility, site conditions are unknown and potential environmental conditions may exist due to the number of USTs at the site and unknown hazardous materials storage and handling practices.

Additional hazardous waste impacts of System Alternative 1 are also common to System Alternatives 2, 3, and the Preferred Alternative and are discussed in **Section 4.13.2.2**.

Table 4.13-2 Recommendations for Additional Assessment / Investigation – System Alternative 1

Type of Environmental Condition	Address	Full or Partial Purchase	Environmental Conditions	Recommendations			Comments
				ISA[1]	PSI[2]	RI/FS[3]	
Recognized	1001 W. Bayaud Avenue	Full	Light industrial/commercial building. FINDS. RCRA Small Quantity Generator-violations reported. Landfill. Unknown use or contents. Former location of the Crauel Manufacturing and Vinegar Co./Leo Vinegar & Sales Co. Unknown site conditions. Located adjacent to the Consolidated Main Line railroad.	X	X		Located in area of former Lake Archer canal.
Potential	135 S. Kalamath St.	Full	Light industrial/commercial building. ERNS. Located in area of former Lake Archer canal and potential landfill.	X	X		
Potential	101 to 125 S. Kalamath Street	Full	Commercial/retail center with tenants ranging from interior design to printing services. Located in area of former Lake Archer canal and potential landfill.	X	X		
Potential	501 Raritan Way	Partial	Commercial building. USTs permanently closed at property. No leaks or spills reported. Unknown site conditions.	X			
Recognized	755 S. Broadway	Partial	Automotive repair and supply facility. Former United Engineers & Contractors and 723 Co. LUST. Residual petroleum impacted soil on site.	X	X		Additional investigation may be necessary for right-of-way acquisition.
Recognized	350 S. Santa Fe Drive	Partial	Vacant lot (former RTD Alameda facility). FINDS. RCRA Small Quantity Generator-no violations reported. UST. AST. LUST. Residual petroleum soil and groundwater contamination may be present.	X	X		
Recognized	919 W. Alameda Avenue	Partial	Former gas station. Historic gasoline filling station. FINDS. RCRA Conditionally Exempt Small Quantity Generator-no violations reported. UST. LUST. Known petroleum contaminated soil and groundwater on the property.	X	X		This site is an active LUST. Coordination with OPS would be required.

Table 4.13-2 Recommendations for Additional Assessment / Investigation – System Alternative 1 *(continued)*

Type of Environmental Condition	Address	Full or Partial Purchase	Environmental Conditions	Recommendations			Comments
				ISA[1]	PSI[2]	RI/FS[3]	
Recognized	950 W. Alameda Avenue	Partial	Restaurant (former Chevron gas station). LUST. Known petroleum contaminated soil and groundwater on the property.	X	X		This site is an active LUST. Coordination with OPS would be required.
Potential	215 S. Santa Fe Drive	Full	Fenced yard with a variety of vehicles, heavy equipment, and materials stored. No leaks or spills reported. Unknown site conditions.	X			Additional investigation may be necessary for right-of-way acquisition.
Potential	268 S. Santa Fe Drive	Partial	Automotive repair and supply facility. FINDS. No leaks or spills reported. Unknown material handling and disposal practices.	X			Additional investigation may be necessary for right-of-way acquisition.
Potential	39 to 57 S. Kalamath Street	Full	Vacant Lot. Former Tetrault Iron Works Co. Unknown site conditions.	X			
Potential	438 Federal Blvd.	Partial	Gas station. UST. Unknown site conditions.	X			
Recognized	450 Federal Blvd.	Partial	Automotive repair and supply facility. Former gas station. UST. LUST. Known petroleum impact soil and groundwater.	X	X		This site is an active LUST. Coordination with OPS would be required.
Potential	2800/2929 W. 7th Ave.	Partial	Denver Public Schools Hilltop Bus Terminal. USTs. No leaks or spills reported. Unknown material handling and disposal practices.	X			Additional investigation may be necessary for right-of-way acquisition.

Source: FHU, 2004j

[1] Initial site assessment (ISA) recommended.

[2] Preliminary site investigation (PSI) recommended.

[3] Remedial investigation/feasibility study (RI/FS) recommended.

AST – aboveground storage tank
ERNS – Emergency Response Notification System
FINDS – facility index system
LUST – leaking underground storage tank
OPS – Colorado Department of Labor and Employment Division of Oil and Public Safety
RCRA – Resource Conservation and Recovery Act
UST – underground storage tank

4.13.2.4 SYSTEM ALTERNATIVE 2

System Alternative 2 involves the relocation of 51 businesses. An asbestos survey was not conducted of structures to be demolished following right-of-way acquisition. Asbestos is a worker and public safety concern.

Of the properties to be partially or completely acquired for System Alternative 2 right-of-way, 19 properties have potential or recognized environmental conditions (see **Table 4.13-3)**. Additional property-specific information on potential and recognized environmental conditions is included in the MESA report (FHU, 2005h).

It is anticipated that soil and groundwater contaminated with solvents and petroleum would be encountered during construction of the tunnel from southbound Broadway to southbound I-25. This area is the focus of an on-going groundwater clean up action. The base of the tunnel is at or near the expected depth of groundwater in the area. Contaminated groundwater impacting the tunnel would be a long-term concern.

The Consolidated Maine Line railroad bridge and several associated structures over Alameda Avenue would be replaced as part of System Alternative 2. A lead-based paint survey was not conducted for these structures. Given the age of these structures, lead-based paint may be present. Lead-based paint is a worker and public safety concern.

Additional hazardous waste impacts to System Alternative 2 are also common to System Alternatives 1, 3, and the Preferred Alternative and are discussed in **Section 4.13.2.2**.

Table 4.13-3 Recommendations for Additional Assessment / Investigation – System Alternative 2

Type of Environmental Condition	Address	Full or Partial Purchase	Environmental Conditions	Recommendations			Comments
				ISA[1]	PSI[2]	RI/FS[3]	
Recognized	1001 W. Bayaud Ave.	Full	Light industrial/commercial building. FINDS. RCRA Small Quantity Generator-violations reported. Landfill. Unknown site conditions. Former location of the Crauel Manufacturing and Vinegar Co./Leo Vinegar & Sales Co. Unknown site conditions. Located adjacent to the Consolidated Main Line railroad.	X	X		Located in area of former Lake Archer canal.
Potential	101 to 125 S. Kalamath St.	Full	Commercial/retail center with tenants ranging from interior design to printing services. Located in area of former Lake Archer canal and potential landfill.	X	X		
Potential	135 S. Kalamath St.	Full	Light industrial/commercial building. ERNS. Located in area of former Lake Archer canal and potential landfill.	X	X		
Potential	501 Raritan Way	Partial	Commercial building. USTs. Unknown site conditions.	X			
Recognized	755 S. Broadway	Partial	Automotive repair and supply facility. Former United Engineers & Contractors and 723 Co. LUST. Residual petroleum impacted soil on site.	X	X		Additional investigation may be necessary for right-of-way acquisition.
Recognized	350 S. Santa Fe Drive	Partial	Vacant lot (former RTD Alameda facility) FINDS. RCRA Small Quantity Generator-no violations reported. UST. AST. LUST. Residual petroleum soil and groundwater contamination may be present.	X	X		
Recognized	500 S. Santa Fe Drive	Partial	Retail center. CERCLA. FINDS. RCRA Small Quantity Generator-no violations reported. UST. LUST. Known heavy metal and radionuclide contaminated soil and groundwater.	X	X		Coordination with CDPHE would be required.
Potential	600 S. Santa Fe Drive	Partial	Manufacturing facility. USTs. No leaks or spills reported. Unknown material handling and disposal practices.	X			
Recognized	698 S. Santa Fe Drive	Partial	Former manufacturers of acetylene gas. FINDS. RCRA Small Quantity Generator. UST. LUST. Unknown site conditions.	X			

Table 4.13-3 Recommendations for Additional Assessment / Investigation – System Alternative 2 (continued)

Type of Environmental Condition	Address	Full or Partial Purchase	Environmental Conditions	Recommendations			Comments
				ISA[1]	PSI[2]	RI/FS[3]	
Recognized	330 S. Kalamath Street	Full	Gas station. (former Total Petroleum gas station). FINDS. UST. LUST. Known petroleum contaminated soil and groundwater on the property.	X	X		This site is an active LUST. Coordination with OPS would be required.
Potential	920 W. Byers	Full	Warehouse. Former location of Shamrock Industrial laundry and dry cleaning.	X	X		
Recognized	919 W. Alameda Avenue	Full	Former Amoco gas station. Historic gasoline filling station. FINDS. RCRA Conditionally Exempt Small Quantity Generator-no violations reported. UST. LUST. Known petroleum contaminated soil and groundwater on the property.	X	X		This site is an active LUST. Coordination with OPS would be required.
Recognized	950 W. Alameda Avenue	Full	Restaurant. (former Chevron gas station). LUST. Known petroleum contaminated soil and groundwater on the property.	X	X		This site is an active LUST. Coordination with OPS would be required.
Potential	268 S. Santa Fe Drive	Full	Automotive repair and service facility. FINDS. No leaks or spills reported. Unknown material handling and disposal practices.	X			Additional investigation may be necessary for right-of-way acquisition.
Potential	280 S. Santa Fe Drive	Full	Construction supply Former location of Six Star Lubricants. Unknown site conditions.	X			
Recognized	301 S. Cherokee St.	Partial	Pharmaceutical company. FINDS. RCRA – Large quantity generator. UST. ERNS. Unknown site conditions.	X			
Potential	215 S. Santa Fe Drive	Full	Fenced yard with a variety of vehicles, heavy equipment, and materials stored. No leaks or spills reported. Unknown site conditions.	X			Additional investigation may be necessary for right-of-way acquisition.
Potential	39 to 57 S. Kalamath St.	Full	Vacant Lot .Former Tetrault Iron Works Co. Unknown site conditions.	X			
Recognized	450 S. Federal Blvd.	Partial	Automotive repair and supply facility. Former gas station. UST. LUST. Known petroleum impact soil and groundwater.	X	X		This site is an active LUST. Coordination with OPS would be required.

Source: FHU, 2004j

[1] Initial site assessment (ISA) recommended
[2] Preliminary site investigation (PSI) recommended
[3] Remedial investigation/feasibility study (RI/FS) recommended
AST – aboveground storage tank
CDPHE – Colorado Department of Public Health & Environment
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
ERNS – Emergency Response Notification System
FINDS – facility index system
LUST – leaking underground storage tank
OPS – Colorado Department of Labor and Employment Division of Oil and Public Safety
RCRA – Resource Conservation and Recovery Act
UST – underground storage tank

4.13.2.5 SYSTEM ALTERNATIVE 3

System Alternative 3 involves the relocation of 38 businesses. An asbestos survey was not conducted of structures to be demolished following right-of-way acquisition. Asbestos is a worker and public safety concern.

Of the properties to be partially or completely acquired for System Alternative 3 right-of-way, 13 properties have potential or recognized environmental conditions, as shown in **Table 4.13-4**. Additional property specific information on potential and recognized environmental conditions is included in the MESA report (FHU, 2005h).

The Consolidated Main Line railroad bridge and several associated structures over Alameda Avenue would be replaced as part of System Alternative 3. A lead-based paint survey was not conducted for these structures. Given the age of these structures, lead-based paint may be present. Lead-based paint is a worker and public safety concern.

Along Santa Fe Drive and Kalamath Street near Alameda Avenue is the Denver Radium CERCLA site (formerly Robinson Brick), one closed LUST site, three active LUST sites, a RCRA large-quantity generator, and several ERNS sites. Soil south of Alameda Avenue is known to be contaminated with petroleum products and arsenic, lead, and zinc. Groundwater in the vicinity of the Kalamath Street and Santa Fe Drive intersections with Alameda Avenue is known to be contaminated with benzene, ethylbenzene, toluene, xylenes, cadmium, manganese, uranium, zinc, and radionuclides. Contaminated soil and groundwater would be encountered during construction. The base of the grade separation is at or near the expected depth of groundwater in the area.

Additional hazardous waste impacts associated with System Alternative 3 are common to System Alternatives 1, 2, and the Preferred Alternative and are discussed in **Section 4.13.2.2**.

Table 4.13-4 Recommendations for Additional Assessment / Investigation – System Alternative 3

Type of Environmental Condition	Address	Full or Partial Purchase	Environmental Conditions	Recommendations			Comments
				ISA[1]	PSI[2]	RI/FS[3]	
Recognized	1001 W. Bayaud Ave.	Full	Light industrial/commercial building. FINDS. RCRA Small Quantity Generator-violations reported. Landfill. Unknown site conditions. Former location of the Crauel Manufacturing and Vinegar Co./Leo Vinegar & Sales Co. Unknown site conditions. Located adjacent to the Consolidated Main Line railroad.	X	X		Located in area of former Lake Archer canal.
Potential	101 to 125 S. Kalamath St.	Full	Commercial/retail center with tenants ranging from interior design to printing services. Located in area of former Lake Archer canal and potential landfill.	X	X		
Potential	135 S. Kalamath St.	Full	Light industrial/commercial building. ERNS. Located in area of former Lake Archer canal and potential landfill.	X	X		
Potential	501 Raritan Way	Partial	Commercial building. USTs. Unknown site conditions.	X			
Recognized	755 S. Broadway	Partial	Automotive repair and service facility. Former United Engineers & Contractors and 723 Co. LUST. Residual petroleum impacted soil on site.	X	X		Additional investigation may be necessary for right-of-way acquisition.
Recognized	350 S. Santa Fe Drive	Partial	Vacant lot (former RTD Alameda facility). FINDS. RCRA Small Quantity Generator-no violations reported. UST. AST. LUST. Residual petroleum soil and groundwater contamination may be present.	X	X		
Recognized	330 S. Kalamath Street	Full	Gas station (former Total Petroleum gas station) FINDS. UST. LUST. Known petroleum contaminated soil and groundwater on the property.	X	X		This site is an active LUST. Coordination with OPS would be required.
Potential	280 S. Santa Fe Drive	Full	Construction supply. Former location of Six Star Lubricants. Unknown site conditions.	X			

Table 4.13-4 Recommendations for Additional Assessment / Investigation – System Alternative 3 *(continued)*

Type of Environmental Condition	Address	Full or Partial Purchase	Environmental Conditions	Recommendations			Comments
				ISA[1]	PSI[2]	RI/FS[3]	
Potential	215 S. Santa Fe Drive	Full	Fenced yard with a variety of vehicles, heavy equipment, and materials stored. No leaks or spills reported. Unknown site conditions.	X			Additional investigation may be necessary for right-of-way acquisition.
Potential	268 S. Santa Fe Drive	Full	Automotive repair and service facility. FINDS. No leaks or spills reported. Unknown material handling and disposal practices.	X			Additional investigation may be necessary for right-of-way acquisition.
Potential	39 to 57 S. Kalamath St.	Full	Vacant Lot. Former Tetrault Iron Works Co. Unknown site conditions.	X			
Potential	438 S. Federal Blvd.	Partial	Gas station. UST. Unknown site conditions.	X			
Recognized	450 S. Federal Blvd.	Partial	UST. LUST. Known petroleum impact soil and groundwater.	X	X		This site is an active LUST. Coordination with OPS would be required.

Source: FHU, 2004j

[1] Initial site assessment (ISA) recommended.

[2] Preliminary site investigation (PSI) recommended.

[3] Remedial investigation/feasibility study (RI/FS) recommended.

AST – aboveground storage tank
FINDS – facility index system
RCRA – Resource Conservation and Recovery Act
UST – underground storage tank
ERNS – Emergency Response Notification System
LUST – leaking underground storage tank
OPS – Colorado Department of Labor and Employment Division of Oil and Public Safety

4.13.2.6 PREFERRED ALTERNATIVE

Of the properties to be partially or completely acquired for Preferred Alternative right-of-way, thirteen properties have potential or recognized environmental conditions, as shown in **Table 4.13-4**. Additional property specific information on potential and recognized environmental conditions is included in the MESA report (FHU, 2005h).

An asbestos survey was not conducted of structures to be demolished following right-of-way acquisition. Given the age of structures in the area, asbestos may be present. Asbestos is a worker and public safety concern.

The Federal Boulevard bridge over I-25 and the Alameda Avenue bridge over the South Platte River would be replaced as part of the Preferred Alternative. A lead-based paint survey was not conducted for these structures. Given the age of these structures, lead-based paint may be present. Lead-based paint is a worker and public safety concern.

Additional hazardous waste impacts associated with the Preferred Alternative that are common to System Alternatives 1, 2, and 3 are discussed in **Section 4.13.2.2**.

Table 4.13-5 Recommendations for Additional Assessment / Investigation – Preferred Alternative

Type of Environmental Condition	Address	Full or Partial Purchase	Environmental Conditions	Recommendations			Comments
				ISA[1]	PSI[2]	RI/FS[3]	
Recognized	1001 W. Bayaud Avenue	Full	Light industrial/commercial building. FINDS. RCRA Small Quantity Generator-violations reported. Landfill. Unknown use or contents. Former location of the Crauel Manufacturing and Vinegar Co./Leo Vinegar & Sales Co. Unknown site conditions. Located adjacent to the Consolidated Main Line railroad. Located in area of former Lake Archer canal.	X	X		
Potential	135 S. Kalamath St.	Full	Light industrial/commercial building. ERNS. Located in area of former Lake Archer canal and potential landfill.	X	X		
Potential	101 to 125 S. Kalamath St.	Full	Commercial/retail center with tenants ranging from interior design to printing services. Located in area of former Lake Archer canal and potential landfill.	X	X		
Potential	215 S. Santa Fe Drive	Full	Fenced yard with a variety of vehicles, heavy equipment, and materials stored. No leaks or spills reported. Unknown site conditions.	X			Additional investigation may be necessary for right-of-way acquisition.
Potential	39 to 57 S. Kalamath Street	Full	Vacant Lot. Former Tetrault Iron Works Co. Unknown site conditions.	X			Additional investigation may be necessary for right-of-way acquisition.
Potential	501 Raritan Way	Partial	Commercial building. USTs permanently closed at property. No leaks or spills reported. Unknown site conditions.	X			
Recognized	755 S. Broadway	Partial	Automotive repair and service facility. Former United Engineers & Contractors and 723 Co. LUST. Residual petroleum impacted soil on site.	X			

Table 4.13-5 Recommendations for Additional Assessment / Investigation – Preferred Alternative (continued)

Type of Environmental Condition	Address	Full or Partial Purchase	Environmental Conditions	Recommendations			Comments
				ISA[1]	PSI[2]	RI/FS[3]	
Recognized	350 S. Santa Fe Drive	Partial	Vacant lot (former RTD Alameda facility). FINDS. RCRA Small Quantity Generator-no violations reported. UST. AST. LUST. Residual petroleum soil and groundwater contamination may be present.	X			
Recognized	500 S. Santa Fe Drive	Partial	Retail center. CERCLA. FINDS. RCRA Small Quantity Generator-no violations reported. UST. LUST. Known heavy metal and radionuclide contaminated soil and groundwater.	X	X		Coordination with CDPHE would be required.
Recognized	919 W. Alameda Avenue	Partial	Former Amoco gas station. Historic gasoline filling station. FINDS. RCRA Conditionally Exempt Small Quantity Generator-no violations reported. UST. LUST. Known petroleum contaminated soil and groundwater on the property.	X	X		This site is an active LUST. Coordination with OPS would be required.
Recognized	950 W. Alameda Avenue	Partial	Restaurant (former Chevron gas station). LUST. Known petroleum contaminated soil and groundwater on the property.	X	X		This site is an active LUST. Coordination with OPS would be required.
Potential	268 S. Santa Fe Drive	Partial	Automotive repair and service facility. FINDS. No leaks or spills reported. Unknown material handling and disposal practices.	X			Additional investigation may be necessary for right-of-way acquisition.
Recognized	450 S. Federal Blvd.	Partial	Automotive repair and supply facility. Former gas station. UST. LUST. Known petroleum impact soil and groundwater.	X	X		This site is an active LUST. Coordination with OPS would be required.

Source: FHU, 2004j

[1] Initial site assessment (ISA) recommended.

[2] Preliminary site investigation (PSI) recommended.

[3] Remedial investigation/feasibility study (RI/FS) recommended.

AST – aboveground storage tank
FINDS – facility index system
RCRA – Resource Conservation and Recovery Act
UST – underground storage tank
ERNS – Emergency Response Notification System
LUST – leaking underground storage tank
OPS – Colorado Department of Labor and Employment Division of Oil and Public Safety

4.13.3 Mitigation Measures

The project is located in an area with a long history of industrial and commercial land use. Although scattered residences are located throughout the area, historic industrial and commercial processes have influenced the project area. Soil and groundwater contamination may be present throughout the project area. Encountering soil and groundwater during construction without prior knowledge can affect the project in terms of cost, schedule, and agency and public relations. In addition, the acquisition of properties with contaminated soil and groundwater by CDOT for right-of-way can lead to liability concerns related to remediation of those properties. The following sections discuss the recommended avoidance, minimization, and mitigation measures for System Alternatives 1, 2, 3, and the Preferred Alternative.

4.13.3.1 No Action Alternative

No mitigation measures are necessary, since the No Action Alternative would result in no impacts to or from sites with recognized or potential environmental conditions .

4.13.3.2 Mitigation Measures Common to System Alternatives 1, 2, 3, and the Preferred Alternative

This section discusses mitigation measures for hazardous waste impacts common to each of System Alternatives 1, 2, 3, and the Preferred Alternative.

Right-of-Way Acquisition

The process for identifying, evaluating, and mitigating hazardous waste during right-of-way acquisition is identified in Chapter 3 of the *CDOT Right of Way Manual* (CDOT, 2003e). Projects requiring right-of-way or easements follow these guidelines in order to avoid to the greatest extent possible acquisition of contaminated property and ensure protection for employees, workers, and the community prior to, during, and after construction. The right-of-way acquisition process for sites with potential and recognized environmental conditions is a three step process (CDOT, 2003e):

- Initial Site Assessment (ISA): The ISA is similar to a MESA or Phase I Environmental Site Assessment and involves a site reconnaissance, historical land use review, and database search. An ISA is performed on properties that are to be acquired by or dedicated to CDOT.
- Preliminary Site Investigation (PSI): The PSI is an investigation performed on properties with potential environmental conditions. A PSI involves a drilling/sampling and analytical program to determine preliminary information regarding environmental conditions on the property. The objective of the PSI is to assist in the decision-making process regarding the potential liability associated with acquiring a property and to provide information regarding health and safety issues for construction workers and the public.
- Remedial Investigation/Feasibility Study (RI/FS): The RI/FS is a detailed, comprehensive investigation that further delineates the magnitude of contamination on a property. The RI/FS details the mitigation and clean-up strategies and provides cost estimates for the clean-up and mitigation of a contaminated property.

It is important to note that a PSI or RI/FS may be recommended based on the findings of an ISA. Sites where a PSI or RI/FS are expected to be required are identified in **Tables 4.13-2**, **4.13-3**, and **4.13-4.**

Known Soil and Groundwater Contamination

Several areas of known contaminated soil and groundwater are located in the project area:

- Broadway and I-25 interchange
- Santa Fe Drive and Kalamath Street intersections with Alameda Avenue
- Cherokee Street and Alameda Avenue intersection
- Lipan Street and Alameda Avenue intersection
- East of the US 6 and I-25 interchange
- South of US 6 along Bryant Street and Federal Boulevard

In addition, historical landfills and fill areas are located throughout the project area.

A PSI will be conducted along the project corridor prior to final design to identify soil and groundwater contamination that may affect feasibility and final design. The investigation would be focused on areas with known soil and groundwater contamination, as well as areas where little or no information is available on potential environmental conditions related to hazardous waste, such as the area of the Santa Fe Drive and Kalamath Street grade separation with the Consolidated Main Line railroad.

Contaminated Materials Management

A materials handling plan and a health and safety plan, as required by Section 250.03 of the *CDOT Standard Specifications for Road and Bridge Construction* (CDOT, 1999) will be used throughout the project area. The materials handling plan and health and safety plan will be based on the findings of the corridor-wide PSI and any relevant information that is identified during the right-of-way acquisition process.

Prior to demolition of any structures or removal of utility lines, an asbestos and miscellaneous hazardous materials survey will be conducted at each property. Materials abatement will be conducted, as necessary, according to Section 250, Environmental, Health, and Safety Management, of the *CDOT Standard Specifications for Road and Bridge Construction* (CDOT, 1999) and relevant Occupational Safety and Health Administration (OSHA) and other regulatory requirements.

The Santa Fe Drive viaduct and the Alameda Avenue bridges over I-25, US 6 bridge over the South Platte River, and the Consolidated Main Line railroad bridge over Alameda Avenue are potentially coated in lead-based paint. A lead-based paint survey will be performed prior to demolition. If lead or heavy metals-based paint is identified, heavy metals-based paint management as required by Section 250.04 of the *CDOT Standard Specifications for Road and Bridge Construction* (CDOT, 1999), will be performed.

4.13.3.3 SYSTEM ALTERNATIVE 1

This section discusses mitigation measures for hazardous waste impacts associated with System Alternative 1.

Right-of-Way Acquisition

Fourteen properties with potential or recognized environmental conditions will be partially or completely acquired for System Alternative 1 right-of-way. **Table 4.13-2** includes the recommended requirements for right-of-way acquisition. The CDOT right-of-way process is discussed in **Section 4.13.3.2**.

Known Soil and Groundwater Contamination

Three active LUST sites would be acquired for right-of-way for System Alternative 1 (see **Table 4.13-2**). In conjunction with final design, a detailed review of OPS files related to these properties would identify the results of any additional site investigations conducted at these properties, remedial systems or actions installed at the properties, and quarterly monitoring requirements. Prior to acquisition of these properties, coordination with OPS will be required. If site characterization and/or remediation has not been completed, CDOT may be required by OPS to complete these activities after acquisition. The OPS requirements may include:

- Removal of any underground storage tanks
- Excavation and management of petroleum contaminated soil
- Modifications to or redesign of remediation systems
- Replacement of any monitoring wells destroyed during construction
- Long-term groundwater monitoring

During the right-of-way acquisition process, additional properties may require similar actions depending on the results of the ISAs.

4.13.3.4 SYSTEM ALTERNATIVE 2

This section discusses mitigation measures for hazardous waste impacts associated with System Alternative 2.

Right-of-Way Acquisition

Nineteen properties with potential or recognized environmental conditions would be partially or completely acquired for System Alternative 2 right-of-way. **Table 4.13-3** includes recommended requirements for right-of-way acquisition. The CDOT right-of-way process is discussed in **Section 4.13.3.2**.

Known Soil and Groundwater Contamination

System Alternative 2 includes a grade separation of southbound Broadway to southbound I-25, using either a tunnel or flyover. If a tunnel were selected, it would be located in an area of known groundwater contamination and on-going investigation and remediation. Concentrations of benzene and TCE exceeding Colorado groundwater standards have been identified in the area. Groundwater benzene concentrations in bedrock wells ranged from 1.0 parts per billion (ppb) to 17,000 ppb (Cherokee Denver, 2003a). Groundwater TCE concentrations ranged from 2.0 ppb to 52,000 ppb (Cherokee Denver, 2003b; CCD, 2004d). The Colorado Basic Standard for groundwater for both TCE and benzene is 5.0 ppb (CDPHE, 1999).

The Cherokee Denver LLC site is undergoing site characterization, and the site has been divided into operable units. VCUP applications are being prepared for the site, and two operable units have been accepted into the CDPHE VCUP. As part of the VCUP, a remedial action, such as installation of a remediation system, will be conducted on the Cherokee Denver site to manage off-site groundwater contamination. In addition, the TCE contaminated groundwater is being investigated on the east side of Broadway (CCD, 2004d). The U.S. EPA Region 8 Superfund Regional Response Team is also investigating TCE contaminated groundwater in the vicinity of Logan Street and I-25 (CCD, 2004d). Remedial actions have not been identified for these areas.

As shown by the number of investigations being conducted in the area, several sources of TCE are located in the vicinity of the I-25 and Broadway interchange. Depending on these results, additional investigations may be required to determine the feasibility of this alternative. Current investigation/remediation results would be reviewed. The base of the tunnel would be at or below the groundwater table and is expected to encounter contaminated soil and groundwater.

Based on the hazardous waste impacts associated with the tunnel, CDOT would coordinate with EPA, CDPHE, and the City and County of Denver Department of Environmental Health throughout alternative selection and final design. Contaminated groundwater could potentially seep into the tunnel structure. Final design of the tunnel would require a drainage system to ensure groundwater and stormwater do not commingle. Contaminated groundwater would need to be contained, conveyed, and treated before any discharge to surface or groundwater. A Section 402 permit (Clean Water Act/Colorado Discharge Permit System) would be required from the CDPHE Water Quality Control Division in order to discharge treated groundwater. A permit would also be needed to discharge groundwater or stormwater from sumps. Contaminated groundwater would be collected separately and require long-term management. Long-term management would require either an on-site treatment system for discharge into the storm sewer system or collection of the groundwater and management of the contaminated groundwater off-site at a RCRA treatment facility. Discharge of groundwater to a City and County of Denver storm sewer will require a discharge permit from the City and County of Denver Wastewater Management Division. Treatment systems would require routine monitoring and reporting to the CDPHE Water Quality Control Division along with routine operation and maintenance activities.

Construction of the tunnel would require hazardous waste and solid waste management. A site-specific materials handling plan, as required by Section 250.03 of the *CDOT Standard Specifications for Road and Bridge Construction* (CDOT, 1999), would be prepared for construction of the tunnel. A health and safety plan would also be prepared and would need to

address the construction technique and potential hazards to be encountered during construction.

A portion of the Home Depot CERCLA Superfund site would be acquired for right-of-way for System Alternative 2. A remedial action has been implemented for the property, which is Operable Unit 9 of the Denver Radium Superfund site. The parking lot of the Home Depot store caps heavy metal contaminated soils that remain in-place on the site, and an area of consolidated thorium contaminated soils are located north of the Home Depot store.. Heavy metal and radionuclide contaminated groundwater is present on the site and downgradient off the site toward I-25 and the South Platte River. As part of the remedial action, CDPHE conducts annual groundwater and surface water monitoring.

Prior to final design, a detailed file review of the Home Depot site would be conducted. The objective of the file review would be to maximize avoidance of the remedial action and determine any site-specific concerns and design requirements. CDOT would coordinate with CDPHE on final design and any changes to the Home Depot site. In addition, CDOT would assume liability for any changes that affect the remedial action.

Four active LUST sites would be acquired for right-of-way for System Alternative 2 (see **Table 4.13-3**). In conjunction with final design, a detailed review of OPS files related to these properties would identify the results of any additional site investigations conducted at these properties, remedial systems or actions installed at the properties, and quarterly monitoring requirements. Prior to acquisition of these properties, coordination with OPS would be required. If site characterization and/or remediation has not been completed, CDOT may be required by OPS to complete these activities after acquisition. The OPS requirements may include:

- Removal of any underground storage tanks
- Excavation and management of petroleum contaminated soil
- Modifications to or redesign of remediation systems
- Replacement of any monitoring wells destroyed during construction
- Long-term groundwater monitoring

During the right-of-way acquisition process, additional properties may require similar actions depending on the results of the ISA.

4.13.3.5 System Alternative 3

This section discusses mitigation measures for hazardous waste impacts associated with System Alternative 3.

Right-of-Way Acquisition

Thirteen properties with potential or recognized environmental conditions would be partially or completely acquired for System Alternative 3 right-of-way. **Table 4.13-4** includes recommended requirements for right-of-way acquisition. The CDOT right-of-way process is discussed in **Section 4.13.3.2**.

Known Soil and Groundwater Contamination

It is anticipated that groundwater and soil contaminated with petroleum, heavy metals, and radionuclides would be encountered during construction of the grade separation at Alameda Avenue for a combined Santa Fe Drive and Kalamath Street, and contaminated groundwater would be a long-term concern. Three active LUST sites adjacent to the Santa Fe Drive and Kalamath Street and Alameda Avenue intersection. Concentrations of benzene exceeding Colorado groundwater standards have been identified in the area. Benzene concentrations ranging from 17.7 ppb to 390 ppb have been reported in groundwater in the vicinity of the intersection (Higgins & Associates, 2001; Delta, 2003). The Home Depot CERCLA Superfund site is located southeast and upgradient of the area. Elevated concentrations of cadmium, manganese, uranium, zinc, radium 226, radium 228, and gross alpha radionuclides have been reported in groundwater downgradient of the Home Depot CERCLA Superfund site (CDPHE, 2003c).

Prior to final design of the grade separation, a RI/FS would be conducted by CDOT. The objective of the RI/FS would be to identify the vertical and horizontal extent of soil and groundwater contamination along the extent of the grade separation. Based on preliminary design, the base of the grade separation would be at or below the groundwater table and is expected to encounter contaminated soil and groundwater. Based on the hazardous waste impacts associated with the grade separation, CDOT would coordinate with EPA, CDPHE, and the City and County of Denver Department of Environmental Health throughout final design.

Contaminated groundwater could potentially seep into the grade separation structure. Final design of the grade separation would require a drainage system to ensure groundwater and stormwater do not commingle. Contaminated groundwater would need to be contained, conveyed, and treated before any discharge to surface or groundwater. A Section 402 permit (Clean Water Act/Colorado Discharge Permit System) would be required from the CDPHE Water Quality Control Division in order to discharge treated groundwater. A permit would also needed to discharge groundwater or stormwater from sumps. Contaminated groundwater would be collected separately and require long-term management. Long-term management would require either an on-site treatment system for discharge into the storm sewer system or collection of the groundwater and management of the contaminated groundwater off-site at a RCRA treatment facility. Discharge of groundwater to a City and County of Denver storm sewer would require a discharge permit from the City and County of Denver Wastewater Management Division. Treatment systems would require routine monitoring and reporting to the CDPHE Water Quality Control Division along with routine operation and maintenance activities.

Construction of the grade separation would require hazardous waste and solid waste management. A site-specific materials handling plan, as required by Section 250.03 of the *CDOT Standard Specifications for Road and Bridge Construction* (CDOT, 1999), would be prepared. A health and safety plan would also be prepared to address potential hazards to be encountered during construction.

Two active LUST sites would be acquired for right-of-way for System Alternative 3 (See **Table 4.13-3**). In conjunction with final design, a detailed review of OPS files related to these properties would identify the results of any additional site investigations conducted at these properties, remedial systems or actions installed at the properties, and quarterly monitoring requirements. Prior to acquisition of these properties, coordination with OPS would be required.

If site characterization and/or remediation has not been completed, CDOT may be required by OPS to complete these activities after acquisition. The OPS requirements may include:

- Removal of any underground storage tanks
- Excavation and management of petroleum contaminated soil
- Modifications to or redesign of remediation systems
- Replacement of any monitoring wells destroyed during construction
- Long-term groundwater monitoring

During the right-of-way acquisition process, additional properties may require similar actions depending on the results of the Initial Site Assessments.

4.13.3.6 PREFERRED ALTERNATIVE

This section discusses mitigation measures for hazardous waste impacts associated with the Preferred Alternative.

Right-of-Way Acquisition

Thirteen properties with potential or recognized environmental conditions will be partially or completely acquired for Preferred Alternative right-of-way. **Table 4.13-4** includes recommended requirements for right-of-way acquisition. The CDOT right-of-way process is discussed in **Section 4.13.3.2**.

Prior to right-of-way acquisition, the MESA will be updated to reassess sites with potential and recognized environmental conditions.

Known Soil and Groundwater Contamination

Three active LUST sites would be acquired for right-of-way for System Alternative 3 (See **Table 4.13-4**). In conjunction with final design, a detailed review of OPS files related to these properties would identify the results of any additional site investigations conducted at these properties, remedial systems or actions installed at the properties, and quarterly monitoring requirements. Prior to acquisition of these properties, coordination with OPS would be required. If site characterization and/or remediation has not been completed, CDOT may be required by OPS to complete these activities after acquisition. The OPS requirements may include:

- Removal of any underground storage tanks
- Excavation and management of petroleum contaminated soil
- Modifications to or redesign of remediation systems
- Replacement of any monitoring wells destroyed during construction
- Long-term groundwater monitoring

During the right-of-way acquisition process, additional properties may require similar actions depending on the results of the ISA.

TABLE OF CONTENTS

Page

4.14 Soils and Geology 14.4-1

4.14.1 Current Conditions 14.4-1

4.14.2 Consequences of the Alternatives 14.4-4

4.14.3 Mitigation Measures 14.4-6

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4.14 Soils and Geology

This section summarizes existing soils and geologic conditions in the project area and describes consequences of the system alternatives, which include System Alternatives 1, 2, 3, and the Preferred Alternative. Information regarding soils and geology in the project area was collected from available NRCS, USGS and Colorado Geological Survey (CGS) publications, and previous environmental and geotechnical investigations.

4.14.1 Current Conditions

The project corridor is located in an area of broadly rolling topography, with local steepening of the terrain where resistant bedrock units crop out. The area's most significant topographic feature is the broad valley of the South Platte River, which lies 10 to 50 feet below the surrounding surface. Elevations range from 5200 feet along the river near US 6 to 5290 feet along I-25 at Logan Street.

I-25 lies largely in the South Platte River valley, generally close to the east bank of the river except near the southern end of the project area. In the project area, the river valley slopes toward the river at gradients on the order of 1 percent, as well as more gently downstream (generally northward). Approximately 2000 to 2500 feet west of the river the terrain abruptly rises 80 feet or more at gradients from 5 to more than 10 percent. To the east the margin of the river valley, is less clearly defined, as the ground rises irregularly over distances of 2000 feet to more than 4000 feet from the South Platte River.

The project area has been developed over an extended period. Construction of roads and railroads, as well as of industrial, commercial, and residential buildings, has modified the native earth materials with cuts and, locally, several generations of fills. In addition, a segment of the river has been re-aligned. Industrial, commercial, and residential development has resulted in numerous local modifications to the topography including cuts, fills, and installation of retaining walls.

4.14.1.1 Geologic Setting

The project area, which lies within the Denver Basin geologic province, consists largely of a sequence of sedimentary rock formations deposited and preserved in the Denver Basin, a structural depression in north-central Colorado. Underlying the area is the west-central portion of the Denver Basin, a major north-south trending structural depression containing sediments ranging in age from late Pennsylvanian through Quaternary.

In the project area, sedimentary rocks dip eastward at low angles (less than 10 degrees, typically) and are overlain by a variety of surficial deposits including alluvial (stream-laid) sediments deposited by the South Platte River and other streams, eolian (wind-blown) materials, and colluvial (slope-wash) deposits.

Much of I-25 in the project area, particularly at the interchanges, is constructed on artificial fill. This artificial fill is composed of varying amounts of clay, silt, sand, gravel, and other debris including concrete, brick, wood, vegetation, and trash (Lindvall, 1978; Shroba, 1980), ranging in thickness from 5 to 40 feet. There have been many quarry operations adjacent to the river (CGS, 1974a). Because many of the abandoned quarries were later used as landfills, artificial fill

may include debris, trash, and other landfill material. The extent of known fill material is described in **Section 4.13** *Hazardous Waste*.

4.14.1.2 SOILS

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. Generalized soils studies for the Denver metropolitan area have focused on the mapping of soil characteristics as these affect construction activities. Three major soil problems have been identified including swelling of clay-rich soils after extensive watering, settling or consolidation of loess/river clay soils, and the potential for landslides along steep slopes.

Soils with "low-swelling potential" have been mapped within the South Platte River alluvium corridor and extend approximately one-quarter of a mile on either side of the river in the project corridor (CGS, 1974b). West of the river, "high-swelling potential" soils band a broad area of "medium-swelling potential" soils farther west. An area of windblown sand or silt is mapped to the east of the alluvium in the project area. Although this material generally has low-swelling potential, windblown material may be subject to settlement or hydrocompaction problems when water is allowed to saturate the deposits. River clays within the alluvium may also have the potential for settling problems.

4.14.1.3 UNCONSOLIDATED DEPOSITS

Figure 4.8-1, in **Section 4.8** *Paleontology,* illustrates the generalized surficial geology in the project area. Natural alluvial deposits consist of sand, gravel, silt, and clay. Surficial deposits just outside the floodplain generally consist of Quaternary-aged (Pleistocene) loess, consisting of non-striated, clayey sandy silt.

The bedrock is incised by the South Platte River and associated alluvial deposits are present. These range from relatively recent (Post-Piney Creek) materials near the active channel to older deposits (e.g., Piney Creek Alluvium and Broadway Alluvium) at depth and preserved on terraces overlooking the river. The alluvial deposits consist largely of coarse sands and gravels, with local cobbles as well as lenses of clays and silty sands. The thickness of the alluvium overlying bedrock ranges from about 4 feet to more than 50 feet. Although the alluvial deposits are irregularly interbedded, and lateral and vertical changes in material type commonly are abrupt, cobbles and coarse gravels generally will be more common in the deposits immediately overlying the bedrock.

The Quaternary Alluvium is made up of several identified geologic units (see **Figure 4.8-1** in **Section 4.8** *Paleontology*). The Broadway Alluvium (Qb) is composed of light brown, non-calcareous, clean to slightly silty pebbly sand interbedded with sandy silt to silty sand along the South Platte River in central Denver where it forms terraces which are approximately 18 to 30 feet thick. The Piney Creek Alluvium (Qp) consists of light gray to dark grayish-brown, humic, slightly calcareous, sandy silt and clay overlying non-calcareous, clean to silty pebbly sand interbedded with sandy silt with a thickness of approximately 18 to 25 feet along the South Platte River in central Denver. The Post-Piney Creek Alluvium (Qpp) consists of light gray to light brown, non-calcareous, clean to slightly silty pebbly sand interbedded with sandy silt and with a thickness of approximately 3 to 10 feet (Shroba, 1980).

Boreholes drilled west of Broadway during investigations for the I-25/Broadway Viaduct Replacement Project generally encountered clay fill with gravel and dark-colored fill (Ballofet-Entranco, 2001a). A layer of sand and gravel was present in most boreholes with thickness ranging from 5 to 30 feet. Boreholes in the area of I-25/Broadway Avenue encountered sand and gravel with large rounded cobbles. Areas of fill included clayey soil containing gravel, brick, concrete, and asphalt fragments.

4.14.1.4 BEDROCK

The Denver Formation, of late Cretaceous and early Paleocene age, is present beneath alluvial materials and/or fill materials at depths from 10 to 60 feet. The bedrock consists of yellowish-brown to grayish-olive tuffaceous claystones, mudstones, and sandstones interbedded with scattered lenticular conglomerates (Shroba, 1980).

In the Denver metropolitan area, the Denver Formation consists largely of claystones and sandstones interbedded on various scales. The claystones typically are moderately to highly expansive. Siltstones and well-cemented, resistant sandstones are encountered locally, as well as over-consolidated, but uncemented and friable sandstones.

Claystones have comprised the bulk of the Denver Formation materials encountered in test holes drilled for various studies along the alignment (Ground Engineering, 1999). They were moderately to highly plastic and expansive. Sandstones were encountered locally, typically in thin, isolated beds and lenses. Typically the uppermost several feet of bedrock materials were severely weathered.

The deepest top of bedrock encountered during I-25/Broadway viaduct investigations was approximately 28 to 32 feet below ground surface (Ballofet-Entranco, 2001a). Claystone, siltstone, and sandstone bedrock samples corresponded to descriptions of the Denver Formation. Weathered, highly-oxidized claystone/siltstone was generally present at thicknesses ranging from 5 to 10 feet, overlying the more competent Denver Formation claystone/siltstone/sandstone. Denver Formation bedrock in the vicinity has been described in numerous investigations as having various colors and textures such as brown hard sandy silty claystone, tan sandstone, tight gray-blue silty sandstone (the "Denver Blue"), strongly cemented olive-brown clayey sandstone, and gray-olive claystone with iron staining.

4.14.1.5 GROUNDWATER

Within the project area, groundwater is typically encountered at depths ranging from 10 to 30 feet below ground surface, with the shallower depths to groundwater near the South Platte River. The shallow alluvial aquifer varies in character within the project area. The areas of highest transmissivity and thus highest groundwater flow are likely to be in the sand and gravel deposit along the South Platte River. In other locations, the magnitude of groundwater flow within the alluvial aquifer will vary, primarily due to variations in grain size. The general direction of groundwater flow in the alluvial aquifer is expected to be toward or parallel to the South Platte River; however, this is likely to vary locally due to the influence of topography, paleochannels, and other influences. Groundwater movement through the bedrock is dominated by flow through sandstone layers and through fractures. Due to the variability in fracture density and connectivity, groundwater flow through the bedrock is highly variable. However, flow through bedrock is generally substantially less than through the overlying alluvium.

4.14.1.6 ENGINEERING SEISMICITY

Neither site reconnaissance nor review of available geologic maps indicates the presence of active or potentially active faults traversing or immediately adjacent to the project area. Therefore, the likelihood of surface fault rupture at the site is considered to be low.

The closest documented active fault to the site is the Rocky Mountain Arsenal Fault, which is located approximately 11 miles to the northeast (Kirkham and Rogers, 1981). This fault is approximately 15 miles in length, trends generally northwest/southeast and is considered to be a right-lateral, strike-slip fault. The most recent significant seismic movements associated with the fault occurred in the 1960s, generating earthquakes up to magnitude 5.5. Research performed by the USGS concluded that a strong correlation existed between the seismic activity of this fault and pressure injection of liquid waste into a disposal well located at the nearby Rocky Mountain Arsenal (Kirkham and Rogers, 1981). Pressure injection in the disposal well was discontinued in 1966 and only minor seismic activity along the fault has been recorded since. The risk of this fault giving rise to damaging, earthquake-induced ground motions at the alignment is considered to be relatively low given the low previously recorded seismic magnitudes.

The Golden Fault passes about 12 miles to the west of the site. That fault is considered to be potentially active (Kirkham and Rogers, 1981). No measurable displacement across the fault has been detected during the last 100 years. Significant movement across that fault is generally considered to have ended in the Eocene Epoch. Sporadic micro-seismicity near the Golden Fault was recorded in the course of studies performed in the 1980s and early 1990s. The risk of the Golden Fault giving rise to a damaging earthquake during the design life of the proposed structures also is considered low.

4.14.1.7 SLOPE STABILITY

The project area topography is comparatively flat-lying except where modified by construction. The native slopes appear to be generally stable. Neither field observations nor a review of published maps indicate landslide deposits on or adjacent to the project area. No features have been identified that are related to mass-wasting processes associated with steep slopes, such as landslides, slumps, or unusual soil creep. Therefore, the likelihood of project improvements being affected by large scale, unanticipated slope instabilities is considered low.

4.14.2 Consequences of the Alternatives

Based on the information presented above, the primary geologic hazards that could affect the system alternatives, including the Preferred Alternative, are swelling of expansive soils and settling or other effects from artificial fill material due to historic landfills. The consequences of these conditions on the alternatives are summarized below.

4.14.2.1 NO ACTION ALTERNATIVE

The No Action Alternative will not involve new construction. Therefore, this alternative would not be affected by geologic conditions in the project area.

4.14.2.2 SYSTEM ALTERNATIVE 1

Structures and roadways that would be constructed under System Alternative 1 could be impacted by expansive soil and artificial fill material. This alternative has the least amount of excavation and has fewer structures than the other system alternatives. However, roadways and structures will still be substantial and are likely to encounter these hazards.

The largest excavation associated with System Alternative 1 would be the grade separation (underpass) at the crossing of Santa Fe/Kalamath and the Consolidated Main Line railroad. Excavation would also be required to widen the current underpass, which takes I-25 under Alameda Avenue.

4.14.2.3 SYSTEM ALTERNATIVE 2

Structures and roadways that would be constructed under System Alternative 2 could also be impacted by expansive soil and artificial fill material. In addition to the excavation areas required for System Alternative 1, System Alternative 2 would require excavation for a grade separation structure (tunnel) to carry traffic from southbound Broadway to southbound I-25. This system alternative would also require excavation to widen the underpass carrying Alameda Avenue under the Consolidated Main Line and LRT.

4.14.2.4 SYSTEM ALTERNATIVE 3

Structures and roadways that would be constructed under System Alternative 3 could also be impacted by expansive soil and artificial fill material. In addition to the excavation areas required for System Alternative 1, System Alternative 3 would require excavation for a grade separation structure (underpass) to carry traffic on Santa Fe/Kalamath under Alameda Avenue. The base of this structure would be lower than the South Platte River, such that drainage would represent a design challenge. This system alternative would also require excavation to widen the underpass carrying Alameda Avenue under the Consolidated Main Line and LRT.

4.14.2.5 PREFERRED ALTERNATIVE

Structures and roadways that would be constructed under the Preferred Alternative could also be impacted by expansive soil and artificial fill material. The Preferred Alternative has less excavation and has fewer structures than System Alternatives 2, and 3. The Preferred Alternative is similar to System Alternative 1 in terms of excavation but has additional structure construction on US 6 (braided ramp from Federal Blvd. to eastbound US 6).

The largest excavation associated with the Preferred Alternative would be the grade separation (underpass) at the crossing of Santa Fe/Kalamath and the Consolidated Main Line railroad. Excavation would also be required to widen the current underpass, which takes I-25 under Alameda Avenue.

4.14.3 Mitigation Measures

Avoidance of all subsurface hazards is not possible due to the distribution of these conditions throughout the project area and project needs. 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.

TABLE OF CONTENTS

Page

4.15 Energy *4.15-1*
4.15.1 Current Conditions 4.15-1
4.15.2 Consequences of the Alternatives 4.15-1
4.15.3 Mitigation Measures 4.15-4

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4.15 Energy

Energy resources would be affected by the proposed Valley Highway Project in several ways. The primary energy consideration is the use of petroleum and other fuels to power vehicles using and maintaining the corridor's transportation facilities. Other energy considerations include increases in electrical energy use associated with project operational features, such as traffic signals and lights, as well as increased energy use associated with construction activities under each of the system alternatives, which include System Alternative 1, 2, 3, and the Preferred Alternative.

4.15.1 Current Conditions

The project corridor is an existing major transportation facility. Current conditions consist of major limited access highways, the connections of these highways to local streets, and portions of local streets. These facilities are already heavily used and consequently represent a substantial consumer of energy. However, the transportation facilities considered in this EIS represent only a very small portion of the Metro Denver transportation system.

During peak traffic hours, traffic congestion leads to inefficient consumption of energy by vehicles within the project area. In addition, traffic at the Santa Fe Drive/Kalamath Street railroad crossing is idled several times each day by local and through-train traffic, increasing fuel consumption. In contrast, periods when traffic is not congested lead to more efficient energy consumption by vehicles. Transit facilities operated by RTD in the project area provide an alternative transportation mode, reducing commuter's reliance on private vehicles, providing a more efficient use of energy consumption.

The project area includes a number of traffic signals and streetlights. These features represent a relatively minor consumption of electricity in the Denver region and are not a burden on the electrical infrastructure.

4.15.2 Consequences of the Alternatives

4.15.2.1 No Action Alternative

Impacts to energy resources under the No Action Alternative would be similar to impacts occurring under current conditions (see **Section 4.15.1**). The same basic transportation facilities would be available in the corridor. Vehicle miles of travel in the corridor would increase over time, leading to increased traffic congestion. This, in turn, would result in even less efficient fuel use by all vehicles in the project corridor during peak periods. Some planned improvements to corridor roads would be made in the future, but none is expected to significantly reduce traffic congestion during peak periods.

Under the No Action Alternative, traffic at the Santa Fe Drive/Kalamath Street railroad crossing would continue to be delayed several times each day by local and through-train rail traffic.

Because of the lack of changes under this alternative, signal and streetlight requirements are not expected to differ greatly from existing conditions. Since no new construction would occur under this alternative, there would be no construction-related energy impacts.

4.15.2.2 SYSTEM ALTERNATIVE 1

The alignment of many corridor roads under System Alternative 1 would resemble existing roadway conditions, but future traffic congestion would be reduced relative to the No Action Alternative. The number of through lanes on I-25 would be increased and travel time by vehicles in the corridor would be reduced. More vehicles could use the project highways in a given period, but each vehicle would use less fuel than under the No Action Alternative.

Santa Fe Drive and Kalamath Street would pass under the railroad, which would eliminate idling associated with rail traffic. This would represent an improvement in energy use over the No Action Alternative. Other energy use by vehicles on the project streets is not likely to differ greatly from the No Action Alternative.

System Alternative 1 would not produce major 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 to the No Action Alternative. Construction associated with System Alternative 1 would increase energy consumption over the short-term when compared with the No Action Alternative, but this would be balanced by the long-term per-vehicle energy savings in the corridor associated with improved traffic flow under this alternative.

4.15.2.3 SYSTEM ALTERNATIVE 2

In comparison with the No Action Alternative, overall per-vehicle energy consumption during peak traffic periods would be reduced under System Alternative 2 via improved traffic flow. Energy resource impacts under this alternative would be similar to impacts under System Alternative 1. A number of improvements overlap between the system alternatives, so the differences would not be great. For most project highways and streets, System Alternative 2 also would provide similar benefits to those under System Alternative 1.

As under System Alternatives 1 (and 3), Santa Fe Drive and Kalamath Street would pass under the railroad, which would eliminate idling vehicles at the current railroad crossing, resulting in more efficient energy use than compared with the No Action Alternative. In comparison to both System Alternative 1 and the No Action Alternative, this alternative would also reduce energy use at the Alameda Avenue/Santa Fe Drive intersection through construction of an overpass that would eliminate a point of traffic congestion in the area. Other energy use by vehicles on project streets is not likely to differ greatly from that under the No Action Alternative or System Alternative 1, since streets would not be improved under this alternative.

System Alternative 2 would not produce major 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 to those under the No Action Alternative and System Alternative 1. Short-term indirect energy consumption from construction associated with System Alternative 2 would be greater than under System Alternative 1, due to construction of the Alameda Avenue/Santa Fe Drive overpass; however, this consumption would be offset by the long-term per-vehicle energy savings in the corridor from improved traffic flow associated with this improvement.

4.15.2.4 System Alternative 3

Energy resource impacts from System Alternative 3 would be similar to System Alternatives 1 and 2. A number of the improvements overlap between the system alternatives, so the differences would not be great. Overall per-vehicle energy consumption during peak traffic periods would be reduced with System Alternative 3 in comparison to the No Action Alternative, due to improved traffic flow. For most project highways and streets, System Alternative 3 would provide benefits similar to those under System Alternatives 1 and 2.

As under the other system alternatives, Santa Fe Drive and Kalamath Street would pass under the railroad, which would eliminate idling vehicles at the current railroad crossing, representing an energy improvement when compared to the No Action Alternative. In comparison to System Alternative 1, System Alternative 3 would reduce energy use at the Alameda Avenue/Santa Fe Drive intersection through construction of an underpass that would eliminate a point of traffic congestion. Other energy use by vehicles on project streets is not likely to differ greatly from the No Action Alternative or the other system alternatives because the streets would not be improved by System Alternative 3.

System Alternative 3 would not produce major changes in the signal and streetlight features. Some features may be removed or added, but in the aggregate, these features and their energy use should be similar to the No Action Alternative and other system alternatives. Indirect energy consumption due to construction of System Alternative 3 would be greater than System Alternatives 1 and 2 because of the Alameda Avenue/Santa Fe Drive underpass, but this would be offset relative to System Alternative 1 by the per-vehicle energy savings in the corridor if System Alternative 3 is built.

4.15.2.5 Preferred Alternative

Energy resource impacts from the Preferred Alternative would be similar to System Alternatives 1, 2, and 3. The alignment of many corridor roads under the Preferred Alternative would resemble existing roadway conditions, but future traffic congestion would be reduced relative to the No Action Alternative. The number of through lanes on I-25 would be increased and travel time by vehicles in the corridor would be reduced. More vehicles could use the project highways in a given period, but each vehicle would use less fuel than under the No Action Alternative.

Santa Fe Drive and Kalamath Street would pass under the railroad, which would eliminate idling associated with rail traffic. This would represent an improvement in energy use over the No Action Alternative. Other energy use by vehicles on the project streets is not likely to differ greatly from the No Action Alternative.

The Preferred Alternative would not produce major 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 to the No Action Alternative. Construction associated with the Preferred Alternative would increase energy consumption over the short-term when compared with the No Action Alternative, but this would be balanced by the long-term per-vehicle energy savings in the corridor associated with improved traffic flow under this alternative.

4.15.3 Mitigation Measures

The system alternatives, including the Preferred Alternative, would not control the number of drivers accessing a public highway like I-25, but all would be likely to reduce the per-vehicle energy use relative to the No Action Alternative. No significant impacts to energy resources are anticipated under any of the system alternatives; therefore, no mitigation measures are necessary.

A variety of energy-saving measures may be available to minimize energy use under any alternative. 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

Additional mitigation measures may be developed during final design, as appropriate. Additional discussion on sustainable construction and designs is provided in **Section 4.17** *Irreversible and Irretrievable Commitments of Resources*.

TABLE OF CONTENTS

Page

4.16 Relationship Between Local Short-Term Uses of the Human Environment and the Maintenance and Enhancement of Long-Term Productivity.....4.16-1

4.16.1 No Action Alternative 4.16-1

4.16.2 System Alternatives 1, 2, 3, and the Preferred Alternative 4.16-1

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4.16 Relationship Between Local Short-Term Uses of the Human Environment and the Maintenance and Enhancement of Long-Term Productivity

Implementation of any one of the system alternatives would involve short-term uses of the environment to reach the long-term productivity gains and benefits offered by that alternative. These uses and benefits vary between the No Action Alternative and system alternatives, which include System Alternatives 1, 2, 3, and the Preferred Alternative.

4.16.1 No Action Alternative

The No Action Alternative would have no planned short-term uses of the environment because no changes to the project area would be made as part of the Valley Highway Project. It should be noted that selection of the No Action Alternative would lead eventually to replacement of highway infrastructure, and these activities could involve short-term uses similar to the system alternatives. The No Action Alternative also would provide no productivity improvements because the current deficiencies of the project area, as described in **Chapter 1** *Purpose and Need,* would remain. In fact, productivity would be expected to decrease because this alternative would place greater demand of increased traffic on unimproved, over-capacity roads. This alternative would involve the least short-term uses of the environment in the near term, but also would provide the least long-term productivity increases. This alternative would not fulfill the project purpose and need.

4.16.2 System Alternatives 1, 2, 3, and the Preferred Alternative

System Alternatives 1, 2, 3, and the Preferred Alternative would have similar short-term uses and long-term benefits, and so they are discussed together. Each of these alternatives would 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 could 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. Relocations would be permanent for residents and businesses. Portions of some properties could be resold for redevelopment after construction.

These alternatives would rebuild the project corridor in different ways (see **Chapter 2** *Alternatives*) to reach the same general goals of providing some long-term benefits. The overall goals and corridor shortcomings were discussed in **Chapter 1** *Purpose and Need*. 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
- Improving transit access

- 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
- Removing high-volume at-grade railroad crossings

The transportation improvements associated with the system alternatives 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 by the system alternatives, including the Preferred Alternative, are consistent with the maintenance and enhancement of long-term productivity for the local area.

TABLE OF CONTENTS

Page

4.17 Irreversible and Irretrievable Commitments of Resources 4.17-1

4.17.1 Consequences of the Alternatives 4.17-1

4.17.2 Mitigation Measures 4.17-1

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4.17 Irreversible and Irretrievable Commitments of Resources

This section discusses the irreversible and irretrievable commitments of resources associated with the system alternatives, which include System Alternatives 1, 2, 3, and the Preferred Alternative. The resources could be natural, physical, human, or fiscal in nature.

4.17.1 Consequences of the Alternatives

4.17.1.1 No Action Alterntiave

The No Action Alternative would involve no changes to the project area due to the proposed project. Therefore, there is no commitment of additional resources formally proposed for the project. However, physical and financial resources would still be required to maintain the current infrastructure. Over time, these resources could resemble the commitments for the system alternatives because some of the infrastructure would eventually have to be replaced completely.

4.17.1.2 System Alternatives 1, 2, 3, and the Preferred alternative

Implementation of any of the system alternatives, including the Preferred Alternative, would involve a similar commitment of resources. The system alternatives would involve the commitment of a range of natural, physical, human, and fiscal resources.

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 **Section 4.2** *Right-of-Way and Displacements*. 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.

4.17.2 Mitigation Measures

Sustainable construction and designs can mitigate irreversible and irretrievable resource depletion and improve air quality, noise, traffic, and community relations. CDOT's environmental mission statement and environmental policy are identified in the *Environmental Stewardship Guide* (CDOT, 2003d). Each of the system alternatives may affect environmental resources not regulated at the federal, state, or local level. Such impacts could include natural resources, such as fossil fuel, electricity, water, gravel, soil, and ore. In some cases, such impacts can not be quantified and cannot be avoided.

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

TABLE OF CONTENTS

Page

4.18 Construction Impacts 4.18-1
4.18.1 Consequences of the Alternatives 4.18-1
4.18.2 Mitigation Measures 4.18-5

LIST OF TABLES

Page

Table 4.18-1 Summary of Citizen Working Group Recommendations for Construction-Related Mitigation Strategies 4.18-6

4.18 Construction Impacts

This section identifies the impacts that would be expected during the construction phase and identifies mitigation measures to address these impacts. Specific construction methods will be addressed during development of the final construction plans. In general, highway construction would include demolition, bridge construction/widening, excavation and grading, utility relocations and adjustments, retaining wall construction, storm sewer installation, and paving.

Construction sequencing and duration strategies would take into account minimization of construction impacts, as well as other important considerations, such as funding and coordination with local communities.

4.18.1 Consequences of the Alternatives

4.18.1.1 No Action Alternative

The No Action Alternative would involve no additional construction over what is currently programmed, approved, and funded. Therefore, the No Action Alternative would result in no construction or utility impacts.

4.18.1.2 Construction Impacts Common to System Alternatives 1, 2, 3, and the Preferred Alternative

Reconstruction and widening of I-25 and US 6 would present the potential for increased dust, noise, runoff, traffic congestion, restricted access to residences and businesses, and visual intrusions to motorists and residents. It is likely that hazardous materials may be encountered during construction activities based on information gathered during this study (see **Section 4.13** *Hazardous Waste*).

Air Quality

Without mitigation, excavation, grading, and fill activities could increase local fugitive dust emissions. Fugitive dust is airborne particulate matter, generally of a relatively large particle size (greater than 100 microns in diameter). Because of the large size, these particles typically settle within 30 feet of their source. Smaller particles could travel as much as several hundred feet depending on wind speed. Through the use of mitigation measures described later in this section, fugitive dust emissions could be effectively controlled.

Noise

Construction noise would present the potential for short-term impacts to those receptors located along the corridor and along the designated construction access routes. The primary source of construction noise is expected to be diesel-powered equipment, such as trucks and earth moving equipment.

Section 36-6(b)(7) of the Denver code, from the Department of Environmental Health, states that the maximum permissible sound pressure levels specified in the code do not apply to sound emitted from construction equipment operated between the hours of 7:00 a.m. and 9:00 p.m. (City and County of Denver, 1973). However, operation of construction equipment between the

hours of 9:00 p.m. and 7:00 a.m. may not exceed the following maximum sound pressure levels or the ambient sound levels when they are equal to or exceed the noted sound levels, unless a noise variance has been granted, as per Section 3-6(2) specified as follows:

- 50 dB at the property line of a residential premise
- 60 dB at the property line of a commercial premise
- 75 dB at the property line of an industrial premise
- 70 dB anywhere on a public premise

Demolition and pile driving could be the loudest construction operations. Demolition of structures, such as existing bridges, is generally conducted at night because of safety issues requiring full or partial closure of the highway and local streets. Piles could be required at most major bridge installations. Alternative construction methods could replace pile driving in noise sensitive locations. The majority of noise receptors are located greater than 50 feet from areas where pile driving, or other high-noise activities, are expected. Noise impacts are expected to occur only in isolated areas along the project corridor.

Vibration

Vibration caused by construction activities would present the potential for short-term impacts in areas where pile driving and compaction equipment are being used. The potential for building damage from pile driving vibration is estimated to exist only within about 50 feet. Vibration from compaction equipment is less severe. Construction activates in close proximity to buildings (within 50 feet) must be sensitive to vibration damage risks. Details would be developed during subsequent design efforts.

Water Quality

During construction, stormwater runoff would present the potential for violations of water quality standards in adjacent waterways and groundwater. Without mitigation measures, stormwater runoff could cause erosion and sedimentation, and transport of spilled fuels or other hazardous materials. For the most part, this project would parallel and drain into the South Platte River. Groundwater could be encountered during relocation of deep utilities, excavation, and construction of tunnels and below-grade roadways. Dewatering and treatment would probably be required where groundwater is present. Mitigation measures for contaminated groundwater potentially encountered during construction are discussed in **Section 4.13** *Hazardous Waste*.

Traffic Impacts

Construction detours would be expected to create short-term impacts on local traffic circulation and congestion. For this project, these impacts would be substantial. Delays to the traveling public and inconvenience to corridor residents would occur. A primary goal of CDOT during construction of the project would be to minimize inconvenience to the public.

Visual Impacts

Short-term construction-related visual impacts would likely occur as a result of this project. These impacts would include the presence of construction equipment and materials, temporary

barriers, guardrail, detour pavement and signs, temporary shoring and retaining walls, lighting for night construction, and removal of vegetative cover.

4.18.1.3 SPECIFIC CONSTRUCTION IMPACTS OF SYSTEM ALTERNATIVES 1, 2, 3, AND THE PREFERRED ALTERNATIVE

Construction of System Alternatives 1, 2, 3, or the Preferred Alternative would be expected to create short-term impacts throughout the construction period. Descriptions of construction methods and related construction and utility impacts are provided below.

- ***I-25 Mainline –*** Reconstruction of I-25 would require careful planning to maintain traffic flow and ramp connections to existing interchanges during construction. Current concepts envision work progressing from the east to the west with an initial relocation of the railroad and then phased widening with traffic shifts onto new pavement. Construction of the underpass at Alameda Avenue would be integrated with the Alameda Avenue bridge replacement. A longer or/and wider structure here would offer flexibility for traffic diversion and allow larger construction areas. Replacement of the drainage system in this location would be staged to ensure that an operating system remains in place as the new system is constructed. The I-25 bridge over Santa Fe Drive would be constructed as a single structure placed in the “gap” between the existing southbound and northbound I-25 roadway. Ramp closures and detours along local arterial streets would be likely here as the new interchange is phased. The same number of existing lanes would be maintained in each direction on I-25 during construction except during short periods of time when partial closures would be required. These would be staged during periods of low traffic on the system, which would likely occur on nights and weekends. Narrow shoulders and lanes are anticipated.
- ***US 6 –*** Reconstruction of US 6 is complicated by the raised road profile at the South Platte River to provide for improved river flow under the highway. It is envisioned that construction would begin on the north and progress south with traffic shifts on to the new pavement and structures as they are completed. Temporary closure of ramps and detours are anticipated, using Federal Boulevard/Alameda Avenue and 8th Avenue as the principal routes. No detours would be allowed through residential neighborhoods.
- ***Santa Fe Drive Kalamath Street / Railroad Grade Separation –*** Construction of the grade separation at the railroad would require detouring of the arterial streets. For System Alternatives 1, 2, and the Preferred Alternative current phasing concepts anticipate that these detours could occur adjacent to the construction using alternating closure of Kalamath Street and Santa Fe Drive from Ellsworth Avenue to Byers Place with consolidation of two-way traffic on the non-closed street. This would require reconfiguring the at-grade railroad crossing with new gate arms and signals. Key to the success of these options would be constructing new railroad bridges offset from the existing rail in order to avoid detouring the railroad itself during construction. This traffic detour would be implemented in concert with a public information program and advanced notice of roadway closures and recommendations for alternate routes. Maintenance of access to existing businesses during construction would be a challenge requiring negotiations and special directional signing.

System Alternative 3 offers more flexibility in that a single bridge would be constructed between Kalamath Street and Santa Fe Drive for the railroad crossing. This would allow traffic on Kalamath Street and Santa Fe Drive to remain on the existing roads until the structure is completed.

- ***Santa Fe Drive / Kalamath Street / Alameda Avenue –*** Construction of Alameda Avenue would be complex for each alternative under consideration. System Alternative 1 and the Preferred Alternative generally would widen Alameda Avenue while leaving intersections at the same elevations and would be accommodated through the closing and or narrowing of lanes to provide room for construction.

  System Alternatives 2 and 3 would consolidate Santa Fe Drive and Kalamath Street at Alameda Avenue and would grade separate them. Systems Alternative 2 would take Santa Fe Drive/Kalamath Street over Alameda Avenue, while System Alternative 3 would take Santa Fe Drive and Kalamath Street under Alameda Avenue. System Alternative 3 is more complex and would require relocating utilities and constructing substantial drainage structures. This alternative would preserve more businesses than System Alternative 2, which would require access to be maintained through construction. In either case, construction of the bridge would be the first action, followed by utility relocations, storm sewer construction, earthwork, and construction of the new roadway.

  Under System Alternatives 2 and 3, reconstruction of Alameda Avenue between Santa Fe Drive and Cherokee Street would require new bridges for the railroad and the parallel LRT line and retaining walls. These structures would be designated to accommodate the city's plans for future roadway widening of Alameda Avenue and for bicycle/pedestrian facilities. Detouring of Alameda Avenue traffic to Broadway or US 6 would be desirable.

4.18.1.4 UTILITY IMPACTS

The Valley Highway corridor right-of-way is crossed by various utilities, some of which would be relocated during construction. Impacts to existing utilities located within the proposed right-of-way were evaluated based on preliminary utility mapping developed from aerial surveys, base maps collected from individual utility companies, and field reconnaissance. Utilities in the project corridor to be considered during the design process are described below.

Electrical and Cable TV

Approximately 60 electrical and cable lines cross and/or are parallel to the Valley Highway. The majority of these lines would be removed or relocated. System Alternatives 2 and 3 would have the largest impacts to utilities because of the grade separations which would take roadways underground; System Alternative 1 and the Preferred Alternative would have the least amount of impacts.

Communication Cables

Communication cables cross and/or parallel the highway. Many of these communication cables would have to be relocated. Communication cables are often found in the same cluster of conduits as fiber optic lines, which are described later in this section.

Natural Gas

Approximately 20 natural gas pipelines, all owned and operated by Xcel Energy, cross and/or parallel the right-of-way. These pipelines vary from 2 inches to 10 inches in diameter. It is anticipated that many of these pipes would need to be relocated since they are not at ample depth to avoid excavation impacts.

Sanitary Sewer

Sanitary sewer services along the right-of-way are provided by the Metro Wastewater Reclamation District, various special districts, and the City and County of Denver. Approximately 30 crossings have been identified, with pipelines ranging from 8 to 72 inches in diameter. It is anticipated that the majority of these pipes are deep enough to avoid excavation impacts.

Storm Sewer

The project corridor contains several storm sewer drainage systems all generally destined for the South Platte River. Major highway and local street drainage systems collect surface drainage and currently discharge directly into the South Platte River. The I-25 underpass at Alameda Avenue has historically flooded. The system includes inlets, pipes, a sheet pile cofferdam that restricts ground water from inundating the highway, and a pump system that lifts the water from the highway and discharges it to the South Platte River. A study of the drainage systems has been conducted through this EIS; results of this study are summarized in the *Water Resources Report* (FHU and Muller Engineering, 2005g) prepared as part of the EIS process. Further discussion of the disposition of the storm sewer system is provided in **Section 4.9** *Water Resources*.

Water Lines

Approximately 20 water lines cross the right-of-way. Relocation would be required for a majority of these pipelines.

Fiber Optic Lines

Approximately 10 fiber optic lines cross and/or parallel the right-of-way. A majority of these lines would need to be relocated. Many of the fiber optic lines cross the highway through the overpass and underpass bridge crossings of I-25 and US 6. They would be accommodated with replacement bridges.

Utility impacts would generally occur within the construction time frame for the project.

4.18.2 Mitigation Measures

4.18.2.1 CONSTRUCTION MITIGATION

The Construction Citizen Working Group met twice during the EIS process to discuss construction-related impacts, identify those parties most likely to be impacted, and to identify possible mitigation measures. A summary of the Citizen Working Group activities is included in **Chapter 6** *Public Involvement.* **Table 4.18-1** provides a summary of their recommendations

regarding mitigation strategies. Appropriate application of these mitigation strategies will be defined during the final engineering phase of this project. Additional mitigation measures may be developed during final design, as appropriate. Additional discussion on sustainable construction and designs is provided in **Section 4.17** *Irreversible and Irretrievable Commitments of Resources.*

4.18.2.2 UTILITY MITIGATION

Mitigation of utility impacts would begin with a confirmation of the location of the utility through further records research, meetings with the specific utility, and field investigations. Relocations, adjustments, or modifications to utilities would be integrated into schedules and budgets as appropriate to avoid disruption of customer service and to ensure that construction can proceed with limited interruption.

Table 4.18-1 Summary of Citizen Working Group Recommendations for Construction-Related Mitigation Strategies

Impact	Most Likely Impacted	Recommended Mitigation Strategies
Noise	• Local residents and businesses	• Implement construction best management practices • Use temporary noise walls / screens • Make available hotel vouchers • Schedule construction during less noise-sensitive times • Create a Noise Hotline manned by an actual troubleshooter • Send information to affected public before construction • Note that there are seasonal differences relative to noise • Email/voice mail affected public before construction activities • Use noise blankets on equipment and quiet-use generators • Combine noisy operations to occur in the same time period • Use alternative construction methods such as sonic or vibratory pile-driving in sensitive areas, when possible
Access	• Local residents and businesses • Traveling public	• Use enhanced signing • Use alternate access enhancements • Use advertising / public relations • Do not close multiple interchanges concurrently
Traffic • Detours • Lane closures • Congestion • Parking impacts • Construction vehicles on local streets • Safety of lane shifts	• Local residents and businesses • Traveling public	• Limit detours • Place detours on major arterial streets and ensure no local street detours are implemented • Schedule construction during periods of least traffic • Use geometric enhancements including wider lanes and better visibility • Limit construction vehicles to major arterials • Enforce speed restrictions; provide adequate space for enforcement on I-25; make prime contractor accountable • Use Courtesy Patrol • Use enhanced signing • Phase construction to limit traffic in neighborhoods

Table 4.18-1 Summary of Citizen Working Group Recommendations for Construction-Related Mitigation Strategies (continued)

Impact	Most Likely Impacted	Recommended Mitigation Strategies
Traffic (Continued)		• Comply with American Association of State Highway and Transportation Officials guidance and *Manual on Uniform Traffic Control Devices* • Coordinate work activities to ensure they do not coincide with sporting or entertainment events • Implement advanced traffic diversion (470 Beltway, Colfax as an alternate to 6th Avenue) • Use intelligent management systems and variable message signs to advise / redirect traffic • Work with Regional Transportation District to offer enhanced operations during peak construction • Develop traffic management plans • Maintain access to local businesses / residents • Coordinate with emergency service providers to minimize delay and ensure access to properties
Modified Pedestrian / Bike Mobility	• Local residents • Commuters	• Provide well defined detours for pedestrians/bicyclists • Enhance safety through the use of adequate signing, fencing, and lighting • Implement a public relations program • Comply with American Disability Act requirements • Construct Bayaud Avenue bike / pedestrian overpass as a detour before Alameda Avenue construction
Environmental Impacts • Dust / Air quality • Hazardous waste • Water quality • Resource use/ Recycling material	• Construction workers • Downstream water users • Local residents and businesses	• Use wetting / chemical inhibitors for dust control • Provide early investigation of subsurface conditions • Prepare a well-defined materials handling plan • Employ educated contractor with trained personnel • Require prompt and safe disposal of waste products • Implement water quality best management practices • Prepare well-defined stormwater management plan • Conduct monitoring • Institute resource reuse and allocation • Ensure regulatory compliance • Cover trucks hauling soil and other materials • Stabilize and cover stockpile areas • Minimize off-site tracking of mud and debris by washing construction equipment in contained areas and via temporary access stabilization • Avoid impacts to wetlands or other areas of important habitat value in addition to those impacted by the project itself • Control and prevent concrete washout and construction wastewater. As projects are designed, ensure that proper specifications are adhered to and reviewed to ensure adequacy in the prevention of water pollution by concrete washout • Store equipment and materials in designated areas only • Promptly remove any unused detour pavement or signs • Follow Sections 107.25 and 208 of *CDOT Standard Specifications for Road and Bridge Construction* (CDOT, 1999)

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TABLE OF CONTENTS

Page

4.19 Permits Required.....4.19-1

LIST OF TABLES

Page

Table 4.19-1 Summary of Permits and Approvals 4.19-1

4.19 Permits Required

Permits and approvals for the construction of System Alternative 1, 2, 3, or the Preferred Alternative are summarized in **Table 4.19-1**. Additional permits may be required in concert with activities such as:

- Erosion control/grading
- Utility access, relocation, or surveying
- Construction, slope, and utility easements
- Access and authorizations

Table 4.19-1 Summary of Permits and Approvals

Agency	Regulated Activity	Permit/Approval
U.S. Army Corps of Engineers	Impacts to wetlands and Waters of the U.S.	Clean Water Act Section 404 Permit
Federal Emergency Management Agency	Floodplain encroachment	Conditional Letter of Map Revision; Letter of Map Revision
US Fish and Wildlife Service	Impacts to threatened and endangered species	Endangered Species Act Section 7 Incidental Take Permit
US Fish and Wildlife Service	Impacts to raptors nesting in area	Depredation Permit
Colorado Department of Public Health and Environment – Water Quality Control Division	Impacts to water quality	Clean Water Act Section 401 Certification
Colorado Department of Public Health and Environment – Water Quality Control Division	Stormwater discharges	National Pollutant Discharge Elimination System (NPDES) Stormwater General Permit for Construction Activities Stormwater Management Plan
Colorado Department of Public Health and Environment – Water Quality Control Division	Dewatering of construction areas	Clean Water Act Section 402 Permit
Colorado Department of Public Health and Environment – Hazardous Materials and Waste Management Division	Classification of construction waste material and transportation of solid wastes generated	May require facility approval
Colorado Department of Public Health and Environment – Hazardous Materials and Waste Management Division	Generation of contaminated materials during construction	Coordination and approval for handling and management plan
Colorado Department of Public Health and Environment – Hazardous Materials and Waste Management Division	Generation of hazardous waste	Notification as RCRA hazardous waste generator
Colorado Department of Health and Environment – Air Pollution Division	Emissions from portable units, such as rock crushers, generators, asphalt plants, and cement plants, used during construction	Air Quality Permit Bridge Demolition Permit

Table 4.19-1 Summary of Permits and Approvals (Continued)

Agency	Regulated Activity	Permit/Approval
Colorado Department of Public Health and Environment – Air Pollution Control Division	Asbestos abatement and building demolition	Asbestos Abatement Permit Demolition Permit
Colorado Department of Public Health and Environment – Air Pollution Control Division	Fugitive dust emissions due to construction activities	Fugitive Dust Permit
Colorado Department of Transportation	Generation of contaminated materials during construction	Development of Materials Handling Plan with approval by the Regional Environmental Planning Manager
Colorado Division of Wildlife	Impacts to stream banks, stream channels, and riparian areas	Senate Bill 40 Certification
Colorado Historical Society Office of Historical Preservation	Impacts to cultural resources	National Historic Preservation Act Section 106 Review
Colorado Public Utilities Commission	Construction of grade-separated railroad crossing	License or Easement
City and County of Denver	Occupancy of right-of-way	Street Occupancy Permit
City and County of Denver	Construction of structures	Construction Permit
City and County of Denver	Traffic control during construction	Construction Access Permits Traffic Control Plan
City and County of Denver	Noise generation during construction	Noise Variance
City and County of Denver	Generation of contaminated materials during construction	Coordination and approval for handling and management plan
City and County of Denver	Discharge of wastewater generated during construction activities to the treatment works (if needed)	Wastewater Discharge Permit
City and County of Denver	Design and construction associated with City-maintained streets, parks, and sewers	Review and approval for design and construction
City and County of Denver Wastewater Management Division	Discharge of groundwater to a City storm sewer	Discharge Permit
City and County of Denver Parks and Recreation Department	Work in dedicated parks including the South Platte River Greenway and Trail	Occupancy Permit
City and County of Denver City Forester	Tree removal	Coordination and approval
City and County of Denver Parks and Recreation Department	Modifications to roadways and utilities	Construction Permit
Union Pacific Railroad and Burlington Northern Santa Fe	Access to and modifications to railroad right-of-way and tracks	License for Environmental Access Temporary Occupancy Permit
Regional Transportation District	Access to and modifications to LRT right-of-way and tracks	Access Agreement and training RTD LRT Operations Permit

TABLE OF CONTENTS

Page

4.20 Cumulative Impacts 4.20-1
4.20.1 Methodology for Assessing Cumulative Impacts 4.20-1
4.20.2 Analysis of Past Development / Land Use Changes 4.20-8
4.20.3 Cumulative Impacts Assessment 4.20-15

LIST OF FIGURES

Page

Figure 4.20-1 Cumulative Impact Study Area 4.20-4
Figure 4.20-2 Land Use – 1956 ..... 4.20-10
Figure 4.20-3 Land Use – 1962 ..... 4.20-11
Figure 4.20-4 Land Use – 1975 ..... 4.20-13
Figure 4.20-5 Land Use – 2002 ..... 4.20-14
Figure 4.20-6 Air Quality Monitoring Data from Nearby Monitoring Stations 4.20-25

LIST OF TABLES

Page

Table 4.20-1 Key Cumulative Impact Resources and Area of Analysis 4.20-3
Table 4.20-2 Current and Future Transportation Projects within the Study Area 4.20-6
Table 4.20-3 Current Local Agency Planning Projects 4.20-7
Table 4.20-4 Current and Future Development Projects within the Study Area 4.20-7
Table 4.20-5 Potential Impacts of Other Projects 4.20-15
Table 4.20-6 Regional Conformity Emissions Results 4.20-24

4.20 Cumulative Impacts

NEPA and its implementing regulations require federal agencies to consider direct, indirect, and cumulative impacts of a proposed federal action. Direct and indirect impacts have been discussed by resource in the preceding sections. This section discusses cumulative impacts that the system alternatives (System Alternatives 1, 2, 3, and the Preferred Alternative), and the No Action Alternative may have on key resources in concert with other actions.

Cumulative impacts may result from the incremental impact of a particular action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts include the total impacts to a particular resource that have occurred in the past, are occurring now, and are likely to occur in the future.

Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. There may be different cumulative impacts on different environmental resources. It is important to note that if a project has no direct or indirect impacts on a particular resource, then it also has no cumulative impacts on that resource.

CEQ and FHWA guidance stress the importance and challenge of analyzing cumulative impacts. Careful consideration during scoping and coordination with other agencies is needed to ensure that the analysis is neither too narrow, such that significant issues are missed, nor too broad, such that the analysis is unwieldy and unfocused.

In addition to providing full disclosure of the impacts of a proposed action, the cumulative impact analysis is intended to ensure that decision makers have adequate information to make an informed decision. This includes FHWA, as well as other federal, state, and local decision makers, such that these decision makers are able to understand the potential relationships between separate actions and make appropriate decisions necessary to achieve desirable outcomes.

4.20.1 Methodology for Assessing Cumulative Impacts

Cumulative impacts result when the effects of an action are added to or interact with effects of other actions in a particular place and within a particular time. It is the combination of these effects, and any resulting environmental degradation, that is the focus of the cumulative impact analysis. While impacts can be differentiated by direct, indirect, and cumulative impacts, the concept of cumulative impacts takes into account all disturbances because cumulative impacts result in the compounding of the effects of all actions over time. The cumulative impacts of an action can be viewed as the total effects on a resource, ecosystem, or human community of that action and all other activities affecting that resource no matter what entity (federal, non-federal, or private) is taking the actions.

Cumulative impact analysis is resource-specific and generally performed for environmental resources directly impacted by a federal action under study, such as a transportation project. However, not all of the resources directly impacted by a project require cumulative impact analysis. Cumulative impact analysis should focus on resources for which the proposed action will have effects similar to other actions in the area and/or resources that have been historically affected by cumulative actions.

Key resources subject to a cumulative impact assessment for the Valley Highway Project have been established through the scoping process and subsequent discussions with other agencies.

4.20.1.1 SCOPING AND COORDINATION WITH OTHER AGENCIES

Detailed project scoping was completed during 2002 for the Valley Highway Project, as summarized in **Chapter 6** *Public Involvement*. Project needs and potential impacts were discussed during the scoping process, and cumulative impact analysis was also considered. Scoping meetings included internal CDOT and FHWA meetings, cooperating/resource agency scoping meetings, and public scoping meetings.

Relative to cumulative impacts, several agencies and individuals raised concern during scoping that there were many transportation projects underway or planned in the Denver metropolitan area, and that coordination was needed. In response, CDOT and RTD have organized a series of monthly corridor coordination meetings between the various project teams to provide communication and coordination between these efforts. The Valley Highway EIS project team has participated in the corridor coordination meetings during the course of this EIS.

Additional coordination and consultation relative to cumulative impacts has included:

- A cumulative impacts planning session between FHWA and CDOT in October 2002
- A follow-up meeting between FHWA and CDOT in July 2003 to confirm the methodology and scope of analysis
- Discussions with the project Technical Working Group in June, July and October 2003, and September 2004
- Information gathering and discussion during various public meetings, Citizen Working Group meetings, and small group meetings

4.20.1.2 KEY RESOURCES AND GEOGRAPHIC AREAS OF ANALYSIS

Key resources to be considered as part of the cumulative impacts assessment were identified on the basis of the direct and indirect impacts of the system alternatives and the potential for impact of other actions on the resources. In addition, a geographic area of analysis has been identified for each key resource, based on the nature of the resource and potential impacts. **Table 4.20-1** identifies key resources and the associated area of analysis for cumulative impacts.

Figure 4.20-1 shows the Cumulative Impacts Study Area identified as appropriate for several of the key resources. The Cumulative Impacts Study Area includes neighborhoods adjacent to and near the project area. In some cases, it is necessary to provide a larger-area focus to the resource, such as the background water quality of the project area, or a smaller area such, as for noise impacts along the highway corridor. These resource-specific areas are indicated in **Table 4.20-1.**

Table 4.20-1 Key Cumulative Impact Resources and Area of Analysis

Resource / Issue	Area of Analysis
Transportation / Traffic	DRCOG Region (Regional Modeling / Planning by DRCOG)
Socio-Economics and Community	Neighborhoods Adjacent to Project (see **Figure 4.20-1**)
Parks and Recreation	Neighborhoods Adjacent to Project (see **Figure 4.20-1**)
Air Quality	DRCOG Region (Conformity Analysis by DRCOG)
Noise	Approximately 500 feet on either side of project
Historic Resources	Neighborhoods Adjacent to Project (see **Figure 4.20-1**)
Water Quality / Water Resources	South Platte River / DRCOG Region
Floodplains	South Platte River / DRCOG Region
Wetlands	Neighborhoods Adjacent to Project (see **Figure 4.20-1**)
Construction	Neighborhoods Adjacent to Project (see **Figure 4.20-1**)

DRCOG – Denver Regional Council of Governments

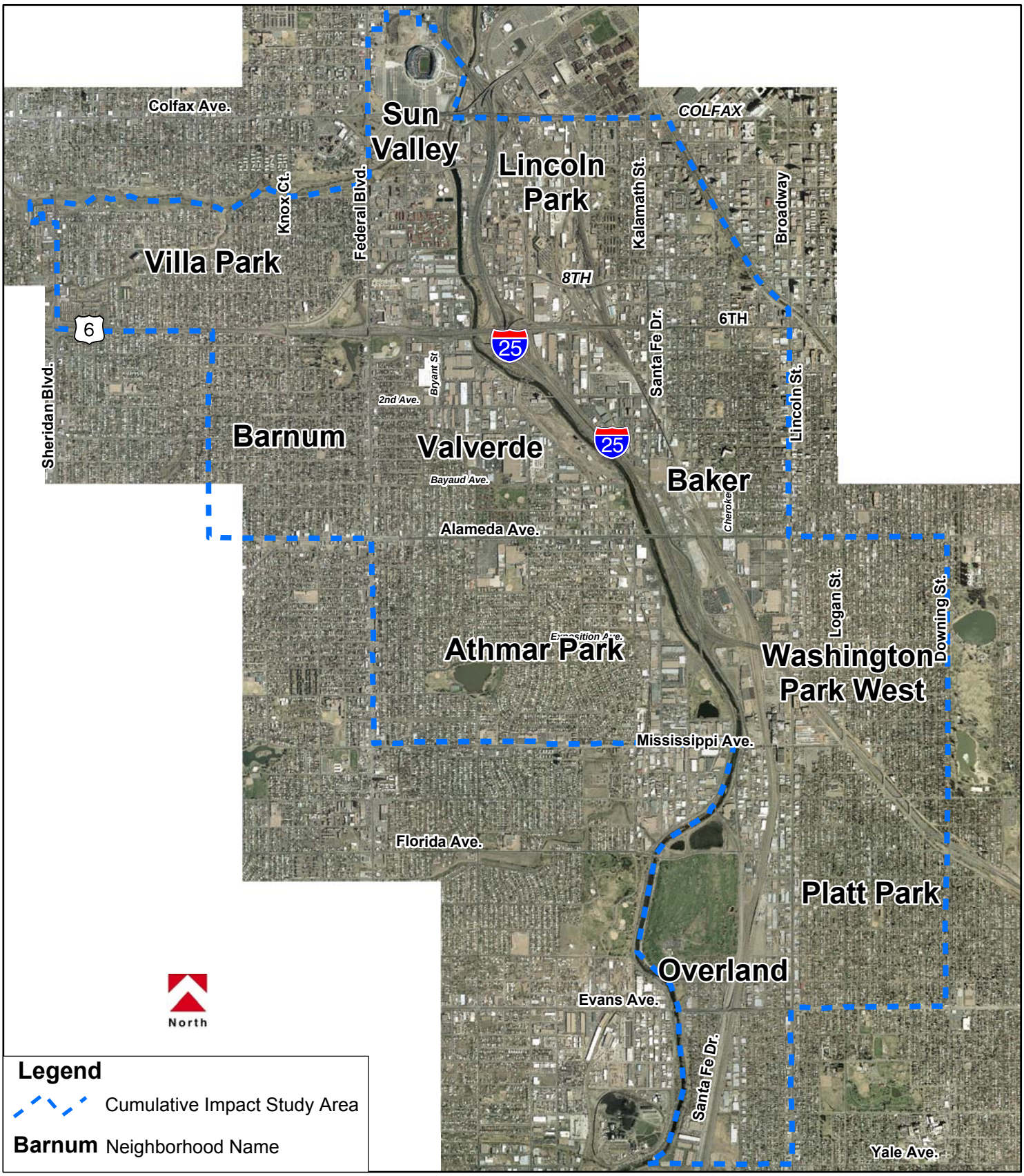
4.20.1.3 TIME FRAME FOR ANALYSIS

To focus the assessment of cumulative impacts, it is important to establish an appropriate time frame for analysis. The time frame should be neither too short (such that longer-term trends are not recognized) nor too long (such that the analysis lacks focus). Typical time frames that have been used on other transportation projects include: 20 to 30 years, start of development, original highway construction, or similar time frames based on the characteristics of the area.

The following time frame was established for this cumulative impacts analysis:

- **Past –** The analysis begins in the mid 1950s, before construction of the original Valley Highway. This time frame allows a view of the history of the corridor and how the Valley Highway may have affected the area.
- **Future –** The analysis extends 20 to 25 years into the future. This corresponds to the horizon used for regional transportation planning. It is also similar to the 20-year horizon used in *Blueprint Denver* (City and County of Denver, 2002c).

Thus, the time frame for cumulative impacts analysis for the Valley Highway Project extends from approximately 1955 to approximately 2030.



Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Cumulative Impact Study Area

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.20-1

4.20.1.4 IDENTIFICATION OF CURRENT AND FUTURE PROJECTS

The identification of other projects that could affect key resources is integral to the assessment of possible cumulative impacts. It is important to focus on projects that are likely to happen, and to this end NEPA guidance indicates that projects should be considered if they are *"reasonably foreseeable"* and not merely *"speculative."*

CDOT and FHWA have worked with cooperating and resource agencies to identify reasonably foreseeable projects that should be considered for cumulative impacts. These projects fall into the following broad categories:

- **Current and Future Transportation Projects** (see **Table 4.20-2**) **–** This includes projects currently under construction (e.g. T-REX), and projects included in current regional plans (e.g.; Federal Boulevard improvements – Alameda Avenue to US 6, and FasTracks transit improvements).
- **Local Agency Planning Projects** (see **Table 4.20-3**) **–** This includes planning efforts that may include requirements and elements relevant to cumulative impacts.
- **Development or Redevelopment Projects** (see **Table 4.20-4**) **–** This includes projects that are either planned/programmed, or can be reasonably anticipated based on development trends and the local planning framework. An example is the redevelopment of the former Gates Rubber Company site, which is currently in the planning stage.

Table 4.20-2 Current and Future Transportation Projects within the Study Area

Project Name / Location	Description	Status
"H" Ramp at Colfax and "A" Ramp at 6th Avenue	Ramp improvements	Recent project
Santa Fe Drive at Iowa and Florida	Signal upgrade for safety improvement	Recent project
T-REX (Southeast Corridor)	Double tracked LRT line totaling 19.12 miles extending south from the Broadway Station and I-25 improvements extending eight through lanes plus collector/distributor lanes from Logan Street south	Current project
I-25 / Broadway Viaduct	Viaduct replacement	Current project
Louisiana LRT Station Plaza	Construction of Light Rail Transit Station Plaza and realignment of Buchtel South	Current project
Buchtel South Bicycle / Pedestrian Improvements	Construction of bicycle lane and sidewalk improvements on Buchtel South between Logan Street and University Boulevard	Current project
Federal Boulevard from Alameda Avenue to 6th Avenue	Widening; transportation improvement project	Planned future project
Federal Boulevard at Lakewood Gulch	Bridge replacement and widening; transportation improvement project	Planned future project
West Corridor LRT	LRT from Downtown Denver to Golden	Planned future project
FasTracks	Major expansion of LRT network throughout the Denver metro area	Planned future project
Alameda Avenue: Knox Court to I-25	Widening (possible lane addition)	Possible future project (included in proposed 2030 Metro Vision Plan)
Federal Boulevard from Colfax Avenue to Hampden Avenue	Widening (possible lane addition)	Possible future project (included in proposed 2030 Metro Vision Plan)
Santa Fe Drive / Kalamath Street: 13th to Speer	Widening (possible lane addition)	Possible future project (included in proposed 2030 Metro Vision Plan)
Broadway / Lincoln Street Improvements near I-25	Improvements/reconfiguration to be considered; specific improvements not yet known.	Future project (City and County of Denver)
Alameda Avenue Underpass between Cherokee Street and Santa Fe Drive	Maintenance, additional pedestrian and bicycle ways, and urban design elements	Possible future project (City and County of Denver)
Mississippi Avenue / Santa Fe Drive Intersection	Reconstruction / improvements	Possible future project (City and County of Denver)
Rail Relocation to Eastern Plains	Relocation of Consolidated Main Line for through trains	Preliminary study

Table 4.20-3 Current Local Agency Planning Projects

Project Name / Location	Description	Status
Downtown Multimodal Access Plan	Integrated plan for vehicular, freight, pedestrian, bicycle and transit access into and throughout Downtown Denver	Current project
Denver Pedestrian Master Plan	Master plan intended to improve pedestrian conditions and increase pedestrian activity, especially with Areas of Change	Current project
Denver Storm Drainage Master Plan	Review of existing stormwater systems and identification of future improvements	Current project
Stormwater Quality Master Plan	Identify locations for water quality enhancements and create guidelines by which to enforce enhancement for development / redevelopment	Current project
La Alma/ Lincoln Park Neighborhood Plan	Small area plan for neighborhood	Current project

Table 4.20-4 Current and Future Development Projects within the Study Area

Project Name / Location	Description	Status
South Platte River channel improvements - 8th Avenue north	Drop structure upstream of 8th Avenue and lowering of channel from there downstream	Current project
Rude Recreation Center 2855 West Holden Place	City bond project to expand and rebuild existing facility	Recent project
Alameda Square Shopping Center Alameda Avenue and Zuni	Redevelopment of existing shopping center	Possible future project
West Corridor Transit Oriented Development -14th Ave and Decatur St.	Transit oriented development near proposed light rail stop	Future project
Cherokee Denver Transit Oriented Development I-25 and Broadway (west side)	Redevelopment of portion of former Gates Rubber Company industrial site (west of Broadway). Rezoned for mixed-use development. Development to include demolition/ replacement of some buildings and may include reuse of some buildings. Project is in initial stage; ultimate development details are not yet available.	Current project
Lionstone Transit Oriented Development I-25 and Broadway (east side)	Redevelopment of portion of former Gates Rubber Company industrial site (east of Broadway). Rezoned for mixed-use development. Development to include reuse of some buildings and demolition/replacement of some buildings. Project is in initial stage; ultimate development details are not yet available.	Current project
Denver Health Medical Center 777 Bannock	Expansion of west wing of medical center	Current project
Rita Bass Trauma and Education Center -150 W. 6th Avenue	New trauma center	Recent project
Former RTD Bus Barn Site Alameda Avenue and Santa Fe Drive	Potential redevelopment; transit oriented use indicated in Baker Neighborhood Plan	Possible future project
Shattuck Site Remediation Jewell and Bannock Street	Contaminated site remediation; possible redevelopment site	On-going remediation, possible future development
General Chemical Site Remediation South Platte River Drive and Bayaud Avenue	Contaminated site remediation; possible redevelopment site	On-going remediation, possible future development
Rosemont Pharmaceutical Alameda Avenue and Cherokee Street	New building, expansion of existing building, removal of existing parking lot	Current project
UniCal Facility 14th and Elliot (approximate)	Contaminated site remediation; possible redevelopment site	On-going remediation, possible future development
Atlas Metals Site Auraria Parkway and Colfax Avenue	High-density student housing on former industrial site (550-750 units).	Current project

Table 4.20-4 Current and Future Development Projects within the Study Area (continued)

Project Name / Location	Description	Status
Townhome Development – Washington/Clarkson/Arizona	11 townhomes	Current project
Condo and neighborhood business development – Buchtel South and Clarkson	Redevelopment; reconstruction of street with bikeway and sidewalks	Current project
Santa Fe Commons 1001 Santa Fe Drive	Redevelopment; construction of 38-unit loft building with ground floor retail	Current project
Osage Mercado - 10th and Osage Light Rail Transit Station	Mixed-use development with public market, housing, and retail	Possible future project

4.20.2 Analysis of Past Development / Land Use Changes

This section presents a summary of past development and land use change within the Cumulative Impact Study Area, concentrating on the time frame for analysis beginning in the mid 1950s (before construction of the original Valley Highway). This is based to a large extent on a review of historical aerial photographs, and considers development patterns rather than individual projects and actions. This analysis forms the basis for the discussion of past cumulative impacts presented in **Section 4.20.3.**

4.20.2.1 DENVER'S ORIGINS

Denver originated in 1858, when several parties of hopeful prospectors arrived in the area in search of gold along the South Platte River and its tributaries. By the spring of 1859, settlements existed along the banks of Cherry Creek. From 1860 to 1870, over $27 million in gold was mined, and Denver became a regional business and cultural center.

Denver's expansion was fueled with the construction of a railroad line to Cheyenne, Wyoming in 1870, tying Denver into the nation's transportation and communication network. The mining district continued to prosper between 1870 and 1900, producing over $224 million in gold and $541 million in silver, spurring population and business booms in Denver. By 1920, the population of Denver was 256,491.

South Broadway was constructed in 1871 to provide a convenient and direct route into the city from the southern suburbs. These suburbs were built as people moved from the city to escape overcrowding, unsanitary conditions, and roadhouses and saloons.

4.20.2.2 CONSTRUCTION OF THE VALLEY HIGHWAY

By the 1930s, Denver's automobile traffic was a concern, and the city began to plan improvements. Initially, several corridors were investigated including Colorado Boulevard, Broadway, Federal Boulevard, and the eventual Valley Highway route. Ultimately, the Valley Highway route was chosen because it provided the most efficient traffic service and direct access, and minimized impacts to existing business and residences.

Construction of the Valley Highway Project commenced in September 1948 and was completed in 1958. The new freeway included 13 major interchanges, four minor interchanges, and no fewer than 62 bridges and grade separations.

Maintaining adequate transportation facilities to handle ever-increasing volumes of traffic has been one of Denver's major challenges. This is true for the Valley Highway, which was incorporated as a segment of I-25, a major transportation route that serves through traffic, as well as local traffic.

4.20.2.3 LAND USE PATTERNS – 1956

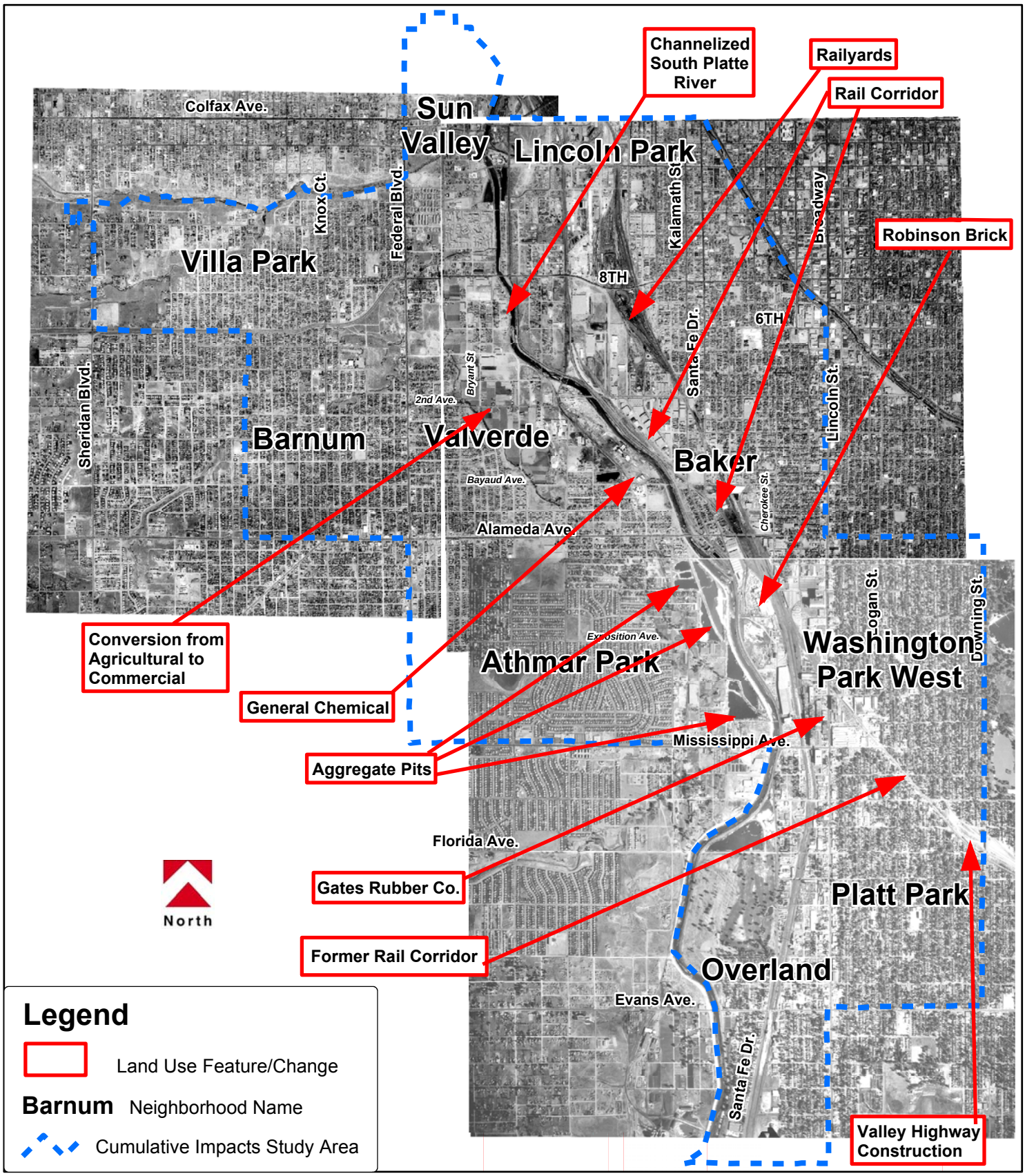
Figure 4.20-2 presents an aerial photographic mosaic from 1956. The cumulative impacts study area is delineated, and several land use features are noted. From analysis of the aerial photograph and available historical information, the following observations can be made regarding the characteristics of the study area before construction of the Valley Highway:

- The initial Valley Highway construction is visible near Downing Street. The alignment along which the highway would be constructed was primarily an existing rail corridor and mostly vacant land along the South Platte River. At least 20 years before construction of the Valley Highway, the South Platte River had been channelized and the floodplain elevated with fill material.
- The primary land uses within the study area were already established in 1956, much as they are today. Residential neighborhoods were well established, with the Athmar Park neighborhood clearly showing up as recently developed in this photograph. The industrial corridor was also clearly established at this time; however, a number of agricultural or vacant parcels are apparent that would later be converted to industrial or commercial use. The area adjacent to the South Platte River contained primarily industrial and commercial land uses. The residential areas were located on the alluvial terraces above the river floodplain.
- The South Platte River appears as a channelized feature, with much the same form that it has today. Available information indicates that the river was channelized before or during the 1930s. A number of aggregate pits are visible along the river. These later were used as landfills and eventually became parks and commercial properties.

4.20.2.4 LAND USE PATTERNS – 1962

Figure 4.20-3 presents an aerial photographic mosaic from 1962. Available photographs do not cover the entire cumulative impacts study area; however, the central portion is covered and several changes are noted:

- The Valley Highway construction was completed. The portion of US 6 / 6th Avenue from Federal Boulevard to Kalamath Street was also completed as part of the original Valley Highway project. A portion of the South Platte River in the vicinity of Alameda Avenue was relocated to provide space for the Valley Highway.
- In the central portion of the study area along the South Platte River, some former agricultural and vacant land was converted to commercial use.
- A few blocks of residences located north of Alameda Avenue along Santa Fe Drive and Kalamath Street were being converted to commercial use.
- Most of the former aggregate pits along the South Platte River have been filled. Vanderbilt Lake remains.



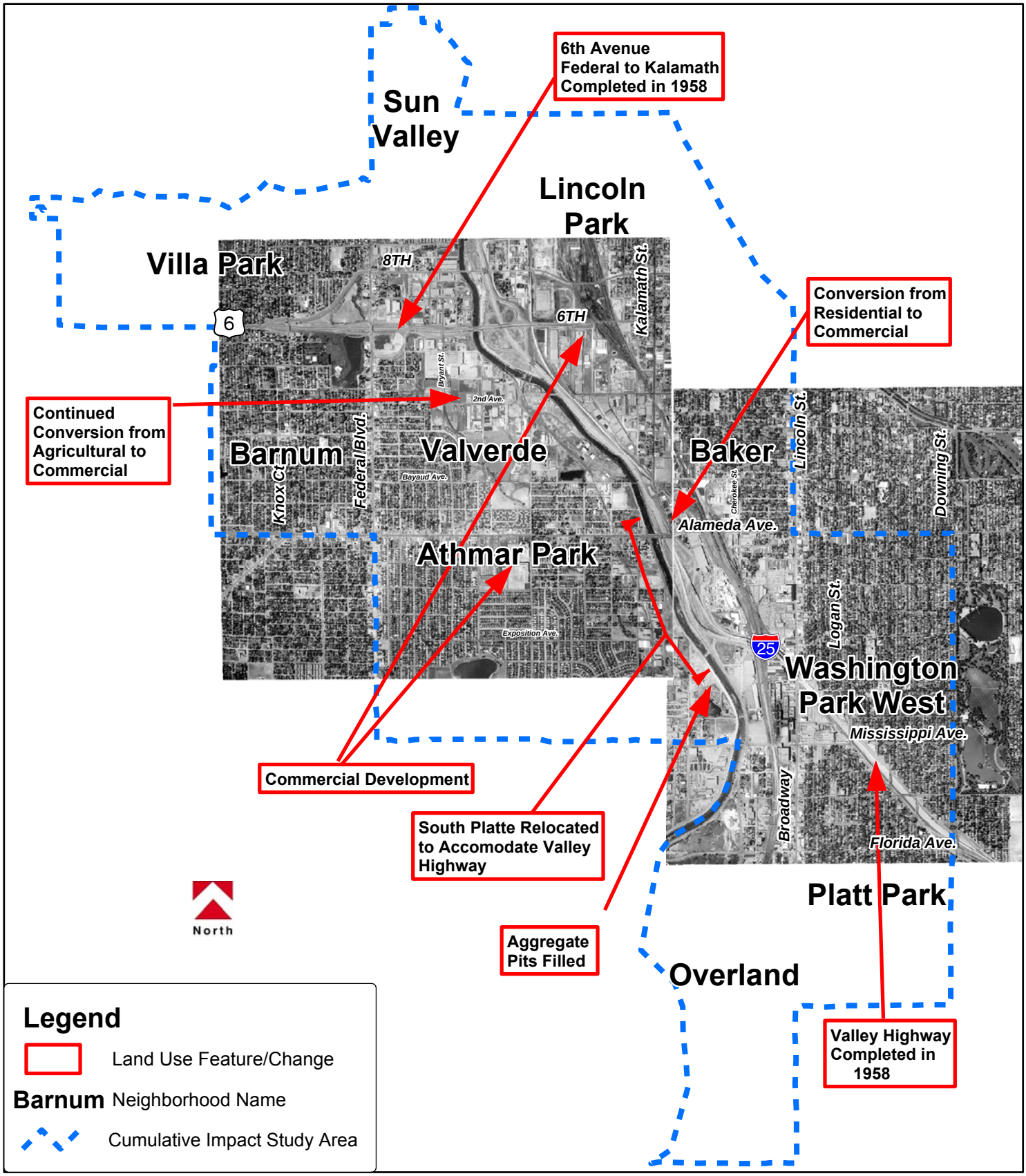
Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Land Use-1956

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.20-2



Valley Highway, 02-069, 10/27/2004

0 0.25 0.5 1 Miles

Land Use-1962

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.20-3

4.20.2.5 LAND USE PATTERNS – 1975

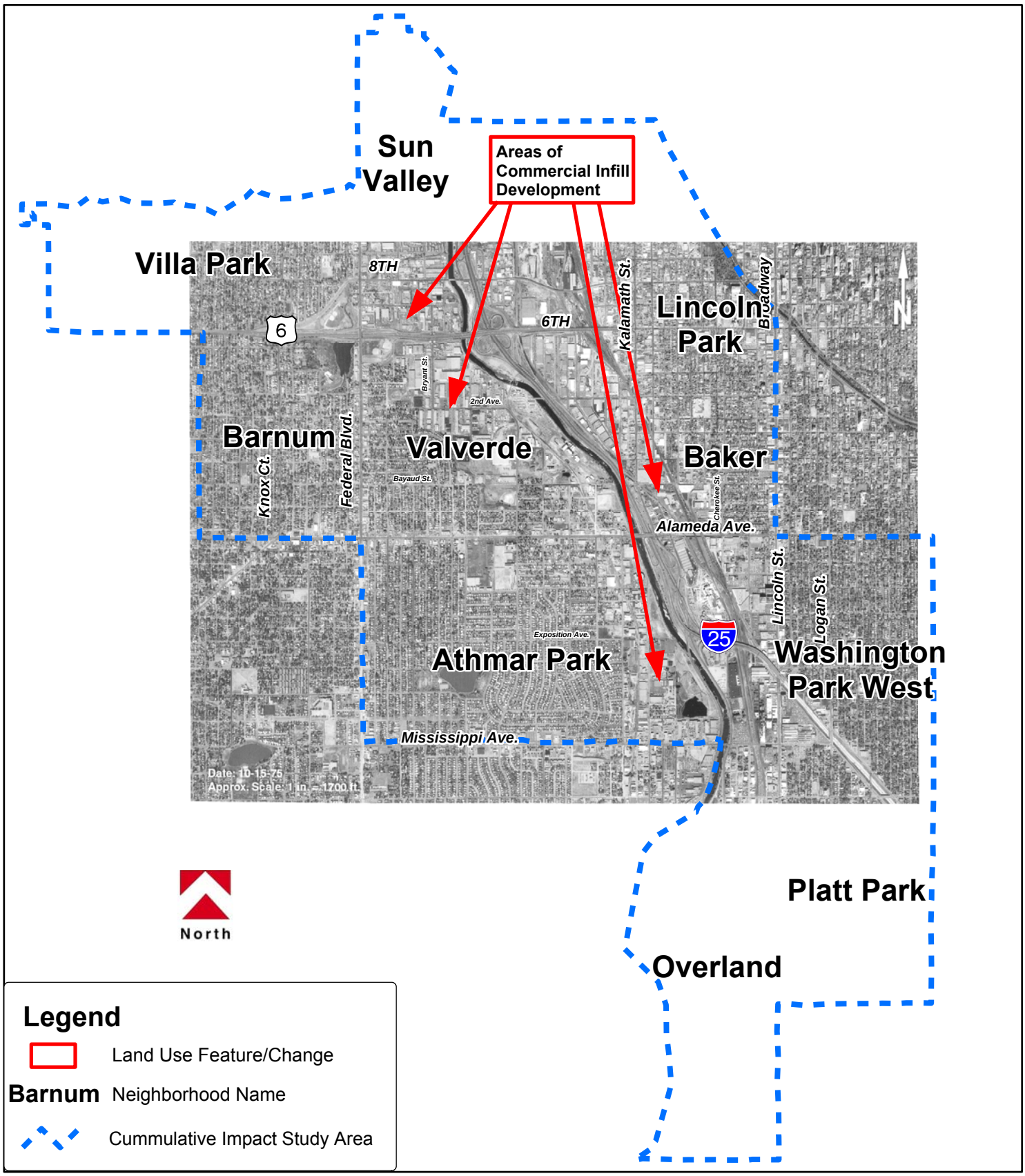
Figure 4.20-4 presents an aerial photographic mosaic from 1975. Again, available photographs do not cover the entire cumulative impacts study area; however, the central portion is covered. The aerial photograph clearly shows areas of commercial infill development occupying the remaining vacant parcel in the central industrial/commercial corridor adjacent to I-25. The development of the original Valley Highway may have contributed to this infill development; however, the pattern was clearly established before the highway was built. The infill development occurred primarily within, and adjacent to, industrial areas with railroad access along the South Platte River.

4.20.2.6 LAND USE PATTERNS – 2002

Figure 4.20-5 presents an aerial photographic mosaic from June 2002. This mosaic shows the area much as it is today, but before initiation of construction of the T-REX and I-25/Broadway viaduct replacement projects.

The following land use changes have occurred since the time of the 1975 aerial photograph and are noted on **Figure 4.20-5**:

- The original LRT Central line and the Southwest Corridor LRT line have been constructed with LRT transfer and park-n-Ride stations at Broadway, Alameda Avenue, and 10th/Osage Street.
- Several commercial properties have been redeveloped. Several additional former commercial or industrial properties are currently being planned or considered for redevelopment.
- The South Platte River greenway has been developed.
- Invesco Field has replaced the former Mile High Stadium.

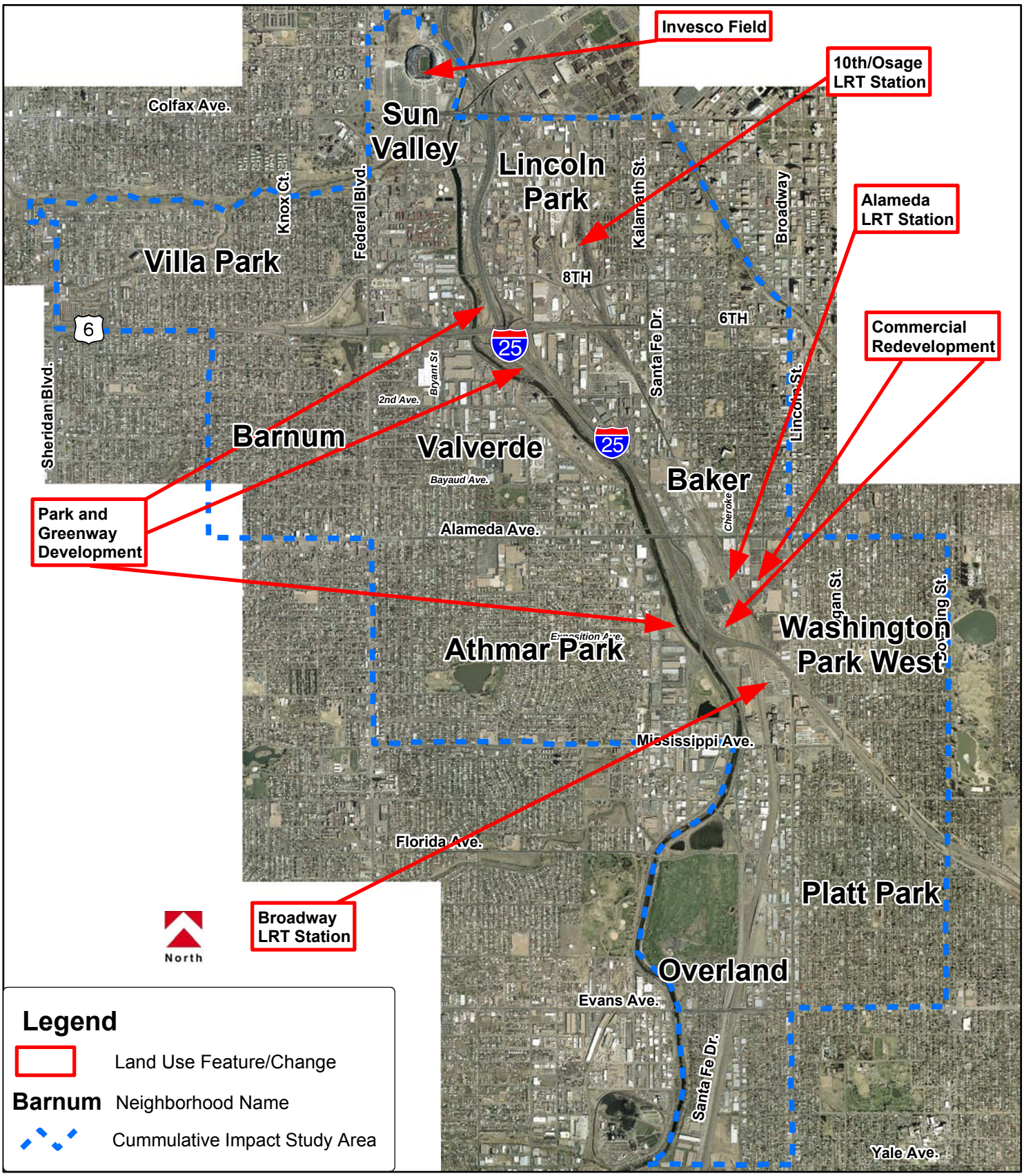


Valley Highway, 02-069, 10/28/2004

0 0.25 0.5 1 Miles

Land Use-1975

Figure 4.20-4



Valley Highway, 02-069, 10/28/2004

0 0.25 0.5 1 Miles

Land Use-2002

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 4.20-5

4.20.3 Cumulative Impacts Assessment

The project area has been largely developed for over 100 years, since construction of the railroads. The Valley Highway was completed in 1958. Some areas in the vicinity of the project are currently undergoing redevelopment. Much of this redevelopment has already been outlined in current planning documents. Many factors will ultimately affect the outcome of redevelopment, including changes in population and employment, land use plans and zoning practices, the location of business markets and job centers, site-specific amenities, physical and socioeconomic constraints, land owner and developer resources, preferences regarding development, and the availability of other developable lands.

This section identifies potential cumulative impacts of other actions, in concert with the No Action Alternative and the systems alternatives (System Alternatives 1, 2, 3, and the Preferred Alternative). This discussion is presented in two steps:

- First, the potential impacts of other current and future actions are identified
- Second, the cumulative impacts are discussed for each of the key resources/issues identified previously

For each key resource, potential mitigation strategies are also highlighted, as appropriate.

4.20.3.1 Potential Cumulative Impacts by Project

Table 4.20-5 presents potential impacts of current and reasonably foreseeable future projects on the key resources identified above in **Table 4.20-1**. The impacts identified are those that fall within the identified area of analysis for each resource (see **Table 4.20-1**).

Table 4.20-5 Potential Impacts of Other Projects

Current or Future Action[1]	Potential Impacts to Key Resources[2] within Area of Analysis[3]
Transportation Projects	
"H" Ramp at Colfax and "A" Ramp at 6th Avenue	Beneficial safety improvements and congestion reduction
Santa Fe Drive and Iowa and Florida	Beneficial safety improvements
T-REX (Southeast Corridor)	Beneficial safety improvements and congestion reduction Business relocations Noise impacts (with mitigation provided by noise walls) Stormwater drainage improvements Construction impacts including: dust, noise, sediment, detours, and access
I-25 / Broadway Viaduct	Beneficial safety improvements and congestion reduction Construction impacts including: noise and short-term road closures
Louisiana Light Rail Transit Station Plaza	Beneficial effect on overall transportation system Construction impacts including: dust, noise, sediment, and detours

Table 4.20-5 Potential Impacts of Other Projects (continued)

Current or Future Action[1]	Potential Impacts to Key Resources[2] within Area of Analysis[3]
Buchtel South Bicycle / Pedestrian Improvements	Beneficial effect on local pedestrian/bicycle mobility Construction impacts including: dust, noise, sediment, and detours
Federal Boulevard from Alameda Avenue to US 6	Beneficial safety improvements and congestion reduction Business relocations and access changes Residential relocation may be required Possible park impacts, not yet determined but likely to be minor Construction impacts including: dust, noise, sediment, and detours
Federal Boulevard at Lakewood Gulch	Beneficial safety improvements and congestion reduction Wetland impacts possible (would be mitigated) Construction impacts including: dust, noise, sediment, and detours
West Corridor Light Rail Transit	Beneficial effect on overall transportation system Adverse affect to historic rail line Stormwater drainage improvements Construction impacts including: dust, noise, sediment, and detours
FasTracks	Beneficial effect on overall transportation system May be additional business and residential relocations and/or environmental effects not yet determined
Alameda Avenue: Federal Boulevard to I-25	Beneficial safety improvements and congestion reduction May be business relocations Construction impacts including: dust, noise, sediment, and detours
Federal Boulevard from Colfax Avenue to Hampden Avenue	Beneficial safety improvements and congestion reduction May be additional business and residential relocations and/or environmental effects not yet determined Construction impacts including: dust, noise, sediment, and detours
Santa Fe Drive / Kalamath Street:13th to Speer	Beneficial safety improvements and congestion reduction May be additional business and residential relocations and/or environmental effects not yet determined Construction impacts including: dust, noise, sediment, and detours
Broadway / Lincoln Street Improvements near I-25	Beneficial safety improvements and congestion reduction May be additional business and residential relocations and/or environmental effects not yet determined Construction impacts including: dust, noise, sediment, and detours
Alameda Avenue Underpass between Cherokee Street and Santa Fe Drive	Pedestrian and bicycle improvements Construction impacts including: dust, noise, sediment, and detours

Table 4.20-5 Potential Impacts of Other Projects (continued)

Current or Future Action[1]	Potential Impacts to Key Resources[2] within Area of Analysis[3]
Mississippi Avenue / Santa Fe Drive Intersection	Beneficial safety improvements and congestion reduction Possible wetland or other environmental impacts not yet determined
Rail Relocation to Eastern Plains	Beneficial safety improvements and congestion reduction Beneficial effect on air quality and noise in central Denver Environmental effects at eastern plains location not determined
Local Agency Planning Projects	
Downtown Multimodal Access Plan	Beneficial effect on overall transportation system
Denver Pedestrian Master Plan	Beneficial effect on overall pedestrian mobility and safety
Denver Storm Drainage Master Plan	Beneficial effect on overall stormwater management
Denver Stormwater Quality Master Plan	Beneficial effect on water quality Water quality ponds of outfall structures could impact wetlands or other resources
Development Projects	
South Platte River Channel Improvements 8th Avenue north	Beneficial impact on floodplain and water quality Wetland impacts (mitigated)
Rude Recreation Center 2855 West Holden Place	Beneficial improvement in local recreation facilities Increased traffic
Alameda Square Shopping Center Alameda Avenue and Zuni	Increased traffic Beneficial effect on economic activity, jobs, and local availability of goods and services Construction impacts including: dust, noise, sediment
West Corridor Transit Oriented Development 14th Avenue and Decatur Street	Increased traffic Beneficial impact on economic activity, available residences, jobs and local availability of goods and services Construction impacts including: dust, noise, sediment
Cherokee Transit Oriented Development Project I-25 and Broadway (west side)	Increased traffic Beneficial impact on economic activity, available residences, jobs and local availability of goods and services Adverse impacts to historic structures with NRPH-eligible historic district (former Gates Rubber Company site) Construction impacts including: dust, noise, sediment
Gates Transit Oriented Development I-25 and Broadway (east side)	Increased traffic Beneficial impact on economic activity, available residences, jobs and local availability of goods and services Adverse impacts to historic structures with NRPH-eligible historic district (former Gates Rubber Company site) Construction impacts including: dust, noise, sediment

Table 4.20-5 Potential Impacts of Other Projects (continued)

Current or Future Action[1]	Potential Impacts to Key Resources[2] within Area of Analysis[3]
Denver Health Medical Center 777 Bannock	Increased traffic Beneficial community impact through availability of medical services
Rita Bass Trauma and Education Center 150 W. 6th Avenue	Increased traffic Beneficial community impact through availability of medical services
Former RTD Bus Barn Site Redevelopment Alameda Avenue and Santa Fe Drive	Increased traffic Beneficial impact on economic activity, available residences, jobs and local availability of goods and services Construction impacts including: dust, noise, sediment
Shattuck Site Remediation Jewell and Bannock	Beneficial impact of removal of contaminated material from community
General Chemical Site Remediation South Platte River Drive and Bayaud Avenue	Beneficial effects on water quality Specific remediation plan and possible site redevelopment not currently known
Rosemont Pharmaceutical Alameda Avenue and Cherokee Street	Beneficial impact on economic activity and local jobs
UniCal Facility Approx. 14th and Elliot	Beneficial impact of removal of contaminated material from community Specific remediation plan and possible site redevelopment not currently known
Atlas Metals Site Auraria Parkway and Colfax	Beneficial increase in available residences
Townhome Development – Washington/Clarkson/Arizona	Increased traffic Beneficial increase in available residences
Condo and Neighborhood Business Development – Buchtel South and Clarkson	Increased traffic Beneficial increase in available residences
Santa Fe Commons 1001 Santa Fe Drive	Increased traffic Beneficial impact on economic activity, available residences, jobs and local availability of goods and services Construction impacts including: dust, noise, sediment
Osage Mercado 10th and Osage Street LRT Station	Increased traffic Beneficial impact on economic activity, available residences, jobs and local availability of goods and services Construction impacts including: dust, noise, sediment

Notes:
1 See **Tables 4.20-2, 4.20-3, and 4.20-4** for project description and status.
2 Potential impacts are noted for key cumulative impact resources as identified in **Table 4.20-1**. For future projects, impacts are often not known with certainty, but impacts that are reasonably foreseeable have been indicated.
3 Area of analysis is defined for each key resource in **Table 4.20.1**.

4.20.3.2 CUMULATIVE IMPACTS AND MITIGATION STRATEGIES BY RESOURCE

This section describes potential cumulative impacts on each identified key resource that may result from the additive effects of multiple projects, as described above. The incremental effect of the system alternatives (System Alternatives 1, 2, 3, and the Preferred Alternative) and the No Action Alternative are included in this discussion. This section also identifies existing and possible mitigation strategies that could be used to reduce adverse cumulative impacts on these resources.

Transportation / Traffic

Since the mid 1950s, the transportation system within the Cumulative Impacts Study Area has undergone a series of changes in response to the relatively steady growth in population and travel demand within the Denver Metro area. Major developments in the transportation system within this timeframe include:

- Construction of the Valley Highway and the 6th Avenue Freeway, which were initially completed in 1958 and were expanded over time in response to increasing traffic volumes.
- Expansion of key arterial streets providing access to downtown Denver, including the Broadway/Lincoln Street and Santa Fe Drive/Kalamath Street one-way pairs.
- Expansion of Santa Fe Drive, including HOV lanes, from I-25 south to provide a transportation corridor linking central Denver with the southern suburbs.
- The current T-REX project will provide highway improvements to I-25 from Logan Street south.
- Initiation of LRT, with initial service connecting the I-25/Broadway Station with downtown Denver. This LRT service was subsequently extended to the southwest and into central Platte Valley. The Southeast Corridor LRT line currently under construction (as part of T-REX) will connect to the southeast, and a metro-wide LRT network will be established over the next 10-15 years under FasTracks. The Louisiana LRT Station Plaza and the RTD West Corridor (listed in **Table 4.20-5**) are part of the LRT expansion.

The improvements to the transportation system over time have generally been outpaced by the growth in transportation demand, resulting in a general increase in congestion. The current and future transportation projects identified above in **Table 4.20-5** have been identified through the local and regional transportation planning process as necessary to help address future demand in the area.

Several development or redevelopment projects have been identified above in **Table 4.20-5** as having the potential to increase demands on the transportation system in the vicinity of the Valley Highway project. These projects are generally consistent with the local planning goals of the City and County of Denver, and with the regional planning objectives of DRCOG. Each of these seeks to facilitate opportunities for redevelopment, often with increased density, in areas close to employment centers and transit facilities. Transportation projects planned or being considered for central Denver, including the Valley Highway project, are generally responding to current and/or anticipated travel demand.

Table 4.20-5 includes several transit oriented development projects. On a regional scale, transit oriented development projects have benefits in that urban sprawl may be limited and automobile

trips may be reduced, thereby providing positive impacts on congestion and other environmental resources. On a local scale, benefits may be realized through revitalization of underutilized properties, thus providing housing, employment, and tax revenues. To the extent that redeveloped areas are served by transit, local transportation benefits may also accrue. However, because the redeveloped areas are also expected to generate substantial numbers of motor vehicle trips, local negative impacts to the transportation system may occur and future transportation projects may be required.

The transportation modeling and analysis conducted for the system alternatives, including the Preferred Alternative, as presented in **Chapter 3** *Transportation Analysis*, include traffic projections prepared in cooperation with DRCOG and the City and County of Denver to account for additional traffic that would be generated by major planned redevelopments. Therefore, the cumulative impacts of reasonably foreseeable projects on the operation of I-25 and its connections to the arterial street system have been accounted for and planned for in the system alternatives.

Local streets and arterials may experience traffic impacts due to redevelopment and resulting increase in activity and traffic. Planning to identify measures to mitigate these impacts is already underway by local and regional agencies. These efforts include:

- City and County of Denver – Blueprint Denver, local area plans, the Pedestrian Master Plan, the Downtown Multi-modal Access Plan, the development review process
- RTD – Southeast Corridor implementation, Central Corridor improvements, the FasTracks proposal for metro-wide transit expansion
- DRCOG – the regional planning process

Each of the transportation projects identified in **Table 4.20-5** will play a part in serving future transportation needs in the area. Coordination and implementation of these projects will help to address the traffic impacts of redevelopment and regional growth. Implementation of identified improvements will be dependent on the availability of funding. Additionally, it will be important that improvement projects are timed to coincide with anticipated traffic impacts.

In summary, the Valley Highway system alternatives, including the Preferred Alternative, provide improvements to transportation systems compatible with other planned transportation improvements. The system alternatives are part of the overall transportation improvement process, contributing a cumulative improvement in the transportation system relative to the future No Action Alternative.

Socio-Economics and Community

The City and County of Denver, along with the rest of the Denver Metro area and the State of Colorado have experienced a number of economic cycles over the past 50 years. These economic cycles have caused fluctuations in the level of economic activity and prosperity; however, the underlying trend throughout this period has been one of growth in population, employment, income and economic diversity.

Through much of the 1990s, Denver enjoyed a booming economy which resulted in growth in population and employment. Most recently, Metro Denver has experienced an economic

downturn consistent with State and National trends, but this downturn has shown signs of moderating (as of late 2004).

Section 4.20.2.3 provided a summary of land use changes within the Cumulative Impacts Study Area since the mid 1950s. These land use changes are reflective of the pattern of socio-economic development and community change. The overall pattern has been relative stability of most residential areas.

More dramatic changes have occurred within the largely commercial and industrial lands on either side of the South Platte River, the I-25 corridor and Consolidated Main Line railroad corridor. Since the mid 1950s, these areas saw initial buildout of the existing heavy and light industrial base, followed by partial conversion to commercial and retail uses as the heavy industrial base declined.

The gradual reduction in heavy manufacturing in the area, as evidenced by the closing of former manufacturing facilities including Robinson Brick, General Chemical, Burkhart Steel, Gates Rubber Company, as well as the RTD Bus Barn/ Maintenance Facility, led to a decline in manufacturing jobs in the area. As this industrial base contracted, workers found employment in other parts of the metro area. More recently, mixed use and high density residential redevelopment has emerged, including anticipated transit oriented development associated with the expanding LRT network. Properties fronting major arterials have also seen a large measure of change, with retail development predominating.

Multiple projects may impact the local community in the vicinity of the Valley Highway Project, as described above. The impacts include changes in aesthetics, neighborhood cohesion, employment, tax base, and access to public facilities. These impacts may be positive or negative, and planning efforts, such as *Blueprint Denver* and future planning efforts, will assist in reinforcing positive impacts and identifying appropriate mitigation for negative impacts. However, there are many factors that will influence positive outcomes, such as the level of funding available for public projects and the economic conditions as they relate to private developments.

As shown in **Table 4.20-5,** several major development projects are being planned or considered in the area. These include redevelopment of the Alameda Square Shopping Center, the former Gates Rubber Company site (Cherokee Transit Oriented Development Project and Gates Transit Oriented Development Project), the RTD Bus Barn site, and a number of smaller redevelopment projects. These projects will bring economic growth and increased vitality to the area, but will also require careful planning by the City and County of Denver and the developers to ensure that the quality of life is maintained for existing and new residents alike.

The City and County of Denver plays a dominant role in the public sector regarding community planning within the city. As a result, involvement of city staff in major projects provides the key to ensuring that positive results are achieved for local neighborhoods and the community as a whole.

The system alternatives, (System Alternatives 1, 2, 3, and the Preferred Alternative) would require relocating a number of businesses (including small businesses). A limited number of residents would also be relocated in three of the four system alternatives, including the Preferred Alternative.

There are a number of other projects which may involve business displacements. Projects with the greatest potential for business displacements within the Cumulative Impact Study Area include:

- T-Rex (property acquisition completed)
- Federal Boulevard from Alameda to 6th Avenue
- Alameda Avenue: Federal Boulevard to I-25

The availability of suitable replacement properties would be dependent on market conditions at the time of relocation; under current market conditions, replacement properties would likely be available. Future market conditions may vary, but planned and potential redevelopment projects may also provide relocation opportunities.

Parks and Recreation

The City and County of Denver has developed an extensive system of parks and recreation facilities over the past 135 years. Denver's park system currently includes nearly 3,000 acres of city parks and parkways, approximately 2,500 acres of urban natural area, and an additional 14,000 acres of Denver-owned mountain parks outside the boundaries of the city. The City and County of Denver also owns and operates 29 recreation centers, seven municipal golf courses, and an extensive network of trails for pedestrians and bicyclists (Game Plan Denver; CCD, 2003c). Denver is continuing its long-standing commitment to parks and recreation, with an additional 334 acres of neighborhood and community parks and 1100 acres of natural areas currently planned.

Since the mid 1950s, a number of parks and recreation facilities have been established and/or developed by the City and County of Denver within the Cumulative Impacts Study Area. Major facilities established or developed during this timeframe include:

- The existing Barnum Park, Barnum North Park and Barnum East Park were developed with facilities including ball fields, the Barnum Recreation Center, picnic areas, walking paths and other amenities
- Vanderbilt Park and Habitat Park were developed atop former aggregated mining areas
- The South Platte River Trail was developed along the South Platte River, along with amenity areas such as Milstein Grove and Frog Hollow Park
- In addition to the Barnum Recreation Center, the following recreation centers are located within the Cumulative Impacts Study Area: Rude Recreation Center, La Alma Recreation Center, La Familia Recreation Center, and Platt Park Senior Center. The Athmar Recreation Center and Washington Park Recreation Center are also nearby

Transportation projects occasionally require the use of property from the edge of parks. However, given the level of legal and planning protection currently in place, such uses are carefully considered and implemented such that the recreation function and value of the facilities is not diminished. In addition, transportation projects often include improvements to recreation amenities. For example, the system alternatives being considered in this EIS all include improvements to pedestrian and bicycle access to the South Platte River Trail. Each of the system alternatives , including the Preferred Alternatives, would require the use of portions of Barnum Park, Barnum North Park and Barnum East Park. These impacts are described in

detail in **Section 4.3** *Parks and Recreation* and **Chapter 5** *Section 4(f) Evaluation*. The No Action Alternative would not impact parks.

As shown in **Table 4.20-5**, only one other project, Federal Boulevard from Alameda to US 6, has been identified as having the potential to impact parks. This project may impact Barnum Park and/or Barnum East Park if land along the edges of either or both of these parks is required for widening of Federal Boulevard. This will be determined in the Environmental Assessment currently being conducted by CDOT for this project.

It is very unlikely that any current or future development projects would be allowed to use land currently occupied by Denver parks land or recreation facilities. Some of these development projects may include improvements to the park and recreation system. For example, transit oriented development of the former Gates Rubber Company site may include the addition of amenities to the currently undeveloped Vanderbilt East Park and improved pedestrian/bicycle connections to the South Platte River Trail.

Parks within the City and County of Denver are generally well protected from physical encroachment by City ordinance and other protections. Section 4(f) has provided protection and required mitigation for the impacts of federal transportation projects since its inception in 1966. The City and County of Denver has provided an overarching planning framework titled *Game Plan Denver* (CCD, 2003c). The *Long Range Management Framework for the South Platte River Corridor* (CCD, 2003a) also provides an important planning framework for parks and recreation facilities along the South Platte River.

Due to the strong protections already in place for parks and requirements for mitigation, negative impacts are often offset by beneficial improvements so that park functions are retained. Project development efforts typically focus on avoiding impacts or maintaining and enhancing park and recreational facilities. This has typically been accomplished by working with the City and County of Denver and other agencies, organizations, and individuals.

Air Quality

Cumulative impacts to air quality are an issue of concern, particularly considering Denver's historic air quality problem. In general, the Denver metro area has made substantial progress in improving air quality over the past couple of decades and in working toward long-term attainment of air quality criteria.

In the past, air quality in the Denver metropolitan area was poor in several respects, but it has been steadily improving over the past several decades. The improving air quality condition has occurred along with dramatic growth in population and VMT in the Denver area. This condition is reflected by the former nonattainment status for Denver for CO, 1-hour O_3 and PM_{10}, which is now attainment/maintenance status for all three pollutants. This condition is further indicated by declining pollutant concentrations at air quality monitoring stations near the project area (**Figure 4.20-6**). **Figure 4.20-6** shows the annual maximum concentrations measured for the pollutants, while the second-highest annual concentrations measured are the values used to determine compliance with the NAAQS (these concentrations may not exceed the NAAQS more than one day per year).

Future regional air quality conditions are estimated by DRCOG through the regional conformity process where planned future transportation improvements must conform to the State Implementation Plan. Through the RTP, DRCOG looks more than 20 years into the future, which is a thorough examination of cumulative air quality trends and predictions for the region. In simple terms, the conformity evaluation consists of calculation of regional pollutant emissions for comparison to a region-wide pollutant budget to ensure that air quality does not decline. When pollutant emissions do not exceed pollutant budgets, conformity is demonstrated.

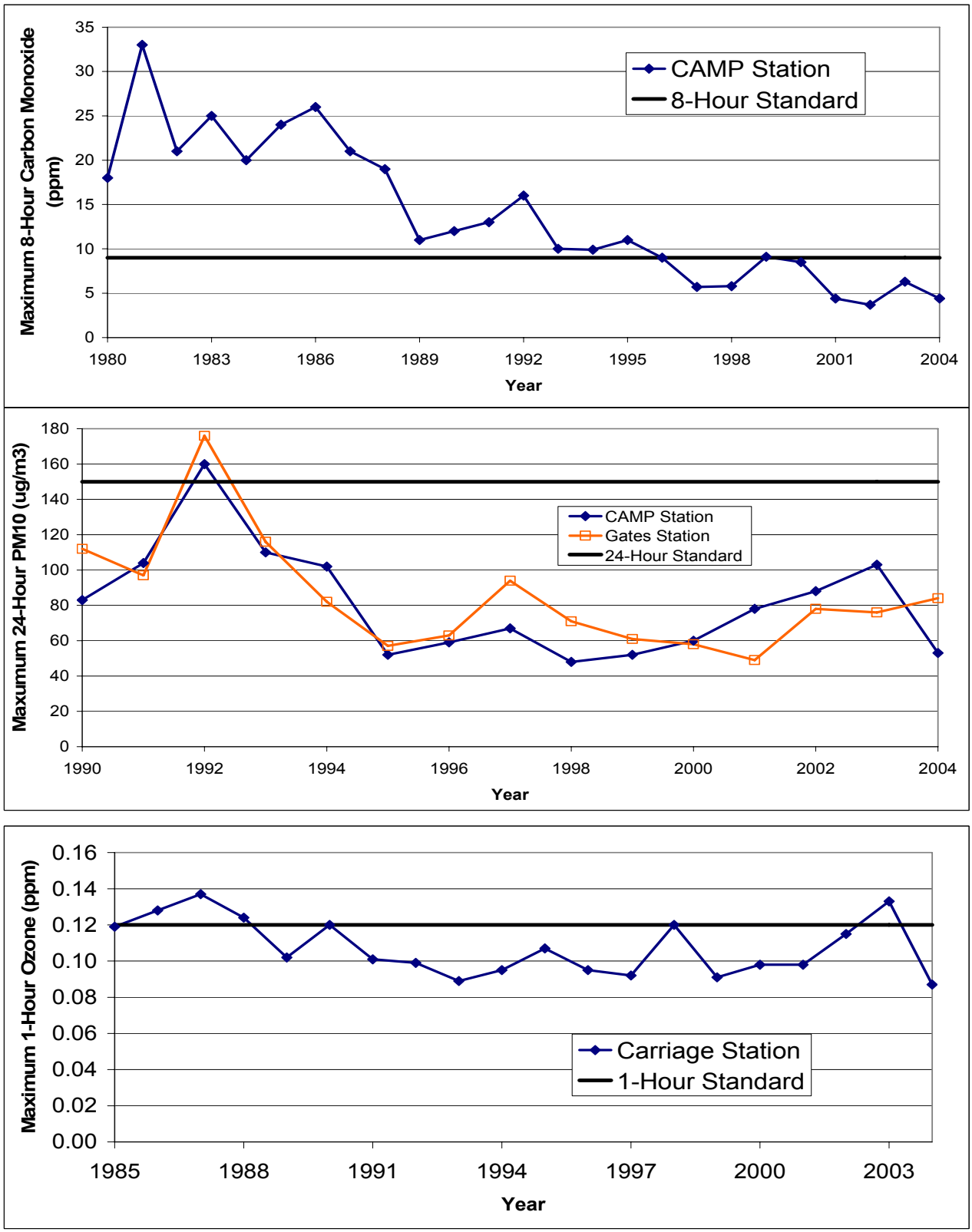
The emissions results for the approved 2025 RTP and the preliminary 2030 RTP are summarized in **Table 4.20-6**. These results show that predicted emissions are within the allotted budgets and that no significant cumulative air quality impacts are likely from reasonably foreseeable projects.

Table 4.20-6 Regional Conformity Emissions Results

Pollutant	2025 RTP (tons per day)		2030 RTP[a] (tons per day)	
	Emissions	Budget	Emissions	Budget
CO	710	800	1207	1520
PM_{10}	50.2	51	49	51
Nitrogen oxides (PM_{10})	89	101	29	101
Volatile organics (O_3)	86	119	42	119
Nitrogen oxides (O_3)	93	134	32	134

[a] Results are preliminary and subject to change.

Figure 4.20-6 Air Quality Monitoring Data from Nearby Monitoring Stations



Noise

The overall ambient noise at a given location depends on the noise from multiple sources. However, noise impacts decrease rapidly with distance so that the closest major sources often predominate. Noise concerns and monitoring have emerged relatively recently; therefore, it is difficult to establish how noise levels may have changed over the last several decades. Traffic has increased on highways and local streets, but vehicles have become quieter over time. In addition, noise from other sources, such as industrial sites, may have decreased over time as site uses have changed.

The noise modeling and analysis, presented in **Section 4.6** *Noise and Vibration*, include the noise impacts of traffic noise sources in the vicinity of the project and thus represent the cumulative impact with regard to traffic noise. As additional transportation projects are considered the noise impacts will typically be evaluated for these projects in a similar manner.

As redevelopment projects are proposed and reviewed, noise contributions by these projects should be considered. In addition, these projects should consider the ambient noise environment and provide appropriate land use planning consideration with regard to noise. An example of this would be to position residential units away from noise sources and/or in a position such that commercial buildings provide shielding from noise sources.

Historic Resources

There are a number of historic structures, historic districts, and potential historic districts within the cumulative impacts study area. These historic resources could be impacted by several future projects as indicated in **Table 4.20-5**. In addition, past projects have impacted historic resources.

Private land owners, developers, and local agencies are not bound by the same requirements for considering and selecting alternatives as are required for a federal transportation project. Thus, the greatest potential for impacts to historic structures within the cumulative impacts study area is likely to come from redevelopment of historic sites. The extent to which these historic resources are preserved has depended and will depend on the interest and plans of the owners/developers, local planning requirements, and possible community input. Facilitation of preservation actions by local and state agencies and preservation organizations can also play a key role.

In the 1950s, as the Valley Highway was taking form, prolific new commercial and industrial development occurred in proximity to the highway, including a warehouse district on Rio Grande Boulevard (between 1st and 3rd Avenues) on the former site of Lake Archer; a light industrial area extending along the east side of I-25, between 8th and 3rd Avenues; and another industrial/warehouse district along Kalamath Street and Santa Fe Drive, north of Alameda Avenue. Most of these changes occurred in lightly developed areas and thus did not displace many historical buildings. Improvement of US 6 in the 1950s, between the Valley Highway and Federal Boulevard, transformed the sparsely settled residential areas both north and south of 6th Avenue into an industrial and warehouse district. A small brick dwelling at 649 Canosa Court, recorded during the cultural resource inventory for the Valley Highway EIS, is an anachronistic survivor of the earlier residential land use pattern in this area.

Two major trends characterize the historic preservation situation in the project area during the 46 years since the Valley Highway was finished (1958):

- many parts of the Cumulative Impact Study Area have experienced relatively little change
- historic preservation regulations, incentives activity have sharply increased over time, particularly during the last 20 years

In most areas along the project corridor large numbers of historical buildings have been preserved, and the land use pattern has been relatively stable over the past 4½ decades. A notable exception is the area bounded by Cherokee Street, Virginia Avenue, Broadway and Alameda Avenue, which contained a neighborhood of numerous modest residences prior to its conversion into a sprawling modern shopping center. Other historical residential neighborhoods adjoining the project have been retained, including Baker, West Washington Park, Platte Park, and Athmar Park. In one mixed-use area, located north of Alameda Avenue in the vicinity of Kalamath Street and Santa Fe Drive, scattered historical dwellings have been converted to commercial uses.

Intentional historic preservation in the Denver area was virtually non-existent prior to the mid-1960s. Following a period of unbridled development during the heyday of the Urban Renewal movement, the federal government issued a national mandate for historic preservation. The National Historic Preservation Act of 1966 established, among other things, the National Register of Historic Places (NRHP), a State Historic Preservation Officer (SHPO) for each state, as well as a process (Section 106) to ensure that significant historical sites are taken into account when subject to potential impacts from federal undertakings. Another federal law passed in 1966 – the Department of Transportation Act – contained a powerful preservationist mandate. Under Section 4(f) of that Act, impacts to significant historical resources from federally-sponsored transportation projects must be prevented unless no feasible and prudent avoidance alternatives are identified.

The City and County of Denver has adopted historic preservation as a key element in its planning process. The preservation of historic architecture is a fundamental part of Blueprint Denver's guiding principles. Preserving historic buildings helps maintain the distinctive character and identity of "Areas of Stability" in the city, while in "Areas of Change" historic buildings can be used as references for appropriate architectural design.

The State of Colorado broadened its historic preservation role by passage of the Historical, Prehistorical, and Archaeological Resources Act of 1973, and by establishment of a State Register of Historic Properties in 1975. A more potent approach was embodied by the Colorado Limited-Stakes Gaming Act of 1991, which established the State Historical Fund. A State Historical Fund grant was used to complete a reconnaissance survey and historical context document in 2002 for the West Washington Park area, on behalf of the West Washington Park Neighborhood Association.

During the 1980s, Section 106 compliance studies resulted in official determinations of NRHP-eligibility for two historical resources in the project vicinity, including the Gates Rubber Company plant, recorded in 1980, and the Bureau of Roads (USPS Vehicle Maintenance Facility), recorded in 1983. In 1985, the vast Baker Historic District, bounded by W. 5th Ave., Broadway, W. Alameda Avenue & Fox Street and containing a wealth of late 19th and early 20th Century architecture, was placed on the National Register of Historic Places.

Adaptive re-use of historical structures has gained popularity over time and is encouraged by CCD as well as financial incentives offered by the Colorado SHPO as well as the National Park Service (which administers the NRHP program). In many cases the re-use of existing building stock makes sound financial sense. An early example of adaptive re-use in the project area involves the USPS Vehicle Maintenance Facility at 915 South Logan Street. The sprawling complex was originally built for the Bureau of Roads as a warehouse and garage for its fleet of vehicles and road-building equipment. In 1960 it was taken over by the U.S. Postal Service, and was used thereafter to maintain a large fleet of postal delivery vehicles.

Industrial properties provide greater challenges for re-use than residential or commercial structures. One such historical property, the General Chemical Company plant located along the west side of I-25, is undergoing major cleanup operations for hazardous waste; its future is uncertain. The vast, 50-acre Gates Rubber Company plant located on the south side of the Broadway Viaduct, has ceased manufacturing operations and is planned for redevelopment to convert the site into a relatively high-density mixed use development with access to an RTD light-rail station and park-n-Ride as well as I-25. Most of the specialized industrial buildings cannot be adapted to the planned development and will reportedly be demolished.

The Preferred Alternative would not adversely affect any historic properties, as described in **Section 4.7** *Historic Preservation* and **Chapter 5** *Section 4(f) Evaluation*.

As shown in **Table 4.20-5**, the following other current or future projects are likely to impact historic sites within the cumulative impact study area:

- T-REX (LRT piers and retaining walls with former Gates Rubber Company site [NRHP-Eligible District])
- Cherokee Transit Oriented Development (former Gates Rubber Company site west of Broadway)
- Gates Transit Oriented Development (former Gates Rubber Company site east of Broadway)

The redevelopment of the Gates site is likely to present the greatest historic preservation challenge within the Cumulative Impacts Study Area. With the exception of the Gates redevelopment project, future land use will likely remain unchanged in the Valley Highway project area for quite some time. Long-established residential areas are considered “Areas of Stability” which embody distinctive historical character and identity, while the light industrial/commercial areas are located in marginal areas not well-suited to residential or retail development. With strong historic preservation controls and incentives in place, it appears likely that historical resources will be increasingly recognized and preserved in areas adjacent to the Valley Highway.

Water Resources, Floodplains, and Wetlands

As Denver has undergone development, South Platte River drainage has been altered substantially. The river was channelized, drainage systems added, flood control undertaken, and wetlands reduced. This has been an evolving process, which was well underway before construction of the original Valley Highway.

The South Platte River is a vital water resource to the Denver Metropolitan Area. The river provides an important beneficial use for recreation, visual aesthetics, domestic drinking water, aquatic life, and stormwater management. Historically, the South Platte River has experienced alterations that have impacted the nature and quality of the water resource. Industrialization and rapid growth in the 1800s and 1900s caused excessive domestic and industrial pollution to be discharged into the river, causing serious human health problems and stream habitat destruction.

Channelization in 1921 and the construction of the Chatfield Reservoir in 1970 dramatically changed the shape, flow regime, and function of the river. Enactment of the Clean Water Act and establishment of numerical water quality standards were a turning point for river water quality. Industrial discharge permitting and the construction of municipal wastewater treatment plants also led to a dramatic water quality improvement in the South Platte River.

The South Platte River is still impaired with regard to fecal coliform and nitrate. EPA and the Colorado Department of Public Health and Environment are conducting a total maximum daily load (TMDL) study in an effort to reduce pollutant loading into the South Platte River. Discharge of collected and passively treated stormwater from the system alternatives is not expected to impact water quality standards or designated use of the river. Fecal coliform and nitrate are not related highway operations.

Under the system alternatives, (System Alternatives 1, 2, 3, and the Preferred Alternative) the water quality of stormwater discharging from I-25 would be improved compared to the No Action Alternative and would represent a positive water quality benefit that would be realized in the river. Stormwater from the system alternatives would not adversely impact water quality in combination with other reasonably foreseeable projects. The amount of I-25 right-of-way area collecting and discharging stormwater into the South Platte River is minor compared to the overall residential and commercial area and to stormwater managed by the City and County of Denver. As shown in **Table 4.20-5**, several other projects are anticipated to provide improvements to stormwater drainage and water quality in the vicinity, including:

- T-REX
- West Corridor LRT
- Denver Storm Drainage Master Plan
- Denver Stormwater Quality Master Plan
- South Platte River Channel Improvements – 8th Avenue north
- General Chemical Site Remediation

The floodplain along the South Platte River has been greatly reduced in size by channelization and fill in the first half of the 20th century. However, flood potential has been greatly reduced through construction of Chatfield Reservoir. Due to past modifications and land reclamation, the floodplain is currently constrained to a fairly limited area along the South Platte River; therefore, only a limited number of projects have the potential to impact the floodplain. Activities within the floodplain are currently well regulated, and potential future impacts could be expected to be controlled by the current regulatory framework.

Wetlands associated with the South Platte River and other drainages have been greatly reduced as a result of urbanization. Much of this loss of wetlands predated the original Valley Highway project, but continued largely unabated until the last couple of decades. Jurisdictional wetlands are now protected under regulations administered by the USACE. The Valley Highway Project and future projects would be expected to comply with these regulations, thus limiting future loss of wetlands. The system alternatives, including the Preferred Alternative, would impact a limited area of wetland, as described in detail in **Section 4.11** *Wetlands, Waters of the US, and Open Water*. Mitigation would be provided for these impacts. The No Action Alternative would not impact wetlands.

Future projects that could impact wetlands are primarily those that involve bridging of rivers or streams. Because most wetlands in the area are located adjacent to rivers, streams, or lakes, development projects have a more limited potential to impact wetlands in the area. As shown in **Table 4.20-5**, the following current and future projects may also impact wetlands:

- Mississippi Avenue/ Santa Fe Drive Intersection
- Federal Boulevard at Lakewood Gulch
- South Platte River Channel Improvements – 8th Avenue north

As described previously, the river corridor has been the subject of a recent planning effort aimed at developing a long-range management framework. The success of this effort will depend on the ability of various agencies to put in place the steps identified in the *Long Term Management Framework* (CCD, 2000a) as necessary for continued improvements in the river corridor.

Construction

Construction projects can cause disruptions and impacts to both the community and the environment. These may range from very short-term inconveniences to longer-term impacts affecting many people. Some of the primary types of impacts include access, noise, dust, and traffic delays. Construction impacts are limited and regulated by a variety of federal, state, and local controls. The construction impacts of the system alternatives were discussed in **Section 4.18** *Construction Impacts*.

As shown in **Table 4.20-5**, many other projects will have construction impacts within the Cumulative Impact Study Area. These projects have the potential to cause cumulative impacts with the Valley Highway Project during construction, depending on timing.
While the timing of many projects is unknown, cumulative impacts during construction are more likely with major projects which overlap or are in close proximity and are constructed during the same timeframe. These may include:

- Federal Boulevard from Alameda to 6th Avenue
- West Corridor Light Rail Transit
- Broadway/Lincoln Street Improvements Near I-25
- Cherokee Transit Oriented Development
- Gates Transit Oriented Development
- Former RTD Bus Barn Redevelopment

When several construction projects proceed contemporaneously, the cumulative impact of the projects on residents and the environment may be compounded, requiring additional coordination. This should be undertaken throughout the planning, design, and construction process, with the City and County of Denver taking the lead in coordination between projects.

4.20.3.3 Conclusions Regarding Cumulative Impacts

The areas surrounding the Valley Highway Project have been largely developed for more than 100 years. Current projects in the area include redeveloping several former industrial sites to provide residential and commercial space. This process of change has been going on in a number of areas of Denver, and has been the focus of several parallel planning efforts, most notably the recent *Blueprint Denver* and individual site rezoning and development plan reviews.

Within the project area, established residential areas are expected to remain the same. Commercial and industrial areas are anticipated to have a greater amount of change, but industrial use is expected to continue in the central project area for many years. In addition to redevelopment projects, a number of other transportation projects are anticipated. These projects focus on providing needed improvements on a local and regional basis, as well as expanding multi-modal choices and access.

The City and County of Denver has played and, is likely to continue to play, a very active role in planning for changes that impact the communities and environment in this area. These efforts are aided by the work of many other federal, state, and local agencies. Through this coordinated process, the quality of life can be maintained and the environment protected.

The Preferred Alternative has been identified by CDOT and FHWA as providing a balance between transportation improvements and environmental impacts. The environmental consequences of the system alternatives would not result in significant cumulative impacts to the key resources discussed above, provided that ongoing coordination continues and other future projects are reviewed appropriately. This conclusion is based on the following for each key resource:

- **Traffic / Transportation** – The system alternatives, including the Preferred Alternative, were developed as part of the on-going regional and local transportation planning process. When considered with other current and planned future transportation projects, the Preferred Alternative and the other system alternatives would provide a net benefit in terms of reduced congestion, increased safety, and increased pedestrian bicycle mobility in the local and regional area compared to the No Action Alternative.

- **Socio-Economics and Community** – The Preferred Alternative and the other system alternatives are generally consistent with recent land use and community planning by the City and County of Denver. There are a number of current and future transportation and redevelopment efforts in the area. These projects in concert with the Valley Highway Project would generally be expected to benefit the community, consistent with the planning vision articulated in *Blueprint Denver*. On-going coordination between agencies is expected to reduce disruptions and provide a measure of continuity between projects.
- **Parks and Recreation** – Section 4(f) provides strong protection of public parks that may be affected by the system alternatives. With this protection and appropriate planning, the incremental effect of the Valley Highway Project on parks and recreation would be minor. The City and County of Denver also has strong statutory and planning procedures in place to protect and improve its public parks. The Preferred Alternative and the other system alternatives include mitigation measures for park impacts. These measures together will protect Denver's parks from degradation of function by the system alternatives and/or other projects. The Valley Highway project is not expected to trigger other negative impacts to parks, and the impacts of this project are being mitigated in a comprehensive manner. Park impacts and mitigation for the project are discussed in detail in **Section 4.3** *Parks and Recreation* and **Chapter 5** *Section 4(f) Evaluation*.
- **Air Quality** – The reduction in congestion provided by the system alternatives will provide some localized reduction in emissions, compared to the No Action Alternative. In addition, national programs will continue to reduce vehicle emissions over time. Regional programs are in place to protect and improve metro Denver area air quality. The regional air quality conformity process would be expected to ensure that significant cumulative impacts do not occur.
- **Noise** – Noise impact analysis and mitigation evaluation performed for the system alternatives included the cumulative impacts of multiple traffic noise sources. This analysis indicated that the system alternatives, including the Preferred Alternative, would have little or no incremental effect on noise levels, compared to the No Action Alternative. This same type of analysis would be conducted for future highway projects, ensuring that cumulative impacts are fully evaluated. The City and County of Denver has a noise ordinance and on-going enforcement program directed at a variety of noise sources that could impact the community. As a result, significant cumulative impacts would not be expected.
- **Historic Resources** – Each of the system alternatives impact one or more historic transportation structures; however, no other historic structures are impacted by any of the system alternatives. The Preferred Alternative would not adversely affect any historic properties. Section 4(f) affords strong protection for historic sites that may be impacted by federal transportation projects, and an ongoing evaluation and consultation process will ensure that historic sites are not impacted unless no feasible and prudent alternative exists. Protection of historic sites is voluntary for non-federal projects; however, in recent years Denver has shown a strong trend in reuse of historic buildings for a variety of uses. It is expected that this trend will continue, but some historic structures (such as some structures on the former Gates Rubber Company site) may be lost if the owners are not able or choose not to reuse the structures.

- **Water Resources, Floodplains, and Wetlands** – Historically, a number of individual actions since the founding of Denver led to a degradation of water quality, encroachment to floodplains, and reduction in the amount and quality of wetlands. However, over recent decades, increasing public concern and regulation has resulted in a great measure of protection of these resources. The system alternatives, including the Preferred Alternative, would greatly improve the quality of stormwater discharge from highway facilities, any minor floodplain encroachments would be reviewed and approved, and relatively minor impacts to wetlands would be mitigated by replacement through the use of wetland banking. Overall, the incremental effect of the Valley Highway Project would be positive compared with the No Action Alternative. These resources would be subject to the same protections for other projects; therefore, no significant cumulative impacts would result.
- **Construction** – Over the past few years, the neighborhoods surrounding the project area have experienced a number of major construction projects. This is expected to continue with several additional transportation and redevelopment projects planned for the area. If these projects were to proceed in an uncoordinated manner, there could be a number of conflicts and complications that could impact the neighborhoods. However, there currently exists and will continue to be on-going coordination and regulatory processes to identify and mitigate construction impacts from multiple projects. The City and County of Denver plays a key role in this process, as do other agencies such as CDOT and RTD. Coordination with residents, business owner and service providers is also very important, and through continuation of this process, significant cumulative impacts related to construction will be avoided.

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TABLE OF CONTENTS

Page

4.21 Summary of Impacts, Mitigation Measures, and Monitoring Commitments ..4.21-1
4.21.1 Summary of Direct and Indirect Impacts.....4.21-1
4.21.2 Summary of Mitigation Measures and Monitoring 4.21-8

LIST OF TABLES

Page

Table 4.21-1 Summary of Direct and Indirect Impacts 4.21-1
Table 4.21-2 Summary of Mitigation Measures and Monitoring 4.21-9

4.21 Summary of Impacts, Mitigation Measures, and Monitoring Commitments

This section summarizes the social and environmental consequences that would result from each of the system alternatives, which include System Alternatives 1, 2, 3, the Preferred Alternative and the No Action Alternative, based on the detailed discussion presented in earlier sections of this chapter. Measures to mitigate these consequences and possible environmental monitoring are also summarized.

This section focuses on impacts to and mitigation measures for the social and environmental resources discussed in **Chapter 4** *Affected Environment, Environmental Consequences, and Mitigation Measures*. Transportation improvements and impacts are presented in **Chapter 3** *Transportation Analysis*.

4.21.1 Summary of Direct and Indirect Impacts

Table 4.21-1 summarizes the direct and indirect impacts for the system alternatives under consideration and the No Action Alternative.

Table 4.21-1 Summary of Direct and Indirect Impacts

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Socio-Economics and Community				
No land use impacts.	Displacement of businesses mostly in Areas of Change as established by the City and County of Denver in *Blueprint Denver*. No displacement of residences.	Displacement of businesses mostly in Areas of Change as established by the City and County of Denver in *Blueprint Denver*. Displacement of residences.	Displacement of businesses mostly in Areas of Change as established by the City and County of Denver in *Blueprint Denver*. Displacement of residences.	Displacement of businesses mostly in Areas of Change as established by the City and County of Denver in *Blueprint Denver*. Displacement of residences.
No pedestrian and bicycle improvements.	Pedestrian and bicycle improvements.	Pedestrian and bicycle improvements.	Pedestrian and bicycle improvements.	Pedestrian and bicycle improvements.
Continued safety problems and deteriorating facilities.	Improved safety; replacement/ improvement of deteriorating facilities.	Improved safety; replacement/ improvement of deteriorating facilities.	Improved safety; replacement/ improvement of deteriorating facilities.	Improved safety; replacement/ improvement of deteriorating facilities.
Increased cut-through traffic due to congestion on highways.	Reduced cut-through traffic due to reduction in congestion.	Reduced cut-through traffic due to reduction in congestion.	Reduced cut-through traffic due to reduction in congestion.	Reduced cut-through traffic due to reduction in congestion

Table 4.21-1 Summary of Direct and Indirect Impacts (Continued)

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Right-of-Way and Displacements				
No right-of-way impacts. No business or residential displacement impacts.	Requires acquisition of 18 acres of right-of-way. No displacement of residences. Full purchase of 32 properties. Partial purchase of 38 properties Access modification to 16 properties. Displacement of 25 businesses	Requires acquisition of 29 acres of right-of-way. Displacement of 9 residences. Full purchase of 60 properties. Partial purchase of 28 properties. Access modification to 13 properties. Displacement of 51 businesses.	Requires acquisition of 21 acres of right-of-way. Displacement of 3 residences. Full purchase of 39 properties. Partial purchase of 36 properties. Access modification to 14 properties. Displacement of 38 businesses.	Requires acquisition of 21 acres of right-of-way Displacement of 3 residences Full purchase of 36 properties Partial purchase of 33 properties Access modification to 17 properties Displacement of 30 businesses.
No relocation of Consolidated Mainline Railroad.	Relocation of Consolidated Main Line railroad.	Relocation of Consolidated Main Line railroad.	Relocation of Consolidated Main Line railroad.	Relocation of Consolidated Main Line railroad.
Parks and Recreation				
Continued poor east-west connection to South Platte Trail at Alameda Avenue.	Improved east-west connection to South Platte Trail at Bayaud Avenue.	Improved east-west connection to South Platte Trail at Bayaud Avenue.	Improved east-west connection to South Platte Trail at Bayaud Avenue.	Improved east-west connection to South Platte Trail at Bayaud Avenue.
No impacts to existing parks.	Requires use of small parts of Barnum (0.01 acre), Barnum North (0.02 acre), and Barnum East (0.16 acre) parks.	Requires use of small parts of Barnum (0.01 acre) and Barnum North (0.05 acre) parks, and a substantial portion of Barnum East (1.54 acres) park.	Requires use of small parts of Barnum (0.02 acre), Barnum North (0.40 acre), and Barnum East (0.14 acre) parks.	Requires use of small parts of Barnum (0.01 acre) and Barnum North (0.05 acre) parks, and a substantial portion of Barnum East (1.54 acre) park.
Aesthetics and Urban Design				
No change in current poor aesthetics and deteriorating visual condition of aging structures.	Improvements to highway landscapes, retaining walls, high-mast lighting, signage, slope and ditch paving, and concrete barriers.	Improvements to highway landscapes, retaining walls, high-mast lighting, signage, slope and ditch paving, and concrete barriers.	Improvements to highway landscapes, retaining walls, high-mast lighting, signage, slope and ditch paving, and concrete barriers.	Improvements to highway landscapes, retaining walls, high-mast lighting, signage, slope and ditch paving, and concrete barriers
Completion of T-REX project and I-25 / Broadway viaduct will improve aesthetics at southern limit of project.	Positive visual effect from movement of northbound I-25 on-ramp from Broadway away from residential area.	Positive visual effect from movement of northbound I-25 on-ramp from Broadway away from residential area. Grade separation of southbound Broadway to southbound I-25 would have a negative visual effect if a flyover structure were used.	Positive visual effect from movement of northbound I-25 on-ramp from Broadway away from residential area.	Positive visual effect from movement of northbound I-25 on-ramp from Broadway away from residential area.

Table 4.21-1 Summary of Direct and Indirect Impacts (Continued)

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Aesthetics and Urban Design (continued)				
No change at I-25 and Santa Fe Drive.	Increased visibility of northbound I-25 on-ramp from northbound Santa Fe Drive.	Increased visibility of northbound I-25 on-ramp from northbound Santa Fe Drive.	Increased visibility of northbound I-25 on-ramp from northbound Santa Fe Drive.	Increased visibility of northbound I-25 on-ramp from northbound Santa Fe Drive.
No change at Santa Fe Drive/Kalamath Street and the Consolidated Main Line.	Canyon-like effect of grade separation of Santa Fe Drive / Kalamath Street below the Consolidated Main Line.	Canyon-like effect of grade separation of Santa Fe Drive / Kalamath Street below the Consolidated Main Line. Visibility of elevated grade separation structure carrying Santa Fe / Kalamath Street over Alameda Avenue.	Canyon-like effect of grade separation of Santa Fe Drive / Kalamath Street below the Consolidated Main Line. Canyon-like effect of grade separation of Santa Fe Drive / Kalamath Street below Alameda Avenue.	Canyon-like effect of grade separation of Santa Fe Drive / Kalamath Street below the Consolidated Main Line.
Air Quality				
Poorer air quality due to increased traffic congestion.	Improved air quality due to improved traffic flow. Temporary increase in air emissions during construction.	Improved air quality due to improved traffic flow. Temporary increase in air emissions during construction.	Improved air quality due to improved traffic flow. Temporary increase in air emissions during construction.	Improved air quality due to improved traffic flow. Temporary increase in air emissions during construction.
Noise and Vibration				
Approximately 66 residences would exceed noise abatement criteria.	Approximately 66 residences would exceed noise abatement criteria.	Approximately 52 residences would exceed noise abatement criteria.	Approximately 58 residences would exceed noise abatement criteria.	Approximately 55 residences would exceed noise abatement criteria
Noise abatement criteria exceeded in portions of the following parks: - Barnum Park - Barnum Park East - Barnum Park North - Frog Hollow Park - Valverde Park - Habitat Park - Vanderbilt Park - Vanderbilt Park East	Noise abatement criteria exceeded in portions of the following parks: - Barnum Park - Barnum Park East - Barnum Park North - Frog Hollow Park - Valverde Park - Habitat Park - Vanderbilt Park - Vanderbilt Park East	Noise abatement criteria exceeded in portions of the following parks: - Barnum Park - Barnum Park East - Barnum Park North - Frog Hollow Park - Valverde Park - Habitat Park - Vanderbilt Park - Vanderbilt Park East	Noise abatement criteria exceeded in portions of the following parks: - Barnum Park - Barnum Park East - Barnum Park North - Frog Hollow Park - Valverde Park - Habitat Park - Vanderbilt Park - Vanderbilt Park East	Noise abatement criteria exceeded in portions of the following parks: - Barnum Park - Barnum Park East - Barnum Park North - Frog Hollow Park - Valverde Park - Habitat Park - Vanderbilt Park - Vanderbilt Park East

Table 4.21-1 Summary of Direct and Indirect Impacts (Continued)

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Noise and Vibration (continued)				
Noise abatement criteria would be exceeded along portions of the South Platte River Trail.	Noise abatement criteria would be exceeded along portions of the South Platte River Trail.	Noise abatement criteria would be exceeded along portions of the South Platte River Trail.	Noise abatement criteria would be exceeded along portions of the South Platte River Trail.	Noise abatement criteria would be exceeded along portions of the South Platte River Trail.
56 commercial properties would exceed the noise abatement criteria.	54 commercial properties would exceed the noise abatement criteria.	37 commercial properties would exceed the noise abatement criteria.	38 commercial properties would exceed the noise abatement criteria.	42 commercial properties would exceed the noise abatement criteria.
No vibration impacts.	No vibration impacts.	No vibration impacts.	No vibration impacts.	No vibration impacts
Historic and Archaeological Preservation				
No impacts.	No impacts.	Requires replacement of three historic bridges and one historic grade separation structure.	Requires replacement of three historic bridges and one historic grade separation structure.	No impacts.
Paleontology				
No impacts to paleontology.	Denver Formation fossils may be encountered; monitoring required.	Denver Formation fossils may be encountered; monitoring required.	Denver Formation fossils may be encountered; monitoring required.	Denver Formation fossils may be encountered; monitoring required
Water Resources				
No short-term sediment impacts.	Short-term increase in sediment from construction.	Short-term increase in sediment from construction.	Short-term increase in sediment from construction.	Short-term increase in sediment from construction.
No change in area drainage.	Increase in impervious drainage area.	Increase in impervious drainage area.	Increase in impervious drainage area.	Increase in impervious drainage area.
Continued discharge of stormwater directly to the South Platte River without benefit of water quality ponds or best management practices.	Consolidate stormwater runoff with fewer outfalls to the South Platte River. Improved quality of stormwater discharge due to construction of water quality ponds and best management practices.	Consolidate stormwater runoff with fewer outfalls to the South Platte River. Improved quality of stormwater discharge due to construction of water quality ponds and best management practices.	Consolidate stormwater runoff with fewer outfalls to the South Platte River. Improved quality of stormwater discharge due to construction of water quality ponds and best management practices.	Consolidate stormwater runoff with fewer outfalls to the South Platte River. Improved quality of stormwater discharge due to construction of water quality ponds and best management practices.

Table 4.21-1 Summary of Direct and Indirect Impacts (Continued)

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Floodplains				
Continued flooding of I-25 under Alameda Avenue.	Upstream floodplain elevation reduced by raising the US 6 bridge over the river. Temporary impacts during replacement of Santa Fe Drive, Alameda Avenue, and US 6 bridges and construction of Bayaud Avenue bicycle/pedestrian bridge. Encroachment into floodplain from southbound I-25 off-ramp to Alameda Avenue and I-25 off-ramp to Santa Fe Drive.	Upstream floodplain elevation reduced by raising the US 6 bridge over the river. Temporary impacts during replacement of Santa Fe Drive, Alameda Avenue, and US 6 bridges and construction of Bayaud Avenue bicycle/pedestrian bridge. Encroachment into floodplain from southbound I-25 off-ramp to Alameda Avenue and I-25 off-ramp to Santa Fe Drive. Grade Separation of Alameda Avenue and Santa Fe Drive/ Kalamath Street would channelize stormwater flow along Alameda.	Upstream floodplain elevation reduced by raising the US 6 bridge over the river. Temporary impacts during replacement of Santa Fe Drive, Alameda Avenue, and US 6 bridges and construction of Bayaud Avenue bicycle/pedestrian bridge. Encroachment into floodplain from southbound I-25 off-ramp to Alameda Avenue and I-25 off-ramp to Santa Fe Drive.	Upstream floodplain elevation reduced by raising the US 6 bridge over the river. Temporary impacts during replacement of Santa Fe Drive, Alameda Avenue, and US 6 bridges and construction of Bayaud Avenue bicycle/pedestrian bridge. Encroachment into floodplain from southbound I-25 off-ramp to Alameda Avenue and I-25 off-ramp to Santa Fe Drive.
Wetlands, Waters of the U.S. and Open Water				
No impacts to existing wetlands.	0.274 acre of jurisdictional and non-jurisdictional wetlands impacted. 0.495 acre of open water impacted.	0.281 acre of jurisdictional and non-jurisdictional wetlands impacted. 0.495 acre of open water impacted.	0.240 acre of jurisdictional and non-jurisdictional wetlands impacted. 0.495 acre of open water impacted.	0.274 acre of jurisdictional and non-jurisdictional wetlands impacted 0.495 acre of open water impacted.

Table 4.21-1 Summary of Direct and Indirect Impacts (Continued)

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Vegetation and Wildlife				
No impacts to vegetation.	Removal of vegetation during construction. Potential introduction of noxious weeds into areas disturbed by construction.	Removal of vegetation during construction. Potential introduction of noxious weeds into areas disturbed by construction.	Removal of vegetation during construction. Potential introduction of noxious weeds into areas disturbed by construction.	Removal of vegetation during construction. Potential introduction of noxious weeds into areas disturbed by construction.
Continued restriction of wildlife movement along the South Platte River due to low bridges.	Short-term disturbance of wildlife and aquatic habitat during construction. Improvements to US 6 and Santa Fe Drive bridges would move traffic away from wildlife habitat along the South Platte. Improvement of wildlife travel corridor by increased horizontal and vertical clearance of bridges.	Short-term disturbance of wildlife and aquatic habitat during construction. Improvements to US 6 and Santa Fe Drive bridges would move traffic away from wildlife habitat along the South Platte. Improvement of wildlife travel corridor by increased horizontal and vertical clearance of bridges.	Short-term disturbance of wildlife and aquatic habitat during construction. Improvements to US 6 and Santa Fe Drive bridges would move traffic away from wildlife habitat along the South Platte. Improvement of wildlife travel corridor by increased horizontal and vertical clearance of bridges.	Short-term disturbance of wildlife and aquatic habitat during construction. Improvements to US 6 and Santa Fe Drive bridges would move traffic away from wildlife habitat along the South Platte. Improvement of wildlife travel corridor by increased horizontal and vertical clearance of bridges.
Hazardous Waste				
No hazardous waste impacts.	14 properties identified with potential or recognized environmental conditions to be acquired for right-of-way.	19 properties identified with potential or recognized environmental conditions to be acquired for right-of-way.	13 properties identified with potential or recognized environmental conditions to be acquired for right-of-way.	13 properties identified with potential or recognized environmental conditions to be acquired for right-of-way.
	Excavations in the vicinity of Broadway/ I-25 interchange would encounter contaminated groundwater and soil.	Excavations in the vicinity of Broadway/ I-25 interchange would encounter contaminated groundwater and soil. Excavation for southbound Broadway to southbound I-25 tunnel would encounter contaminated soil and groundwater, and could conflict with on-going remediation by others.	Excavations in the vicinity of Broadway/ I-25 interchange would encounter contaminated groundwater and soil.	Excavations in the vicinity of Broadway / I-25 interchange would encounter contaminated groundwater and soil.

Table 4.21-1 Summary of Direct and Indirect Impacts (Continued)

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Hazardous Waste (continued)				
	Excavations in the vicinity of the Santa Fe Drive / I-25 interchange may encounter contaminated groundwater, soil, and fill material.	Excavations in the vicinity of the Santa Fe Drive / I-25 interchange may encounter contaminated groundwater, soil, and fill material.	Excavations in the vicinity of the Santa Fe Drive / I-25 interchange may encounter contaminated groundwater, soil, and fill material.	Excavations in the vicinity of the Santa Fe Drive / I-25 interchange may encounter contaminated groundwater, soil, and fill material.
	Excavations in the vicinity of the Alameda Avenue / I-25 interchange may encounter contaminated groundwater, soil, and fill material.	Excavations in the vicinity of the Alameda Avenue / I-25 interchange may encounter contaminated groundwater, soil, and fill material.	Excavations in the vicinity of the Alameda Avenue / I-25 interchange may encounter contaminated groundwater, soil, and fill material.	Excavations in the vicinity of the Alameda Avenue/ I-25 interchange may encounter contaminated groundwater, soil, and fill material.
	Relocation of Consolidated Main Line along I-25 parallel to existing track may encounter contaminated groundwater, soil, and fill material.	Relocation of Consolidated Main Line along I-25 parallel to existing track may encounter contaminated groundwater, soil, and fill material.	Relocation of Consolidated Main Line along I-25 parallel to existing track may encounter contaminated groundwater, soil, and fill material.	Relocation of Consolidated Main Line along I-25 parallel to existing track may encounter contaminated groundwater, soil, and fill material.
	Excavations in the vicinity of the I-25 / US 6 interchange may encounter contaminated groundwater, soil, fill material, and methane. Excavations along US 6 may encounter contaminated soil and groundwater.	Excavations in the vicinity of the I-25 / US 6 interchange may encounter contaminated groundwater, soil, fill material, and methane. Excavations along US 6 may encounter contaminated soil and groundwater.	Excavations in the vicinity of the I-25 / US 6 interchange may encounter contaminated groundwater, soil, fill material, and methane. Excavations along US 6 may encounter contaminated soil and groundwater.	Excavations in the vicinity of the I-25 / US 6 interchange may encounter contaminated groundwater, soil, fill material, and methane. Excavations along US 6 may encounter contaminated soil and groundwater.
	Santa Fe Drive, Alameda Avenue, and US 6 bridges may be coated with lead-based paint.	Santa Fe Drive, Alameda Avenue, US 6, and railroad bridges may be coated with lead-based paint.	Santa Fe Drive, Alameda Avenue, US 6, and railroad bridges may be coated with lead-based paint.	Santa Fe Drive, Alameda Avenue, US 6, and railroad bridges may be coated with lead-based paint.

Table 4.21-1 Summary of Direct and Indirect Impacts (Continued)

No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Soils and Geology				
No impacts to soils.	Expansive soils and unsuitable fill material may be encountered.	Expansive soils and unsuitable fill material may be encountered.	Expansive soils and unsuitable fill material may be encountered.	Expansive soils and unsuitable fill material may be encountered
Energy				
Increase in fuel use due to inefficient fuel use from increased traffic congestion.	Increase in energy use due to construction. Decrease in fuel use due to decreased traffic congestion.	Increase in energy use due to construction. Decrease in fuel use due to decreased traffic congestion.	Increase in energy use due to construction. Decrease in fuel use due to decreased traffic congestion.	Increase in energy use due to construction. Decrease in fuel use due to decreased traffic congestion.
Construction				
No short-term construction-related impacts.	Short-term fugitive dust emissions during construction. Short-term construction noise. Short-term increase in sediment from construction. Short-term traffic delays. Short-term visual impacts. Short-term utility impacts.	Short-term fugitive dust emissions during construction. Short-term construction noise. Short-term increase in sediment from construction. Short-term traffic delays. Short-term visual impacts. Short-term utility impacts.	Short-term fugitive dust emissions during construction. Short-term construction noise. Short-term increase in sediment from construction. Short-term traffic delays. Short-term visual impacts. Short-term utility impacts.	Short-term fugitive dust emissions during construction. Short-term construction noise. Short-term increase in sediment from construction. Short-term traffic delays. Short-term visual impacts. Short-term utility impacts.

4.21.2 Summary of Mitigation Measures and Monitoring

Table 4.21-2 summarizes the mitigation measures and monitoring for the Valley Highway EIS System Alternatives 1, 2, 3, and the Preferred Alternative under consideration.

Table 4.21-2 Summary of Mitigation Measures and Monitoring

Socio-Economics and Community	• Continue information and discussions with local community during planning and implementation to minimize disruptions • Continue consideration of environmental justice through final design and implementation
Right-of-Way and Displacements	• Conform to the requirements set forth in the Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970 (Public Law 91-646) and the Uniform Relocation Act Amendments of 1987 (Public Law 100-17), each of which contains specific requirements that govern the manner in which a government entity acquires property for public use • Prepare a relocation analysis and provide relocation advisory service
Parks and Recreation	• Prepare final design to acquire the least possible amount of park land while meeting operational and safety requirements • Redesign/reconstruct Barnum East Park to provide equivalent or upgraded facilities (System Alternative 2 and Preferred Alternative)
Aesthetics and Urban Design	• Use conceptual "kit of parts" in design of aesthetic elements and treatments • Continue coordination with other agencies through final design and implementation
Air Quality	• Maintain construction equipment in good working order • Implement a dust control plan • Ensure no excessive idling of inactive or unnecessary equipment or vehicles • Use higher-grade fuel in construction equipment • Locate stationary equipment as far from sensitive receivers as possible
Noise and Vibration	• Provide noise barrier along I-25 in the vicinity of 800 block of S. Lincoln St. (System Alternatives 1, 3, and the Preferred Alternative), 2900 block of W. Short Place (System Alternative 1) and a portion of the South Platte River Trail (System Alternatives 1, 2, 3, and the Preferred Alternative) • Evaluate 3300 block of W. 5th Avenue for possible noise barrier (System Alternatives 1, 2, 3; and the Preferred Alternative dependent on acquisition or easement for strip of land needed for barrier) • No vibration mitigation measures are necessary • During preparation of final design, consider elements to reduce "nuisance noise" experienced near the highway
Historic and Archaeological Preservation	• Determine mitigation of adverse effects to any National Register of Historic Places -eligible or -listed resources through consultation with CDOT cultural resource staff, the State Historic Preservation Office, and if necessary, the Advisory Council on Historic Preservation. Mitigation measures may include preparation of graphic and narrative documentation to Historic American Buildings Survey / Historic American Engineering Record standards or by the development of public interpretation • Mitigation not required for System Alternative 1 or the Preferred Alternative
Paleontology	• Monitor, as feasible, areas where Denver Formation rocks may be disturbed. Have the CDOT paleontologist examine project design plans as each is finalized to determine the extent of impact to the Denver Formation, and the scope, if any, of monitoring work required
Water Quality and Water Resources	• Use construction BMPs to reduce temporary impacts • On-site project area runoff will be controlled through water quality ponds or other BMPs to settle and improve water quality runoff releasing to the South Platte River • Reduction of the overall number of outfalls into the South Platte River and installation of energy dissipaters, such as riprap, at outfalls to reduce erosion potential • Use of pump stations to remove runoff at underpasses on grades separations and water quality ponds to settle sediment and improve water quality releasing into the South Platte River • Application of the BMPs would be further defined during the final engineering phase of this project. Substantial conditions and designs would be developed during final design, as appropriate, and in accordance with CDOT's environmental mission statement and environmental policy

Table 4.21-2 Summary of Mitigation Measures and Monitoring (Continued)

Floodplains	• Construct bridges on piers or outside of floodplain to minimize impacts • Restore bridge construction areas • Install storm sewer improvements to reduce flooding on I-25 under Alameda Avenue • Provide additional volume in areas of floodplain encroachment for overall “no rise” in floodplain
Wetlands, Waters of the U.S. and Open Water	• Mitigate jurisdictional and non-jurisdictional wetlands on a 1:1 basis • Minimize culvert lengths and use construction BMPs to reduce impacts • Use construction BMPs to reduce temporary impacts • Use water quality BMPs to minimize indirect impacts from non-point source pollution
Vegetation and Wildlife	• Revegetate construction areas using CDOT-approved native seed mix • If construction occurs outside of appropriate seeding windows, slopes will be temporarily protected from erosion using mulch and mulch tackifier • Replace trees greater than 2 inches in diameter on a 1:1 basis • Existing shrubs removed during construction will be replaced with native species to their pre-construction aerial coverage • Impacted landscape areas (irrigated or otherwise) shall be enhanced and incorporated into final design to ensure the existing landscape does not become fragmented • Clean construction vehicles before entering construction site to control noxious weed introduction • Prepare and implement an Integrated Weed Management Plan to target noxious weed populations • Conduct habitat disturbing activities, such as tree removal, grading, scraping, grubbing, etc. during the non-breeding season unless the area has been verified by a qualified biologist that no active nests are present
Hazardous Waste	• Conduct individual, site-specific initial site assessments of properties before acquiring right-of-way • Conduct a preliminary site investigation before final design to identify soil and groundwater contamination that may affect feasibility evaluation and final design • Perform a remedial investigation/feasibility study in the area of the tunnel (System Alternative 2) • Prepare a materials handling plan and a health and safety plan, which includes asbestos-containing material, as required by Section 250.03 of the *CDOT Standard Specifications for Road and Bridge Construction* • Conduct an asbestos and miscellaneous material survey prior to demolition of any structures • Coordinate with OPS and CDPHE, as necessary, for properties being acquired • Perform a heavy metals based paint survey of bridges in the project area
Soils and Geology	• Consider potential for expansive soils and unsuitable fill during final design
Energy	• Consider energy conservation measures during final design

Table 4.21-2 Summary of Mitigation Measures and Monitoring (Continued)

Construction	Identify appropriate construction mitigation during final design and construction planning, with consideration of the following possible mitigation measures identified by the Citizens Working Group: • Use construction BMPs • Erect temporary noise walls / screens; make available vouchers for hotels • Schedule construction during less noise-sensitive times; create noise hotline • Send information to affected public before implementing construction activities • Use noise blankets on equipment and quiet-use generators • Combine noisy operations and schedule to occur during the same time period • Use alternative construction methods, such as sonic or vibratory pile driving, in sensitive areas whenever possible • Use enhanced signing; develop alternate access enhancements • Use advertising / implement public relations activities • Do not close multiple interchanges concurrently • Limit detours to major arterial streets – ensure no local street detours • Schedule construction during periods of least traffic • Provide geometric enhancements including wider lanes and better visibility • Limit construction vehicles to major arterials • Enforce speed restrictions; provide adequate space for enforcement on I-25 • Implement use of Courtesy Patrol • Phase construction to limit traffic in neighborhoods • Coordinate work activities to avoid coinciding with local sporting / entertainment events • Advance traffic diversion (470 Beltway, Colfax as alternate to 6th Avenue) • Use intelligent transportation systems / variable message signs to advise and redirect traffic • Work with RTD to offer enhanced operations during peak construction • Develop traffic management plans; maintain access to local businesses and residents • Coordinate with emergency service providers to minimize delay and ensure access to properties • Use wetting / chemical inhibitors for dust • Implement procedures to ensure prompt and safe disposal of waste products • Develop stormwater management plan • Cover trucks hauling soil and other materials • Stabilize and cover stockpile areas • Minimize off-site tracking of mud and debris by washing construction equipment in contained areas and by temporary access stabilization • Avoid impacts to wetlands or other areas of important habitat value in addition to those impacted by the project itself • Control and prevent concrete washout and construction wastewater by including proper specifications in project designs, adhering to those specifications, and reviewing design specifications to ensure adequacy in preventing water pollution by concrete washout • Store equipment and materials in designated areas only • Remove any unused detour pavement or signs

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TABLE OF CONTENTS

Page

5.0 FINAL SECTION 4(F) EVALUATION 5-1

5.1 Parks 5-6

5.2 Coordination 5-21

5.3 Section 4(f) Finding 5-21

LIST OF FIGURES

Page

Figure 5-1 Historic Properties and Parks Subject to Section 4(f) Use 5-3
Figure 5-2 Parks Impacts – System Alternative 1 5-7
Figure 5-3 Parks Impacts – System Alternative 2 5-8
Figure 5-4 Parks Impacts – System Alternative 3 5-9
Figure 5-5 Parks Impacts - Preferred Alternative 5-10
Figure 5-6 Barnum East Park Concept – Preferred Alternative 5-19

LIST OF TABLES

Page

Table 5-1 Summary of Section 4(f) Use by Alternative 5-4
Table 5-2 Section 4(f) Protected Parks Subject to Use 5-6
Table 5-3 Elements of Barnum East Park Reconstruction 5-20

5.0 FINAL SECTION 4(F) EVALUATION

Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 U.S.C. Section 303 and 23 U.S.C. Section 138) mandates that the Secretary of Transportation shall not approve any transportation project requiring the use of publicly owned parks, recreation areas or wildlife and waterfowl refuge, or significant historic sites, regardless of ownership, unless:

- there is no prudent and feasible alternative to using that land
- the program or project includes all possible planning to minimize harm to the public park, recreation area, wildlife or waterfowl refuge, or significant site, resulting from that use

In order to be protected under Section 4(f), public parks and recreation facilities must be considered "significant," as determined by the federal, state, or local officials having jurisdiction over them. Historic sites qualifying for 4(f) protection must be officially listed on, or eligible for inclusion in, the National Register of Historic Places (NRHP), or contribute to a historic district that is eligible for or listed on the NRHP.

In federally-sponsored or assisted transportation projects, the NRHP-eligibility of specific resources is established through a consultation process outlined in Section 106 of the National Historic Preservation Act. Determinations of eligibility are made by the lead federal agency (FHWA), and concurrence is sought from the State Historic Preservation Officer (SHPO). NRHP-eligible or listed sites are referred to as "historic properties" under Section 106, and this term will be utilized hereafter in this Section 4(f) evaluation to avoid confusion.

Section 106 consultation also involves the assessment of effects to historic properties from the proposed federal undertaking. Determinations of effect are made by the lead federal agency (FHWA), who solicits concurrence from the SHPO. Effects to historic properties are determined by application of the Advisory Council on Historic Preservation's Criteria of Adverse Effect (36 CFR 800.5), resulting in a finding of either 1) "No Historic Properties Affected," 2) "No Adverse Effect," or 3) "Adverse Effect." Determinations of eligibility and effect made under Section 106 enable FHWA to identify and evaluate 4(f) impacts to historic properties.

Three possible types of impacts to a property protected under Section 4(f) must be evaluated, as defined in 23 CFR 771.135(p):

- A "direct use" of a Section 4(f) property occurs when land from a qualifying 4(f) property is acquired and permanently incorporated into a transportation facility
- A "use" under Section 4(f) also occurs when there is a temporary occupancy of 4(f) land during construction of the transportation facility that is considered adverse to the preservationist purposes of the Section 4(f) statute
- A "constructive use" may occur when no land is acquired from a Section 4(f) property but the proximity of the project results in indirect impacts which would "substantially impair" the current use of the property such as visual, noise, or vibration impacts, or impairment of property access

A Draft Section 4(f) Evaluation was included in the Draft EIS issued by FHWA and CDOT in April 2005. The Draft Section 4(f) Evaluation examined the impact that each of three build alternatives (System Alternatives 1, 2 and 3) would have on properties protected under Section 4(f). The Draft Section 4(f) Evaluation also analyzed possible avoidance alternatives and presented measures to minimize harm for each Section 4(f) use. At the time of the Draft EIS and Draft Section 4(f) Evaluation, FHWA and CDOT had not identified a Preferred Alternative for the project.

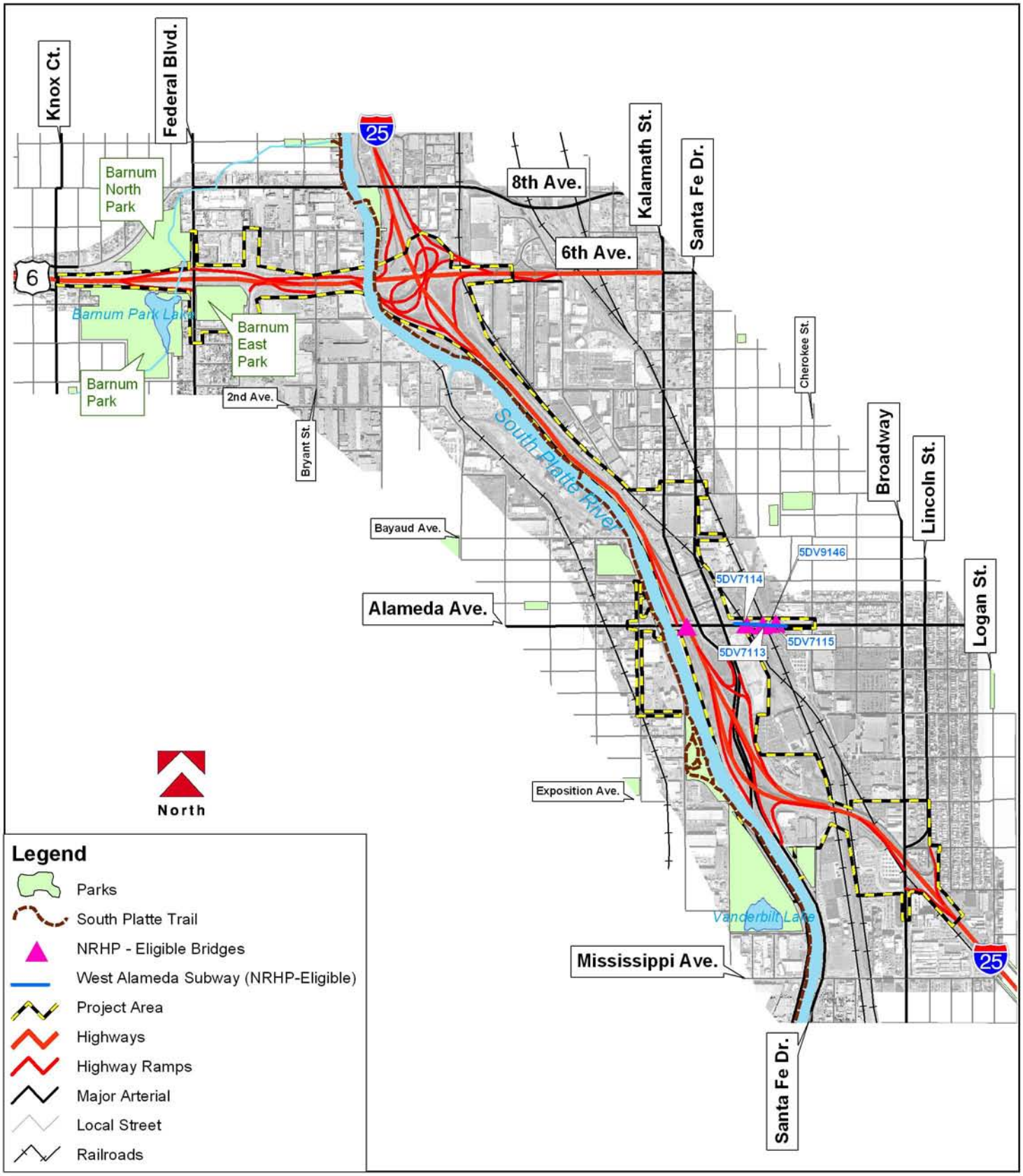
FHWA and CDOT have now identified a Preferred Alternative, as described in **Chapter 2** *Alternatives*. The Preferred Alternative combines elements of the three system alternatives to meet the project purpose and need objectives, while providing appropriate avoidance, minimization, and mitigation for project impacts. The Preferred Alternative also includes refinements made to reduce impacts and improve operations, in response to agency and public comments received during the Draft EIS comment period.

The Preferred Alternative is described in detail in **Chapter 2** *Alternatives* and includes the following major elements:

- **I-25 Mainline:** Widening of I-25 to provide a consistent section with four through lanes plus auxiliary lanes in each direction through the project area (these improvements were common to System Alternatives 1, 2, and 3 in the Draft EIS)
- **I-25/Broadway:** Tight diamond interchange (these improvements were included in System Alternative 3 in the Draft EIS)
- **I-25/Sante Fe Drive:** Single point urban interchange with a flyover ramp for northbound Santa Fe Drive to northbound I-25 (these improvements were common to System Alternatives 1, 2, and 3 in the Draft EIS)
- **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 (these improvements were included in System Alternative 1 in the Draft EIS)
- **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 through the project area (these improvements were include in System Alternative 2 in the Draft EIS)

Figure 5-1 shows the locations of historic properties and parks/recreation facilities that would be subject to Section 4(f) use under one or more of the system alternatives, which include the Preferred Alternative.

Table 5-1 summarizes the Section 4(f) uses that would result from the implementation on the Preferred Alternative, as well as System Alternatives 1, 2, and 3. The No Action Alternative, which does not address the project purpose and need, is also presented for comparison.



0 0.25 0.5 1 Miles

Historic Properties and Parks Subject to Section 4(f) Use

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 5-1

Table 5-1 Summary of Section 4(f) Use by Alternative

	No Action Alternative	System Alternative 1	System Alternative 2	System Alternative 3	Preferred Alternative
Historic Resources	***Subject to Section 4(f) use under this alternative?***				
Alameda Avenue Underpass/ Railroad Bridge (5DV7113)	No 4(f) Use	No 4(f) Use	4(f) Use	4(f) Use	**No 4(f) Use[1]**
Alameda Avenue Underpass/ Railroad Bridge (5DV7114)	No 4(f) Use	No 4(f) Use	4(f) Use	4(f) Use	**No 4(f) Use[1]**
Alameda Avenue Underpass/ Railroad Bridge (5DV7115)	No 4(f) Use	No 4(f) Use	4(f) Use	4(f) Use	**No 4(f) Use[1]**
West Alameda Subway (5DV9146)	No 4(f) Use	No 4(f) Use	4(f) Use	4(f) Use	**No 4(f) Use[1]**
Parks /Recreation Resources	***Subject to Section 4(f) use under this alternative?***				
Barnum Park	4(f) Use	4(f) Use	4(f) Use	4(f) Use	**4(f) Use**
Barnum East Park	4(f) Use	4(f) Use	4(f) Use	4(f) Use	**4(f) Use**
Barnum North Park	4(f) Use	4(f) Use	4(f) Use	4(f) Use	**4(f) Use**

Note: [1] This resource is not subject to Section 4(f) use with the Preferred Alternative and, therefore, is not discussed further in this Final Section 4(f) Evaluation

As shown in **Table 5-1**, three parks (Barnum, Barnum East, and Barnum North Parks) are subject to Section 4(f) use with implementation of the Preferred Alternative. This Final Section 4(f) Evaluation describes possible avoidance alternative (all of which were found not prudent and feasible) and minimization of harm for each Section 4(f) use under the Preferred Alternative.

As also shown in **Table 5-1**, the Preferred Alternative avoids Section 4(f) use of four historic properties (the West Alameda "Subway" grade separation structure and three associated railway bridges) that would have been subject to Section 4(f) use under System Alternatives 2 and 3. Avoidance alternatives and measures to minimize harm for these four additional historic properties were described in detail in the Draft Section 4(f) Evaluation. However, as these properties are not subject to use under the Preferred Alternative, no further analysis is required or presented in this Final Section 4(f) Evaluation. No historic properties are subject to Section 4(f) use under the Preferred Alternative.

The Draft Section 4(f) Evaluation discussed two additional resources: the Alameda Avenue Bridge over I-25 and the South Platte River Trail. Neither of these resources is subject to Section 4(f) use under the Preferred Alternative as follows:

- ***Alameda Avenue (SH 26) Bridge over I-25 (5DV7074):*** Subsequent to completion of the Draft Section 4(f) Evaluation, the Advisory Council for Historic Preservation approved an exemption regarding the Section 106 review process for effects from federal agency undertakings on the Interstate Highway System, with the exception of specific Interstate elements that have been determined by FHWA to embody national or exceptional significance. As a result of a special committee review, nine such elements were identified along the interstate highways within Colorado, including I-25. The Alameda Avenue (SH 26) Bridge over I-25 (5DV7074) does not appear on that list, indication that this bridge is not considered exceptional. Therefore, the Alameda Avenue Bridge over I-25 has been removed from consideration under both Section 106 and Section 4(f) in accordance with

the exemption.

- ***South Platte River Trail:*** The South Platte River Trail (see **Figure 5-1**) runs along the west side of the South Platte River, from the southern project limits to approximately 1st Avenue, where it crosses a bridge to the east side of the river. From this point to the northern project limits, the South Platte River Trail follows the east bank of the South Platte River. The trail serves dual purposes as a City and County of Denver maintenance access road, and as a heavily used public bike and pedestrian trail. Under the Preferred Alternative, a stretch of the trail that closely parallels I-25 would experience temporary construction impacts, but would ultimately be improved by the project. This trail segment extends from a point between 3rd and 4th Avenues, southward to a point between Ellsworth Avenue and 1st Avenue, where the trail crosses the South Platte River, and temporary detour during construction would be needed. Temporary construction impacts to the South Platte River Trail would also occur at US 6 and Alameda Avenue, where the existing bridges would be replaced, as well as at the crossing of a realigned southbound Santa Fe Drive. During bridge construction, the trail would be subject to temporary detour. The raising of bridge profiles would result in improvement of the trial. Neither acquisitions nor other permanent impacts are anticipated, nor should use of the trail be substantially impaired as a result of increased noise, visual, or access impacts. The temporary construction impacts to the South Platte River trail would not constitute a use within the meaning of Section 4(f).

Because the Alameda Avenue Bridge over I-25 and the South Platte River Trail are not subject to Section 4(f) use, they are not discussed further in this Section 4(f) Evaluation.

The remainder of this Final Section 4(f) Evaluation is organized as follow:

- Descriptions of the 4(f) protected properties subject to use with the Preferred Alternative and analyses of Preferred Alternative impacts, avoidance alternatives, and measures to minimize harm are presented in **Section 5.1** *Parks*.
- Coordination with pertinent agencies is summarized in **Section 5.2** *Coordination*.
- FHWA's finding is presented in **Section 5.3** *Section 4(f) Finding*.

5.1 Parks

Under the Preferred Alternative (as with System Alternatives 1, 2, and 3), three public parks (Barnum, Barnum East, and Barnum North Parks) would be subject to Section 4(f) use. These facilities are all owned by the City and County of Denver. The locations of these parks are shown on **Figure 5-1**.

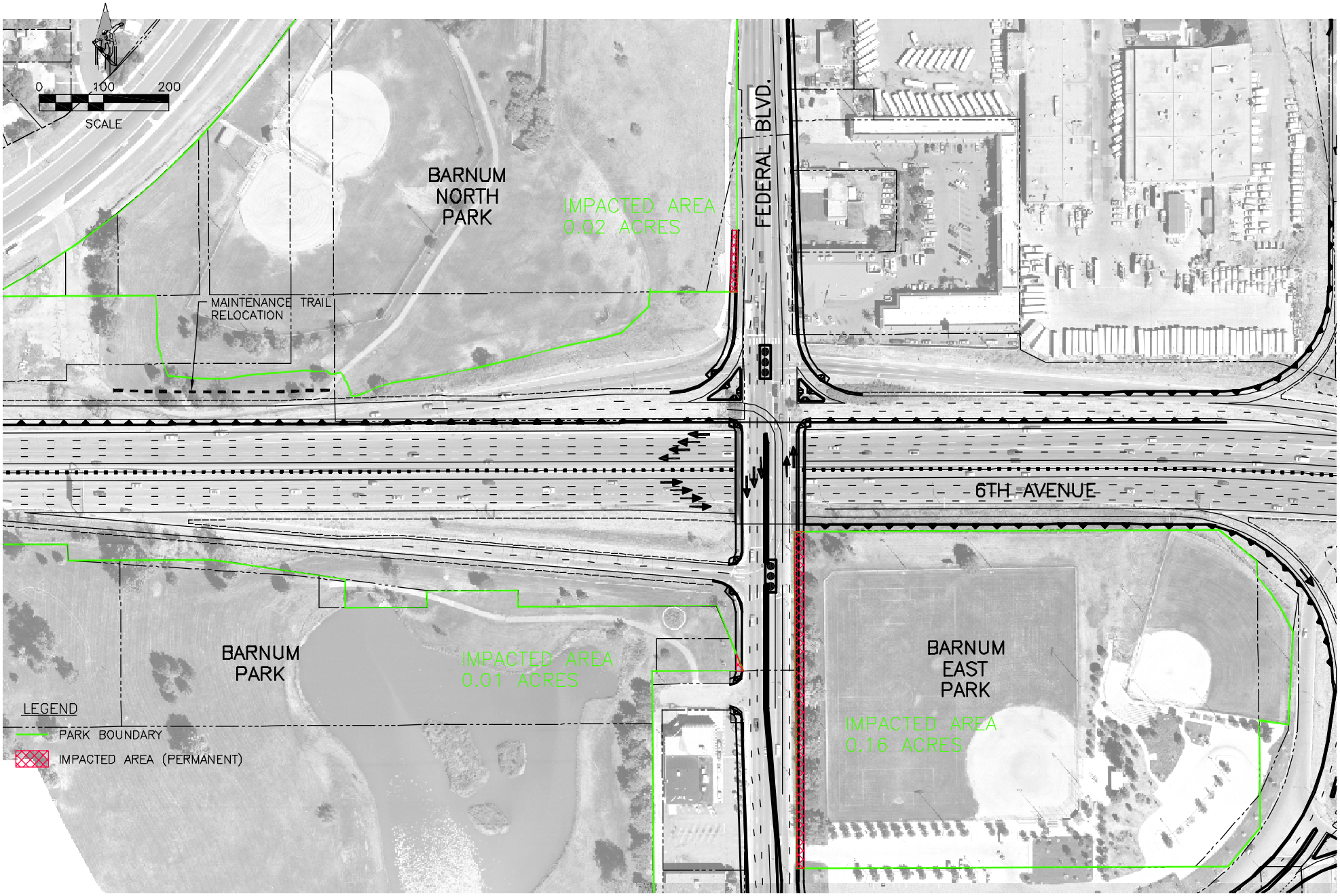
Table 5-2 provides information about the amenities of these City-owned parks; this information was derived from park inventory data provided by City and County of Denver (City and County of Denver, 2003a; Mike Butler, City and County of Denver Department of Parks and Recreation, personal communication, March 2, 2004). As shown on **Table 5-2**, two of these parks contain improvements made with Land and Water Conservation Act funds, and are therefore protected under Section 6(f) of the Act from conversion to uses other than public outdoor recreation without appropriate mitigation (generally replacement). Summary information about each impacted park is provided below.

Table 5-2 Section 4(f) Protected Parks Subject to Use

Park	Facilities	Section 6(f) Improvements?
Barnum Park	Basketball court, drinking fountain, flower garden, fishing/lake, outdoor swimming pool, playground, picnic tables and shelter, recreation center, restroom, soccer field, tennis court	Yes
Barnum East Park	Lighted baseball field, drinking fountain, restroom, lighted soccer field	No
Barnum North Park	Soccer field, lighted softball field, drinking fountain, restroom	Yes

The boundaries of these parks were investigated to resolve discrepancies noted in Geographical Information System (GIS) parcel data supplied by the City and County of Denver. This effort involved a review of records at the Denver Parks and Recreation Department, the Denver County Clerk & Recorder, the Denver County Assessor, the Colorado State Archives, the Denver City Clerk's Office, the Denver Public Library, CDOT archives, the Colorado Railroad Museum and the Denver County Transportation & Denver County Surveyor's offices (Farnsworth Group, 2004).

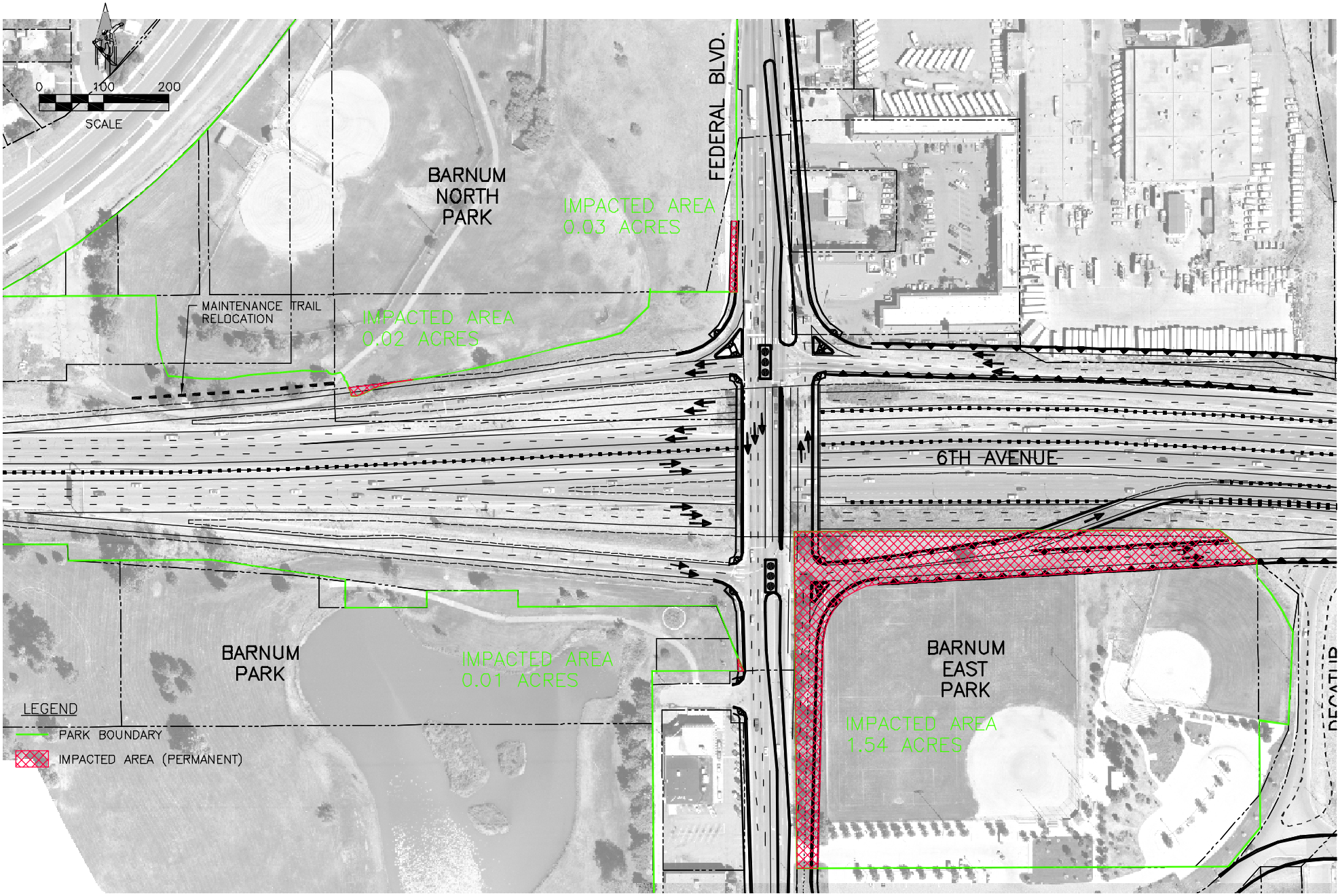
Impacts to parks are shown for System Alternatives 1, 2, 3, and the Preferred Alternative in **Figures 5-2, 5-3, 5-4, and 5-5** respectively. Impacts are described for each of the park and recreation resource below.



Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Park Impacts - System Alternative 1

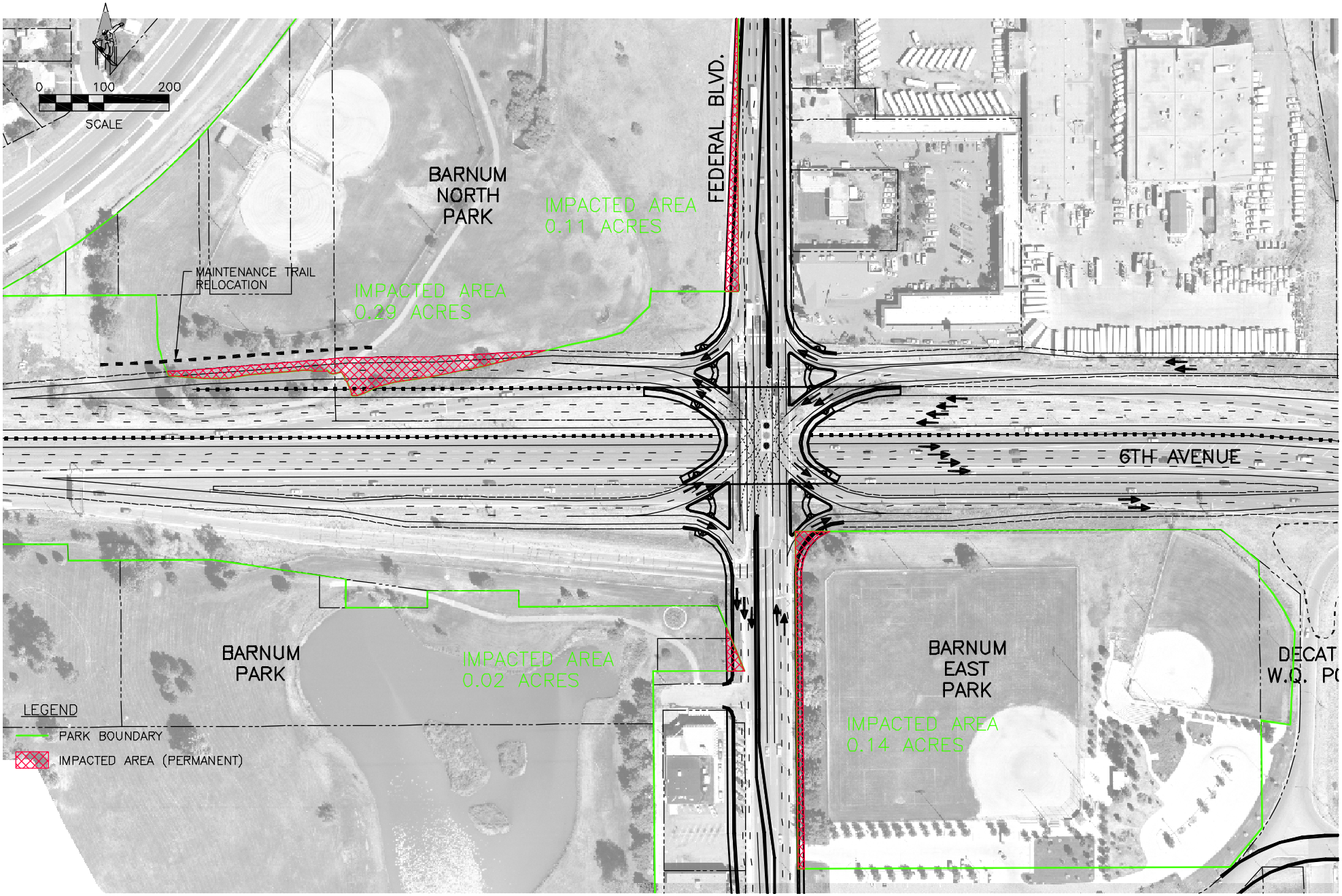
Figure 5-2



Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Park Impacts - System Alternative 2

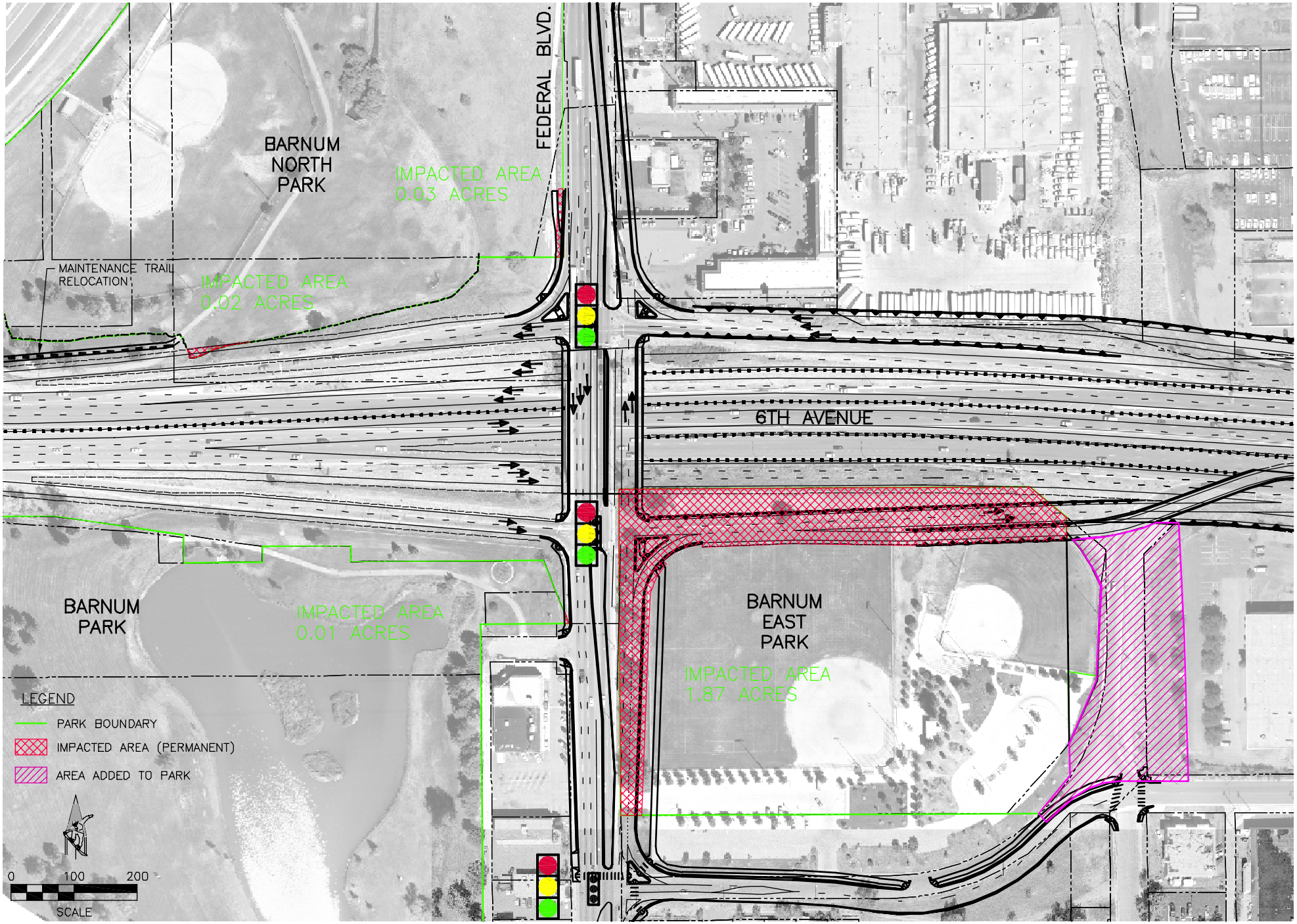
Figure 5-3



Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Park Impacts - System Alternative 3

Figure 5-4



Park Impacts - Preferred Alternative

Figure 5-5

5.1.1 Barnum Park Description and Impacts

5.1.1.1 DESCRIPTION OF RESOURCE

Barnum Park (also known as Barnum South Park) is located on the southwest side of the US 6 and Federal Boulevard interchange, within the Southwest Denver Park District. The irregularly shaped parcel extends approximately between US 6 on the north and 3rd Avenue on the south, and between Federal Boulevard on the east and Julian Street on the west. This 35.6-acre park contains a small man-made lake (Barnum Park Lake) and provides facilities for a wide variety of recreational activities, including fishing, swimming, basketball, soccer, tennis, picnicking, and walking. Recreational trails in Barnum Park approach within 60 feet of the US 6 ramp in the southwest quadrant and 75 feet of Federal Boulevard.

According to information provided by Colorado State Parks, Section 6(f) improvements were made at Barnum Park between 1965 and 1967 under Land and Water Conservation Project # 05-00106. The improvements included installation of 150 feet of 8-foot by 12-foot culvert, earth fill, landscaping, and sprinkler system expansion. These improvements were confined to the southeastern portion of the park, which is outside of the project area.

5.1.1.2 PROJECT IMPACTS

No Action Alternative

Under the No Action Alternative, the physical characteristics and recreational uses of Barnum Park would remain unchanged.

System Alternative 1

Proposed reconfiguration of the US 6/Federal Boulevard interchange includes widening of both sides of Federal Boulevard and would require the acquisition and direct use of a tiny (0.01 acre) piece of land from Barnum Park's northeast corner. This minor right-of-way would not affect existing use of Barnum Park. Barnum Park's 6(f) improvements would not be impacted by System Alternative 1. Temporary construction impacts associated with replacement of the Federal Boulevard Bridge over US 6 may occur, including damage to landscaping.

System Alternative 2

Widening of Federal Boulevard under System Alternative 2 would require the acquisition and direct use of a tiny (0.01 acre) piece of land from Barnum Park's northeast corner. This minor right-of-way acquisition would not affect existing use of Barnum Park. Barnum Park's 6(f) improvements would not be impacted by System Alternative 2. Temporary construction impacts associated with replacement of the Federal Boulevard Bridge over US 6 may occur, including damage to landscaping.

System Alternative 3

Widening of Federal Boulevard under System Alternative 3 would require the acquisition and direct use of a tiny (0.02 acre) piece of land from Barnum Park's northeast corner. This minor right-of-way acquisition would not affect existing use of Barnum Park. Barnum Park's 6(f)

improvements should not be impacted by System Alternative 3. Temporary construction impacts associated with replacement of the Federal Boulevard Bridge over US 6 may occur, including damage to landscaping.

Preferred Alternative

Widening of Federal Boulevard under the Preferred Alternative, which is similar to System Alternative 2 at this location, would require the acquisition and direct use of a tiny (0.01 acre) piece of land from Barnum Park's northeast corner. This minor right-of-way acquisition would not affect existing use of Barnum Park. Barnum Park's 6(f) improvements would not be impacted by the Preferred Alternative. Temporary construction impacts associated with replacement of the Federal Boulevard Bridge over US 6 may occur, including damage to landscaping.

5.1.2 Barnum East Park Description and Impacts

5.1.2.1 Description of Resource

Barnum East Park is located southeast of the intersection of US 6 and Federal Boulevard. This rectangular, 11.8-acre park is situated in the Southwest Denver Park District. Barnum East Park is bounded on the north by US 6, on the south by the on-ramp from Federal Boulevard to eastbound US 6, on the west by Federal Boulevard, and on the east by Decatur Street. Barnum East Park provides facilities for baseball and soccer and is equipped with lights for night games. Barnum East Park's ball fields are situated relatively close to the existing roadways; as close as 60 feet east of Federal Boulevard and as close as 40 feet south of US 6. No Section 6(f) improvements have been made to the park.

5.1.2.2 Project Impacts

No Action Alternative

Under the No Action Alternative, the physical characteristics and recreational use of Barnum East Park would remain unchanged.

System Alternative 1

Widening of Federal Boulevard south of US 6 would cause encroachment along the entire western edge of Barnum East Park, necessitating the acquisition of a narrow (14-ft wide; 0.16 acre) strip of landscaped land adjacent to Federal Boulevard. No impacts to recreational features (ball fields) would occur. Reconfiguration of the on- and off-ramp to eastbound US 6 would increase physical separation of the roadway from an existing ball field located at the east end of the park, and would allow for potential park expansion. Pedestrian access and safety would be improved by installation of traffic signals at the park's southwest and southeast corners. Temporary construction impacts associated with replacement of the Federal Boulevard bridge over US 6 may occur, including damage to landscaping.

System Alternative 2

Substantial encroachment/direct use would occur along the northern and western edges of Barnum East Park due to proposed widening of Federal Boulevard to accommodate turning lanes on the bridge over US 6, as well as a new roadway/ramp from Federal Boulevard to eastbound US 6 or Bryant Street. Approximately 1.54 acres of park land would be acquired for new right-of-way, and would cut across the ball fields, impairing their use and necessitating redesign and reconstruction of some or all park facilities. Temporary construction impacts associated with replacement of the Federal Boulevard bridge over US 6 may occur, including damage to landscaping.

System Alternative 3

Under System Alternative 3, a narrow (10-ft wide; 0.14 acre) strip of new right-of-way would be required along the west side of the park for widening of Federal Boulevard to accommodate turning lanes on the bridge over US 6, as well as a new roadway/ramp from Federal Boulevard to eastbound US 6. No impacts to recreational features (ball fields) would occur. Closing of the existing ramp from Federal Boulevard (on the south side of Barnum East Park) to eastbound US 6 would increase physical separation of the roadway from an existing ball field located at the east end of the park, and would allow for potential park expansion. Temporary construction impacts associated with replacement of the Federal Boulevard bridge over US 6 may occur, including damage to landscape.

Preferred Alternative

With the Preferred Alternative, which is similar to System Alternative 2 at this location, substantial encroachment/direct use would occur along the northern and western edges of Barnum East Park due to proposed widening of Federal Boulevard to accommodate turning lanes on the bridge over US 6, as well as a new roadway/ramp from Federal Boulevard to eastbound US 6 or Bryant Street. Approximately 1.54 acres of park land would be acquired for new right-of-way, and would cut across the ball fields, impairing their use and necessitating redesign and reconstruction of some or all park facilities. A range of mitigation measures have been developed and included in the Preferred Alternative to address these impacts. These are described below in **Section 5.1.3.4** *Minimization of Harm*. Temporary construction impacts associated with replacement of the Federal Boulevard bridge over US 6 may occur, including damage to landscaping.

5.1.3 Barnum North Park Description and Impacts

5.1.3.1 Description of Resource

Barnum North Park is located northwest of the intersection of US 6 and Federal Boulevard. This 13.6-acre park is situated within the Northwest Denver Park District. This roughly triangular parcel is bounded by Federal Boulevard on the east, US 6 on the south, and the 8th Avenue bypass/ramp to westbound US 6 on the north/west. Landscaped CDOT-owned land extends from the western edge of the park to Knox Court. Barnum North Park provides facilities for soccer and softball and is equipped with lights for night softball games. The ball fields in Barnum North Park are located quite a distance away from existing roadways – approximately 400 feet west of Federal Boulevard and 130 feet north of the US 6 westbound on ramp.

According to information provided by Colorado State Parks, Section 6(f) improvements were made at Barnum North Park in 1973 and 1976. The 1973 project (Land and Water Conservation Project # 08-00363), included design and construction of an archery range shooting pad, a hiking/biking trail, and a parking lot. These improvements encompassed a large area of the park. Additional improvements were made in 1976 (Land and Water Conservation Project # 08-00514) and included construction of two ball fields with fencing, backstops, and a sprinkler system, as well as restrooms and a combination storage/press box building in the central area of the park. Certain 6(f) improvements made in 1973 have been modified or are no longer in use, including the archery range, southwest parking lot, and practice ball field located in the southern part of Barnum North Park.

A portion of one of the 1973 6(f) improvements, the hiking/biking trail, would require relocation under each of the system alternatives, including the Preferred Alternative, as shown in **Figures 5-2, 5-3, 5-4, and 5-5**. The trail was originally constructed to provide access to the archery range that has been removed. The portion of the trail to be relocated is contained mostly within the US 6 right-of-way (not within the park boundary) and currently serves primarily as a maintenance trail for park staff. Following relocation, the trail will serve an equivalent function. CDOT has consulted with the City and County of Denver regarding impacts to this trail (as well as other impacts to the parks), and they have indicated that minor changes in this area can be accommodated if the overall park function is maintained. Based on the above, the realignment of the trail near the southern boundary does not represent a land conversion under the provisions of Section 6(f). CDOT and FHWA will continue consultations with the City and County of Denver during final design to establish realignment details and ensure that park function is maintained.

5.1.3.2 Project Impacts

No Action Alternative

Under the No Action Alternative, Barnum North Park would remain unchanged.

System Alternative 1

Under System Alternative 1, a narrow (10-ft wide; 0.02 acre) strip of land along the east edge of Barnum North Park would be required for new right-of-way to accommodate a redesigned westbound on-ramp to US 6 from southbound Federal Boulevard. Although this is a direct use under Section 4(f), no impacts should occur to existing recreational facilities or uses.

The existing park maintenance access road which extends beyond the park boundary would require relocation. Temporary construction impacts associated with replacement of the Federal Boulevard bridge over US 6 may occur, including damage to landscaping.

System Alternative 2

Under System Alternative 2, a narrow (10-ft wide; 0.03 acre) strip of land along the east edge of Barnum North Park would be required for new right-of-way to accommodate a redesigned westbound on-ramp to US 6 from southbound Federal Boulevard. An additional 0.02 acre area would be required on the south side of the park. Although this is a direct use under Section 4(f),

no impacts would occur to existing recreational facilities or uses. The existing park maintenance access road which extends beyond the park boundary would require relocation. Temporary construction impacts associated with replacement of the Federal Boulevard bridge over US 6 may occur, including damage to landscaping.

System Alternative 3

Under System Alternative 3, small amounts of new right-of-way would be required along the eastern and southern edges of Barnum North Park. Acquisitions include 0.11 acre of park land along the park's east side, and another acquisition (0.29 acre) at the south side to accommodate the westbound US 6 on-ramp. The existing maintenance access road/trail that extends beyond the park's boundary would be impacted, but no impacts to recreational facilities or recreational uses within the park would occur. Temporary construction impacts associated with replacement of the Federal Boulevard bridge over US 6 may occur, including damage to landscaping.

Preferred Alternative

Under the Preferred Alternative, which is similar to System Alternative 2 at this location, a narrow (10-ft wide; 0.03 acre) strip of land along the east edge of Barnum North Park would be required for new right-of-way to accommodate a redesigned westbound on-ramp to US 6 from southbound Federal Boulevard. An additional 0.02 acre area would be required on the south side of the park. Although this is a direct use under Section 4(f), no impacts would occur to existing recreational facilities or uses. The existing park maintenance access road which extends beyond the park boundary would require relocation. Temporary construction impacts associated with replacement of the Federal Boulevard bridge over US 6 may occur, including damage to landscaping.

5.1.3.3 Avoidance Alternatives for Barnum, Barnum East, and Barnum North Parks

Avoidance of impacts to public park lands in the vicinity of the Federal and US 6 interchange is made difficult by the close proximity of 4(f)-protected park land in the interchange's southeast, southwest and the northwest quadrants. The landscaped edges of Barnum, Barnum East, and Barnum North parks abut the existing Federal Boulevard right-of-way.

Park property along Federal is very close to the existing roadway – as close as the back of existing curb and gutter. At the narrowest, 80 feet separates the Barnum Park right-of-way on the west from Barnum Park East on the east. Federal Boulevard and US 6/ramp lanes, shoulders, curb and gutter, and sidewalk currently exists outside of the park right-of-way. This is accomplished generally through narrow (10 feet) lanes on Federal or narrow shoulders or non-typical ramp configurations on US 6. Along US 6, the location of Barnum and Barnum East Parks along the south side and Barnum North Park along the north side of the highway limit the possibilities for transportation improvements without park impacts.

Alternatives were developed and evaluated to determine if there was a prudent and feasible alternative to the use of land from Barnum, Barnum East and Barnum North Parks. Avoidance alternatives were considered collectively for all three of these parks due to their close proximity

and position in three quadrants of the interchange. These avoidance alternatives are described below.

No Action Alternative

Under the No Action Alternative, no impacts would occur to Barnum, Barnum East or Barnum North Parks. However, this alternative would not result in needed safety and operational improvement of the Federal-US 6 interchange, including reconfiguration of turning lanes and widening of traffic lanes. Because safety and operational deficiencies would not be addressed, the No Action Alternative would not meet the project purpose and need. Therefore, this alternative is not a prudent and feasible avoidance alternative with respect to these parks.

Improve Transportation Facilities Without Using Barnum, Barnum East or Barnum North Park Land

Only limited improvements to the Federal-US 6 interchange are possible without widening Federal Boulevard. Minor reconfiguring of interchange ramps and replacing the Federal Boulevard bridge over US 6 with a new structure, while retaining the existing width of Federal Boulevard, would provide some operational and safety benefit to US 6, but would not remedy the operational and geometric deficiencies on Federal Boulevard. Because of these limitations, this alternative does not correct existing roadway design deficiencies nor adequately address operational deficiencies of the interchange. Therefore, this alternative does not meet the project purpose and need, and does not represent a prudent and feasible avoidance alternative with respect to these parks.

Improve Transportation Facilities in a New Location

In order to avoid impacts to all of the parks in the vicinity of the Federal-US 6 interchange, an avoidance alternatives concept was considered involving the realignment of a portion of Federal Boulevard well to the east of its existing alignment. This concept involves constructing a new curved alignment that would skirt Barnum East Park, cross US 6 on a new skewed bridge, and rejoin the existing north-south alignment of Federal Boulevard on the north side of US 6. To avoid the parks, Federal would need to be realigned approximately 900 feet to the east impacting a large number of residential and commercial properties. A portion of the existing Federal Boulevard roadway would be abandoned, and the existing Federal Boulevard bridge over US 6 would be removed. The interchange would be relocated to the new location, bringing it closer to the US 6/I-25 Interchange.

Federal Boulevard is a linear arterial roadway in a heavily developed urban corridor providing regional north-south connectivity in the west central Denver metropolitan area. Moving the US 6/Federal Boulevard interchange closer to the I-25/US 6 interchange would not address the current substandard geometry and safety. Adjacent land use is predominately commercial, with businesses located as close as a block away from Federal Boulevard in the southeast and southwest quadrants. A neighborhood of modest single family dwellings is located just south of Barnum East Park.

The implementation of this alternative would require the acquisition/relocation of at least 30 homes and 15 businesses. The alternative would reroute Federal Boulevard, a major arterial, through the heart of an existing residential neighborhood, introducing noise, traffic, safety and other community impacts into an area currently characterized by quiet residential streets. This

neighborhood has a high minority and low-income population, and the impacts of rerouting Federal Boulevard would be predominantly borne by this community, raising environmental justice concerns.

In addition to the community impacts of this alternative, safety problems would result from moving the US 6 / Federal Boulevard interchange to a location much closer to the I-25 / US 6 interchange. With this alternative, the ramp terminals would be less than 600 feet apart between these two major interchanges. This distance is much less than current criteria of 1600 feet, indicating that severe safety problems would result from the implementation of this alternative.

This alternative is not prudent or feasible due to the large number of business and residential relocations, severe impacts to the existing community, environmental justice concerns, and failure of the alternative to address current safety deficiencies along US 6 that have been identified within the project purpose and need. Therefore, this alternative is not a prudent and feasible avoidance alternative with respect to these parks.

In summary, the close proximately and location of Barnum, Barnum East and Barnum North Parks in three quadrants limits the options for making transportation improvements without impacting the parks. As demonstrated above, there is no prudent and feasible alternative that avoid direct use of park land. Therefore, measures to minimize harm to the parks have been identified in accordance with the requirements of Section 4(f). These are described below.

5.1.3.4 Minimization of Harm to Barnum, Barnum East, and Barnum North Parks

When no prudent and feasible avoidance alternative exists, Section 4(f) requires that harm to protected resources be minimized. Through the process of selection and refinement of the Preferred Alternative, FHWA and CDOT have worked with the City and County of Denver to identify appropriate measures to minimize harm. These have been included in the Preferred Alternative, as described below.

System Alternative 2 would use more land from Barnum East Park than System Alternatives 1 and 3, and would require reconfiguration of the facilities in Barnum East Park. However, due to the substantial safety and operational benefits provided by System Alternative 2 at this location, this alternative was further refined to include measures to minimize harm, such that it could be included in the Preferred Alternative. These additional measures were developed through consultation with the City and County of Denver, and were added to the harm minimization measures previously discussed for System Alternative 2 in the Draft Section 4(f) Evaluation. This alternative has been identified as the Preferred Alternative at this location.

Specific harm minimization measures included in the Preferred Alternative for Barnum, Barnum East, and Barnum North Parks include the following:

- Under the Preferred Alternative, spacing between intersections on Federal Boulevard at the ramp terminals was kept to a minimum in order to keep as compact an interchange as possible.
- Under the Preferred Alternative, Federal Boulevard widening was pushed to the east, north of US 6 to avoid Barnum North Park.

- The Preferred Alternative would impact recreational use of Barnum East Park by excising land from existing sports ball fields. Appropriate mitigation would include fair financial compensation for right-of-way acquisition, as well as redesign and reconstruction of ball fields to restore the park's usefulness to the same level or better than pre-project conditions. Any damage to park landscaping or facilities caused by bridge construction would be repaired.
- Providing additional new park land along the east edge of the park by vacating the existing on-ramp and acquiring a strip of land from an adjacent property owner. The addition of this new park land will result in a net reduction in park functional area of only 0.3 acre.
- Redesign and reconstruction of park facilities to provide upgraded facilities with enhanced function. **Figure 5-6** presents a concept for park reconstruction developed in cooperation with the City and County of Denver. This concept provides for replacement of the existing facilities with new facilities, enhanced accessibility for disabled individuals through ADA compliance, and the addition of a playground area between the ball fields. Final design and construction will be achieved through a cooperative effort between CDOT and the City and County of Denver. **Table 5-3** lists the elements of the reconstruction and upgrade of the Barnum East Park facilities.
- Arrangements to be made by the City and County of Denver to provide alternative play locations from permitted field users during seasons that will be disrupted by construction.

The Preferred Alternative (which is similar to System Alternative 2 at this location) provides substantial safety and operational benefits not provided by either System Alternatives 1 or 3. With regard to safety, the estimated 20 year accident reduction for System Alternative 2 and the Preferred Alternative would be in the range of 1,550 -1,750 total accidents. Of these, 340-420 would be prevented injury accidents. This equates to a 30 to 45% overall accident reduction as compared to the next closest alternative (System Alternative 3) and a 300 to 350% overall accident reduction when compared to System Alternative 1.

The Preferred Alternative also offers operational benefits at this location not provided by either System Alternatives 1 or 3. For the overall network, which includes US 6 and the surface streets within the corridor, the operational benefit of the Preferred Alternative is 13% greater than Alternative 3 and 10% greater than Alternative 1. This becomes more pronounced on US 6 where 25% less freeway delay is experienced with the Preferred Alternative as compared to Alternative 3 and 15% less than System Alternative 1. The safety and operational analysis for the alternatives is described in detail in **Chapter 3 *Transportation Analysis***.

Depending on the specific circumstances, there are instances where FHWA must consider the important non-Section 4(f) impacts in establishing a prudent alternative. This is described in the 2005 FHWA Section 4(f) Policy Paper. In this case, the important non-Section 4(f) impact is safety. As described above, the Preferred Alternative would provide a 30 to 45% overall accident reduction as compared to System Alternative 3 and a 300 to 350% overall accident reduction when compared to System Alternative 1. Due to these substantial safety benefits provided by the Preferred Alternative, it would not be prudent to choose System Alternative 1 or 3 at this location. Therefore, the Preferred Alternative (which provides the benefits of System Alternative 2 with the additional harm minimization measures identified above) has been identified as the prudent and feasible alternative which best minimizes harm to the parks at this location.

North

Barnum East Park Concept - Preferred Alternative

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 5-6

Table 5-3 Elements of Barnum East Park Reconstruction

Measure	Preferred Alternative
Functional Park Space	• Includes two baseball fields, two parking lots, commons area between ball fields, and landscaped perimeter • Total area = 421,995 square feet = 9.69 acres (3% less than the existing; primarily lost in landscaped perimeter between ball fields)
Parking	• Refined concept provides a single contiguous parking lot with 174 parking spaces (3.5% greater than existing) • Overflow parking is provided along adjacent 5th and Decatur and undeveloped park land south of 5th Ave.
Pedestrian Mobility/ Accessibility	North-South • Sidewalks along Federal Blvd. from 5th Ave. to 7th Ave. would be replaced to meet Denver standards • The new park layout better aligns its easterly most access across from Decatur St. providing more direct and safer pedestrian access East-West • New sidewalks are provided within the park • Detached sidewalks will be provided along the northern edge of 5th Ave. for the length of the park • An additional pedestrian crossing of Federal Blvd. will be provided at 5th Ave. with a new traffic signal
Amenities	• Two baseball fields - adult (larger) field and youth (smaller) field • The adult field has a built in soccer field and is also used for Frisbee golf • Other site amenities to be replaced in kind or better include: – **Adult Ball Field -** Backstop and surrounding chain link fence, Bleachers, Benches, Storage cabinet, Score Board – **Youth Ball Field -** Backstop and surrounding chain link fence, Bleachers, Benches, Storage cabinet – **Landscape -** Deciduous trees, Evergreen trees – **Lighting -** Parking Lot and Plaza Area, Night lighting for Adult Field, Night lighting for Youth Field – **Park Structures -** Restroom (men and women) – **Miscellaneous -** Barrel trash cans, Vehicular gates, Trash enclosures/dumpsters, Bollards, Utility Boxes
Current Deficiencies Corrected	• Final design of the adult field will establish an appropriate size to address Denver Parks comment that the outfield is too large • The youth field will be a more uniform and symmetrical shape replacing the shorter right field • Artificial turf will be considered in final design to address downtime during construction. • Trench drains will be considered on field perimeters for improved drainage during final design • Secure chain link fencing (10-12 ft. height) and gate to the parking lot will be provided on the edges of the fields to control illegal use of the fields • Shared rest room and concession stands facilities will be incorporated • A new press box for the youth field will be included • Additional bleachers can be accommodated • A playground will be included in the "plaza" between the two fields • The new "plaza" area offers a flatter/usable space between the two fields, much improved over the current terraced space between the two fields
Adjacent Roadway Operations	• The EB US 6 on ramp will be realigned from the east and south side of the existing park to be on the north side with slightly less traffic (17,500 ADT); 5th Ave. will be converted to two way operations with substantially less traffic (8500 ADT); and there would be no east side roadway. The park will no longer be surrounded by US 6 and associated ramp connections • A new traffic signal will be added at 5th Street to aid ingress and egress. • Implementing the Preferred Alternative offers substantial operational and safety benefits along US6 EB realized through braiding the EB US6 ramp with the CD road
Accessibility for Vehicles	• Access to the park will be through two full movement access intersections to 5th Ave
Use	• The new facilities will accommodate the current uses and potentially enhanced usage due to improved accessibility, a new modern facility and amenities and efficiency of layout.
Temporary Construction Impacts	• Construction sequencing is likely to impact the use of the facility for potentially two seasons. Integrating artificial turf may allow for earlier use of the fields • Alternative ball fields may have to be identified within the City and County of Denver park system to accommodate the loss of use for this facility. Denver must assist with determining where this can best be met
Miscellaneous	• Noise impacts to residential properties to the south of 5th Av. would be reduced as a result of the realignment of the US 6 EB on-ramp. • Park functional areas are offset to the east, adjacent to Federal Blvd., preserving opportunities for possible future needs by others

5.2 Coordination

Coordination has been conducted with agencies having jurisdiction or regulatory oversight of Section 4(f) properties. Coordination efforts to date have included:

- Consultation with the Colorado SHPO to determine the area of potential effects and survey methodology for cultural resources (CDOT, 2004b; SHPO, 2004).
- Completion of a cultural resource inventory (FHU, 2004g) for review by the Colorado SHPO, City and County of Denver's Planning Department, and the Denver Landmarks Commission
- Effects determination and consultation for historic sites under Section 106 (CDOT, 2006; SHPO, 2006)
- A meeting with City and County of Denver Parks and Recreation Department staff, February 5, 2003. This meeting was held to inform the Parks and Recreation Department about the project, and to obtain information to aid in the identification of all public parks and recreation facilities that could be impacted by the project.
- A meeting with Colorado State Parks staff, concerning parks with 6(f) improvements, May 6, 2003. During this meeting, information was obtained about 6(f) improvements to specific parks as well as the process for mitigating impacts to parks with 6(f) improvements.
- Detailed investigation of park boundaries, by the Farnsworth Group, including consultation with the City and County of Denver's Parks and Recreation Department, 2003 to 2004 (Farnsworth Group, 2004)
- A series of meetings and working sessions with the City and County of Denver after issue of the Draft EIS to develop the Barnum East Park concept and minimization of harm measures incorporated into the preferred alternative.
- A meeting with representatives of Barnum East Park permit holders (i.e.; organized sport leagues) on October 25, 2006.

5.3 Section 4(f) Finding

Based on the above considerations, FHWA has determined that there are no prudent and feasible alternatives to the use of the following Section 4(f) properties:

- Barnum Park
- Barnum East Park
- Barnum North Park

The Preferred Alternative includes all possible planning to minimize harm to these properties resulting from such use.

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TABLE OF CONTENTS

Page

6.0 PUBLIC INVOLVEMENT 6-1

6.1 Objectives 6-1

6.2 Elements of Program 6-1

6.3 Agency Input 6-6

6.4 Public Input 6-11

6.5 Special Outreach to Low-Income and Minority Populations 6-20

6.6 Release of Draft EIS 6-25

6.7 Coordination Subsequent to Release of Final EIS 6-26

LIST OF FIGURES

Page

Figure 6-1 Mailing Distribution Area....6-3

LIST OF TABLES

Page

Table 6-1 Local Media Contact List....6-5
Table 6-2 Agency and Local Government Involvement Activities....6-7
Table 6-3 Summary of Citizen Working Group Meetings....6-13
Table 6-4 Local Neighborhood Associations and Business Groups....6-15
Table 6-5 Neighborhood and Local Businesses Public Involvement Activities....6-16
Table 6-6 Summary of Comments Received from Neighborhood Associations, Business Groups, and Non-Profits....6-19
Table 6-7 Local Community Representatives Contacted....6-22
Table 6-8 Special Outreach Activities for Low-Income or Minority Populations....6-23

6.0 PUBLIC INVOLVEMENT

FHWA and CDOT are committed to involving the public and other agencies throughout the Valley Highway EIS process. The success of the Valley Highway Project hinges upon communication and cooperation between FHWA, CDOT, and the local community. This includes involvement of federal, state, and local governmental officials, regional transportation planning entities, citizen advisory groups, community groups, civic and professional organizations, businesses, residents, and low-income and minority populations in the EIS process. The public involvement process includes providing information, timely public notice, access to key decisions, and opportunities for early and continuing participation.

This chapter describes objectives and elements of the public involvement process, as well as specific activities conducted to date with the public and federal, state, and local agencies and government representatives. It also highlights special public outreach efforts to low-income and minority populations in the project area. It includes a discussion of further opportunity for public input to comment on the project and the Final EIS as part of the public hearing that will be held.

6.1 Objectives

Public involvement objectives include:

- Provide a mechanism for public perspectives, needs, and ideas to be incorporated into the planning process
- Develop the public's understanding of the problems and opportunities related to the Valley Highway EIS
- Demonstrate explicit consideration and response to public input
- Develop a consensus on project alternatives

6.2 Elements of Program

A multi-tiered public involvement approach was used to reach out to a variety of groups located in the project area with differing needs and perspectives. The public involvement process consisted of three general areas of coordination: public, agency, and special outreach to low-income or minority populations.

Public outreach efforts emphasized using public meetings, as well as presentations to local neighborhood associations, business groups and non-profit organizations, to disseminate project information and provide a mechanism to incorporate the public's ideas, needs, and concerns into the EIS process. Agency coordination focused on involving federal, state, and local governmental agencies in developing the technical requirements of the EIS, and in providing technical expertise and assisting in development of the EIS. Environmental justice outreach efforts included identifying and contacting local organizations involved with low-income populations and minority populations, disseminating project information to local leaders and residents, and diversifying public outreach efforts to meet the specific needs of low-income populations and minority populations.

In addition, the following program elements were used as primary means of information dissemination that were not linked to any specific audience.

6.2.1 Notice of Intent

A notice of intent, advising the public that an EIS would be prepared for the Valley Highway Project, appeared in the *Federal Register* on July 23, 2002. The Notice of Intent formally communicated the commencement of the public involvement process associated with the Valley Highway EIS.

6.2.2 Project Contacts

Key project staff were made available to answer questions from the public via phone, fax, email, and in person. The three main project contacts were:

Mr. Tony Gross
Senior Project Manager
CDOT Region 6
2000 South Holly St.
Denver, CO 80222
Tel: (303) 972-9112
Fax: (303) 972-9114
e-mail: tony.gross@dot.state.co.us

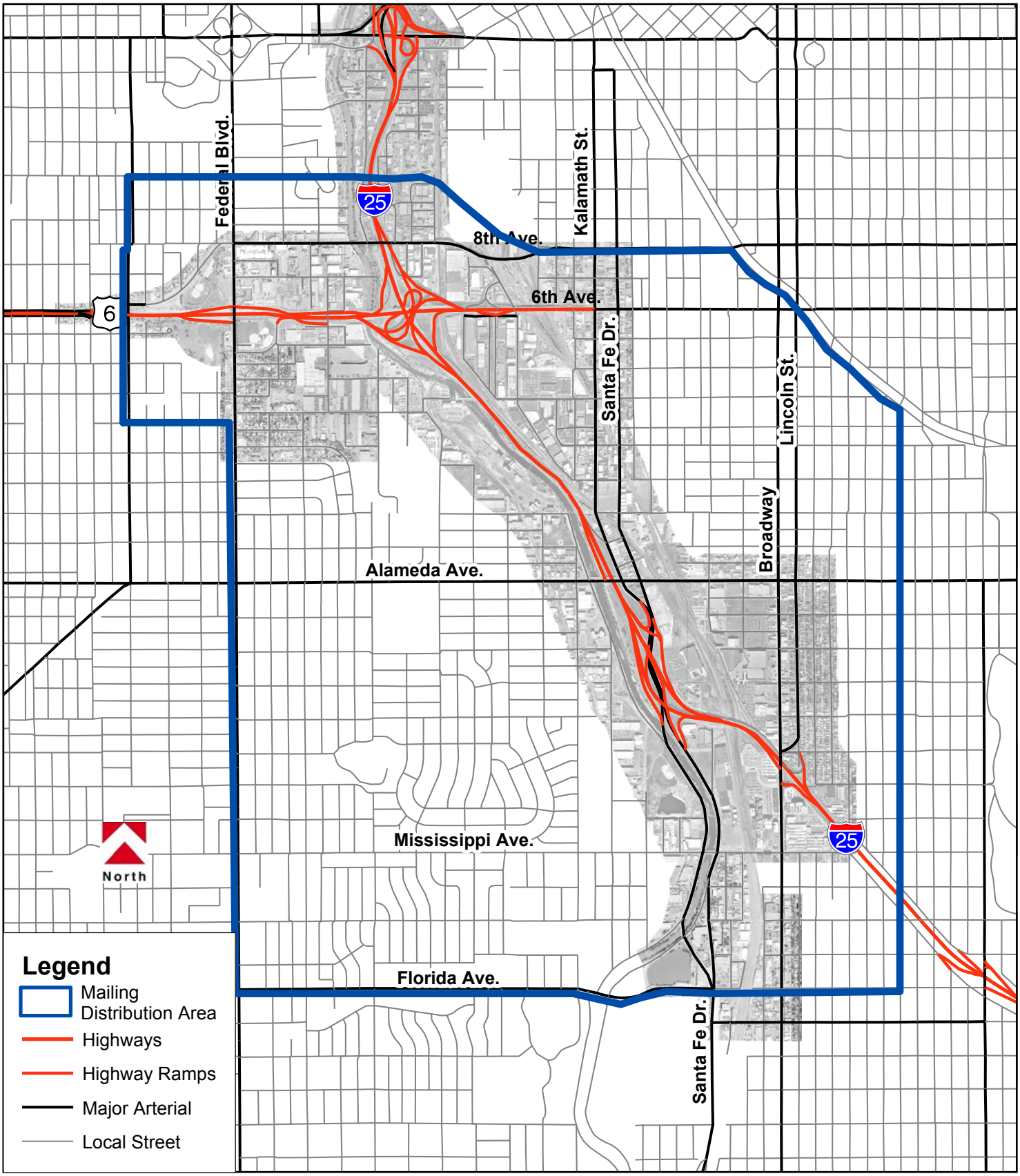
Mr. Dean Bradley
Project Manager
Felsburg Holt & Ullevig
6300 S. Syracuse Way, Suite 600
Centennial, CO 80111
Tel: (303) 721-1440
Fax: (303) 721-0832
e-mail: dean.bradley@fhueng.com

Mr. Chris Horn
Senior Operations Engineer
Federal Highway Administration
12300 W. Dakota Ave., Suite 180
Lakewood, CO 80228
Tel: (720) 963-3000
Fax: (720) 963-3001
e-mail: chris.horn@fhwa.dot.gov

6.2.3 Mailing List Development

Approximately 20,000 residences and businesses in the neighborhoods surrounding the project area received project newsletters and postcard meeting notices. Project newsletters and postcard notices inviting local residents and businesses to public meetings were sent via a mass mailing to the project area, which included the neighborhoods of Athmar Park, Baker, Barnum, Godsman, Lincoln Park, Overland, Platt Park, Sun Valley, Valverde, Villa Park, and West Washington Park in the City and County of Denver. **Figure 6-1** depicts the boundaries of the mailing distribution area. The area targeted for mass mailing is located approximately north of Florida Avenue, west of Washington Street, east of Federal Boulevard, and south of 8th Avenue in south Denver. In the area along US 6 west of I-25, the mailing area extends north to 10th Avenue and west to Knox Court.

In addition, a mailing list of over 700 individuals was compiled. An initial mailing list was prepared during the EIS scoping process. The initial list included the name, group association, mailing address, phone number, and email address of representatives from local neighborhood associations; business groups; and federal, state, and local governmental agencies. Over the course of the public involvement process, the mailing list was updated with the contact information of public meeting attendees, interested individuals, religious groups, non-profit organizations, and other individuals not identified on the initial mailing list. The mailing list was used to disseminate project information, such as meeting minutes and notification of public meetings.



Valley Highway, 02-069, 10/29/2004

0 0.25 0.5 1 Miles

Mailing Distribution Area

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 6-1

6.2.4 Project Website

A project website was developed (www.valleyhighway.com) in December 2002 to provide the public up-to-date information on the Valley Highway Project. Information presented on the website was designed to avoid technical jargon, wherever possible, and communicate a plain and understandable message. A link to a multi-lingual translator was provided on the website. The website was updated on a monthly or as needed basis; individuals could sign up for the Citizens Online database to receive email notices whenever the website was updated. The website provided electronic access to:

- A project description and map
- Public involvement activities, including public meeting comment summaries and Citizen Working Group meeting minutes
- Environmental resources
- Project element and system alternatives, including screened alternatives and the screening process
- EIS chapters in a downloadable format
- Broadway viaduct construction information
- Frequently asked questions
- A glossary of terms
- Newsletters and news releases
- Meeting notices
- Contact information
- Public comments

The project website provided interested members of the public with an opportunity to comment on the project, ask questions, and request project-related information through a comment feedback form. Comments were received at the website via the comment feedback form and from emails sent to the webmaster.

6.2.5 News Releases to Local Media

Periodic news releases were prepared and provided to the local media before public meetings. The list of local media is summarized in **Table 6-1**. News releases were provided in September 2002, December 2002, July 2003, January 2004, October 2004, and May 2005. A copy of each news release is included in **Appendix B**, *Public Coordination*.

Table 6-1 Local Media Contact List

Media Type	Local Media Resource
Newspaper	*Denver Post*
Newspaper	*Rocky Mountain News*
Newspaper	*Daily Journal and Colorado Construction*
Newspaper	*Rocky Mountain Construction*
Newspaper	*Denver Business Journal*
Newspaper	*Arvada Sentinel*
Newspaper	*Golden Transcript*
Newspaper	*Brighton Standard Blade*
Newspaper	*Commerce City Sentinel Express*
Newspaper	*Fort Lupton Press*
Newspaper	*Centennial Citizen*
Newspaper	*Englewood Herald*
Newspaper	*Highlands Ranch Herald*
Newspaper	*The Voice*
Newspaper	*North Denver Tribune*
Newspaper	*Westminster Window*
Newspaper	*Northglenn/Thornton Sentinel*
Newspaper	*Westsider*
Newspaper	*Erie Review*
Newspaper	*Lafayette News*
Newspaper	*Louisville Times*
Newspaper	*Front Range News*
Newspaper	*Aurora Sentinel*
Newspaper	*Broomfield Enterprise*
Newspaper	*Castle Rock News Press*
Newspaper	*Englewood Centennial Journal*
Newspaper	*Evergreen Canyon Courier*
Newspaper	*Greenwood Village The Villager*
Newspaper	*Littleton Independent*
Newspaper	*Loveland Daily Report*
Newspaper	*El Hispano*
Newspaper	*Urban Spectrum*
Newspaper	*Hispania News*
Newspaper	*Intermountain Jewish News*
Newspaper	*Korea Times Denver*
Newspaper	*Korean Denver News*
Newspaper	*Colorado Chinese News*
Television	KUSA-TV (NBC)
Television	KCNC-TV (CBS)
Television	KMGH-TV (ABC)
Television	KDVR-TV (FOX)
Television	KWGN-TV (WB)
Television	KCEC-TV (Univision)
Television	FTFD-TV
Television	KMAS-TV (Telemundo)
Television	KRMT-TV
Radio	KHOW-AM 630
Radio	KOA-AM 850
Radio	KMXA-AM 1090
Radio	KJMN-FM 92.1
Radio	KUVO-FM 89.3

6.2.6 Bilingual Project Phone Hotline

The project team established and promoted a bilingual Spanish/English project phone hotline [(720) 489-7923], which was put in place in September 2002 and made available throughout the public involvement process. The bilingual project phone hotline provided individuals and groups with the opportunity to leave a message for the project team. All messages were responded to within 24 hours. Individuals were offered a one-on-one meeting with a project team member if additional information was required. Forty-three phone calls to the project hotline were received as of June 2006. Two of the phone calls were received from Spanish speakers.

6.2.7 Project Newsletters

Project newsletters were mailed to approximately 20,000 residences and businesses in the neighborhoods encompassing the project area. Newsletters were developed and distributed in August 2002, July 2003, November 2003, May 2004, May 2005, and November 2005, and served to:

- Introduce the project
- Inform the public of the progress of the project
- Provide contact information for project-related questions
- Advertise public meetings
- Discuss results of the Citizen Working Groups

The July 2003, November 2003, May 2004, May 2005, and November 2005 project newsletters were bilingual (Spanish and English).

6.3 Agency Input

The Lead Agency for the Valley Highway EIS is FHWA, and CDOT is the Applicant Agency. Upon request of the Lead Agency, any other federal, state, or local agency may become a cooperating agency. Cooperating agencies have technical insight into many of the transportation-related problems for the Valley Highway and special expertise with respect to specific environmental issues and jurisdiction by law. Four cooperating agencies were identified for the Valley Highway EIS: the City and County of Denver, the FRA, FTA, and RTD.

Responsibilities of the coordinating agencies include:

- Develop information and perform environmental analysis, as needed
- Provide staff for lead agency requests for support
- Participate in the transportation planning process and in the EIS scoping process
- Attend the Public Advisory Committee and Technical Working Group meetings (see **Sections 6.3.2** and **6.3.3**),
- Review and comment on environmental documentation

In addition to the cooperating agencies, resource agencies were identified. Resource agencies have specific technical expertise and regulatory oversight on various environmental issues and potential impacts associated with the project. Resource agencies for the Valley Highway EIS include: the USACE, UDFCD, Public Utilities Commission (PUC), EPA, USFWS, CDPHE, CDOW, DRCOG, and the SHPO.

Responsibilities of the resource agencies include:

- Provide technical expertise, as needed
- Participate in the meetings and working groups, as needed
- Review and provide comments on relevant EIS documentation

Agency involvement activities ranged from one-on-one meetings with agency officials to a series of meetings with local, state, and federal agency representatives. **Table 6-2** summarizes local, state, and federal agency and government involvement activities conducted as part of the Valley Highway EIS process.

Table 6-2 Agency and Local Government Involvement Activities

Date	Group
Jan 22, 2002	Meeting with City and County of Denver Councilwoman Ramona Martinez
May 6, 2002	FHWA/CDOT Pre-Scoping Kick-off Meeting
Jun 27, 2002	FHWA/CDOT Technical Scoping Meeting
Aug 21, 2002	Cooperating/Resource Agencies Scoping Meeting
Sep 10, 2002	Meeting with City and County of Denver Councilwoman Debbie Ortega
Sep 17, 2002	Meeting with City and County of Denver Councilwoman Ramona Martinez
Oct 10, 2002	FHWA/CDOT Scoping Debriefing Meeting
Oct 10, 2002	Technical Working Group Meeting
Oct 24, 2002	Technical Working Group Broadway Workshop
Oct 30, 2002	Technical Working Group Railroad Workshop
Nov 7, 2002	Cherokee Denver Transportation Task Force Meeting
Nov 8, 2002	RTD/CDOT Regional Coordination Meeting
Nov 13, 2002	Policy Advisory Committee Meeting
Nov 14, 2002	Technical Working Group Meeting
Nov 14, 2002	Cherokee Denver Transportation Task Force Meeting
Nov 15, 2002	Cherokee Development Work Session
Nov 21, 2002	Cherokee Denver Transportation Task Force Meeting
Nov 25, 2002	Meeting with City and County Of Denver Councilwoman Kathleen MacKenzie
Dec 2, 2002	Technical Working Group Meeting
Dec 5, 2002	Cherokee Denver Transportation Task Force Meeting
Dec 11, 2002	Technical Working Group
Dec 12, 2002	Cherokee Denver Transportation Task Force Meeting
Dec 19, 2002	Cherokee Denver Transportation Task Force Meeting
Jan 2, 2003	Cherokee Denver Transportation Task Force Meeting
Jan 9, 2003	Cherokee Denver Transportation Task Force Meeting
Jan 10, 2003	RTD/CDOT Regional Coordination Meeting
Jan 16, 2003	Policy Advisory Committee Meeting
Jan 16, 2003	Cherokee Denver Transportation Task Force Meeting
Jan 23, 2003	Cherokee Denver Transportation Task Force Meeting
Jan 30, 2003	Cherokee Denver Transportation Task Force Meeting
Feb 6, 2003	FHWA/CDOT/EPA Coordination Meeting
Feb 12, 2003	Technical Working Group Meeting

Table 6-2 Agency and Local Government Involvement Activities (continued)

Date	Group
Feb 14, 2003	RTD/CDOT Regional Coordination Meeting
Feb 25, 2003	CDOT, RTD, City and County of Denver, Cherokee Denver LLC, and Gates Properties Facilitation Meeting
Mar 2003	City and County of Denver Stormwater Management Meeting
Mar 2003	CDOT, T-REX, and Cherokee Denver LLC Coordination Meeting
Mar 12, 2003	Technical Working Group Meeting
Mar 14, 2003	RTD/CDOT Regional Coordination Meeting
Apr 9, 2003	Technical Working Group Meeting
Apr 10, 2003	CDOT and City and County of Denver Stormwater Management Meeting
May 5, 2003	Denver Parks Meeting
May 6, 2003	Colorado State Parks Meeting
May 14,2003	Technical Working Group Meeting
Jun 11, 2003	Technical Working Group Meeting
Jun 13, 2003	RTD/CDOT Regional Coordination Meeting
Jul 9, 2003	Technical Working Group Meeting
Jul 10, 2003	CDOT Stormwater Meeting
Jul 11, 2003	RTD/CDOT Regional Coordination Meeting
Jul 30, 2003	Meeting with City and County of Denver Councilwoman Rosemary Rodriguez
Aug 7, 2003	Policy Advisory Committee Meeting
Aug 8, 2003	RTD/CDOT Regional Coordination Meeting
Aug 18, 2003	Meeting with City and County of Denver Councilwoman Judy Montero
Aug 26, 2003	CDOT Cultural Resources Meeting
Sep 4, 2003	CDOT/CDPHE Air Quality Meeting
Sep 10, 2003	Technical Working Group Meeting
Sep 12, 2003	RTD/CDOT Regional Coordination Meeting
Sep 15, 2003	CDOT and CDPHE Hazardous Materials Meeting
Sep 26, 2003	City and County of Denver EIS Coordination Meeting
Sep 29, 2003	Cherokee Denver LLC Hazardous Materials Meeting
Oct 2, 2003	Mayor's Bicycle Advisory Committee Meeting
Oct 7, 2003	CDOT/Colorado Historical Society Office of Archaeology and Historic Preservation Cultural Resources Meeting
Oct 8, 2003	Technical Working Group Meeting
Oct 10, 2003	RTD/CDOT Regional Coordination Meeting
Oct 16, 2003	Transportation Commission Meeting
Oct 21, 2003	CDOT Hazardous Materials Meeting
Oct 22, 2003	CDOT Drainage and Floodplain Issues Meeting
Oct 23, 2003	City and County of Denver Hazardous Materials Meeting
Oct 29, 2003	RTD Hazardous Materials Meeting
Nov 3, 2003	CDPHE Hazardous Materials Meeting
Nov 12, 2003	Technical Working Group Meeting
Nov 14, 2003	RTD/CDOT Regional Coordination Meeting
Nov 14, 2003	City and County of Denver Drainage Meeting
Nov 17, 2003	City and County of Denver Mayor's Bicycle Advisory Committee Representative Meeting
Dec 1, 2003	Policy Advisory Committee Meeting
Dec 12, 2004	RTD/CDOT Regional Coordination Meeting
Jan 6, 2004	CDOT, CDPHE, and City and County of Denver Hazardous Materials Meeting
Jan 9, 2004	RTD/CDOT Regional Coordination Meeting
Jan 14, 2004	Technical Working Group Meeting
Feb 13, 2004	RTD/CDOT Regional Coordination Meeting
Feb 25, 2004	Policy Advisory Committee Meeting
Mar 10, 2004	Technical Working Group Meeting
Mar 12, 2004	RTD/CDOT Regional Coordination Meeting

Table 6-2 Agency and Local Government Involvement Activities (continued)

Date	Group
Apr 13, 2004	Technical Working Group Meeting
Apr 15, 2004	Transportation Commission Meeting
May 12, 2004	Technical Working Group Meeting
May 14, 2004	RTD/CDOT Regional Coordination Meeting
May 26, 2004	Policy Advisory Committee Meeting
June 11, 2004	RTD/CDOT Regional Coordination Meeting
July 9, 2004	RTD/CDOT Regional Coordination Meeting
July 17, 2004	Technical Working Group Meeting
Aug 11, 2004	Technical Working Group Meeting
Aug 13, 2004	RTD/CDOT Regional Coordination Meeting
Aug 16, 2004	FHWA, CDOT, and EPA Project Status Meeting
Aug 23, 2004	CDOT and CDPHE Hazardous Materials Meeting
Aug 25, 2004	Policy Advisory Committee Meeting
Sep 8, 2004	Technical Working Group Meeting
Sep 17, 2004	RTD/CDOT Regional Coordination Meeting
Oct 8, 2004	RTD/CDOT Regional Coordination Meeting
Oct 13, 2004	Technical Working Group Meeting
Nov 12, 2004	RTD/CDOT Regional Coordination Meeting
Dec 10, 2004	RTD/CDOT Regional Coordination Meeting
Jan 12, 2005	Technical Working Group Meeting
Jan 14, 2005	RTD/CDOT Regional Coordination Meeting
Mar 9, 2005	Technical Working Group Meeting
Mar 11, 2005	Meeting with City and County of Denver Councilwoman Judy Montero
Apr 13, 2005	Technical Working Group
Apr 15, 2005	Policy Advisory Committee
May 11, 2005	Technical Working Group
Jun 9, 2005	Tour of project area with City and County of Denver Councilwoman Judy Montero
Jul 13, 2005	Technical Working Group
Aug 3, 2005	FHWA/CDOT Preferred Alternative
Aug 10, 2005	Technical Working Group
Oct 12, 2005	Technical Working Group
Nov 9, 2005	Technical Working Group
Jan 11, 2006	Technical Working Group
Feb 8, 2006	Technical Working Group
Mar 9, 2006	Technical Working Group
Apr 12, 2006	Technical Working Group
May 10, 2006	Technical Working Group
May 31, 2006	CDOT, City and County of Denver, and RTD I-25/Broadway Coordination Meeting
May 31, 2006	CDOT and City and County of Denver Barnum East Park Coordination Meeting
August 3, 2006	Meeting with City and County of Denver Councilwoman Rosemary Rodriquez
August 15, 2006	Meeting with Julie Connor Aide to City and County of Denver Councilwoman Kathleen MacKenzie
August 16, 2006	Technical Working Group Meeting
September 6, 2006	Meeting with City and County of Denver Councilwoman Judy Montero
October 11, 2006	CDOT And City and County of Denver Barnum East Park Coordination Meeting

6.3.1 Scoping Meetings

A series of agency scoping meetings were held in conjunction with the Valley Highway EIS. These meetings were held to identify significant issues related to the proposed action and to determine the scope of the issues to be addressed in the Valley Highway EIS. The meetings were designed to share project information and collect comments, questions, and feedback to facilitate design of the project scope.

Four agency scoping meetings were conducted as follows:

- An FHWA/CDOT Pre-Scoping Meeting was held on May 6, 2002
- An FHWA/CDOT Scoping Meeting was held on June 27, 2002
- A Cooperating and Resource Agencies Scoping Meeting was held on August 21, 2002
- An FHWA/CDOT/EPA Coordination Meeting was held on February 6, 2003

The meetings were conducted as part of the EIS scoping process to determine the project approach and receive comments from FHWA, CDOT, the cooperating agencies, and resource agencies. The Cooperating and Resource Agencies Scoping Meeting was held at the Hilton Hotel in the Denver Technological Center, and 43 technical and management representatives from 14 agencies attended the meeting. During the meeting, the Valley Highway EIS project team introduced the Valley Highway EIS, summarized the NEPA process, discussed significant and other issues, and determined the ability of the agencies to provide specific technical support. Additional meetings, including one-on-one meetings with federal, state, and local government representatives, were conducted as necessary.

6.3.2 Policy Advisory Committee

A policy advisory committee was established to provide the project team with different perspectives on major issues related to the proposed action and to enhance the communication with selected audiences. The policy advisory committee was comprised of local government officials, governmental agencies, and non-profit groups and met on a quarterly basis. Policy advisory committee meetings are included in **Table 6-2.**

6.3.3 Technical Working Group

A technical working group was established to provide monthly reviews and discussions of the alternatives, community concerns, and environmental issues and to participate in reviews to facilitate the development of the EIS document. The technical working group included representatives of local government, public sector agencies from the project area, CDOT and FHWA. Technical working group members possessed technical expertise in the areas of engineering, environment, planning, utilities, transportation (highway and railroad), and transit. The technical working group meetings are summarized in **Table 6-2**.

6.3.4 Transportation Task Force Meetings

A series of meetings were held to discuss the Broadway/I-25 interchange area and expected redevelopment activities. Meeting attendees generally included representatives from Cherokee Denver LLC, CDOT, RTD, City and County of Denver, and Gates Properties. The objectives of the meetings were to identify expected redevelopment activities, determine expected traffic volumes, and provide for coordination between the project team, cooperating agencies, Cherokee Denver LLC, and Gates Properties. These meetings are summarized in **Table 6-2**.

6.3.5 Local Government Official Meetings

Meetings were held with the City and County of Denver council members representing the project area. The project team met with Councilwoman Ramona Martinez, Debbie Ortega, and Kathleen MacKenzie in January, September, and November 2002, respectively. Additional meetings were held with Councilwoman Rosemary Rodriquez in July 2003, and Councilwoman Montero in August 2003 and April 2004. Councilwoman Judy Montero and Rosemary Rodriquez replaced Ramona Martinez and Debbie Ortega following the 2003 elections. The objective of the meetings was to inform the councilwomen of the project and answer any related questions. These meetings are summarized in **Table 6-2**.

6.4 Public Input

Public involvement activities ranged from door-to-door visits of businesses to presentations at neighborhood associations and business groups, public meetings, and one-on-one meetings. The subsections below describe various public involvement activities conducted before release of the Draft EIS.

6.4.1 Public Meetings

Public meetings were held at key points during the EIS process. Project newsletters and/or postcard notices inviting local residents and businesses to the public meetings were sent via a mass mailing to the project area. These meetings were also advertised in the neighborhood association newsletters; through news releases to local media; in bilingual flyers (Spanish and English) distributed at local churches, schools and recreation centers; and via email notices. Meeting attendance ranged from approximately 40 to 100 individuals.

Each of the meetings was held with an open-house format, followed by an open-forum period conducted with the aide of a meeting facilitator. Spanish translation was available at each meeting. The meetings were designed to provide the public with information on the project and the EIS process, to receive feedback, and to establish a relationship with the local communities. At each meeting, Valley Highway project team members gave a presentation that included slides, maps, and graphics.

Following each presentation, a question-and-answer session was conducted by a bilingual facilitator. Comments and concerns were written on a flip chart to verify they were accurately interpreted and to encourage additional discussion. In addition, comments and concerns were recorded in the meeting minutes. A comment summary was prepared with CDOT responses and disseminated using the project mailing list.

At each public meeting, comment feedback and/or evaluation forms were provided to solicit comments. Additional comments were collected during the question-and-answer session portion of each public meeting. Written and verbal comments received at each public meeting were compiled, a written response from CDOT was prepared for each comment, and the comment summaries and a cover letter were and posted on the project website. A summary of the input received is included in **Section 6.4.6**.

Five types of public meetings were held ten times before the public hearing for the Draft EIS. The meetings included the following:

6.4.1.1 PUBLIC SCOPING MEETINGS – SEPTEMBER 2002

Public scoping meetings were held on September 24, 25, and 26, 2002. The meetings were held at three different locations throughout the project area:

- Cameron Church, 1600 South Pearl Street (West Washington Park area)
- Valverde Elementary School, 2030 West Alameda Avenue (Valverde area)
- Del Pueblo Elementary School, 750 Galapago Street (Baker, West Washington Park, Lincoln Park areas)

These meetings were held to introduce the project, obtain scoping input, describe the NEPA process, and introduce the project team.

6.4.1.2 ELEMENT ALTERNATIVES PUBLIC MEETINGS – DECEMBER 2002

Element alternatives public meetings were held on December 12 and 17, 2002. The meetings were held in the project area at the Lighting Services Building (241 South Cherokee Street) at the northwestern corner of Alameda Avenue and Cherokee Street. These meetings were held to present the element design alternatives for the I-25 mainline; Broadway, Santa Fe Drive, and Alameda Avenue interchanges; and the Santa Fe Drive/Kalamath Street grade separation with the Consolidated Main Line railroad. The element alternatives are presented and discussed in **Chapter 2** *Alternatives*.

6.4.1.3 SYSTEM ALTERNATIVES PUBLIC MEETINGS – JULY 2003

System alternatives public meetings were held on July 23 and 29, 2003 at the Lighting Services Building (241 South Cherokee Street). These meetings were held to present four “build” system alternatives identified from the elements alternatives screening process and the No Action Alternative. Each of the system alternatives and the No Action Alternative are discussed in **Chapter 2** *Alternatives.*

6.4.1.4 COMMUNITY AND ENVIRONMENTAL RESOURCES PUBLIC MEETINGS/JANUARY 2004

Community and environmental resources public meetings were held on January 22 and 28, 2004 at the Lighting Services Building (241 South Cherokee Street). These meetings were held to present the three system alternatives that remained following the screening process, as well as the No Action Alternative, existing conditions (community and environmental resources), and potential impacts. System Alternatives 1, 2, and 3 and the No Action Alternative are presented in **Chapter 2** *Alternatives.*

6.4.1.5 INFORMATIONAL MEETING

In May 2005, the Draft EIS was made available to the public for a 45-day public comment period. An informational meeting was held on May 19, 2005 at the Baker Middle School (574 W. 6th Avenue), approximately two weeks prior to the public hearing. The meeting was held to update the public on the project prior to the public hearing and to solicit comments and feedback on the project.

6.4.2 Citizen Working Group Meetings

During the EIS scoping process, five main environmental issues of concern were identified through detailed discussion and public input:

- Aesthetics / Urban Design
- Bicycle / Pedestrian Mobility
- Construction Impacts
- Noise
- South Platte River Corridor

Citizen working groups were established for each of these concerns, and volunteers for each citizen working groups were solicited during the public meetings. The purpose of each citizen working group was to inform the public of the specific issue, discuss how the issue would be impacted by the Valley Highway Project, and present a forum for the public to ask questions, express concerns, and present additional ideas. The information from the each citizen working group was included into the decision-making process for the system alternatives. **Table 6-3** summarizes feedback and comments received during the citizen working group meetings. Meeting minutes from each citizen working group meeting were posted on the project website. The citizen working group meetings were held at a variety of locations in the Athmar Park, Baker, Platte Park, and West Washington Park neighborhoods. Meeting locations were limited due to available facilities.

Table 6-3 Summary of Citizen Working Group Meetings

Citizen Working Group	Objective	Meeting Date and Locations	Issues/Concerns
Aesthetics and Urban Design	• Establish urban design goals for the project that take into consideration the context of the corridor within the larger I-25 corridor, the existing community character and goals, and long-term maintenance obligations	September 15, 2003 Washington Street Community Center 809 S. Washington St. December 15, 2003 Washington Street Community Center 809 S. Washington St.	• Consider the point of view of highway users and adjacent neighborhoods • Provide urban design elements for a sense of neighborhood identity and to help with orientation • Consider lighting effects on neighborhoods (light trespass, safety, views of sunsets, night sky) • Consider flyover aesthetics from all points of view
Bicycle and Pedestrian Mobility	• Consider the mobility of bicyclists and pedestrians through and around the project corridor • Review current and planned bicycle/pedestrian facilities • Provide recommendations to the project team on how to integrate the facilities into the project	June 12, 2003 CDOT Broadway Viaduct Construction Trailer 753 S. Lincoln St. December 8, 2003 CDOT Broadway Viaduct Construction Trailer 753 S. Lincoln St.	• Improve east to west mobility, which is difficult through the project area due to the railroads, I-25, and the South Platte River • Improve access to the RTD park-n-Ride and I-25/Broadway • Improve safety along Alameda

Table 6-3 Summary of Citizen Working Group Meetings (continued)

Citizen Working Group	Objective	Meeting Date and Locations	Issues/Concerns
Bicycle and Pedestrian Mobility (Continued)	•	April 8, 2004 Athmar Park Library 1055 Tejon St.	• Construct the Bayaud bicycle/pedestrian bridge as an early action item to mitigate bicycle/pedestrian impacts during Alameda reconstruction • Do not recommend underpasses due to safety concerns
Construction Impacts	• Discuss potential construction impacts associated with the system alternatives, including such topics as detours, noise, dust generation, and construction staging	September 24, 2003 Athmar Park Library 1055 Tejon St. December 10, 2003 Athmar Park Library 1055 Tejon St.	• Hold the Design/Build Contractor accountable for compliance with CDPHE regulations and provide CDOT with the right to shut the project down for non-compliance • Coordinate with impacted residents/businesses prior to construction to discuss traffic control • Consider neighborhood impacts when deciding on construction phasing
Noise	• Consider the social and analytical elements of noise • Discuss potential noise mitigation techniques • Provide recommendations on how the mitigation techniques could be integrated into the project	January 16 and 21, 2003 Demonstration Tours September 26, 2003 Washington Street Community Center 809 S. Washington St. December 16, 2003 Washington Street Community Center 809 S. Washington St. January 27, 2004 Washington Street Community Center 809 S. Washington St.	• Review pavement types to reduce noise • Evaluate multiple simultaneous noise mitigation measures • Coordinate public participation during demolition after a contractor has been selected
South Platte River Corridor	• Consider the recreational and water body character of the South Platte River, including designated uses, water quality, and history • Review impacts to the river • Offer input as to mitigation measures	September 16, 2003 La Familia Recreation Center 65 S. Elati St. December 4, 2003 Cameron Church 1600 S. Pearl St.	• Avoid the South Platte River • Replace the sump at Alameda and I-25 • Provide enhancements to the South Platte River Trail, such as improved access, where possible

Note: Additional details are provided in the meeting minutes, which are included in **Appendix B**, *Public Coordination*.

6.4.3 Local Neighborhood Association and Business Group Meetings

Project staff also met with individual residential and commercial property owners and local neighborhood associations and business groups to introduce the project and to discuss concerns and issues related to the system alternatives and the NEPA process.

Table 6-4 lists the local neighborhood associations and business groups that were identified and contacted. Neighborhoods with a majority low-income and minority populations that were contacted are discussed in **Section 6.5** *Special Outreach to Low-Income and Minority Populations.'*

Table 6-4 Local Neighborhood Associations and Business Groups

Association/Group	Contact
Antique Row Association	Peter Schmidt
Broadway Area Revitalization District	Joan Loughridge
Broadway Partnership MDLDC	Tony Gengaro
Old South Pearl Street Association	Mark Shanstrom
Overland Neighborhood Association	Jack Unruch
Platt Park Neighborhood Association	Cathy Bird
Santa Fe Drive Redevelopment District (NEWSED)	Pauline Johnson
Sumner Business Group	Bruce Peterson

Each of the neighborhood associations and business groups were contacted by the project team. The Valley Highway Project was introduced and a meeting requested. A project team member met with a neighborhood association or business group representative or attended a meeting, presented the Valley Highway Project, received feedback on the alternatives, and answered questions. **Table 6-5** summarizes local neighborhood and business public involvement activities. If a meeting could not be scheduled, an information packet was provided and the group was included on the mailing list. Sixteen meetings with local neighborhood associations and business groups were attended between January 2002 and June 2006.

6.4.4 Neighborhood Association Newsletter Articles

Periodically (see **Table 6-5**), articles were prepared and submitted to various neighborhood associations for inclusion in their monthly or quarterly newsletter. The articles provided information on the progress of the project and contained announcements of public meetings. A copy of neighborhood association newsletter articles that were obtained are included in **Appendix B**, *Public Coordination*.

6.4.5 Door-to-Door Business Visits

Due to the number of businesses located in the project area and the lack of organized business groups, particularly in the concentrated industrialized/warehouse areas, door-to-door visits were conducted. During the door-to-door visits, project information was presented and additional meetings scheduled, as needed. Door-to-door visits were conducted in the following areas:

- Alameda merchants (along Alameda Avenue from Broadway to Federal Boulevard)
- Baker industrial district area (west of Santa Fe Drive, north of Alameda Avenue, south of US 6, and east of I-25)

- Mississippi industrial triangle area (south of Alameda Avenue, west of the South Platte River, north of Mississippi, and east of Lipan)
- Valverde warehouse / industrial area (north of Alameda Avenue, south of US 6, and west of I-25)
- US 6 / Bryant Street area businesses

During the door-to-door visits, the project team introduced the project and discussed the alternatives, and received feedback. Additional information about door-to-door activities is summarized in **Table 6-5**.

Table 6-5 Neighborhood and Local Businesses Public Involvement Activities

Date	Public Involvement Activity/Group(s)
Jan 9, 2002	Door-to-door visits with South Broadway businesses
Feb 19, 2002	Door-to-door visits with Santa Fe Drive / Kalamath Street businesses
Feb 21, 2002	Door-to-door visits with Lipan Triangle businesses
Mar 11, 2002	Door-to-door visits with South Broadway businesses
Mar 13, 2002	Door-to-door visits with South Broadway businesses
Mar 18, 2002	Door-to-door visits with Santa Fe Drive / Alameda Avenue businesses
Mar 19, 2002	Door-to-door visits with Alameda Avenue businesses
Mar 20, 2002	Door-to-door visits with Lipan Triangle businesses
Mar 22, 2002	Door-to-door visits with Santa Fe Drive / Alameda Avenue businesses
Mar 27, 2002	Door-to-door visits with Valverde neighborhood businesses
Apr 18, 2002	Door-to-door visits with Kalamath Street and 4th and 5th Avenue businesses
May 2, 2002	Door-to-door visits with South Broadway businesses
May 30, 2002	Phone conversation with Performance Radiator representative
Jun 24, 2002	West Washington Park Neighborhood Association representatives meeting
Jun 24, 2002	Overland Neighborhood Association representatives meeting
Jul 13, 2002	Conference of Southwest Denver Neighborhood Associations meeting
Jul 23, 2002	*Federal Register* Notice of Intent
Aug 5, 2002	Platt Park Neighborhood Association representatives meeting
Aug 2002	Project newsletter mailed to 20,000 businesses / residences in the project area
Sep 2002	Project phone hotline set up
Sep 12, 2002	Door-to-door visits with Alameda Avenue businesses
Sep 17, 2002	Sumner Business Group representatives meeting
Sep 23, 2002	News release
Sep 23, 2002	*Rocky Mountain News* newspaper article
Sep 24, 2002	Public Scoping Meeting – Iowa Avenue and Pearl Street
Sep 25, 2002	Public Scoping Meeting – Alameda Avenue and Tejon Street
Sep 26, 2002	Public Scoping Meeting – 8th Avenue and Galapago Street
Oct 28, 2004	Phone conversation with Jerry's Amoco owner
Nov 2002	*Platt Park Post* (neighborhood association newsletter) article
Nov 11, 2002	Phone conversation with US Welding representative
Dec 2002	Project postcard meeting notice mailed to 20,000 businesses / residences in project area
Dec 3, 2002	CDOT right-of-way meeting for potentially affected businesses
Dec 4, 2002	News release
Dec 4, 2002	Old South Pearl Street representative meeting
Dec 9, 2002	Website (www.valleyhighway.com) launched
Dec 10, 2002	CDOT right-of-way meeting for potentially affected residents
Dec 12, 2002	Element Alternatives Public Meeting – Lighting Services Bldg, 241 South Cherokee Street
Dec 16, 2002	*Rocky Mountain News* newspaper article
Dec 17, 2002	Element Alternatives Public Meeting – Lighting Services Bldg, 241 South Cherokee Street
Jan 2003	*Platt Park Post* (neighborhood association newsletter) article
Jan 16, 2003	Noise Citizen Working Group demonstration tour

Table 6-5 Neighborhood and Local Businesses Public Involvement Activities (continued)

Date	Public Involvement Activity/Group(s)
Jan 21, 2003	Noise Citizen Working Group demonstration tour
Jan 29, 2003	Sumner Group meeting
Mar 22, 2003	West Washington Park Neighborhood Association meeting
Apr 23, 2003	Platt Park Neighborhood Association meeting
May 2003	*Platt Park Post* (neighborhood association newsletter) article
May 6, 2003	Meeting with Burlington Northern & Santa Fe Railway company representatives
May 20, 2003	Sumner Group meeting
May 30, 2003	Phone conversation with Hurricane Drain owner
Jun 9, 2003	Website updated
Jun 12, 2003	Bicycle/Pedestrian Mobility Citizen Working Group meeting
Jun 30, 2003	Website updated
Jul 2003	*Washington Park The Profile* newspaper article
Jul 2003	Project newsletter mailed to 20,000 businesses/residences in the project area
Jul 14, 2003	Website updated
Jul 16, 2003	Door-to-door visits with US 6 and Bryant Street businesses
Jul 17, 2003	Door-to-door visits with US 6, Bryant Street, and Federal Boulevard businesses
Jul 22, 2003	News release
Jul 23, 2003	System Alternatives Public Meeting
Jul 28, 2003	*Rocky Mountain News* newspaper article
Jul 29, 2003	System Alternatives Public Meeting
Sep 1, 2003	Website updated
Sep 12, 2003	One-on-one meeting with local business owner
Sep 15, 2003	Urban Design/Aesthetics Citizen Working Group meeting
Sep 15, 2003	*Rocky Mountain News* newspaper article
Sep 16, 2003	South Platte River Corridor Citizen Working Group meeting
Sep 19, 2003	Website updated
Sep 24, 2003	Construction Impacts Citizen Working Group meeting
Sep 26, 2003	Noise Citizen Working Group meeting
Oct 2, 2003	US 6 and Bryant Street businesses workshop
Oct 8, 2003	West Washington Park Neighborhood Association meeting
Oct 22, 2003	Broadway Area Revitalization District (BARD) meeting
Nov 12, 2003	Website updated
Nov 2003	Project newsletter mailed to 20,000 businesses / residences in the project area
Dec 4, 2003	Santa Fe Drive Redevelopment District (NEWSED) meeting
Dec 4, 2003	South Platte River Corridor Citizen Working Group meeting
Dec 4, 2003	Website updated
Dec 8, 2003	Bicycle/Pedestrian Mobility Citizen Working Group meeting
Dec 9, 2003	Platt Park People's Neighborhood Association meeting
Dec 10, 2003	Construction Impacts Citizen Working Group meeting
Dec 15, 2003	Aesthetics/Urban Design Citizen Working Group meeting
Dec 16, 2003	Noise Citizen Working Group meeting
Dec 17, 2003	Website updated
Jan 2004	Project postcard meeting notices mailed to 20,000 businesses / residences in project area
Jan 6, 2004	Provided bilingual (Spanish/ English) flyers to NEWSED for distribution to members/clientele
Jan 9, 2004	Website updated
Jan 16, 2004	News release
Jan 22, 2004	Community and Environmental Resources Public Meeting
Jan 27, 2004	Noise Citizen Working Group meeting
Jan 28, 2004	Community and Environmental Resources Public Meeting
Feb 4, 2004	Phone conversation with Broadway Partnership representative
May 2004	Project newsletter mailed to 20,000 businesses/residences in the project area
Apr 1, 2004	Santa Fe Drive Redevelopment District (NEWSED) meeting
Apr 28, 2004	Bicycle/Pedestrian Mobility Citizen Working Group meeting

Table 6-5 Neighborhood and Local Businesses Public Involvement Activities (continued)

Date	Public Involvement Activity/Group(s)
May 2004	Website Updated
Jun 15, 2004	Website Updated
July 8, 2004	Website Updated
July 13, 2004	Community meeting on nuisance noise
Oct 5, 2004	Phone conversation with Wine Storage owner
Oct 11, 2004	Letter on project status distributed to the project mailing list
Oct 13-15, 2004	Website updated
Dec 6, 2004	Website updated
Mar 4, 2004	Website updated
April 2005	Project newsletter mailed to 20,000 businesses/residences in the project area
Apr 18, 2005	Website updated
Apr 28, 2005	Website updated
Apr 29, 2005	Federal Register Notice of Availability of the Draft EIS
May 6, 2005	Website updated
May 16, 2005	Website updated
May 19, 2005	Draft EIS Informational Meeting
May 23, 2005	Website updated
Jun 2, 2005	Draft EIS Public Hearing
Jun 29-30, '05	Website updated
Aug 10, 2005	Website updated
Oct 6, 2005	Website updated
Nov, 2005	Project newsletter mailed to 20,000 businesses/residences in project area
Dec 6, 2005	Website updated
Jan 13, 2006	Website updated
Feb 28, 2006	Website updated
Mar 1, 2006	Website updated
Mar 8, 2006	Website updated
Sept 9, 2006	Inter-neighborhood cooperation meeting
Sept 13, 2006	West University Community Association meeting
Sept 15, 2006	Website updated
Sept 18, 2006	West Washington Park Neighborhood Association meeting
Sept 27, 2006	Sumner Group meeting
Sept 28, 2006	US 6 and Bryant Street businesses workshop
Oct 10, 2006	Platt Park People's Association meeting
Oct 25, 2006	Barnum East Park users meeting
Nov, 2006	Project newsletter mailed to 20,000 businesses/residences in the project area

6.4.6 Public Input Obtained

Public comments that were identified during the public meetings prior to release of the Draft EIS included:

- Expressed concern over safety along the I-25 mainline; at the Broadway, Santa Fe Drive, and Alameda Avenue interchanges; and along US 6 at the Bryant Street interchange
- Expressed concern over impacts to property and property acquisition for right-of-way
- Expressed concern over traffic congestion and the impact of property redevelopment in the Broadway/I-25 interchange area on traffic flow and volumes
- Supported closure of the Bryant Street/US 6 interchange

- Expressed concern over business access to US 6 and I-25 if the Bryant Street interchange is closed
- Supported grade separation of the Consolidated Main Line railroad tracks and Santa Fe Drive and Kalamath Street to improve safety and traffic congestion
- Supported improved bicycle/pedestrian mobility along Alameda Avenue, access to the Broadway LRT station, and the Bayaud Avenue bicycle/pedestrian bridge
- Expressed concerns over highway noise, lights, and local view sheds
- Expressed concern over impacts to local businesses and neighborhoods during construction
- Supported a grade separation from southbound Broadway to southbound I-25
- Expressed concern over the use of a design-build process for final design and project construction
- Wanted to know when the project would begin and if funding was available

In addition to the general public comments received, **Table 6-6** identifies comments received from neighborhood associations, business groups, and non-profit organizations that were met with prior to release of this EIS.

Table 6-6 Summary of Comments Received from Neighborhood Associations, Business Groups, and Non-Profits

Group/Individual	Issues/Concerns
Athmar Park Neighborhood Association	• Noise issues related to I-25 and Santa Fe Drive/I-25 interchange • East/west connectivity along Alameda Avenue • Safety at the Bryant Street/US 6 interchange • Supported improvements to the Santa Fe Drive/I-25 interchange
Atlantis Community Inc.	• Americans with Disability Act (ADA) accessibility and mobility
Baker Neighborhood Association	• Noise and light pollution issues related to I-25 • Maintain view across I-25 toward the mountains • Pedestrian/bicycle accessibility to the Alameda LRT station • Supported movement of northbound I-25 on-ramp to the west side of Broadway • Access to the South Platte River and the South Platte River Trail
Barnum Improvement Council	• Safety at the Bryant Street/US 6 interchange • Project impacts at the Bryant Street/US 6 Avenue interchange • Excess traffic in neighborhood
Bayaud Industries	• Pedestrian mobility and safety
Broadway Area Revitalization District	• Traffic along Broadway • Aesthetics and urban design of the corridor • Coordination between CDOT and Cherokee Denver LLC
Columbine Homes (The Bridge Project)	• East/west connectivity along Alameda Avenue • Safety along Alameda Avenue
Denver Indian Center	• Project funding • Project schedule
Godsman Neighborhood Association	• Safety at the Santa Fe Drive/I-25 interchange
Hispanic Chamber of Commerce	• Project funding • Project schedule
La Alma/Lincoln Park Planning Group	• Access to the business area northeast of the US 6/I-25 interchange • Improvements to I-25 north of US 6 • Traffic along Santa Fe Drive and Kalamath Street north of US 6

Table 6-6 Summary of Comments Received from Neighborhood Associations, Business Groups, and Non-Profits (continued)

Group/Individual	Issues/Concerns
Mi Casa Resource Center	• Project funding • Project schedule • Employment opportunities and involvement
Old South Pearl Street Association	• Impacts to local businesses during construction • Project schedule • Excess traffic in neighborhood
Overland Neighborhood Association	• Excess traffic in neighborhood • Noise issues related to I-25 • Supported improvements to the Santa Fe Drive/I-25 interchange
Platt Park Neighborhood Association	• Noise issues related to the Broadway viaduct • Excess traffic in neighborhood • Pedestrian/bicycle accessibility to the Broadway LRT station • Safety underneath the Broadway viaduct
Poder Advocacy Council	• Supported the railroad grade separation at Santa Fe Drive and Kalamath Street • Excess traffic in neighborhood
Santa Fe Drive Redevelopment Corp. (NEWSED)	• Increased traffic and speed along Santa Fe Drive with railroad grade separation • Parking along Santa Fe Drive • Right-of-way acquisition and displacements along Santa Fe Drive and Kalamath Street
Shalom	• Employee safety and traffic along 2nd Avenue • Improved pedestrian mobility along 2nd Avenue
Sumner Group	• Property access • Mobility of trucks
Valverde Neighborhood Association/Metropolitan Organization for the People	• Noise issues related to I-25 • East/west connectivity along Alameda Avenue
Villa Park Neighborhood Association	• Safety at the Bryant Street/US 6 interchange • Project impacts at the Bryant Street/US 6 interchange • Impacts to Barnum Park, Barnum Park North, and Barnum Park East near the Federal Boulevard/US 6 interchange • Traffic congestion at the US 6/I-25 interchange
West Washington Park Neighborhood Association	• Noise issues related to the Broadway viaduct • Excess traffic in neighborhood • Pedestrian/bicycle accessibility to the Broadway LRT station • Supported movement of northbound I-25 on-ramp to the west side of Broadway • Supported tunnel from southbound Broadway to southbound I-25 • Supported System Alternative 2

6.5 Special Outreach to Low-Income and Minority Populations

Low-income and minority populations were identified through 2000 US Census Bureau data and through local community representatives. A discussion on environmental justice is included in **Section 4.1**, *Socio-Economics and Community*. Outreach activities were conducted to ensure that everyone living in the project area, including low-income or minority populations, received information related to the project and were afforded the opportunity to voice their questions and concerns related to the project. Special outreach activities to low-income and minority populations included:

- News releases to community and ethnic media (see **Section 6.2.5**)
- Provision of project information in Spanish and English, as necessary

- Access to translation at public meetings, through the project hotline, and on the project website (see **Section 6.2.4, 6.2.6, and 6.4.1**)
- Dissemination of project information through community institutions and organizations, such as local schools, churches, recreation centers, and local organizations (neighborhood associations, community groups, and non-profit organizations)
- Meetings with neighborhood associations, community groups, and non-profit organizations providing services for low-income and minority populations
- One-on-one meetings with local residents and individuals
- An information booth at the El Grito de la Independencia festival

6.5.1 Project Information Dissemination

Based on the demographic and employment characteristics of the project area (see **Section 4.1** *Socio-Economics and Community*), the following neighborhoods were identified with minority and low-income populations and were consequently targeted for special outreach: Athmar Park, Baker, Barnum, Lincoln Park, Valverde, Villa Park, and Sun Valley. Hispanics are the largest minority group in the project area (See **Table 4.1-1, Section 4.1)**.

To facilitate use by non-English speakers, a multi-lingual translator was provided on the Valley Highway project website. The multi-lingual translator could translate the website into thirteen different languages, including Spanish, Chinese, and Russian. In addition to the website, a bilingual (Spanish/English) project phone hotline was established. Project information, such as newsletters, flyers, and postcards, was provided in Spanish and English. Spanish translation was also made available at the public meetings (see **Section 6.4.1**). Vietnamese translation was also provided at the project meeting held at Columbine Homes, a Denver Housing Authority public housing site.

News releases were prepared and provided to media targeting minority populations, such as *El Hispano*, *Urban Spectrum*, *Hispania News, Korea Times Denver*, *Korean Denver News*, *Colorado Chinese News*, *Univision*, and *Telemundo*. **Table 6-1** identifies the list of local media that news releases were provided to. A newspaper article on the Valley Highway Project was published in the *La Voz* and a television news story was aired on *Univision* in December 2002.

Bilingual newsletters and flyers (Spanish/English) were distributed through local schools, churches, recreation centers, and local organizations. The following community institutions and organizations distributed project information:

- Fairmount Elementary, Greenlee Elementary School, Barnum Elementary, Del Pueblo Elementary School, Baker Middle School, Valverde Elementary School, Lincoln Elementary, and Rishel Middle School
- St. Anthony of Padua, St. Vincent de Paul Parish, Presentation of Our Lady, St. Augustine Orthodox, Valverde Park Presbyterian, Rocky Mountain Church of God, and Church of Latter Day Saints
- La Alma and La Familia Recreation Centers
- Mi Casa Resource Center, Centro Bienestar, the Bridge Project (Columbine Homes), NEWSED, Hispanic Chamber of Commerce, and Asian Chamber of Commerce, Rocky Mountain Indian Chamber of Commerce

6.5.2 Local Neighborhood Association and Non-Profit Organization Meetings

Project staff met with local neighborhood associations and non-profit organizations to introduce the project and to discuss concerns and issues related to the system alternatives and the NEPA process. Project staff contacted each community representative to inform them of the project and to request the opportunity to conduct a small, informal briefing with an organization representative or in a group setting. **Table 6-7** summarizes the local community representatives contacted.

These briefings allowed the project team the opportunity to provide detailed project information in a personalized manner to a large number of individuals. Meetings were attended both by local community group leaders and residents. Information was also provided to the community representatives for dissemination. **Table 6-8** summarizes the special outreach activities to low-income and minority populations in the project area.

Project staff met with the Athmar Park, Baker, Barnum, Valverde, Villa Park, and Poder Advocacy Council neighborhood associations or their representative. Specific comments from these meetings and groups are summarized in **Table 6-6**. The meeting with the Valverde Neighborhood Association representative was also attended by a representative from the Metropolitan Organization for the People.

Additional meetings were held with several non-profit organizations in the project area: Atlantis Community, Bayaud Industries, Shalom, Platte River Industries, The Bridge Project at Columbine Homes, and Making Connections Denver.

Table 6-7 Local Community Representatives Contacted

Association/Group	Contact
Alameda Square Businesses	Khahn Vu
Asian Chamber of Commerce	John Wright
Athmar Park Neighborhood Association	Karen Cuthbertson
Atlantis Community, Inc.	Tim Thornton
Barnum Improvement Council	Howard Kumpf
Bayaud Industries	David Henniger
The Bridge Project (Columbine Homes – Denver Public Housing)	Jeanne Orrben
Catalus Resources/Making Connections/Westside Visions Coalition	Kit Williams
Colorado Commission of Indian Affairs	Karen Wilde-Rogers
Denver Buddhist Cultural Society	Sue Ong Moyers
Denver Indian Center	Colleen Brave/Carrie Howell
Denver's Neighborhood Safe Haven	Arturo Rodriquez
Florence Crittenton Center	Silvia Milanese
Godsman Neighborhood Association	Betty Stewart
Hispanic Chamber of Commerce	Diedra Garcia
Historic Baker Neighborhood Association	Al Habercorn
La Familia Recreation Center	Sid Shuck
La Alma/Lincoln Park Planning Group	Peter Hynes
La Alma Recreation Center	Dave Rodriguez
Metropolitan Organization for the People	Mateos Alvarez
Mi Casa	Brenda Lopez
Northwest Neighbor's Coalition	Ray Defa
Platte River Industries	Robert Smith
Poder Advocacy Council	Carlos Guerra

Table 6-7 Local Community Representatives Contacted (continued)

Association/Group	Contact
Presentation of Our Lady	Father Vincent
Rocky Mountain Indian Chamber of Commerce	Paul Kabotie
St. Anthony of Padua	Theresa Martinez
St. Augustine Orthodox Church	Father Michael
St. Joseph's Redemptorist Church/Centro Bienstar	Father Steve
St. Rose of Lima	Rev. Patrick Dolan
St. Vincent de Paul Parish	Nancy Schaffner
Shalom	Arnold Kover
Sun Valley Community Association	Paul Bobian
Valverde Neighborhood Association	Leticia Otero
Villa Park Neighborhood Association	Rosa Howard
Western Indian Chamber of Commerce	Ben Sherman

Table 6-8 Special Outreach Activities for Low-Income or Minority Populations

Date	Group/Activity
May 3, 2002	Door-to-door visits with Alameda Avenue businesses (with Spanish interpreter)
Jun 24, 2002	Godsman Neighborhood Association representative meeting
Jul 10, 2002	Door-to-door visits with Alameda Square businesses
Jul 11, 2002	Athmar Park Neighborhood Association representative meeting
Aug 8, 2002	Baker Historic Neighborhood Association representative meeting
Aug 8, 2002	Villa Park Neighborhood Association representative meeting
Aug 8, 2002	Barnum Improvement Council representative meeting
Sep 8, 2003	Provided information packet to Western Indian Chamber representative
Sep 22, 2003	Provided information packet to Denver Indian Center representative
Sep 22, 2003	Provided information packet to Rocky Mountain Indian Chamber of Commerce representative
Sep 23, 2002	News release
Nov 19, 2002	Native American Conference
Nov 16, 2002	Athmar Park Neighborhood Association annual meeting
Dec 2, 2002	Delivered bilingual (Spanish/English) flyers to elementary schools
Dec 2, 2002	Delivered bilingual (Spanish/English) flyers to churches
Dec 4, 2002	News release
Dec 11, 2002	Univision KCEC-TV news story
Dec 11, 2002	*La Voz* newspaper article
Jul 2003	Delivered bilingual (Spanish/English) flyers to St. Anthony of Padua, St. Vincent de Paul Parish, Presentation of Our Lady, and St. Augustine Orthodox Church.
Jul 2003	Delivered bilingual (Spanish/ English) flyers to La Alma Recreation Center and La Familia Recreation Center
Jul 2003	Delivered bilingual (Spanish/English) flyers to Mi Casa Resource Center
Jul 2003	Delivered bilingual (Spanish/English) flyers to businesses along US 6, Bryant Street, and Federal Boulevard
Jul 22, 2003	News release
Jul 24, 2003	Mi Casa Resource Center presentation
Jul 31, 2003	One-on-one meeting with area resident
Sep 13, 2003	*El Grito de la Independencia* Festival
Sep 16, 2003	Barnum Improvement Council meeting
Sep 24, 2003	Making Connections – Denver meeting
Oct 2, 2003	Valverde Neighborhood Association representative and Metropolitan Organization for the People representative meeting
Oct 22, 2003	Villa Park Neighborhood Association meeting
Oct 24, 2003	Provided information packet to Colorado Commission of Indian Affairs Executive Director
Oct 27, 2003	One-on-One meeting with local resident

Table 6-8 Special Outreach Activities for Low-Income and Minority Populations (continued)

Date	Group/Activity
Nov 4, 2003	Shalom meeting
Nov 4, 2003	Columbine Housing (Bridge Project) planning meeting
Nov 11, 2003	Baker Neighborhood Association meeting
Nov 15, 2003	Athmar Park Neighborhood Association meeting
Nov 18, 2003	Hispanic Chamber of Commerce meeting
Nov 20, 2003	Poder Advocacy Council meeting
Dec 8, 2003	Mi Casa Resource Center managers meeting
Dec 11, 2003	Columbine Housing meeting
Jan 2004	Delivered bilingual (Spanish/English) flyers to St. Anthony of Padua, St. Vincent de Paul Parish, Presentation of Our Lady, and St. Joseph's Churches
Jan 2004	Delivered bilingual (Spanish/English) flyers to La Alma Recreation Center and La Familia Recreation Center
Jan 6, 2004	Delivered bilingual (Spanish/English) flyers to Making Connections - Denver
Jan 7, 2004	Delivered bilingual (Spanish/English) flyers to the Asian Chamber of Commerce
Jan 12, 2004	Delivered bilingual (Spanish/English) flyers to Columbine Homes (Denver Housing Authority)
Jan 16, 2004	News release
Jan 19, 2004	Phone conversation with Platte River Industries representative
Jan 23, 2004	Bayaud Industries meeting
Jan 23, 2004	Atlantis Community, Inc. meeting
Feb 1, 2004	Athmar Park newsletter article
Feb 19, 2004	One-on-one meeting with area resident
Mar 2004	Delivered flyers to the Rocky Mountain Indian Chamber of Commerce for distribution at the Denver March Powwow
Mar 30, 2004	Phone conversation with Hispanic Chamber of Commerce representative
Apr 6, 2004	La Alma/Lincoln Park Community Planning Group representative meeting
Apr 27, 2004	Denver Indian Center Public Meeting
May 25, 2004	Athmar Park Neighborhood Association meeting
Aug 12, 2004	Phone conversation on project status with Atlantis representative
Aug 12, 2004	Phone conversation on project status with Shalom representative
Aug 22, 2004	Phone conversation on project status with Platte River Industries representative
Aug 22, 2004	Phone conversation on project status with Bayaud Industries representative
Aug 22, 2004	Phone conversation on project status with Mi Casa Resource Center representative
Aug 22, 2004	Phone conversation on project status with Columbine Homes/The Bridge Project representative
April, 2005	Delivered bilingual (English/Spanish) flyers to St. Anthony de Padua, St. Vincent de Paul Parish, Presentation of our Lady, and St. Joseph's Church
May 6, 2005	Delivered bilingual (English/Spanish) flyers to church of Latter Day Saints, St. Vincent de Paul Parish, St. Joseph's Church, St. Rose de Lima, Mi Casa Resource Center, and Centro Bienestar
May 9, 2005	Delivered bilingual (English/Spanish) flyers to Fairmount Elementary, Baker Middle School, Barnum Elementary, Rishel Middle School, Valverde Elementary School, Lincoln Elementary, Del Pueblo elementary, St. Anthony de Padua, Valverde Park Presbyterian Church, Platte Park Senior Center, La Alma Recreation Center, La Familia Recreation Center, Cameron United Methodist Church, and St. Augustine
May 11, 2005	Delivered bilingual (English/Spanish) flyers to Presbyterian of Our Lady, NEWSED, Bridge Project/Columbine Homes
May 13, 2005	Delivered bilingual (English/Spanish) flyers to Rocky Mountain Church of God
Sept 12, 2006	Concerned Citizens for Barnum meeting
Sept 16 and 17, 2006	*El Grito de la Independeneia Festival*
Sept 26, 2006	Athmar Park Neighborhood Association meeting
Sept 26, 2006	La Alma/Lincoln Park Planning Group meeting
Sept 27, 2006	Villa Park Neighborhood Association meeting
Oct 10, 2006	Baker Historic Neighborhood Association meeting

6.5.3 Local Festival

Project team members staffed a booth at the *El Grito de la Independencia* Festival (Cry for Independence) on September 13th to 14th 2003 and September 16th and 17th 2006, along Santa Fe Drive. The *El Grito de la Independencia* Festival is an annual gathering celebrating Mexico's independence from colonial Spain, which is sponsored by NEWSED. Approximately 75,000 primarily Spanish-speakers attended the festival in 2004. The objective was to disseminate project information and discuss the project with local residents. A Spanish translator was available to facilitate discussions on the project. Interested individuals were included on the mailing list and Citizen Working Groups.

6.6 Release of Draft EIS

A Notice of Availability for the I-25 Valley Highway Project Draft Environmental Impact Statement (EIS) was published in the *Federal Register* on April 29, 2005. The Notice of Availability included the date and location of the public hearing. This information was also disseminated through a mass mailing to the project area, flyers, and news releases (see **Tables 6-2, 6-5,** and **6-8**).

The Draft EIS was made available to the public on the project website at www.valleyhighway.com and at the following locations:

- FHWA, 12300 W. Dakota Avenue, Lakewood
- CDOT, 2000 S. Holly Street, Denver
- Denver Public Library, Central Library, 10 W. 14th Avenue Parkway, Denver
- Denver Public Library, Ross-Barnum Branch, 3570 W. First Avenue, Denver
- Denver Public Library, Byers Branch, 675 Santa Fe Drive, Denver
- Denver Public Library, Ross-Broadway Branch, 33. E. Bayaud, Avenue, Denver
- Denver Public Library, Athmar Park Branch, 1055 S. Tejon Street, Denver
- Denver Public Library, Decker Branch, 501 S. Logan Street, Denver

The 45-day public comment period for the Draft EIS ended on June 14, 2005. During the comment period, an informational meeting was held on May 19, 2005, and the public hearing was held on June 2, 2005. Twenty-seven individuals attended the informational meeting, and twenty-six individuals attended the public hearing. The comments were received, as follows:

- Ten individuals provided verbal comments during the informational meeting, and one written comment was received.
- Seven individuals provided verbal comments during the public hearing, and two written comments were received.
- Six comments were received via the website during the comment period.
- U.S. Welding, Rio Grande Company, Cherokee Denver, West Washington Park Neighborhood Association, and Robert Shedd provided comment letters.
- Comments were also received from SHPO, USFWS, City and County of Denver, EPA, RTD, DRCOG, and the U.S. Department of the Interior. The Federal Railroad Administration (FRA) indicated that they had no comments.

The agency and public comments received and responses to the comments, including the court reports transcripts of oral comments received at the informational meeting and the public hearing, are included in **Appendix A** *Agency Coordination* and **Appendix B** *Public Coordination*.

6.7 Coordination Subsequent to Release of Final EIS

The availability of this Final EIS and the date and location of the public hearing will be announced at least 15 days in advance of the hearing. This information will be disseminated through a mass mailing to the project area, flyers, and news releases. At the public hearing, the public will be provided the opportunity to comment on the project and the Final EIS. Written comments will be accepted for 30 days following availability and will be included in the official record.

TABLE OF CONTENTS

Page

7.0 PHASED PROJECT IMPLEMENTATION 7-1

7.1 Phased Implementation Requirements 7-1

7.2 Identification of Logical Project Phases and Priorities 7-4

7.3 Detailed Discussion of Project Phases 7-7

7.4 Further Coordination and Decision Making after Final EIS 7-43

LIST OF FIGURES

Page

Figure 7.1 Phased Implementation Process 7-3
Figure 7.2 Phasing Plan 7-6
Figure 7.3 Phase 1 Layout for I-25 7-8
Figure 7.4 Phase 1 Layout for US 6 7-10
Figure 7.5 Phase 1 2025 AM/PM Peak Hour LOS – Logan to Alameda Avenue 7-12
Figure 7.6 Phase 1 2025 AM/PM Peak Hour LOS – US 6 7-13
Figure 7.7 Phase 2 Layout 7-19
Figure 7.8 Phase 3 Layout 7-24
Figure 7.9 Phase 4 Layout 7-29
Figure 7.10 Phase 5 Layout 7-34
Figure 7.11 Phase 6 Layout 7-39

LIST OF TABLES

Page

Table 7.1 Project Phases and Priorities 7-5
Table 7.2 Project Objectives Addressed by Phase 1 7-9
Table 7.3 Surface Street Levels of Service – Phase 1 7-14
Table 7.4 Phase 1 Environmental Consequences, Mitigation Measures, and Monitoring 7-16
Table 7.5 Project Objectives Addressed by Phase 2 7-20
Table 7.6 Phase 2 Environmental Consequences, Mitigation Measures, and Monitoring 7-21
Table 7.7 Project Objectives Addressed by Phase 3 7-25
Table 7.8 Phase 3 Environmental Consequences, Mitigation Measures, and Monitoring 7-26
Table 7.9 Project Objectives Addressed by Phase 4 7-30
Table 7.10 Phase 4 Environmental Consequences, Mitigation Measures, and Monitoring 7-31
Table 7.11 Project Objectives Addressed by Phase 5 7-35
Table 7.12 Phase 5 Environmental Consequences, Mitigation Measures, and Monitoring 7-36
Table 7.13 Project Objectives Addressed by Phase 6 7-40
Table 7.14 Phase 6 Environmental Consequences, Mitigation Measures, and Monitoring 7-41

7.0 PHASED PROJECT IMPLEMENTATION

This chapter describes the phased implementation of the Preferred Alternative. With a Record of Decision (ROD) to be issued after this Final EIS has been made available and public comment received, FHWA and CDOT plan to select an initial phase (Phase 1) for implementation. The identification of a Preferred Alternative for the entire project in this Final EIS is consistent with the FHWA's objective of analyzing and selecting transportation solutions on a broad enough scale to provide meaningful analysis and avoid segmentation. The selection of an initial phase for implementation is consistent with FHWA requirements to have funding for projects identified before final decisions are made (this is known as "fiscal constraint" for transportation projects). It is the intent of CDOT and FHWA to work toward implementation of the Preferred Alternative in its entirety through this phased approach, as additional funds become available.

This chapter describes a series of six project development phases proposed for implementation of the entire Preferred Alternative. The chapter is organized as follows:

- Section 7.1 describes the requirements for phased project implementation
- Section 7.2 highlights the phases that have been identified and the sequence envisioned to implement these phases
- Section 7.3 provides detail regarding the benefits provided by each phase, as well as the associated environmental consequences and mitigation measures by phase
- Section 7.4 describes the additional coordination and decision making that will take place after publication of this Final EIS

7.1 Phased Implementation Requirements

Major transportation projects are typically implemented in phases. This may be done for a number of reasons, the most obvious of which is the ability to physically construct the project. Another reason is funding limitations that may preclude the ability to implement the entire project at one time. In cases where a project is implemented in more than one phase, care must be taken to ensure that the transportation system operates acceptably at the conclusion of each phase. This is referred to as "independent utility" – the ability of each phase to operate on its own. Additionally, it must be demonstrated that air quality conformity will not be jeopardized. In addition, any mitigation measures needed in response to project impacts must be implemented with the phase in which the impacts occur, rather than deferred to a later phase.

Phased implementation is typically detailed during final design. However, the requirements of fiscal constraint must be satisfied for FHWA to approve a ROD. Because the fiscally-constrained Regional Transportation Plan (RTP) does not contain the entire Preferred Alternative for the Valley Highway project, CDOT and FHWA believe that it is appropriate to identify project phasing within the NEPA process. This will allow consideration of phasing at an earlier time than for many projects, with the goal of better understanding of the impacts of phasing as well as increased opportunity for public involvement. The Metro Vision (unconstrained) plan will contain the entire Preferred Alternative. DRCOG will test air quality conformity for the Preferred Alternative by modeling the Preferred Alternative on the fiscally-

constrained RTP network, in addition to modeling Phase 1 of the project on that same network. DRCOG's modeling will be completed before a ROD is issued.

7.1.1 Need for Phased Implementation

As noted above, the implementation of the Preferred Alternative will need to occur in a number of phases, due to the longer-term nature of funding availability for the entire project. The RTP examines transportation needs and identifies the funding that can reasonably be expected to be available for major transportation projects within the current planning horizon. The RTP is periodically amended and updated. As funds become available for additional project phases, the RTP will be amended accordingly.

The fiscally-constrained element of the 2030 RTP (DRCOG, 2005) establishes reasonably expected funding for the project corridor through the year 2030 to be as follows:

- I-25: Broadway to Alameda - $84.0 million
- US 6: Bryant – $15.0 million
- US 6: Federal - $8.1 million

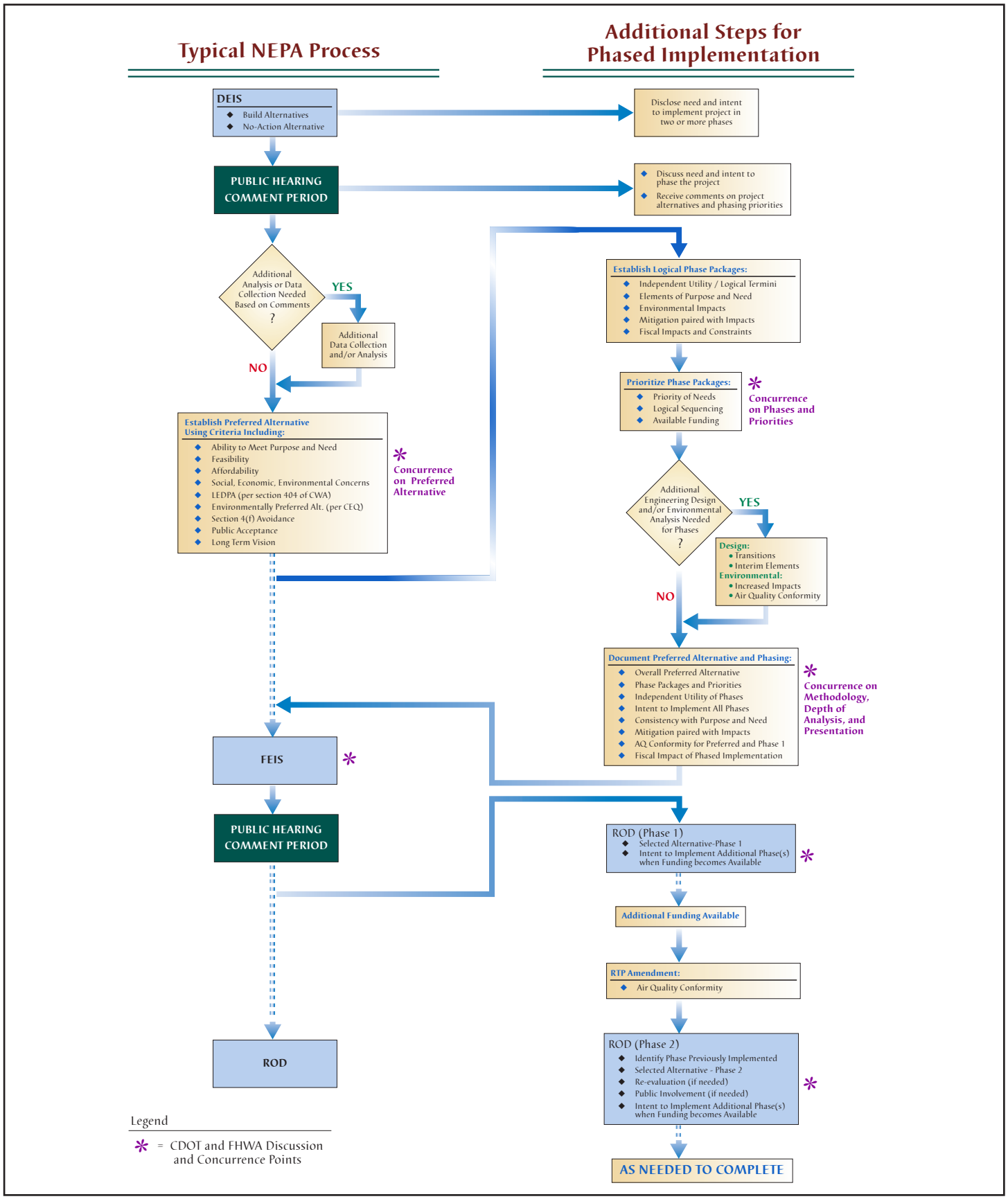
This indicates that $107.1 million (in 2005 $s) can reasonably be expected for the project corridor through the year 2030, including $84 million for I-25 and $23.1 million for US 6. This compares with estimated costs for the entire Preferred Alternative of $294 million.

With a ROD to be issued after the FEIS public hearing and comment period, CDOT and FHWA will select an initial phase (Phase 1). The Phase 1 package will be fiscally-constrained (i.e., will have a probable cost equal to or less than the amount in the RTP). As additional funding becomes available, the RTP will be amended and CDOT/FHWA will issue ROD(s) to implement subsequent phases, working toward implementation of the Preferred Alternative in its entirety.

The Clean Air Act requires air quality conformity to be demonstrated for major transportation project is non-attainment areas. Region air quality conformity for Phase 1 will be demonstrated by its inclusion in the fiscally-constrained RTP. For the entire Preferred Alternative, air quality conformity will be established by inclusion in the unconstrained "vision" model prepared by DRCOG as part of the RTP process. As additional funding becomes available, subsequent phases will be included in the fiscally-constrained RTP for purposes of air quality conformity.

7.1.2 Process Requirements and Criteria for Establishing Logical Phase Packages

To provide more information and opportunity for public comment, as well as to satisfy the requirements for fiscal constraint, CDOT and FHWA have developed an approach to be used for this project to support phased implementation. This approach, which is shown in **Figure 7.1**, allows for disclosure and discussion of project phasing during the NEPA process. With this approach, the analysis of alternatives and identification of a Preferred Alternative is fully consistent with the typical NEPA process for transportation projects. However, in this approach additional detail is provided regarding phasing, as an enhancement to the typical NEPA process.



Phased Implementation Process

FHWA and CDOT have identified a set of criteria to be used as guidelines in establishing logical project phases, as presented in **Figure 7.1**. The criteria used to establish logical project phases include:

- Independent utility / logical termini – each phase should have independent utility and logical termini to the extent that the phase provides a functional transportation system even in the absence of other phases
- Elements of purpose and need – each phase should contribute to meeting the purpose and need for the entire project
- Environmental impacts – individual phases should avoid the introduction of substantial additional environmental impacts that cannot be mitigated
- Mitigation paired with impacts – each phase should include appropriate mitigation measures to match the environmental impacts of that phase
- Fiscal constraint – Phase 1 must meet the requirements of fiscal constraint, demonstrated by inclusion in the RTP
- Air quality conformity

Of these criteria, the first two are considered key in establishing meaningful project phases that work toward meeting the overall corridor needs.

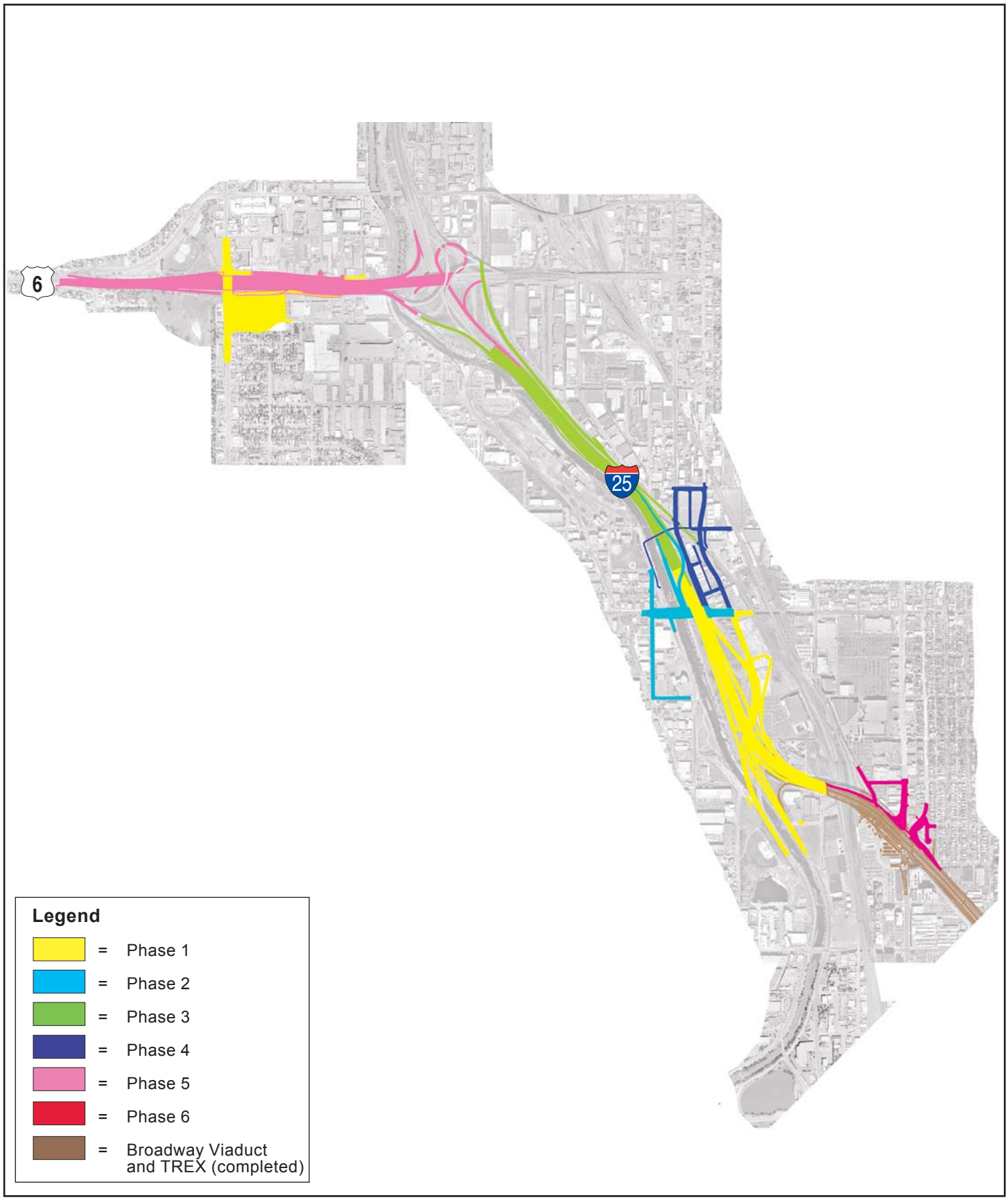
7.2 Identification of Logical Project Phases and Priorities

A series of logical phases has been established by CDOT and FHWA based on a balance of the criteria listed above. In addition to these criteria, logical sequencing of phases in terms of constructability and operation has been considered and a general priority of needs has been applied, with system reliability and safety as the top priority, followed by lane continuity on I-25.

Following the initial identification, testing and refinement of phase packages was conducted and an initial phase (Phase 1) was identified meeting the requirements of fiscal constraint. Additional logical phases (Phases 2 through 6) were identified to be implemented as funding becomes available, and CDOT and FHWA work toward implementation of the entire Preferred Alternative. The resulting identification of phases and priorities is summarized in **Table 7.1**; the phases are shown on **Figure 7.2.**

Table 7.1 Project Phases and Priorities

Phase	Phase Package Description Elements Included	Sequencing Restrictions	Probable Cost	Comments
1 Most critical on I-25	**I-25 / Santa Fe Interchange with Lane Continuity through Alameda** • Reconstruction of I-25/ Santa Fe Interchange • Construction of flyover ramp from NB Santa Fe to NB I-25 • Replacement of Alameda bridge over I-25 • Reconstruction of I-25 under Alameda with associated sump and drainage improvements	None	$81M $ 3M ROW $84M	NB and SB structures at Santa Fe both rated as structurally deficient with sufficiency rating of 20.2 and 22.8, respectively. A sufficiency rating of 50 is considered acceptable. Continuous auxiliary lanes on I-25 (US 85 lane balance) will not be fully addressed until Mainline Widening is completed
1 Most critical on US6	**US 6 / Federal Bridge and Ramps, excluding Braided Ramp and West Side US 6 / Federal Ramps** • Closure of Bryant Street Interchange to US 6 • Replacement of Federal Blvd. bridge over US 6 • Reconfiguration/reconstruction of ramps • Reconfiguration of Barnum East Park	None	$20M $ 3M ROW $23M	
2	**I-25/ Alameda Interchange and Alameda Bridge over South Platte** • Alameda widening from Lipan St. to Santa Fe Drive • Replacement of Alameda bridge over the S. Platte River • Construction of Lipan St. and closure of Platte River Drive north of Alameda • Widening of Lipan south of Alameda • Replacement of Alameda ramps to I-25	Must follow or be concurrent with **I-25 / Santa Fe Interchange**	$18M $ 5M ROW $23M	
3	**I-25 Mainline Widening From Alameda to US 6** • Relocation of CML railroad to allow widening of I-25 • Reconstruction of I-25 north of Alameda to full section with shoulders	Must follow or be concurrent with **I-25/ Alameda Interchange**	$28M $ 8M ROW $36M	Railroad relocation sequencing and logistics requires further detailed evaluation.
4	**Santa Fe/ Kalamath CML Grade Separation** • Construction of road underpasses taking Santa Fe and Kalamath under the CML • Construction of pedestrian/ bicycle bridge over Santa Fe, Kalamath, CML, I-25 and South Platte River along Bayaud alignment	Must follow **I-25/ Alameda Interchange** Must follow or be concurrent with **I-25 Mainline Widening From Alameda to US 6**	$22M $7M Ped.Br. $ 7M ROW $36M	
5	**US 6 from Federal to I-25 with Braided Ramp** • Reconstruction of US 6 from Federal to I-25 • Replacement of US 6 bridge over S. Platte River • Construction of braided ramp from Federal Blvd. to EB US6 • Construction of EB US 6 to Federal off ramp • Construction of Federal to WB US 6 on ramp	Must follow **US 6 / Federal Bridge and Ramps excl. Braided Ramp**	$75M $ 2M ROW $77M	
6	**I-25/ Broadway Interchange** • Reconfiguration/reconstruction of I-25/Broadway interchange	None	$13M $ 2M ROW $15M	



North

Phased Implementation Plan

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 7-2

Phase 1 was selected to provide improvements aimed at addressing the most critical needs in the I-25 and US 6 corridors. Specifically:

- On I-25, Phase 1 provides for the replacement of structurally-deficient structures at I-25 and Santa Fe Drive
- Also on I-25, Phase 1 provides lane continuity with four through lanes on I-25 to match the sections to the north and south
- On US 6, Phase 1 provides for closure of the Bryant Street interchange with standardization of the Federal interchange. These actions will enhance safety through this high accident area.

It must be noted that these are current priorities. Priorities may change, especially with regard to how phases may fit with future funding amounts. In addition, actions to improve safety (for example, replacement of guard rails, barriers, or repairs on bridges) could occur separately from this effort and will be funded at that time by safety funds and/or other funding sources.

7.3 Detailed Discussion of Project Phases

This section describes the improvements to be made for each project phase and the transportation benefits associated with the improvements. The environmental consequences of each phase are also discussed and mitigation measures to address adverse consequences are presented.

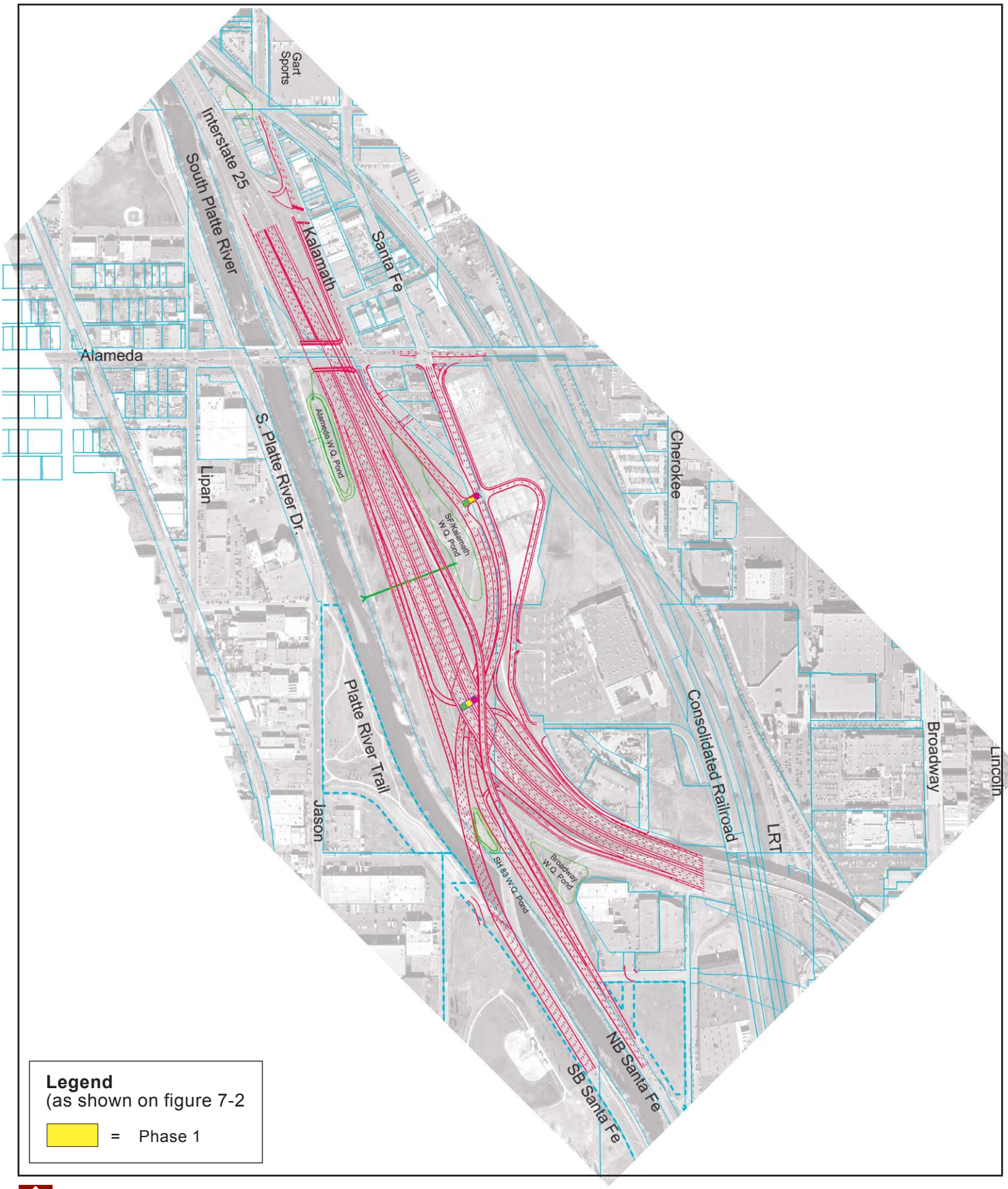
7.3.1 Phase 1 Improvements

7.3.1.1 DESCRIPTION OF PHASE 1 IMPROVEMENTS

Phase 1 includes improvements to both I-25 and US 6. These are described separately below.

For I-25, Phase 1 includes the following improvements, as shown on **Figure 7.3**:

- Reconstruction of the I-25 / Santa Fe Drive interchange. As identified in Chapter 2, the reconstructed interchange will be a single-point urban type, with a flyover ramp carrying traffic exiting northbound Santa Fe Drive bound for northbound I-25
- Replacement of the southbound Santa Fe Drive bridge over the South Platte River
- Reconfiguration of Santa Fe Drive and Kalamath Street between I-25 and Alameda Avenue, along with associated access roads in this area
- Replacement of the Alameda Avenue bridge over I-25
- Reconstruction of the I-25 mainline from the northern end of the I-25 over Broadway viaduct to a point north of Alameda Avenue where the merge of northbound Santa Fe Drive to northbound I-25 will be completed
- Minor additional improvements to nearby roadways as shown on **Figure 7.3**



North

Phase 1

Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Figure 7-3

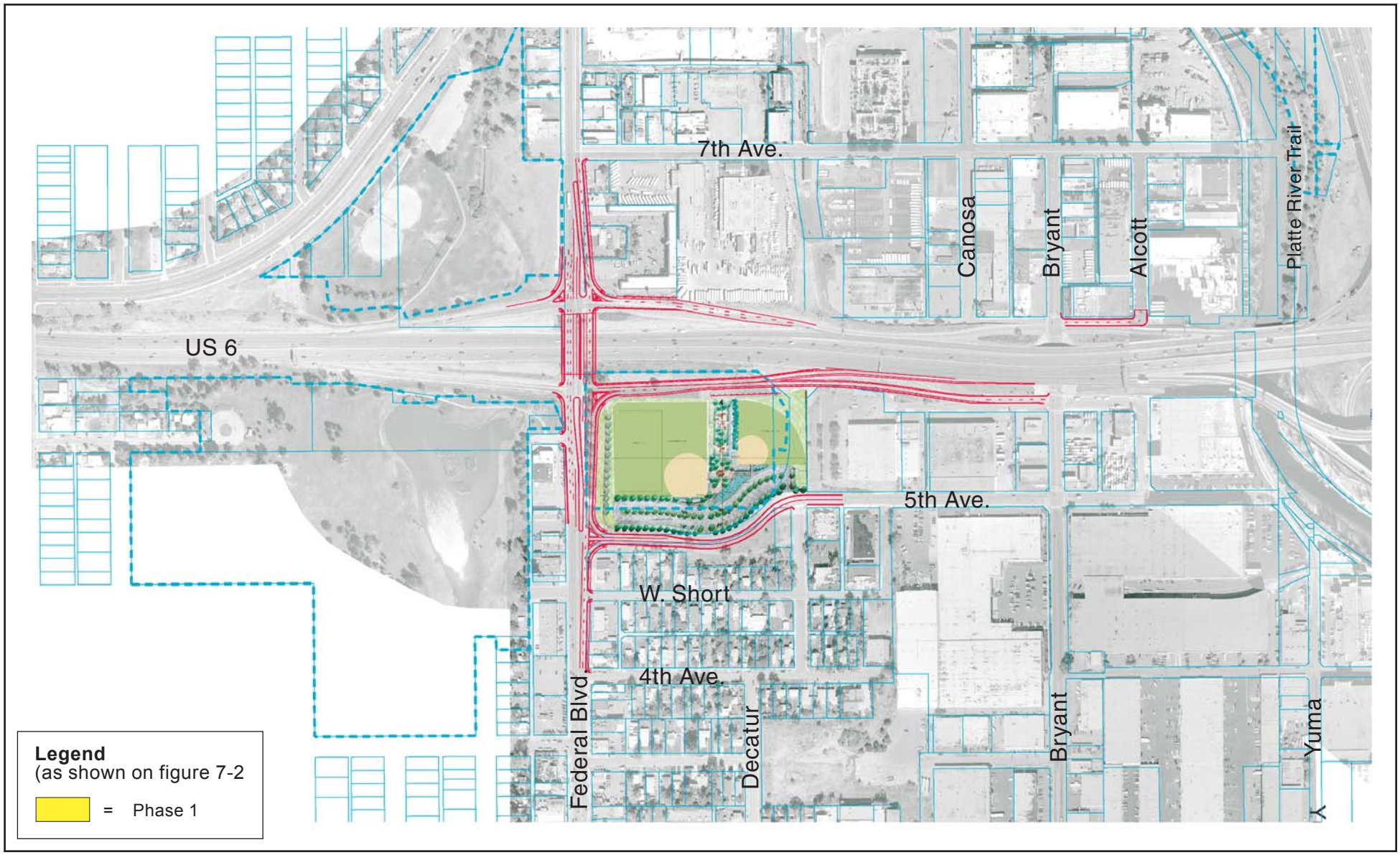
For US 6, Phase 1 includes the following improvements as shown on **Figure 7.4**:

- Relocation of the on-ramp from northbound Federal Boulevard to eastbound US6 from the south and east sides of Barnum East Park to the north side of Barnum East Park. This will result in a more standard diamond configuration for the US 6/Federal Boulevard interchange
- Conversion of 5th Avenue to two-way operation east of Federal Boulevard
- Reconstruction of Barnum East Park
- Construction of a south side slip ramp providing access to Bryant Street via the US 6/ Federal Boulevard interchange
- Closure of the partial interchange at US 6 and Bryant Street, with Bryant Street access to be provided via the slip ramps and collector-distributor system included in the US 6/ Federal Boulevard interchange
- Replacement of the Federal Boulevard bridge over US 6, along with associated improvements

Table 7.2 highlights the overall project objectives, as presented in **Chapter 1** ***Purpose and Need***, and identifies the benefits that will be provided by Phase 1, relative to the overall project objectives.

Table 7.2 Project Purpose and Need Objectives Addressed by Phase 1

Need Category	Overall Project Objective	Benefits to be Provided by Phase 1
Lane Continuity and Balance	Provide lane continuity and balance on I-25 between the existing and planned roadway sections to the north and south of the project	Provides lane continuity on I-25, creating a continuous 8-lane facility through the study area
Transportation Demand and Operations	Optimize highway system operations as measured in reduced delay of vehicle hours/day, reduced hours of congestion, and/or levels of service	Provides improved highway system operation on I-25, as presented in detail below
Inter-modal Relationships and Bicycle/Pedestrian Mobility	Preserve existing or provide improved facilities for automobile, bus, and pedestrian connections. Upgrade bicycle/pedestrian facilities within and across the project corridor to provide improved access to the Platte River Trail, safer facilities at intersections, complete missing links of bicycle/pedestrian facilities, and provide better linkages between transportation modes	Addition of a sidewalk along a portion of Santa Fe Drive south of Alameda Replacement of the southbound Santa Fe bridge will result in increased clearance for the South Platte Trail under the bridge Improved pedestrian facilities in the vicinity of the US 6 / Federal Boulevard interchange
Safety	Increase safety and decrease the likelihood of accidents within the project corridor by improving the geometric design of the roadway	Decrease in likelihood of accidents on I-25 due to elimination of left-side on ramp onto I-25 from Santa Fe Drive and reduced congestion Decrease in likelihood of accidents on US 6 corridor due to closure of Bryant Street partial interchange and reconfiguration of the US 6 /Federal Boulevard interchange
Roadway Deficiencies	Address existing roadway deficiencies, and replace aging structures to provide for improved operation of and reduced maintenance costs for the roadway facilities	Replacement of structurally deficient bridges at I-25/ Santa Fe Replacement of aging, deficient bridge carrying Alameda over I-25
Consolidated Main Line Crossing	Reduce system disruptions, and improve safety conditions related to the current at-grade crossing	Not addressed in this phase – see Phase 4



North

Phase 1

Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Figure 7-4

7.3.1.2 PHASE 1 TRAFFIC OPERATIONS AND SAFETY

Figure 7.5 and **Figure 7.6** depict year 2025 intersection and freeway levels of service associated with Phase 1. These results may be compared with **Figures 3.6 through 3.13** and accompanying text in **Chapter 3** ***Transportation Analysis*** to evaluate the operational performance of Phase 1 relative to the No Action Alternative and the Preferred Alternative. Based on these measures, the operational performance of Phase 1 is described below by freeway and surface street locations.

Freeway Sections

The primary freeway improvement associated with Phase 1 is the completion of eight continuous travel lanes on I-25 through the study area, satisfying one of the fundamental project needs of providing lane continuity through the study area. The following specific operational benefits will result from this addition:

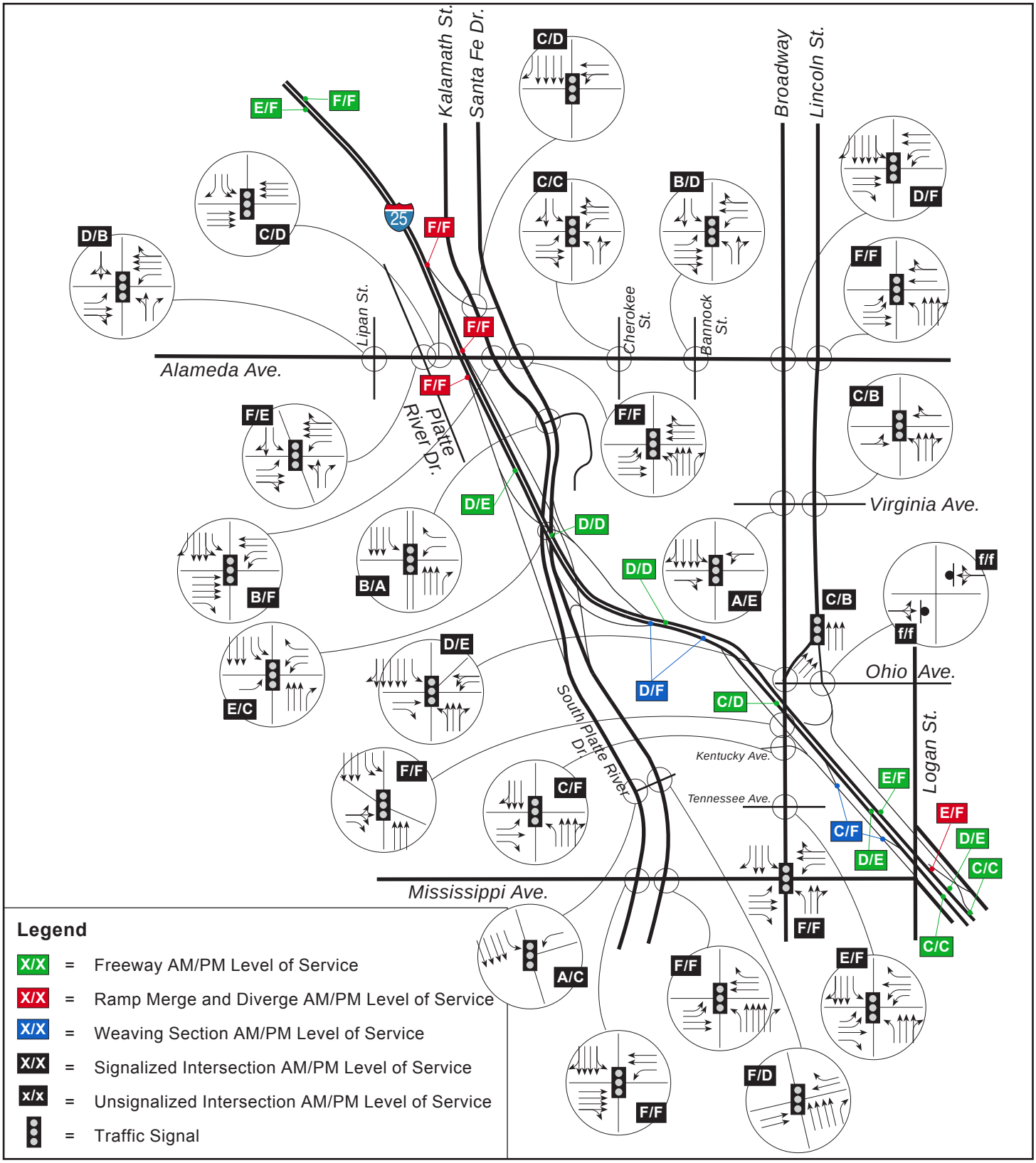
- The additional northbound travel lane between the Broadway and Alameda Avenue interchanges will improve mainline I-25 operations to LOS D, compared to LOS F in the No Action Alternative.
- The additional southbound travel lane between the Alameda Avenue and Santa Fe interchanges will improve the No-Action LOS F condition to LOS D during the AM peak hour and LOS E during the PM peak hour.

With implementation of Phase 1, the approximately 2,600 – 2,800 (peak hour) northbound Santa Fe vehicles bound for northbound I-25 will be accommodated with a two-lane flyover ramp and will enter I-25 at a merge section.

- Based on Highway Capacity Manual guidelines, this enhancement will provide sufficient ramp capacity for this high-demand movement, while the current (and No-Action) single-lane ramp does not provide adequate capacity.
- The northbound Santa Fe on-ramp to I-25 currently feeds a continuous I-25 through lane. With implementation of Phase 1, this lane addition will be replaced with a ramp merge section connecting northbound Santa Fe with northbound I-25. This merge section is anticipated to operate at LOS F during peak hours, primarily due to significant traffic congestion downstream of the ramp merge, where four mainline travel lanes will accommodate flows of up to 2,400 vehicles per hour per lane in 2025. The fifth northbound (auxiliary) lane that is part of Phase 3 will address this congestion, improving peak hour operations from LOS F to LOS E.

Phase 1 will improve northbound I-25 operations by eliminating the existing access to northbound I-25 at the Santa Fe / Alameda Avenue on-ramp located south of Alameda Avenue. Under the No-Action Alternative, this merge section will operate at LOS F.

In the No Action alternative, the short eastbound US 6 weaving section between the Federal Boulevard / 5th Avenue on ramp and Bryant Street off ramp operates at LOS F during the AM peak hour. Phase 1 will improve freeway operations by removing this weaving section.

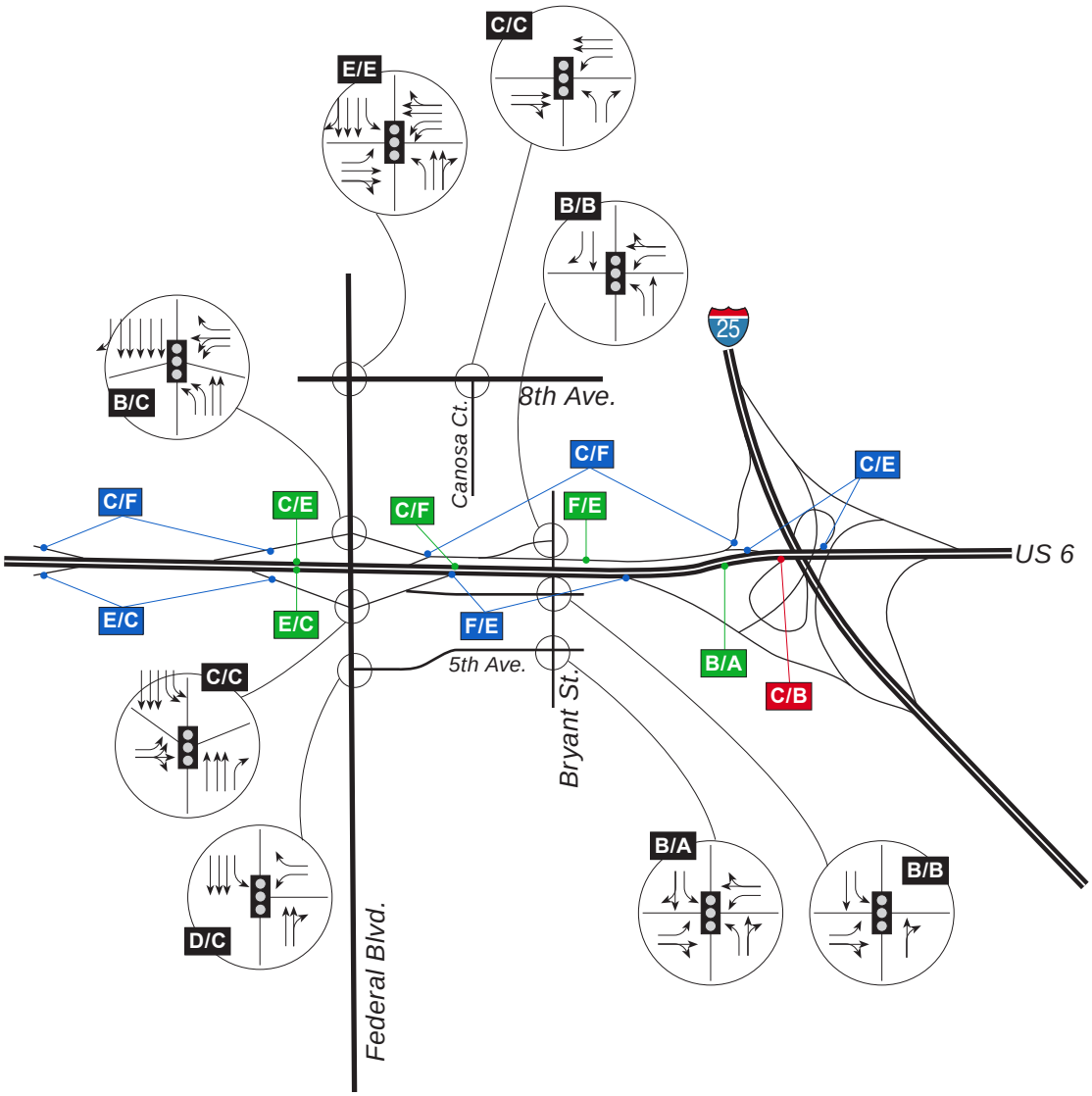


Phase I
2025 AM/PM Peak Hour Levels of Service and Lane Geometry
Logan Street to Alameda Avenue

North

Valley Highway - Logan To 6th Ave. Environmental Impact Statement (EIS)

Figure 7.5



Legend

X/X	=	Freeway AM/PM Level of Service
X/X	=	Ramp Merge and Diverge AM/PM Level of Service
X/X	=	Weaving Section AM/PM Level of Service
X/X	=	Signalized Intersection AM/PM Level of Service
x/x	=	Unsignalized Intersection AM/PM Level of Service
	=	Traffic Signal

North

Phase I
2025 AM/PM Peak Hour Levels of Service and Lane Geometry US 6

Figure 7.6

Surface Streets

Phase 1 will eliminate the existing access to northbound I-25 at the Santa Fe / Alameda Avenue on-ramp located south of Alameda Avenue. This closure will increase traffic volumes accessing northbound I-25 at the Maple Street ramp connection and adjust traffic patterns through the Santa Fe / Kalamath Street one-way pair intersections with Alameda Avenue. The operational results of this ramp closure can be illustrated (see **Table 7.3**) by comparing projected Phase 1 intersection operations along Alameda Avenue with the No Action alternative.

Table 7.3 Surface Street Levels of Service – Phase 1

Intersection	AM (PM) Peak Hour Level of Service (Average Delay per Vehicle in Seconds)			
	No-Action		Phase 1	
	AM	PM	AM	PM
Santa Fe / Alameda Avenue	F (97)	F (135)	F (140)	F (162)
Kalamath Street / Alameda Avenue	D (39)	F (154)	B (18)	F (92)
Kalamath Street / Maple Street	C (23)	C (21)	C (25)	D (39)
Santa Fe / Development Access / I-25 ramps	E (55)	F (113)	E (68)	C (33)
			B (12)	A (10)

As shown in the table, the largest increases in delay with Phase 1 will occur at the Santa Fe / Alameda Avenue and Kalamath Street / Maple Street intersections. Traffic delays will decrease with Phase 1 by approximately 40 percent at the Kalamath Street / Alameda Avenue intersection. The existing Santa Fe / Development Access / I-25 ramp intersection located south of Alameda Avenue will be replaced in Phase 1 by two signalized intersections: one provides access to local development and the other accommodates I-25 / Santa Fe interchange movements. The operational level of these two Phase 1 intersections will represent an improvement over the No-Action Alternative LOS F condition.

Traffic operations at the Alameda Avenue / Santa Fe intersection are worsened primarily by a significant increase in the eastbound to northbound left-turn demand. This peak-hour traffic volume is anticipated to increase by approximately 80 percent over No Action levels with implementation of Phase 1. To address this increase, Phase 1 will include a third westbound through lane along Alameda Avenue approaching the intersection.

Increased delays at the Kalamath Street / Maple Street intersection will result from an approximate doubling of the No-Action Alternative demand for the westbound through movement onto northbound I-25. To address this demand, Phase 1 will include a fourth southbound through lane along Kalamath Street approaching the intersection.

With improved lane geometry at the Santa Fe / Alameda Avenue and the Kalamath Street / Maple Street intersections, Phase 1 is expected to maintain surface street intersection operations at a level comparable to the No Action Alternative. Surface street operations in the Federal Boulevard / US 6 area will also be approximately equivalent to the No Action Alternative.

Traffic Safety
Implementation of Phase 1 is anticipated to result in accident reductions throughout the study area. Based on information contained in the Traffic Safety Report, traffic safety benefits associated with Phase 1 include:

- Additional mainline I-25 capacity – The completion of a continuous 8-lane section through the study area will address congestion-related safety problems on I-25, as stated in the Traffic Safety Report.
- Relocation of Bryant Street US 6 access – The closure of the direct eastbound US 6 off ramp to Bryant Street will address one of the most significant safety concerns in the US 6 study area. In addition, closure of the westbound collector-distributor road connection to Bryant Street is anticipated to reduce accident frequency.
- 5th Avenue local access – Conversion of the 5th Avenue intersection with Federal Boulevard to local access only is anticipated to decrease accident frequency at this location.
- Elimination of commercial access - Phase 1 will improve traffic safety in the I-25 / Santa Fe Drive interchange area by eliminating commercial access from the NB I-25 off ramp.

In summary, the primary operational and traffic safety improvement associated with Phase 1 is the completion of eight continuous travel lanes along I-25 through the study area. Phase 1 will also improve freeway operations along US 6 by removing a short eastbound weaving section. These improvements, along with the conversion of the 5th Avenue / Federal Boulevard intersection to local access only, are anticipated to decrease accident frequency.

7.3.1.3 PHASE 1 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

Chapter 4 ***Affected Environment, Environmental Consequences, and Mitigation Measures*** discussed the impact of the Preferred Alternative on a range of environmental resources, with mitigation measures identified, as appropriate, in response to adverse impacts. The portion of the environmental impacts and associated mitigation measures applicable to Phase 1 have been identified from the Preferred Alternative analysis. In addition, care has been taken to identify any additional incremental impacts that will result from implementing the project in phases.

Table 7.4 presents the environmental consequences and mitigation/monitoring measures associated with the implementation of Phase 1.

Table 7.4 Phase 1 Environmental Consequences, Mitigation Measures, and Monitoring

Resource	Consequences of Phase 1	Mitigation Measures and Monitoring
Socio-Economics and Community	• Displacement of businesses • Improved safety; replacement/improvement of deteriorating facilities • Pedestrian and bicycle improvements • Reduced cut-through traffic due to reduction in congestion • Implementation of the project in phases will introduce uncertainty with regard to timing of property acquisition for future phases	• Continue discussions with local communities during design and implementation to minimize disruptions. Continue consideration of environmental justice through final design, and implementation. • Continue coordination with City and County of Denver.
Right-of-Way and Displacements	• Displacement of 1 business; full purchase of 1 property; partial purchase or access modification of 14 properties	• Conform to the requirements set forth in the Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970, as amended, which contains specific requirements that govern the manner in which a government entity acquires property for public use. • Prepare a relocation analysis and provide relocation advisory service.
Parks and Recreation	• Requires use of small parts of Barnum (0.01 acres) and Barnum North (0.05 acre) parks, and a substantial portion of Barnum East (1.54 acres) park	• Reconstruction/reconfiguration of Barnum East Park, with addition of replacement park land, to maintain park function and provide upgraded facilities.
Aesthetics and Urban Design	• Improvements to highway landscapes in areas to be reconstructed • Increased visibility of northbound I-25 on-ramp from northbound Santa Fe Drive	• Use conceptual "kit of parts" in design of aesthetic elements and treatments • Continue coordination with other agencies through final design and implementation
Air Quality	• Improved air quality due to improved traffic flow • Meets air quality conformity requirements • Temporary increase in air emissions during construction	• Maintain construction equipment in good working order by ensuring no excessive idling of inactive equipment or vehicles, and by using higher-grade fuel • Implement a dust control plan and locate stationary equipment as far from sensitive receivers as possible
Noise and Vibration	• Within Phase 1 area, noise abatement criteria exceeded for Vanderbilt Park, Vanderbilt Park East, Habitat Park, and Barnum East Park • 6 commercial properties will experience exceedances of the noise abatement criteria	• Noise barrier evaluation results show that noise barriers are not feasible/reasonable for noise abatement at these locations. • During preparation of final design, consider elements to reduce "nuisance noise" experienced near the highway
Historic and Archaeological Preservation	• No impacts are expected	• If historic or archaeological materials are encountered or unearthed during construction, work will be halted immediately in the vicinity of the find, and the CDOT archaeologist or cultural resource staff, and the SHPO, will be notified promptly
Paleontology	• Denver Formation fossils may be encountered during construction	• CDOT paleontologist to examine final design plans to determine the extent of impact to the Denver Formation, and the scope, if any, of monitoring required

Table 7.4 Phase 1 Environmental Consequences, Mitigation Measures, and Monitoring (continued)

Resource	Consequences of Phase 1	Mitigation Measures and Monitoring
Water Quality and Water Resources	• Short-term increase in sediment from construction • Increase in impervious drainage area • Consolidation of stormwater runoff with fewer outfalls to the South Platte River • Improved quality of stormwater discharge due to construction of water quality ponds and BMPs	• Use construction BMPs to reduce temporary impacts • On-site project area runoff will be controlled through water quality ponds or other BMPs to settle and improve water quality runoff releasing to the South Platte River • Reduction of the overall number of outfalls into the South Platte River and installation of energy dissipaters, such as riprap, at outfalls to reduce erosion potential • Use pump stations to remove runoff at underpasses on grades separations and water quality ponds to settle sediment and improve water quality releasing into the South Platte River
Floodplains	• Temporary impacts during replacement of southbound Santa Fe Drive bridge over the South Platte River • Encroachment into floodplain from southbound I-25 off-ramp to Santa Fe Drive	• Construct bridges on piers or outside of floodplain to minimize impacts • Restore bridge construction areas • Install storm sewer improvements to reduce flooding on I-25 under Alameda Avenue • Provide additional volume in areas of floodplain encroachment for overall “no rise” in floodplain
Wetlands, Waters of the U.S. and Open Water	• 0.204 acre of jurisdictional and 0.010 acre of non-jurisdictional wetlands impacted	• Mitigate jurisdictional and non-jurisdictional wetlands on a 1:1 basis • Minimize culvert lengths and use construction BMPs to reduce impacts • Use construction BMPs to reduce temporary impacts; and use water quality BMPs to minimize indirect impacts
Vegetation and Wildlife	• Removal of vegetation during construction • Potential introduction of noxious weeds into areas disturbed by construction • Short-term disturbance of wildlife and aquatic habitat during construction • Improvements to Santa Fe Drive bridge will move traffic away from wildlife habitat along the South Platte and will improve wildlife travel corridor by increased horizontal and vertical clearance of bridges	• Revegetate construction areas using CDOT –approved native seed mix. If construction occurs outside of appropriate seeding windows, slopes will be temporarily protected from erosion using mulch and mulch tackifier • Replace trees greater than 2 inches in diameter on a 1:1 basis. Existing shrubs removed during construction will be replaced with native species to their pre-construction aerial coverage • Impacted landscape areas (irrigated or otherwise) shall be enhanced and incorporated into final design to ensure the existing landscape does not become fragmented • Target noxious weed populations by preparing and implementing an Integrated Weed Management Plan and clean construction vehicles entering construction areas to avoid introduction • Conduct habitat disturbing activities, such as tree removal, grading, scraping, grubbing, ect., during the non-breeding season unless the area has been verified by a qualified biologist that no active nests are present

Table 7.4 Phase 1 Environmental Consequences, Mitigation Measures, and Monitoring (continued)

Resource	Consequences of Phase 1	Mitigation Measures and Monitoring
Hazardous Waste	• 13 properties identified with potential or recognized environmental conditions to be acquired for right-of-way • Excavations may encounter contaminated groundwater, soil, and fill material, and in some locations methane • Santa Fe, Alameda Avenue, US 6, and railroad bridges may be coated with lead-based paint.	• Conduct individual, site-specific initial site assessments of properties and coordinate with OPS and CDPHE, as necessary, before acquiring right-of-way • Conduct a preliminary site investigation before final design to identify soil and groundwater contamination that may affect feasibility evaluation and final design • Prepare a materials handling plan and a health and safety plan, which includes asbestos-containing material, as required by Section 250.03 of the CDOT Standard Specifications for Road and Bridge Construction • Conduct an asbestos, heavy metals based paint survey of bridges, and miscellaneous material survey prior to demolition of any structures
Soils and Geology	• Expansive soils and unsuitable fill material may be encountered	• Consider potential for expansive soils and unsuitable fill during final design
Energy	• Increase in energy use due to construction. • Decrease in fuel use due to decreased traffic congestion	• Consider energy conservation measures during final design
Construction	• Short-term fugitive dust emissions, construction noise, increase in sediment, traffic delays, visual impacts, and utility impacts during construction	• Identify construction mitigation measures during final design and construction planning, with consideration of the possible mitigation measures identified by the Citizens Working Group (See **Table 4.18-1** in Chapter 4)

The mitigation and monitoring measures identified above for Phase 1 will be carried forward and refined during final design, construction planning, and implementation.

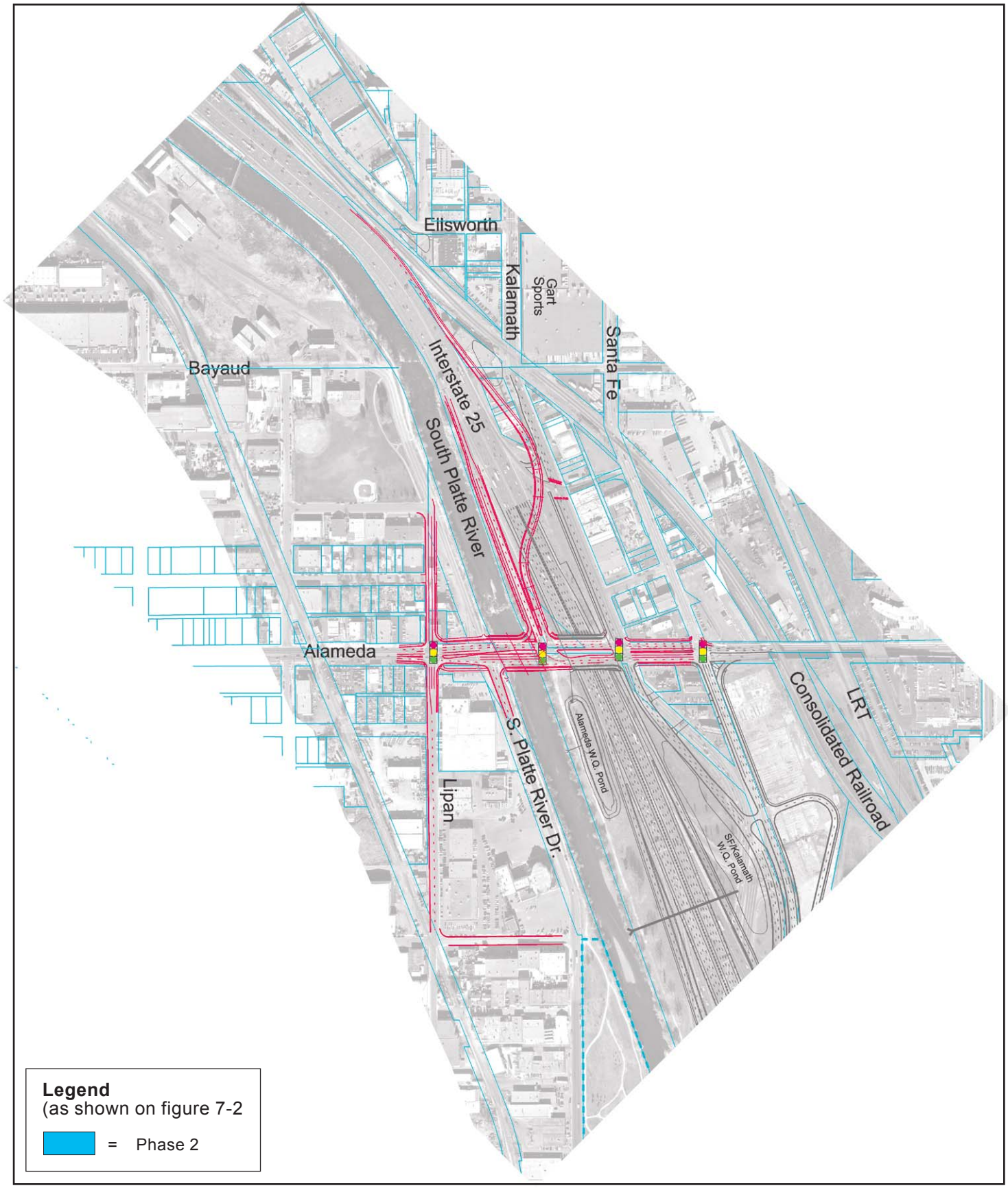
7.3.2 Phase 2 Improvements

7.3.2.1 Description of Phase 2 Improvements

Proposed Phase 2 includes improvements to the I-25/Alameda Avenue interchange. Phase 2 includes the following improvements, as shown on **Figure 7.7**:

- Alameda will be widened from Lipan Street to Santa Fe Drive
- Replacement of the Alameda bridge over the South Platte River
- Construction of Lipan Street and closure of Platte River Drive north of Alameda
- Lipan Street will be widened south of Alameda
- Replacement of Alameda ramps to I-25

Table 7.5 highlights the overall project objectives, as presented in **Chapter 1** ***Purpose and Need***, and identifies the benefits that will be provided by Phase 2, relative to the overall project objectives.



North

Phase 2

Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Figure 7-7

Table 7.5 Project Purpose and Need Objectives Addressed by Phase 2

Need Category	Overall Project Objective	Benefits Provide by Phase 2
Lane Continuity and Balance	Provide lane continuity and balance on I-25 between the existing and planned roadway sections to the north and south of the project	Not addressed in this phase – see Phases 1 and 3
Transportation Demand and Operations	Optimize highway system operations as measured in reduced delay of vehicle hours/day, reduced hours of congestion, and/or levels of service	Provides improved highway system operation on I-25 in the vicinity of Alameda
Inter-modal Relationships and Bicycle/Pedestrian Mobility	Preserve existing or provide improved facilities for automobile, bus, and pedestrian connections. Upgrade bicycle/pedestrian facilities within and across the project corridor to provide improved access to the Platte River Trail, safer facilities at intersections, complete missing links of bicycle/pedestrian facilities, and provide better linkages between transportation modes	Addition of a sidewalk along portions of Alameda that will enhance pedestrian and bicycle mobility Replacement of bridge structures over the South Platte Trail will result in increased clearance for the trail under the bridge Improved pedestrian facilities in the vicinity of the I-25/Alameda interchange
Safety	Increase safety and decrease the likelihood of accidents within the project corridor by improving the geometric design of the roadway	Decrease in likelihood of accidents with Alameda improvements
Roadway Deficiencies	Address existing roadway deficiencies, and replace aging structures to provide for improved operation of and reduced maintenance costs for the roadway facilities	Replacement of structurally deficient bridges at Alameda over the South Platte River
Consolidated Main Line Crossing	Reduce system disruptions, and improve safety conditions related to the current at-grade crossing	Not addressed in this phase – see Phase 4

7.3.2.2 PHASE 2 TRAFFIC OPERATIONS AND SAFETY

Traffic Operations

Construction of Phase 2 will complete the Preferred Alternative at the I-25 / Alameda Avenue interchange. This construction will affect surface street traffic operations in the Alameda area. The operational effects of Phase 2 relative to Phase 1 will include the following:

- Construction of the direct northbound I-25 on-ramp from Alameda Avenue will reduce eastbound left turn traffic volumes through the Alameda Avenue / Santa Fe Drive intersection, reducing peak hour intersection delay by approximately 36 percent. This ramp will also eliminate the Maple Street on ramp to northbound I-25, significantly reducing delay at the Maple Street intersection with Kalamath Street.
- Closure of Platte River Drive north of Alameda Avenue will eliminate a signalized intersection along Alameda Avenue and reduce delay.
- Additional traffic at the Alameda Avenue / Lipan Street intersection (due to closure of Platte River Drive) will worsen traffic operations at this location. To address this condition, the northbound Lipan Street approach will be widened to accommodate exclusive left turn, through, and right turn lanes.

Traffic Safety

Phase 2 will improve traffic safety along Alameda Avenue primarily through addressing visibility and intersection operational problems that contribute to broadside accidents. The elimination of the traffic signal at Platte River Drive/Alameda Avenue will also improve safety. It is estimated that the 20-year expected accident reduction associated with Phase 2 will be in the range of 60-90 total accidents.

7.3.2.3 PHASE 2 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

Table 7.6 presents the environmental consequences and mitigation/monitoring measures associated with the implementation of Phase 2.

Table 7.6 Phase 2 Environmental Consequences, Mitigation Measures, and Monitoring

Resource	Consequences of Phase 2	Mitigation Measures and Monitoring
Socio-Economics and Community	• Displacement of businesses • Improved safety; replacement/improvement of deteriorating facilities • Pedestrian and bicycle improvements • Reduced cut-through traffic due to reduction in congestion • Implementation of the project in phases will introduce uncertainty with regard to timing of property acquisition for future phases	• Continue discussions with local communities during design and implementation to minimize disruptions. Continue consideration of environmental justice through final design, and implementation • Continue coordination with City and County of Denver
Right-of-Way and Displacements	• Displacement of 10 businesses; full purchase of 7 properties; partial purchase and access modification to 6 properties	• Conform to the requirements set forth in the Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970, as amended, which contains specific requirements that govern the manner in which a government entity acquires property for public use • Prepare a relocation analysis and provide relocation advisory service
Parks and Recreation	• No impacts are expected to parks and recreation as a result of Phase 2	• No specific mitigation is warranted at this time
Aesthetics and Urban Design	• Improvements to highway landscapes, retaining walls, high-mast lighting, signage, slope and ditch paving, and concrete barriers	• Use conceptual "kit of parts" in design of aesthetic elements and treatments • Continue coordination with other agencies through final design and implementation
Air Quality	• Improved air quality due to improved traffic flow • Meets air quality conformity requirements • Temporary increase in air emissions during construction	• Maintain construction equipment in good working order by ensuring no excessive idling of inactive or unnecessary equipment or vehicles, and by using higher-grade fuel • Implement a dust control plan and locate stationary equipment as far from sensitive receivers as possible
Noise and Vibration	• Within Phase 2 area, 1 commercial property will exceed the noise abatement criteria	• During preparation of final design, consider elements to reduce "nuisance noise" experienced near the highway

Table 7.6 Phase 2 Environmental Consequences, Mitigation Measures, and Monitoring (continued)

Resource	Consequences of Phase 2	Mitigation Measures and Monitoring
Historic and Archaeological Preservation	• No impacts are expected	• If historic or archaeological materials are encountered or unearthed during construction, work will be halted immediately in the vicinity of the find, and the CDOT archaeologist or cultural resource staff, and the SHPO, will be notified promptly
Paleontology	• Denver Formation fossils may be encountered during construction	• CDOT paleontologist to examine final design plans to determine the extent of impact to the Denver Formation, and the scope, if any, of monitoring required
Water Quality and Water Resources	• Short-term increase in sediment from construction • Increase in impervious drainage area. • Consolidation of stormwater runoff with fewer outfalls to the South Platte River • Improved quality of stormwater discharge due to construction of water quality ponds and BMPs	• Use construction BMPs to reduce temporary impacts • On-site project area runoff will be controlled through water quality ponds or other BMPs to settle and improve water quality runoff releasing to the South Platte River • Reduction of the overall number of outfalls into the South Platte River and installation of energy dissipaters, such as riprap, at outfalls to reduce erosion potential • Use pump stations to remove runoff at underpasses on grades separations and water quality ponds to settle sediment and improve water quality releasing into the South Platte River
Floodplains	• Temporary impacts during replacement of Alameda Avenue bridge	• Construct bridges on piers or outside of floodplain to minimize impacts • Restore bridge construction areas • Install storm sewer improvements to reduce flooding on I-25 under Alameda Avenue • Provide additional volume in areas of floodplain encroachment for overall “no rise” in floodplain
Wetlands, Waters of the U.S. and Open Water	• 0.017 acre of jurisdictional and 0.010 non-jurisdictional wetlands impacted	• Mitigate jurisdictional and non-jurisdictional wetlands on a 1:1 basis • Minimize culvert lengths and use construction BMPs to reduce impacts • Use construction BMPs to reduce temporary impacts; and use water quality BMPs to minimize indirect impacts
Vegetation and Wildlife	• Removal of vegetation during construction • Potential introduction of noxious weeds into areas disturbed by construction • Short-term disturbance of wildlife and aquatic habitat during construction	• Revegetate construction areas using CDOT –approved native seed mix. If construction occurs outside of appropriate seeding windows, slopes will be temporarily protected from erosion using mulch and mulch tackifier • Replace trees greater than 2 inches in diameter on a 1:1 basis. Existing shrubs removed during construction will be replaced with native species to their pre-construction aerial coverage • Impacted landscape areas (irrigated or otherwise) shall be enhanced and incorporated into final design to ensure the existing landscape does not become fragmented • Target noxious weed populations by preparing and implementing an Integrated Weed Management Plan and clean construction vehicles entering construction areas to avoid introduction • Conduct habitat disturbing activities, such as tree removal, grading, scraping, grubbing, ect., during the non-breeding season unless the area has been verified by a qualified biologist that no active nests are present

Table 7.6 Phase 2 Environmental Consequences, Mitigation Measures, and Monitoring (continued)

Hazardous Waste	• Several properties identified with potential or recognized environmental conditions to be acquired for right-of-way • Excavations and relocations occurring within the vicinity of the Consolidated Main Line may encounter contaminated groundwater, soil, and fill material, and in some locations methane • Santa Fe Drive, Alameda Avenue, and railroad bridges may be coated with lead-based paint	• Conduct individual, site-specific initial site assessments of properties and coordinate with OPS and CDPHE, as necessary, before acquiring right-of-way • Conduct a preliminary site investigation before final design to identify soil and groundwater contamination that may affect feasibility evaluation and final design • Prepare a materials handling plan and a health and safety plan, which includes asbestos-containing material, as required by Section 250.03 of the CDOT Standard Specifications for Road and Bridge Construction • Conduct an asbestos, heavy metals based paint survey of bridges, and miscellaneous material survey prior to demolition of any structures
Soils and Geology	• Expansive soils and unsuitable fill material may be encountered	• Consider potential for expansive soils and unsuitable fill during final design
Energy	• Increase in energy use due to construction • Decrease in fuel use due to decreased traffic congestion	• Consider energy conservation measures during final design
Construction	• Short-term fugitive dust emissions, construction noise, increase in sediment, traffic delays, visual impacts, and utility impacts during construction	• Identify construction mitigation measures during final design and construction planning, with consideration of the possible mitigation measures identified by the Citizens Working Group (See **Table 4.18-1** in Chapter 4)

The mitigation and monitoring measures identified above for Phase 2 will be carried forward and refined during final design, construction planning, and implementation for this phase.

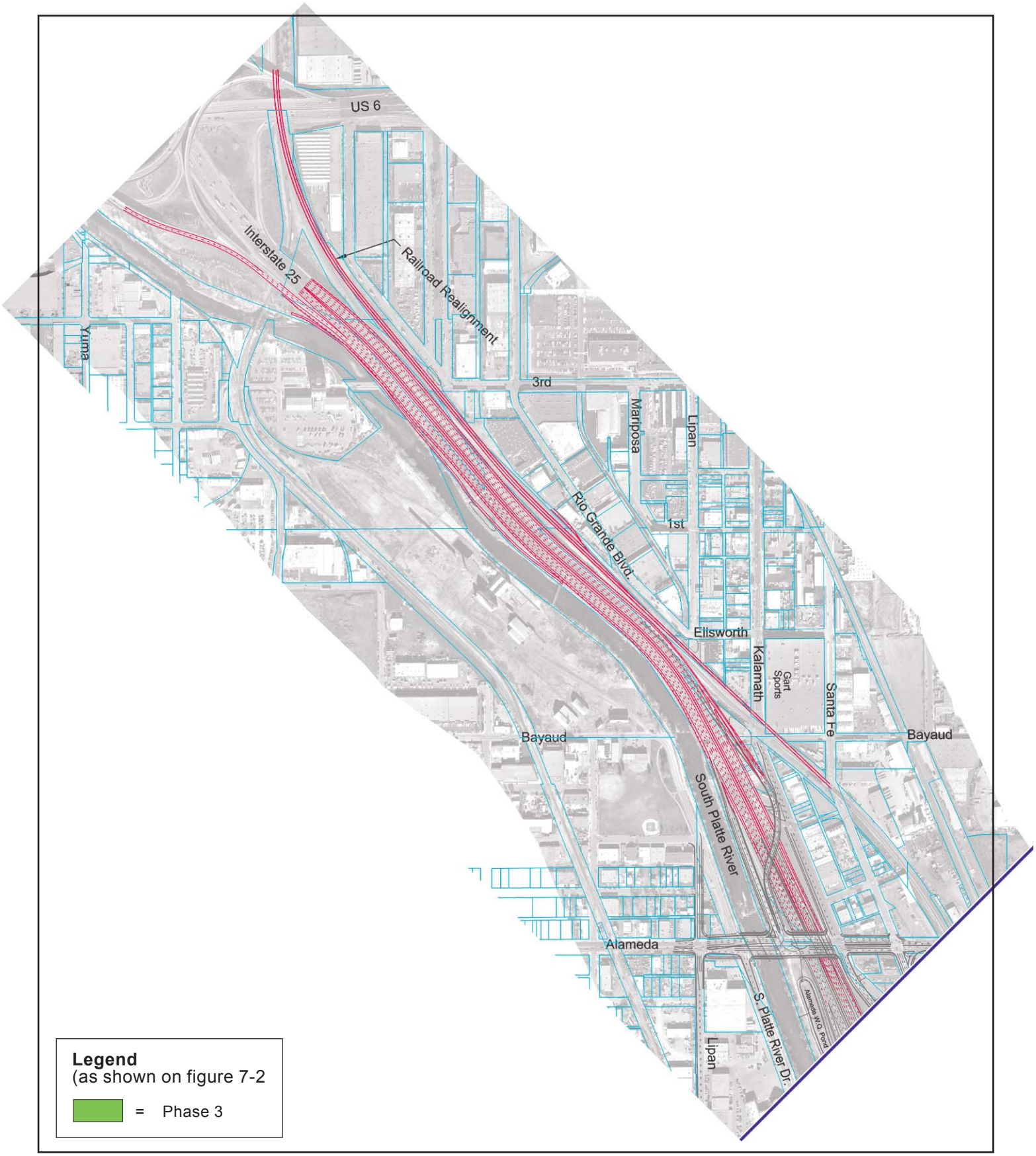
7.3.3 Phase 3 Improvements

7.3.3.1 Description of Phase 3 Improvements

Proposed Phase 3 includes improvements to I-25. Phase 3 includes the following improvements, as shown on **Figure 7.8**:

- Widening of I-25 from Alameda to US 6
- Relocation of the CML railroad to allow widening of I-25
- Reconstruction of I-25 north of Alameda to full section with shoulders

Table 7.7 highlights the overall project objectives, as presented in **Chapter 1 Purpose and Need,** and identifies the benefits that will be provided by Phase 3, relative to the overall project objectives.



North

Phase 3

Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Figure 7-8

Table 7.7 Project Purpose and Need Objectives Addressed by Phase 3

Need Category	Overall Project Objective	Benefits Provide by Phase 3
Lane Continuity and Balance	Provide lane continuity and balance on I-25 between the existing and planned roadway sections to the north and south of the project	Provides lane balance on I-25 by completing auxiliary lanes through the study area
Transportation Demand and Operations	Optimize highway system operations as measured in reduced delay of vehicle hours/day, reduced hours of congestion, and/or levels of service	Reduction in freeway system delay
Inter-modal Relationships and Bicycle/Pedestrian Mobility	Preserve existing or provide improved facilities for automobile, bus, and pedestrian connections. Upgrade bicycle/pedestrian facilities within and across the project corridor to provide improved access to the Platte River Trail, safer facilities at intersections, complete missing links of bicycle/pedestrian facilities, and provide better linkages between transportation modes	Enhancement of the Platte Rive Trail adjacent to I-25. Will provide or upgrade facilities of the trail between Alameda to US 6.
Safety	Increase safety and decrease the likelihood of accidents within the project corridor by improving the geometric design of the roadway	Decrease in likelihood of accidents on I-25 by improving the geometric design of the roadway and increasing mainline capacity
Roadway Deficiencies	Address existing roadway deficiencies, and replace aging structures to provide for improved operation of and reduced maintenance costs for the roadway facilities	Improved surface street operations
Consolidated Main Line Crossing	Reduce system disruptions, and improve safety conditions related to the current at-grade crossing	The CML will be relocated to the north to accommodate the widening of I-25 which will reduce system disruptions

7.3.3.2 PHASE 3 TRAFFIC OPERATIONS AND SAFETY

Freeway Sections

Construction of Phase 3 will Widen I-25 from Alameda to US 6 and reconstruct I-25 north of Alameda to a full section with shoulders. This construction will improve freeway operations along I-25 between Santa Fe Drive and US 6, particularly in the northbound direction. Widening of northbound I-25 will provide a continuous lane addition for the northbound Santa Fe Drive on ramp. Without completion of Phase 3, more than 2,500 vehicles per hour will enter northbound I-25 through a freeway merge section projected to operate at LOS F. Phase 3 will accommodate this heavy demand with a continuous lane.

The addition of a southbound through lane will improve mainline traffic operations between the Alameda Avenue and Santa Fe Drive off ramps from LOS F/F to LOS D/F.

Traffic Safety

Implementation of Phase 3 is anticipated to result in accident reductions throughout the study area. Based on information contained in the Traffic Safety Report, Phase 3 is anticipated to improve traffic safety along mainline I-25 north of the Santa Fe Drive interchange by increasing gap availability for weaving, merging and diverging.

7.3.3.3 PHASE 3 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

Table 7.8 presents the environmental consequences and mitigation/monitoring measures associated with the implementation of Phase 3.

Table 7.8 Phase 3 Environmental Consequences, Mitigation Measures, and Monitoring

Resource	Consequences of Phase 3	Mitigation Measures and Monitoring
Socio-Economics and Community	• Displacement of businesses • Improved safety; replacement/improvement of deteriorating facilities • Pedestrian and bicycle improvements • Reduced cut-through traffic due to reduction in congestion • Implementation of the project in phases will introduce uncertainty with regard to timing of property acquisition for future phases	• Continue discussions with local communities during design and implementation to minimize disruptions Continue consideration of environmental justice through final design, and implementation • Continue coordination with City and County of Denver
Right-of-Way and Displacements	• Displacement of 1 business, full purchase of 12 properties; partial purchase or access modification to 9 properties; and relocation of the Consolidated Main Line railroad	• Conform to the requirements set forth in the Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970, as amended, which contains specific requirements that govern the manner in which a government entity acquires property for public use • Prepare a relocation analysis and provide relocation advisory service
Parks and Recreation	• No impacts to parks as a result of Phase 3	• No specific mitigation is warranted at this time
Aesthetics and Urban Design	• Improvements to highway landscapes, retaining walls, high-mast lighting, signage, slope and ditch paving, and concrete barriers	• Use conceptual "kit of parts" in design of aesthetic elements and treatments • Continue coordination with other agencies through final design and implementation
Air Quality	• Improved air quality due to improved traffic flow • Meets air quality conformity requirements • Temporary increase in air emissions during construction	• Maintain construction equipment in good working order by ensuring no excessive idling of inactive or unnecessary equipment or vehicles, and by using higher-grade fuel • Implement a dust control plan and locate stationary equipment as far from sensitive receivers as possible
Noise and Vibration	• Within Phase 3 area, noise abatement criteria exceeded along the South Platte River Trail • 7 commercial properties will experience exceedances of the noise abatement criteria	• Provide noise barrier along a portion of the South Platte River Trail • During preparation of final design, consider elements to reduce "nuisance noise" experienced near the highway
Historic and Archaeological Preservation	• No impacts are expected	• If historic or archaeological materials are encountered or unearthed during construction, work will be halted immediately in the vicinity of the find, and the CDOT archaeologist or cultural resource staff, and the SHPO, will be notified promptly
Paleontology	• Denver Formation fossils may be encountered during construction	• CDOT paleontologist to examine final design plans to determine the extent of impact to the Denver Formation, and the scope, if any, of monitoring required

Table 7.8 Phase 3 Environmental Consequences, Mitigation Measures, and Monitoring (continued)

Resource	Consequences of Phase 3	Mitigation Measures and Monitoring
Water Quality and Water Resources	• Short-term increase in sediment from construction • Increase in impervious drainage area • Consolidation of stormwater runoff with fewer outfalls to the South Platte River • Improved quality of stormwater discharge due to construction of water quality ponds and BMPs	• Use construction BMPs to reduce temporary impacts • On-site project area runoff will be controlled through water quality ponds or other BMPs to settle and improve water quality runoff releasing to the South Platte River • Reduction of the overall number of outfalls into the South Platte River and installation of energy dissipaters, such as riprap, at outfalls to reduce erosion potential • Use pump stations to remove runoff at underpasses on grades separations and water quality ponds to settle sediment and improve water quality releasing into the South Platte River
Floodplains	• Encroachment into floodplain located along the eastern bank of the South Platte River	• Restore bridge construction areas • Install storm sewer improvements to reduce flooding on I-25 under Alameda Avenue • Provide additional volume in areas of floodplain encroachment for overall “no rise” in floodplain
Wetlands, Waters of the U.S. and Open Water	• 0.043 acre of jurisdictional and wetlands impacted	• Mitigate jurisdictional and non-jurisdictional wetlands on a 1:1 basis • Minimize culvert lengths and use construction BMPs to reduce impacts • Use construction BMPs to reduce temporary impacts; and use water quality BMPs to minimize indirect impacts
Vegetation and Wildlife	• Removal of vegetation during construction • Potential introduction of noxious weeds into areas disturbed by construction • Short-term disturbance of wildlife and aquatic habitat during construction	• Revegetate construction areas using CDOT –approved native seed mix. If construction occurs outside of appropriate seeding windows, slopes will be temporarily protected from erosion using mulch and mulch tackifier • Replace trees greater than 2 inches in diameter on a 1:1 basis. Existing shrubs removed during construction will be replaced with native species to their pre-construction aerial coverage • Impacted landscape areas (irrigated or otherwise) shall be enhanced and incorporated into final design to ensure the existing landscape does not become fragmented • Target noxious weed populations by preparing and implementing an Integrated Weed Management Plan and clean construction vehicles entering construction areas to avoid introduction • Conduct habitat disturbing activities, such as tree removal, grading, scraping, grubbing, ect., during the non-breeding season unless the area has been verified by a qualified biologist that no active nests are present

Table 7.8 Phase 3 Environmental Consequences, Mitigation Measures, and Monitoring (continued)

Resource	Consequences of Phase 3	Mitigation Measures and Monitoring
Hazardous Waste	• Several properties identified with potential or recognized environmental conditions to be acquired for right-of-way • Excavations and relocation occurring within the vicinity of the Consolidated Main Line may encounter contaminated groundwater, soil, and fill material, and in some locations methane	• Conduct individual, site-specific initial site assessments of properties and coordinate with OPS and CDPHE, as necessary, before acquiring right-of-way • Conduct a preliminary site investigation before final design to identify soil and groundwater contamination that may affect feasibility evaluation and final design • Prepare a materials handling plan and a health and safety plan, which includes asbestos-containing material, as required by Section 250.03 of the CDOT Standard Specifications for Road and Bridge Construction • Conduct an asbestos and miscellaneous material survey prior to demolition of any structures
Soils and Geology	• Expansive soils and unsuitable fill material may be encountered	• Consider potential for expansive soils and unsuitable fill during final design
Energy	• Increase in energy use due to construction. • Decrease in fuel use due to decreased traffic congestion	• Consider energy conservation measures during final design
Construction	• Short-term fugitive dust emissions, construction noise, increase in sediment, traffic delays, visual impacts, and utility impacts during construction	• Identify construction mitigation measures during final design and construction planning, with consideration of the possible mitigation measures identified by the Citizens Working Group (See **Table 4.18-1** in Chapter 4)

The mitigation and monitoring measures identified above for Phase 3 will be carried forward and refined during final design, construction planning, and implementation for this phase.

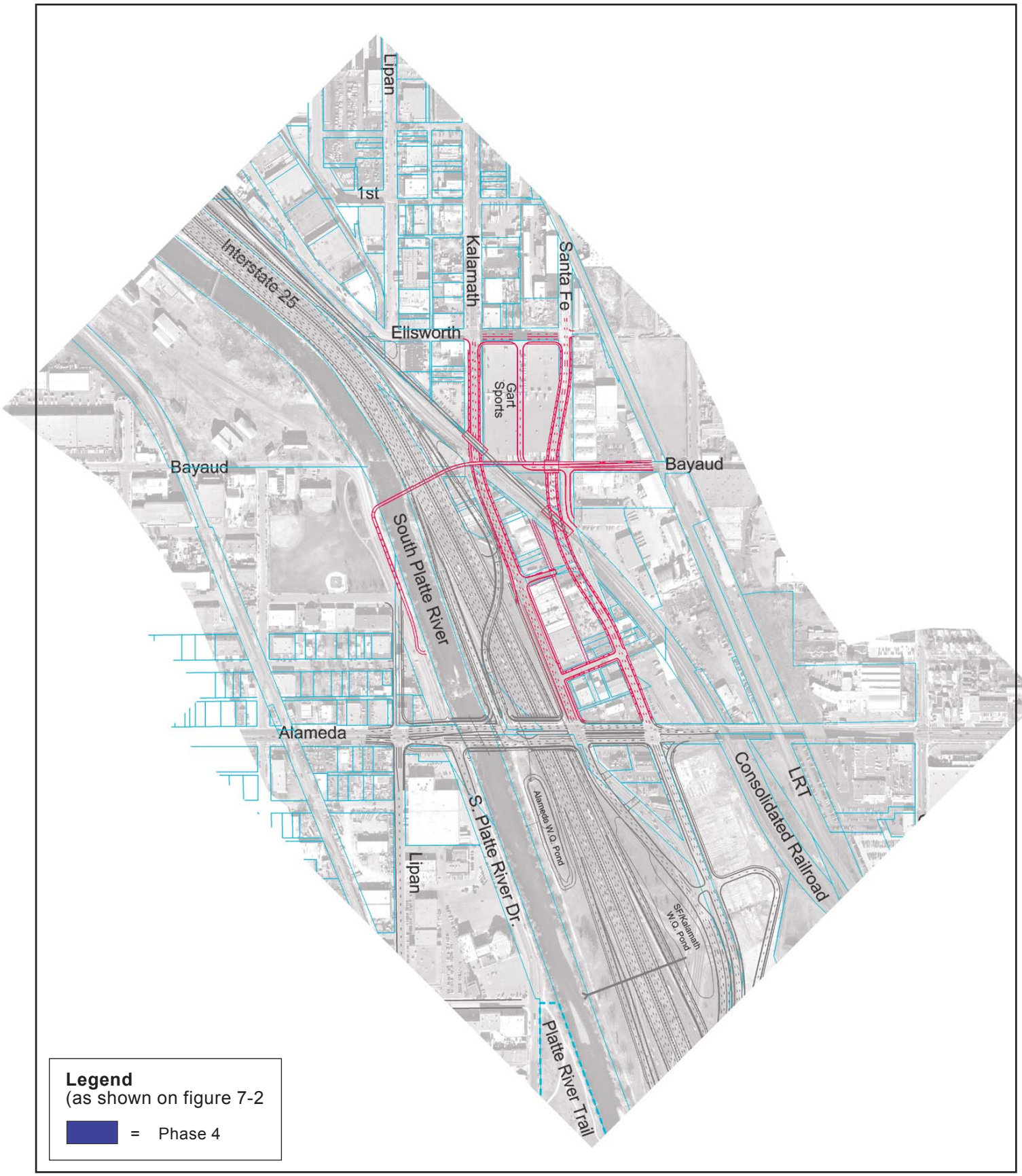
7.3.4 Phase 4 Improvements

7.3.4.1 Description of Phase 4 Improvements

Proposed Phase 4 Improvements include the grade separation of Santa Fe/Kalamath from the CML. Phase 4 includes the following Santa Fe/Kalamath / CML improvements, as shown on **Figure 7.9**:

- Improvements will take Santa Fe and Kalamath under the CML
- A pedestrian/bicycle bridge will be constructed beginning along Bayaud, passing over Santa Fe, Kalamath, the CML, I-25 and the South Platte River, and connecting with the South Platte River trail

Table 7.9 highlights the overall project objectives, as presented in **Chapter 1** ***Purpose and Need***, and identifies the benefits provided by Phase 4, relative to the overall project objectives.



North

Phase 4

Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Figure 7-9

Table 7.9 Project Purpose and Need Objectives Addressed by Phase 4

Need Category	Overall Project Objective	Benefits Provide by Phase 4
Lane Continuity and Balance	Provide lane continuity and balance on I-25 between the existing and planned roadway sections to the north and south of the project	Not addressed in this phase – see Phases 1 and 3
Transportation Demand and Operations	Optimize highway system operations as measured in reduced delay of vehicle hours/day, reduced hours of congestion, and/or levels of service	Improvement in surface street operations by eliminating at-grade CML crossings
Inter-modal Relationships and Bicycle/Pedestrian Mobility	Preserve existing or provide improved facilities for automobile, bus, and pedestrian connections. Upgrade bicycle/pedestrian facilities within and across the project corridor to provide improved access to the Platte River Trail, safer facilities at intersections, complete missing links of bicycle/pedestrian facilities, and provide better linkages between transportation modes	Improvement in pedestrian/bicycle mobility across corridor and provide improved access connection from Bayaud to South Platte River Trail
Safety	Increase safety and decrease the likelihood of accidents within the project corridor by improving the geometric design of the roadway	Improvement in safety by eliminating the at-grade CML crossings
Roadway Deficiencies	Address existing roadway deficiencies, and replace aging structures to provide for improved operation of and reduced maintenance costs for the roadway facilities	Improvement in system operation due to grade separation
Consolidated Main Line Crossing	Reduce system disruptions, and improve safety conditions related to the current at-grade crossing	Reduce system disruptions, and improve safety conditions related to the current at-grade crossing

7.3.4.2 Phase 4 Traffic Operations and Safety

Traffic Operations
Construction of Phase 4 will take Santa Fe Drive and Kalamath Street under the CML. This grade separation will reduce vehicular delay associated with the current at-grade crossing, eliminating an estimated 438 vehicle-hours of delay per day by the year 2025.

Traffic Safety
In addition to reducing delay, the grade separation completed with Phase 4 will improve traffic safety by eliminating the potential for collisions between vehicles and passing trains.

7.3.4.3 Phase 4 Environmental Consequences and Mitigation Measures

Table 7.10 presents the environmental consequences and mitigation/monitoring measures associated with the implementation of Phase 4.

Table 7.10 Phase 4 Environmental Consequences, Mitigation Measures, and Monitoring

Resource	Consequences of Phase 4	Mitigation Measures and Monitoring
Socio-Economics and Community	• Displacement of businesses • Improved safety; replacement/improvement of deteriorating facilities • Pedestrian and bicycle improvements • Reduced cut-through traffic due to reduction in congestion • Implementation of the project in phases will introduce uncertainty with regard to timing of property acquisition for future phases	• Continue discussions with local communities during design and implementation to minimize disruptions. Continue consideration of environmental justice through final design, and implementation • Continue coordination with City and County of Denver
Right-of-Way and Displacements	• Displacement of 10 businesses; full purchase of 23 properties; partial purchase or access modification to 8 properties; and relocation of the Consolidated Main Line (CML) railroad	• Conform to the requirements set forth in the Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970, as amended, which contains specific requirements that govern the manner in which a government entity acquires property for public use • Prepare a relocation analysis and provide relocation advisory service
Parks and Recreation	• Improved east-west connection to South Platte Trail at Bayaud Avenue	• Prepare final design to accommodate pedestrian and bicycle traffic, and cooperating with trail users, while meeting operational and safety requirements
Aesthetics and Urban Design	• Improvements to highway landscapes, retaining walls, high-mast lighting, signage, slope and ditch paving, and concrete barriers • Canyon-like effect from grade separation of Santa Fe Drive and Kalamath Street below the CML	• Use conceptual "kit of parts" in design of aesthetic elements and treatments • Continue coordination with other agencies through final design and implementation
Air Quality	• Improved air quality due to improved traffic flow • Meets air quality conformity requirements • Temporary increase in air emissions during construction	• Maintain construction equipment in good working order by ensuring no excessive idling of inactive or unnecessary equipment or vehicles, and by using higher-grade fuel • Implement a dust control plan and locate stationary equipment as far from sensitive receivers as possible
Noise and Vibration	• Within Phase 4 area, noise abatement criteria exceeded for approximately 3 residences • 42 commercial properties will experience exceedances of the noise abatement criteria	• During preparation of final design, consider elements to reduce "nuisance noise" experienced near the highway
Historic and Archaeological Preservation	• No impacts are expected	• If historic or archaeological materials are encountered or unearthed during construction, work will be halted immediately in the vicinity of the find, and the CDOT archaeologist or cultural resource staff, and the SHPO, will be notified promptly
Paleontology	• Denver Formation fossils may be encountered during construction	• CDOT paleontologist to examine final design plans to determine the extent of impact to the Denver Formation, and the scope, if any, of monitoring required

Table 7.10 Phase 4 Environmental Consequences, Mitigation Measures, and Monitoring (Continued)

Resource	Consequences of Phase 4	Mitigation Measures and Monitoring
Water Quality and Water Resources	• Short-term increase in sediment from construction • Increase in impervious drainage area • Consolidation of stormwater runoff with fewer outfalls to the South Platte River • Improved quality of stormwater discharge due to construction of water quality ponds and BMPs	• Use construction BMPs to reduce temporary impacts • On-site project area runoff will be controlled through water quality ponds or other BMPs to settle and improve water quality runoff releasing to the South Platte River • Reduction of the overall number of outfalls into the South Platte River and installation of energy dissipaters, such as riprap, at outfalls to reduce erosion potential • Use pump stations to remove runoff at underpasses on grades separations and water quality ponds to settle sediment and improve water quality releasing into the South Platte River
Floodplains	• Temporary impacts during replacement of Santa Fe Drive bridges and construction of Bayaud Avenue bicycle/pedestrian bridge	• Restore pedestrian bridge construction areas • Provide additional volume in areas of floodplain encroachment for overall “no rise” in floodplain??
Wetlands, Waters of the U.S. and Open Water	• No wetland impacts are expected as a result of Phase 4	• No mitigation measures are warranted at this time
Vegetation and Wildlife	• Removal of vegetation during construction • Potential introduction of noxious weeds into areas disturbed by construction • Short-term disturbance of wildlife and aquatic habitat during construction	• Revegetate construction areas using CDOT –approved native seed mix. If construction occurs outside of appropriate seeding windows, slopes will be temporarily protected from erosion using mulch and mulch tackifier • Replace trees greater than 2 inches in diameter on a 1:1 basis. Existing shrubs removed during construction will be replaced with native species to their pre-construction aerial coverage • Impacted landscape areas (irrigated or otherwise) shall be enhanced and incorporated into final design to ensure the existing landscape does not become fragmented • Target noxious weed populations by preparing and implementing an Integrated Weed Management Plan and clean construction vehicles entering construction areas to avoid introduction • Conduct habitat disturbing activities, such as tree removal, grading, scraping, grubbing, ect., during the non-breeding season unless the area has been verified by a qualified biologist that no active nests are present
Hazardous Waste	• Several properties identified with potential or recognized environmental conditions to be acquired for right-of-way • Excavations and relocation of the Consolidated Main Line may encounter contaminated groundwater, soil, and fill material, and in some locations methane • Railroad bridges may be coated with lead-based paint	• Conduct individual, site-specific initial site assessments of properties and coordinate with OPS and CDPHE, as necessary, before acquiring right-of-way • Conduct a preliminary site investigation before final design to identify soil and groundwater contamination that may affect feasibility evaluation and final design • Prepare a materials handling plan and a health and safety plan, which includes asbestos-containing material, as required by Section 250.03 of the CDOT Standard Specifications for Road and Bridge Construction • Conduct an asbestos and miscellaneous material survey prior to demolition of any structures

Table 7.10 Phase 4 Environmental Consequences, Mitigation Measures, and Monitoring (Continued)

Resource	Consequences of Phase 4	Mitigation Measures and Monitoring
Soils and Geology	• Expansive soils and unsuitable fill material may be encountered	• Consider potential for expansive soils and unsuitable fill during final design
Energy	• Increase in energy use due to construction • Decrease in fuel use due to decreased traffic congestion	• Consider energy conservation measures during final design
Construction	• Short-term fugitive dust emissions, construction noise, increase in sediment, traffic delays, visual impacts, and utility impacts during construction	• Identify construction mitigation measures during final design and construction planning, with consideration of the possible mitigation measures identified by the Citizens Working Group (See **Table 4.18-1** in Chapter 4)

The mitigation and monitoring measures identified above for Phase 4 will be carried forward and refined during final design, construction planning, and implementation for this phase.

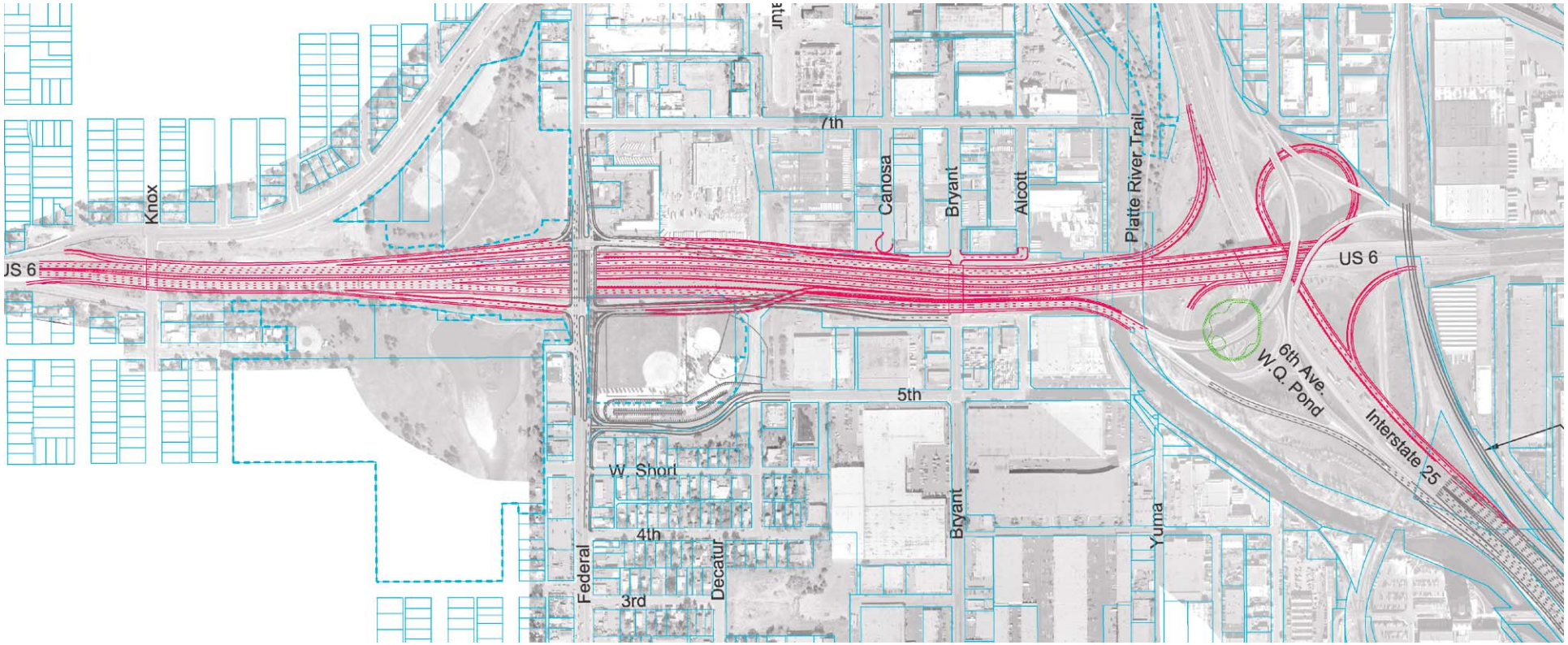
7.3.5 Phase 5 Improvements

7.3.5.1 Description of Phase 5 Improvements

Proposed Phase 5 includes improvements to US 6. Phase 5 includes the following improvements, as shown on **Figure 7.10**:

- Reconstruction of US 6 from Federal to I-25
- Replacement of US 6 bridge over South Platte River
- Construction of braided ramp from Federal Boulevard to eastbound US 6
- Construction of eastbound US 6 to Federal off-ramp
- Construction of Federal to westbound US 6 on-ramp

Table 7.11 highlights the overall project objectives, as presented in **Chapter 1** ***Purpose and Need***, and identifies the benefits provided by Phase 5, relative to the overall project objectives.



Legend

= Phase 5

North

Phase 5

Valley Highway - Logan to 6th Ave. Environmental Impact Statement (EIS)

Figure 7-10

Table 7.11 Project Purpose and Need Objectives Addressed by Phase 5

Need Category	Overall Project Objective	Benefits Provide by Phase 5
Lane Continuity and Balance	Provide lane continuity and balance on I-25 between the existing and planned roadway sections to the north and south of the project	Not addressed by this phase – see Phases 1 and 3
Transportation Demand and Operations	Optimize highway system operations as measured in reduced delay of vehicle hours/day, reduced hours of congestion, and/or levels of service	Reductions in system delay, particularly due to construction of the eastbound braided ramp and collector-distributor road
Inter-modal Relationships and Bicycle/Pedestrian Mobility	Preserve existing or provide improved facilities for automobile, bus, and pedestrian connections. Upgrade bicycle/pedestrian facilities within and across the project corridor to provide improved access to the Platte River Trail, safer facilities at intersections, complete missing links of bicycle/pedestrian facilities, and provide better linkages between transportation modes	Platte River Trail enhancement due to improved clearance under US 6 bridge
Safety	Increase safety and decrease the likelihood of accidents within the project corridor by improving the geometric design of the roadway	Improved safety due to a decrease in likelihood of accidents on US 6
Roadway Deficiencies	Address existing roadway deficiencies, and replace aging structures to provide for improved operation of and reduced maintenance costs for the roadway facilities	Improved highway system operational reliability by raising US 6 bridge above South Platte 100-year floodplain
Consolidated Main Line Crossing	Reduce system disruptions, and improve safety conditions related to the current at-grade crossing	Not addressed in this phase – see Phase 4

7.3.5.2 PHASE 5 TRAFFIC OPERATIONS AND SAFETY

Traffic Operations

Phase 5 will complete construction of the Preferred Alternative in the US 6 area. Based on traffic simulation results, completion of Phase 5 will reduce peak hour vehicle delay by approximately 35-40 percent from the No Action Alternative. Operational benefits related to the Preferred Alternative include the separation of eastbound weaving movements using a C-D road and reconfiguration of US 6 access to and from Bryant Street.

Traffic Safety

Traffic safety benefits associated with Phase 5 include intersection improvements (signal phasing, visibility of signal heads, improved lane geometry) and separation of eastbound weaving movements using a C-D road. It is estimated that the Preferred Alternative in the US 6 area will reduce total accidents by 1,550 – 1,750 accidents relative to the No Action Alternative.

7.3.5.3 PHASE 5 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

Table 7.12 presents the environmental consequences and mitigation/monitoring measures associated with the implementation of Phase 5.

Table 7.12 Phase 5 Environmental Consequences, Mitigation Measures, and Monitoring

Resource	Consequences of Phase 5	Mitigation Measures and Monitoring
Socio-Economics and Community	• Displacement of businesses • Improved safety; replacement/improvement of deteriorating facilities • Pedestrian and bicycle improvements • Reduced cut-through traffic due to reduction in congestion • Implementation of the project in phases will introduce uncertainty with regard to timing of property acquisition for future phases	• Continue discussions with local communities during design and implementation to minimize disruptions. Continue consideration of environmental justice through final design, and implementation • Continue coordination with City and County of Denver
Right-of-Way and Displacements	• Displacement of 5 businesses; full purchase of 1 property; partial purchase or access modification to 2 properties	• Conform to the requirements set forth in the Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970, as amended, which contains specific requirements that govern the manner in which a government entity acquires property for public use • Prepare a relocation analysis and provide relocation advisory service
Parks and Recreation	• Requires use of a small part of Barnum North (0.05 acre) park	• Prepare final design to acquire the least possible amount of park land while meeting operational and safety requirements
Aesthetics and Urban Design	• Improvements to highway landscapes, retaining walls, high-mast lighting, signage, slope and ditch paving, and concrete barriers	• Use conceptual "kit of parts" in design of aesthetic elements and treatments • Continue coordination with other agencies through final design and implementation
Air Quality	• Improved air quality due to improved traffic flow • Meets air quality conformity requirements • Temporary increase in air emissions during construction	• Maintain construction equipment in good working order by ensuring no excessive idling of inactive or unnecessary equipment or vehicles, and by using higher-grade fuel • Implement a dust control plan and locate stationary equipment as far from sensitive receivers as possible
Noise and Vibration	• Within the Phase 5 area, noise abatement criteria exceeded for approximately 3 residences and in portions of Barnum Park, Barnum Park North, and Frog Hollow Park • 2 commercial properties will experience exceedances of the noise abatement criteria	• During preparation of final design, consider elements to reduce "nuisance noise" experienced near the highway
Historic and Archaeological Preservation	• No impacts are expected	• If historic or archaeological materials are encountered or unearthed during construction, work will be halted immediately in the vicinity of the find, and the CDOT archaeologist or cultural resource staff, and the SHPO, will be notified promptly

Table 7.12 Phase 5 Environmental Consequences, Mitigation Measures, and Monitoring (Continued)

Resource	Consequences of Phase 5	Mitigation Measures and Monitoring
Paleontology	• Denver Formation fossils may be encountered during construction	• CDOT paleontologist to examine final design plans to determine the extent of impact to the Denver Formation, and the scope, if any, of monitoring required
Water Quality and Water Resources	• Short-term increase in sediment from construction • Increase in impervious drainage area. • Consolidation of stormwater runoff with fewer outfalls to the South Platte River • Improved quality of stormwater discharge due to construction of water quality ponds and BMPs	• Use construction BMPs to reduce temporary impacts • On-site project area runoff will be controlled through water quality ponds or other BMPs to settle and improve water quality runoff releasing to the South Platte River • Reduction of the overall number of outfalls into the South Platte River and installation of energy dissipaters, such as riprap, at outfalls to reduce erosion potential • Use pump stations to remove runoff at underpasses on grades separations and water quality ponds to settle sediment and improve water quality releasing into the South Platte River
Floodplains	• Upstream floodplain elevation reduced by raising the US 6 bridge over the river • Temporary impacts during replacement of the US 6 bridge	• Construct bridges on piers or outside of floodplain to minimize impacts • Restore bridge construction areas • Provide additional volume in areas of floodplain encroachment for overall “no rise” in floodplain
Wetlands, Waters of the U.S. and Open Water	• No wetland impacts are expected as a result of Phase 5	• No mitigation measures are warranted at this time
Vegetation and Wildlife	• Removal of vegetation during construction. • Potential introduction of noxious weeds into areas disturbed by construction • Short-term disturbance of wildlife and aquatic habitat during construction • Improvements to US 6 bridge will move traffic away from wildlife habitat along the South Platte and will improve wildlife travel corridor by increased horizontal and vertical clearance of bridges	• Revegetate construction areas using CDOT –approved native seed mix. If construction occurs outside of appropriate seeding windows, slopes will be temporarily protected from erosion using mulch and mulch tackifier • Replace trees greater than 2 inches in diameter on a 1:1 basis. Existing shrubs removed during construction will be replaced with native species to their pre-construction aerial coverage • Impacted landscape areas (irrigated or otherwise) shall be enhanced and incorporated into final design to ensure the existing landscape does not become fragmented • Target noxious weed populations by preparing and implementing an Integrated Weed Management Plan and clean construction vehicles entering construction areas to avoid introduction • Conduct habitat disturbing activities, such as tree removal, grading, scraping, grubbing, ect., during the non-breeding season unless the area has been verified by a qualified biologist that no active nests are present

Table 7.12 Phase 5 Environmental Consequences, Mitigation Measures, and Monitoring (Continued)

Resource	Consequences of Phase 5	Mitigation Measures and Monitoring
Hazardous Waste	• Several properties identified with potential or recognized environmental conditions to be acquired for right-of-way • Excavations may encounter contaminated groundwater, soil, and fill material, and in some locations methane • US 6 bridge may be coated with lead-based paint	• Conduct individual, site-specific initial site assessments of properties and coordinate with OPS and CDPHE, as necessary, before acquiring right-of-way • Conduct a preliminary site investigation before final design to identify soil and groundwater contamination that may affect feasibility evaluation and final design • Prepare a materials handling plan and a health and safety plan, which includes asbestos-containing material, as required by Section 250.03 of the CDOT Standard Specifications for Road and Bridge Construction • Conduct an asbestos, heavy metals based paint survey of bridges, and miscellaneous material survey prior to demolition of any structures
Soils and Geology	• Expansive soils and unsuitable fill material may be encountered	• Consider potential for expansive soils and unsuitable fill during final design
Energy	• Increase in energy use due to construction. • Decrease in fuel use due to decreased traffic congestion	• Consider energy conservation measures during final design
Construction	• Short-term fugitive dust emissions, construction noise, increase in sediment, traffic delays, visual impacts, and utility impacts during construction	• Identify construction mitigation measures during final design and construction planning, with consideration of the possible mitigation measures identified by the Citizens Working Group (See **Table 4.18-1** in Chapter 4)

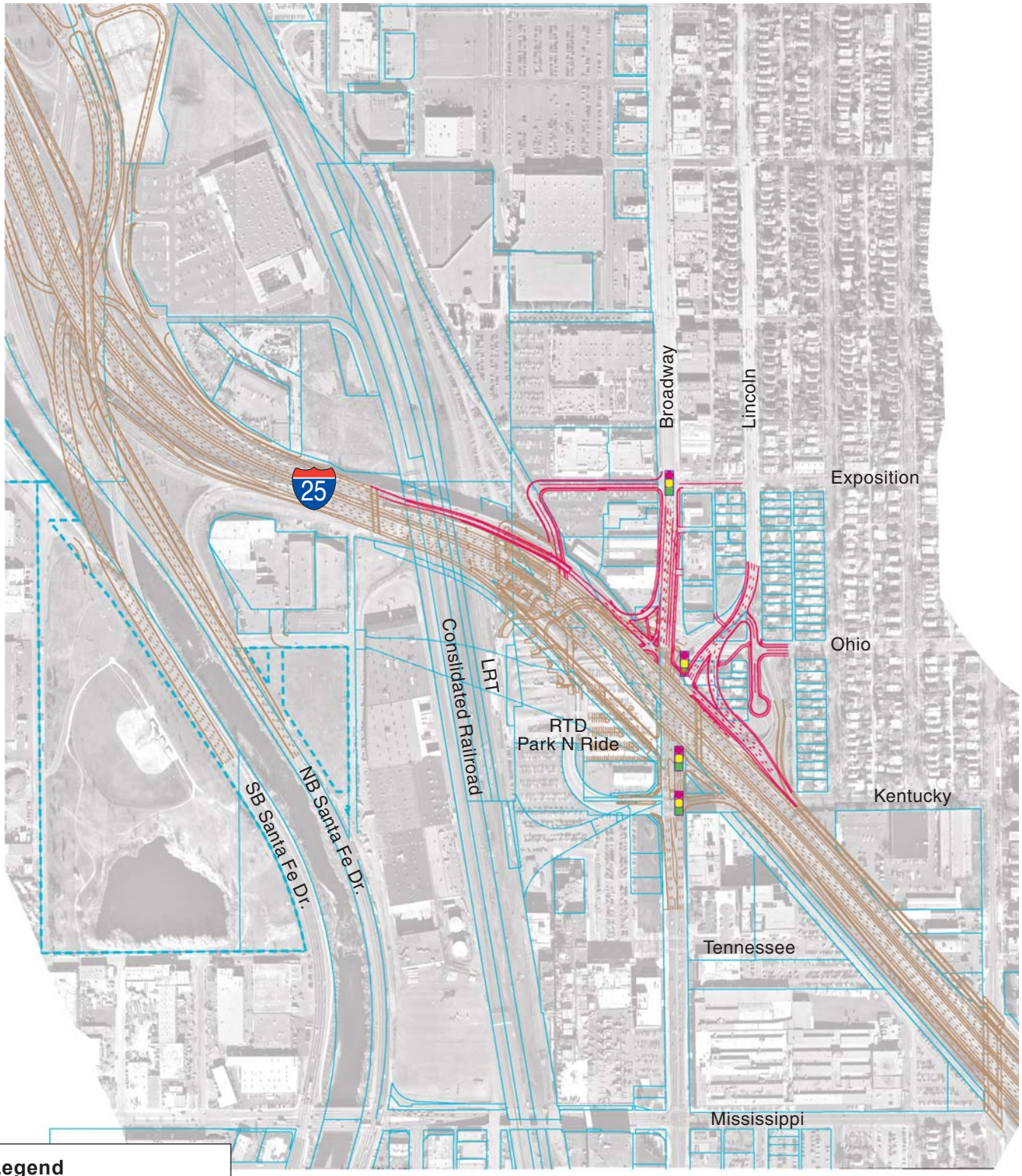
The mitigation and monitoring measures identified above for Phase 5 will be carried forward and refined during final design, construction planning, and implementation for this phase.

7.3.6 Phase 6 Improvements

7.3.6.1 Description of Phase 6 Improvements

Proposed Phase 6 includes reconfiguration/reconstruction of I-25/Broadway interchange Improvements, as shown on Figure 7.11.

Table 7.13 highlights the overall project objectives, as presented in **Chapter 1** *Purpose and Need*, and identifies the benefits produced by Phase 6, relative to the overall project objectives.



Legend
(as shown on figure 7-2

= Phase 6

North

Phase 6

Valley Highway - Logan to 6th Ave.
Environmental Impact Statement (EIS)

Figure 7-11

Table 7.13 Project Purpose and Need Objectives Addressed by Phase 6

Need Category	Overall Project Objective	Benefits Provide by Phase 6
Lane Continuity and Balance	Provide lane continuity and balance on I-25 between the existing and planned roadway sections to the north and south of the project	Not addressed in this phase – see Phases 1 and 3
Transportation Demand and Operations	Optimize highway system operations as measured in reduced delay of vehicle hours/day, reduced hours of congestion, and/or levels of service	Reduction in surface street delay
Inter-modal Relationships and Bicycle/Pedestrian Mobility	Preserve existing or provide improved facilities for automobile, bus, and pedestrian connections. Upgrade bicycle/pedestrian facilities within and across the project corridor to provide improved access to the Platte River Trail, safer facilities at intersections, complete missing links of bicycle/pedestrian facilities, and provide better linkages between transportation modes	Pedestrian/bicycle mobility and access improvements relative to the LRT station
Safety	Increase safety and decrease the likelihood of accidents within the project corridor by improving the geometric design of the roadway	Reduction in accident potential due signal and lane geometry improvements
Roadway Deficiencies	Address existing roadway deficiencies, and replace aging structures to provide for improved operation of and reduced maintenance costs for the roadway facilities	Replacement of deficient structures
Consolidated Main Line Crossing	Reduce system disruptions, and improve safety conditions related to the current at-grade crossing	Not addressed in this phase – see Phase 4

7.3.6.2 PHASE 6 TRAFFIC OPERATIONS AND SAFETY

Traffic Operations

Phase 6 will construct the Preferred Alternative at the I-25 / Broadway interchange. Based on traffic simulation results, completion of Phase 6 will reduce peak hour vehicle delay in the I-25 / Broadway interchange area by 175 vehicle-hours per day compared with the No Action Alternative.

Traffic Safety

Traffic safety benefits associated with Phase 6 include implementing revised signal phasing, increasing the visibility of signal heads and improving lane geometry. The 20-year expected accident reduction associated with the Preferred Alternative will be in the range of 330-400 total accidents.

7.3.6.3 PHASE 6 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

Table 7.14 presents the environmental consequences and mitigation/monitoring measures associated with the implementation of Phase 6.

Table 7.14 Phase 6 Environmental Consequences, Mitigation Measures, and Monitoring

Resource	Consequences of Phase 6	Mitigation Measures and Monitoring
Socio-Economics and Community	• Displacement of businesses. Displacement of residences • Improved safety; replacement/improvement of deteriorating facilities • Pedestrian and bicycle improvements • Reduced cut-through traffic due to reduction in congestion • Implementation of the project in phases will introduce uncertainty with regard to timing of property acquisition for future phases	• Continue discussions with local communities during design and implementation to minimize disruptions. Continue consideration of environmental justice through final design, and implementation • Continue coordination with City and County of Denver
Right-of-Way and Displacements	• Displacement of 3 residences and 3 businesses; full purchase of 6 properties; partial purchase or access modification to 7 properties	• Conform to the requirements set forth in the Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970, as amended, which contains specific requirements that govern the manner in which a government entity acquires property for public use • Prepare a relocation analysis and provide relocation advisory service
Parks and Recreation	• No impacts are expected to parks and recreation as a result of Phase 6	• No specific mitigation is warranted at this time
Aesthetics and Urban Design	• Improvements to highway landscapes, retaining walls, high-mast lighting, signage, slope and ditch paving, and concrete barriers. Positive visual effect from movement of northbound I-25 on-ramp from Broadway away from residential area	• Use conceptual "kit of parts" in design of aesthetic elements and treatments • Continue coordination with other agencies through final design and implementation
Air Quality	• Improved air quality due to improved traffic flow • Meets air quality conformity requirements • Temporary increase in air emissions during construction	• Maintain construction equipment in good working order by ensuring no excessive idling of inactive or unnecessary equipment or vehicles, and by using higher-grade fuel • Implement a dust control plan and locate stationary equipment as far from sensitive receivers as possible
Noise and Vibration	• Within Phase 6 area, noise abatement criteria exceeded for approximately 51 residences • 3 commercial properties will experience exceedances of the noise abatement criteria	• Provide noise barrier along I-25 in the vicinity of 800 S. Lincoln St. • During preparation of final design, consider elements to reduce "nuisance noise" experienced near the highway
Historic and Archaeological Preservation	• No replacement of historic structures	• If historic or archaeological materials are encountered or unearthed during construction, work will be halted immediately in the vicinity of the find, and the CDOT archaeologist or cultural resource staff, and the SHPO, will be notified promptly

Table 7.14 Phase 6 Environmental Consequences, Mitigation Measures, and Monitoring (Continued)

Resource	Consequences of Phase 6	Mitigation Measures and Monitoring
Paleontology	• Denver Formation fossils may be encountered during construction	• CDOT paleontologist to examine final design plans to determine the extent of impact to the Denver Formation, and the scope, if any, of monitoring required
Water Quality and Water Resources	• Short-term increase in sediment from construction • Increase in impervious drainage area • Consolidation of stormwater runoff with fewer outfalls to the South Platte River • Improved quality of stormwater discharge due to construction of water quality ponds and BMPs	• Use construction BMPs to reduce temporary impacts • On-site project area runoff will be controlled through water quality ponds or other BMPs to settle and improve water quality runoff releasing to the South Platte River • Reduction of the overall number of outfalls into the South Platte River and installation of energy dissipaters, such as riprap, at outfalls to reduce erosion potential • Use pump stations to remove runoff at underpasses on grades separations and water quality ponds to settle sediment and improve water quality releasing into the South Platte River
Floodplains	• No impacts to floodplains from Phase 6 are expected	• No mitigation is warranted at this time
Wetlands, Waters of the U.S. and Open Water	• No wetland impacts are expected as a result of Phase 6	• No mitigation measures are warranted at this time
Vegetation and Wildlife	• Removal of vegetation during construction • Potential introduction of noxious weeds into areas disturbed by construction • Short-term disturbance of wildlife and aquatic habitat during construction	• Revegetate construction areas using CDOT –approved native seed mix. If construction occurs outside of appropriate seeding windows, slopes will be temporarily protected from erosion using mulch and mulch tackifier • Replace trees greater than 2 inches in diameter on a 1:1 basis. Existing shrubs removed during construction will be replaced with native species to their pre-construction aerial coverage • Impacted landscape areas (irrigated or otherwise) shall be enhanced and incorporated into final design to ensure the existing landscape does not become fragmented • Target noxious weed populations by preparing and implementing an Integrated Weed Management Plan and clean construction vehicles entering construction areas to avoid introduction • Conduct habitat disturbing activities, such as tree removal, grading, scraping, grubbing, ect., during the non-breeding season unless the area has been verified by a qualified biologist that no active nests are present

Table 7.14 Phase 6 Environmental Consequences, Mitigation Measures, and Monitoring (Continued)

Resource	Consequences of Phase 6	Mitigation Measures and Monitoring
Hazardous Waste	• Several properties identified with potential or recognized environmental conditions to be acquired for right-of-way • Excavations in the vicinity of the RTD Park-n-Ride may encounter contaminated groundwater, soil, and fill material, and in some locations methane • Santa Fe Drive, Alameda Avenue, US 6, and railroad bridges may be coated with lead-based paint	• Conduct individual, site-specific initial site assessments of properties and coordinate with OPS and CDPHE, as necessary, before acquiring right-of-way • Conduct a preliminary site investigation before final design to identify soil and groundwater contamination that may affect feasibility evaluation and final design • Prepare a materials handling plan and a health and safety plan, which includes asbestos-containing material, as required by Section 250.03 of the CDOT Standard Specifications for Road and Bridge Construction • Conduct an asbestos, heavy metals based paint survey of bridges, and miscellaneous material survey prior to demolition of any structures
Soils and Geology	• Expansive soils and unsuitable fill material may be encountered	• Consider potential for expansive soils and unsuitable fill during final design
Energy	• Increase in energy use due to construction. • Decrease in fuel use due to decreased traffic congestion	• Consider energy conservation measures during final design
Construction	• Short-term fugitive dust emissions, construction noise, increase in sediment, traffic delays, visual impacts, and utility impacts during construction	• Identify construction mitigation measures during final design and construction planning, with consideration of the possible mitigation measures identified by the Citizens Working Group (See **Table 4.18-1** in Chapter 4)

The mitigation and monitoring measures identified for Phase 6 will be carried forward and refined during final design, construction planning, and implementation for this phase.

7.4 Further Coordination and Decision Making after Final EIS

7.4.1 Public Availability of Final EIS and Execution of Initial ROD

After this Final EIS is completed, CDOT and FHWA will:

- Publish notice of availability of the Final EIS in the Federal Register
- Provide copies of the Final EIS for public review at convenient locations
- Hold a public hearing
- Receive public comments at the public hearing and through written submissions
- Review public comments, prepare responses, and refine the Preferred Alternative and/or project phases in response to comments, as appropriate
- Execute a ROD selecting a fiscally-constrained Phase 1 for implementation

Following execution of a ROD, CDOT and FHWA will proceed with final design and implementation of Phase 1.

7.4.2 Implementation of Future Project Phases

With an initial ROD, CDOT and FHWA will select Phase 1 for implementation. Subsequent project phases will be implemented as additional funding become available, and CDOT and FHWA work toward implementation of the entire Preferred Alternative. For each subsequent phase, a ROD will be issued detailing the phase to be implemented. CDOT and FHWA will review the information provided in this Final EIS and the initial ROD in preparing each subsequent ROD.

The following steps are indicative of the process that will be followed to implement each successive phase:

- Identify additional funding available for corridor improvements
- Review remaining phases and current priorities to identify the next phase for implementation
- Confirm the expected benefits and impacts of the phase, as appropriate, based on the Final EIS and current conditions at the time of selection
- Confirm/identify the appropriate mitigation measures to be included in the phase, based on the Final EIS and current conditions at the time of selection
- Confirm air quality conformity through inclusion of the new improvements in the RTP
- Execute a ROD for the phase

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9.0 AVAILABILITY OF TECHNICAL REPORTS

Several sections of the Valley Highway EIS are summaries of technical reports and addenda prepared by the project team as follows:

Alternatives

Initial Screening for Reasonableness/Practicability, Technical Memorandum for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. June 6, 2003. Prepared by Felsburg Holt & Ullevig.

Compatibility Testing of Elements, Technical Memorandum for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. February 2005. Prepared by Felsburg Holt & Ullevig.

Concept Plan for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. February 2005. Prepared by Felsburg Holt & Ullevig.

Concept Plan for the Valley Highway EIS Preferred Alternative, Logan Street to 6th Avenue, City and County of Denver, Colorado. October 2006. Prepared by Felsburg Holt & Ullevig.

Transportation/Traffic Analysis

Traffic Report for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. February 2005. Prepared by Felsburg Holt & Ullevig.

Traffic Report for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. Addendum October 2006. Prepared by Felsburg Holt & Ullevig.

Safety Analysis

Assessment of Traffic Safety for the Valley Highway EIS/I-25 Improvement Project, Logan Street to 6th Avenue, City and County of Denver, Colorado. February 2005. Prepared by the Colorado Department of Transportation Region 6.

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Aesthetics and Urban Design

Aesthetics and Urban Design Report for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. February 2005. Prepared by Felsburg Holt & Ullevig and Design Workshop.

Aesthetics and Urban Design Report for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. Addendum October 2006. Prepared by Felsburg Holt & Ullevig and Design Workshop.

Cultural Resources

Cultural Resources Inventory for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. March 2004. Prepared by Felsburg Holt & Ullevig.

Paleontology

Paleontology Survey Report for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. October 3, 2003. Prepared by Felsburg Holt & Ullevig and Rocky Mountain Paleontology.

Air Quality

Air Quality Impact Assessment Report for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. February 2005. Prepared by Felsburg Holt & Ullevig.

Air Quality Impact Assessment Report for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. *Addendum* October 2006. Prepared by Felsburg Holt & Ullevig.

Noise

Noise and Vibration Impact Assessment Report for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. February 2005. Prepared by Felsburg Holt & Ullevig.

Noise and Vibration Impact Assessment Report for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. Addendum October 2006. Prepared by Felsburg Holt & Ullevig.

Hazardous Waste

Modified Environmental Site Assessment for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. February 2005. Prepared by Felsburg Holt and Ullevig.

Water Resources/Water Quality and Floodplains

Water Resources Technical Report for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. February 2005. Prepared by Felsburg Holt & Ullevig and Muller Engineering.

Water Resources Technical Report for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. Addendum October 2006. Prepared by Felsburg Holt & Ullevig and Muller Engineering.

Wetlands

Wetland Delineation Report for the Valley Highway EIS, Logan Street to 6th Avenue, City and County of Denver, Colorado. March 2004. Prepared by Felsburg Holt & Ullevig and ERO Resources.

These technical reports are available for reference at the following locations:

Colorado Department of Transportation
Region 6
2000 S. Holly Street
Denver, CO 80222

Denver Public Library
Central Library
10 W. 14th Ave. Pkwy.
Denver, CO 80204

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11.0 INDEX

Subject	Chapter 1 Purpose and Need	Chapter 2 Alternatives	Chapter 3 Transportation	Chapter 4 Environmental Consequences	Chapter 5 4(f) Evaluation	Chapter 6 Public Involvement	Chapter 7 Phased Project Implementation
Aesthetics and Urban Design				4.4-1, 4.21-9		6-12	7-16, 7-21, 7-26, 7-31, 7-36, 7-41
Agency Involvement		2-1		4.1-41, 4.21-1	5-34	6-6	
Air Quality				4.5-1, 4.18-1, 4.20-23, 4.20-32, 4.21-3, 4.21-4			7-16, 7-21, 7-26, 7-31, 7-36,
Alternatives Considered and Eliminated		2-7					
Alternatives Development		2-4					
Alternatives Screening		2-4					
Archaeological Sites				4.7-8, 4.21-4			
Construction Impacts				4.18-1, 4.20-30, 4.20-33, 4.21-8, 4.21-9, 4.21-10		6-12	7-18, 7-23, 7-28, 7-33, 7-38, 7-43
Cumulative Impacts				4.20-1			
Displacements				4.2-1			7-16, 7-21, 7-26, 7-31, 7-36, 7-41
Energy				4.15-1			7-18, 7-23, 7-28, 7-33, 7-38, 7-43
Environmental Justice				4.1-39 to 4.1-47		6-20	
Floodplains				4.10-1, 4.20-28, 4.20-30, 4.21-5, 4.21-10			7-16, 7-22, 7-27, 7-32, 7-37, 7-42
Groundwater Resources				4.9-13			
Hazardous Waste				4.13-1, 4.21-7, 4.21-10			7-18, 7-23, 7-28, 7-32, 7-37, 7-41
Historic Districts				4.7-7			
Historic Preservation /Resources/Properties				4.7-1, 4.20-26, 4.20-32	5-2		7-16, 7-22, 7-26, 7-31, 7-36
Native American Consultation				4.7-8			

Subject	Chapter 1 Purpose and Need	Chapter 2 Alternatives	Chapter 3 Transportation	Chapter 4 Environmental Consequences	Chapter 5 4(f) Evaluation	Chapter 6 Public Involvement	Chapter 7 Phased Project Implementation
Noise				4.6-1, 4.18-1, 4.20-26, 4.20-32, 4.21-3		6-12	7-16, 7-21, 7-26, 7-31, 7-36, 7-41
Noxious Weeds				4.12-6			
Paleontology				4.8-1, 4.21-4, 4.21-9			7-16, 7-22, 7-26, 7-31, 7-42
Parks and Recreation				4.3-1, 4.20-22, 4.20-32, 4.21-2, 4.21-9	5-22		7-16, 7-21, 7-26, 7-31, 7-36, 7-41
Pedestrian/Bicycle Mobility	1-5, 1-10, 1-11	2-35, 2-45, 2-54, 2-61				6-12	7-15, 7-20, 7-25, 7-30, 7-35, 7-40
Permits				4.19-1			
Phased Implementation							All Chapter 7.0
Project History	1-3						
Project Location	1-1						
Public Involvement		2-1		4.1-41		6-1, 6-10	
Purpose and Need	1-1						7-1
Railroad Vibration				4.6-13, 4.18-2			
Right-of-way				4.2-1, 4.21-2, 4.21-9			7-16, 7-21, 7-26, 7-31, 7-36, 7-41
Screening Process		2-4					
Socio-Economics and Community				4.1-1, 4.20-20, 4.20-30, 4.21-9			7-16, 7-21, 7-26, 7-31, 7-36, 7-41
Soils and Geology				4.14-1			
Stormwater Drainage				4.9-15			7-18, 7-23, 7-28, 7-33, 7-38, 7-43
Surface Water Resources				4.9-6			
Threatened and Endangered Species				4.12-9			
Transportation Network			3-1				
Traffic Operations			3-5, 3-12, 3-28, 3-30, 4.20-19, 4.20-31				7-11, 7-15, 7-20, 7-25, 7-30, 7-35, 7-40
Traffic Safety			3-8				7-11, 7-15, 7-20, 7-25, 7-30, 7-35, 7-40
Traffic Volumes			3-10				7-12, 7-13
Travel Demand			3-3, 3-9				7-15, 7-20, 7-25, 7-30, 7-35, 7-40

Subject	Chapter 1 Purpose and Need	Chapter 2 Alternatives	Chapter 3 Transportation	Chapter 4 Environmental Consequences	Chapter 5 4(f) Evaluation	Chapter 6 Public Involvement	Chapter 7 Phased Project Implementation
Water Quality/Resources				4.9-1, 4.18-2, 4.20-28, 4.20-32, 4.21-4, 4.21-9		6-12	7-17, 7-22, 7-27, 7-32, 7-37, 7-42
Wetlands				4.11-1, 4.20-28, 4.20-32, 4.21-5, 4.21-10			7-17, 7-22, 7-27, 7-32, 7-37, 7-42
Vegetation and Wildlife				4.12-1, 4.21-6, 4.21-10			7-17, 7-22, 7-27, 7-32, 7-37, 7-42

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