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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 through 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	May 19, 2005	Baker Middle School	To present the Draft EIS and allow the opportunity for members of the public to ask questions and provide comments
Public Hearing	June 2, 2005	Drury Gymnasium	

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

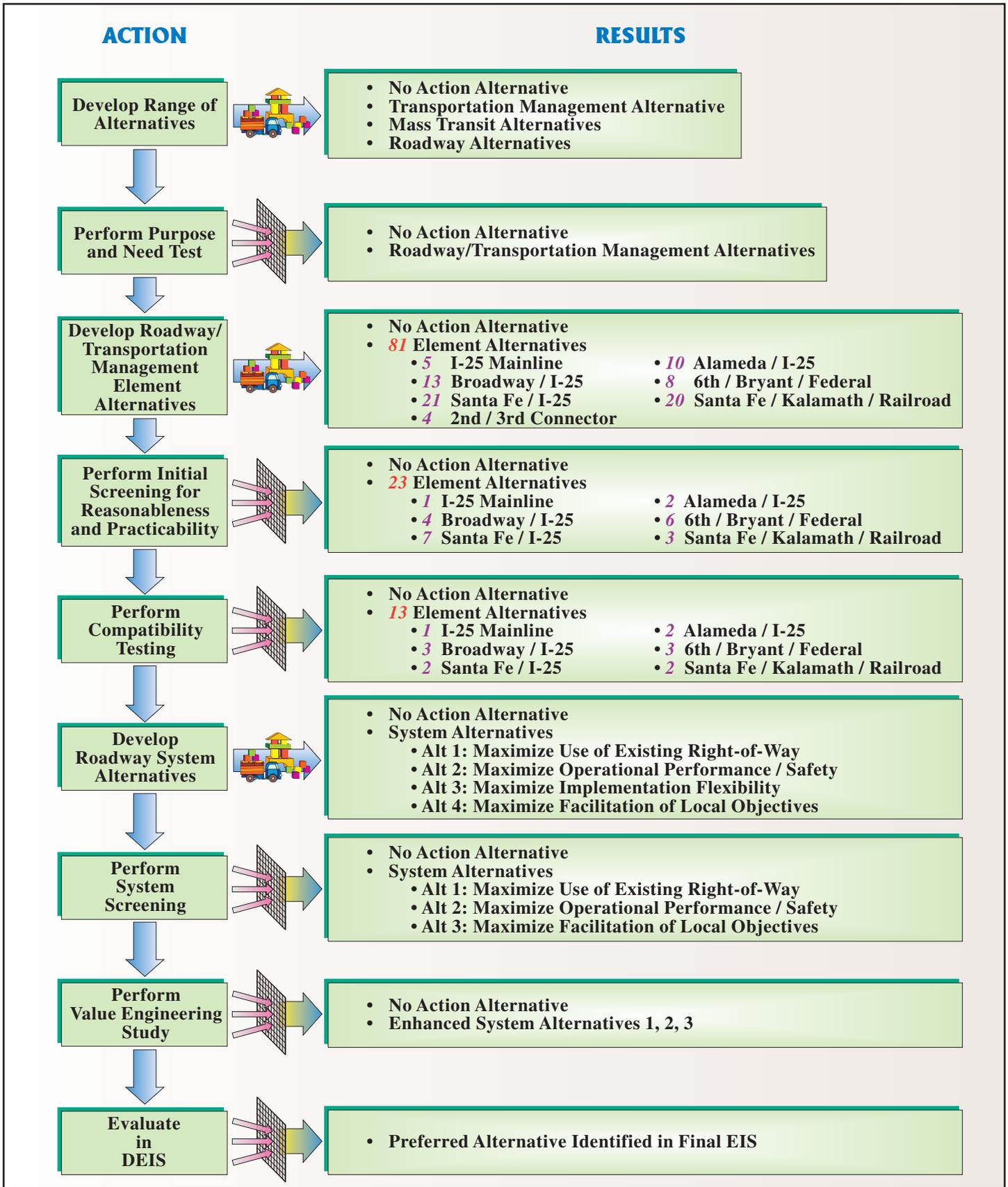
2.3.1.1 TRANSPORTATION MANAGEMENT ALTERNATIVE

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.



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>I-25 Mainline</i>			
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>I-25 / Broadway Interchange</i>			
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>I-25 / Santa Fe Drive Interchange</i>		
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>I-25 / Santa Fe Drive Interchange (continued)</i>		
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>I-25 / Alameda Avenue Interchange</i>		
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 8 th 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 8 th 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
<i>Proposals Advanced from Value Engineering Study</i>			
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 <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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**.

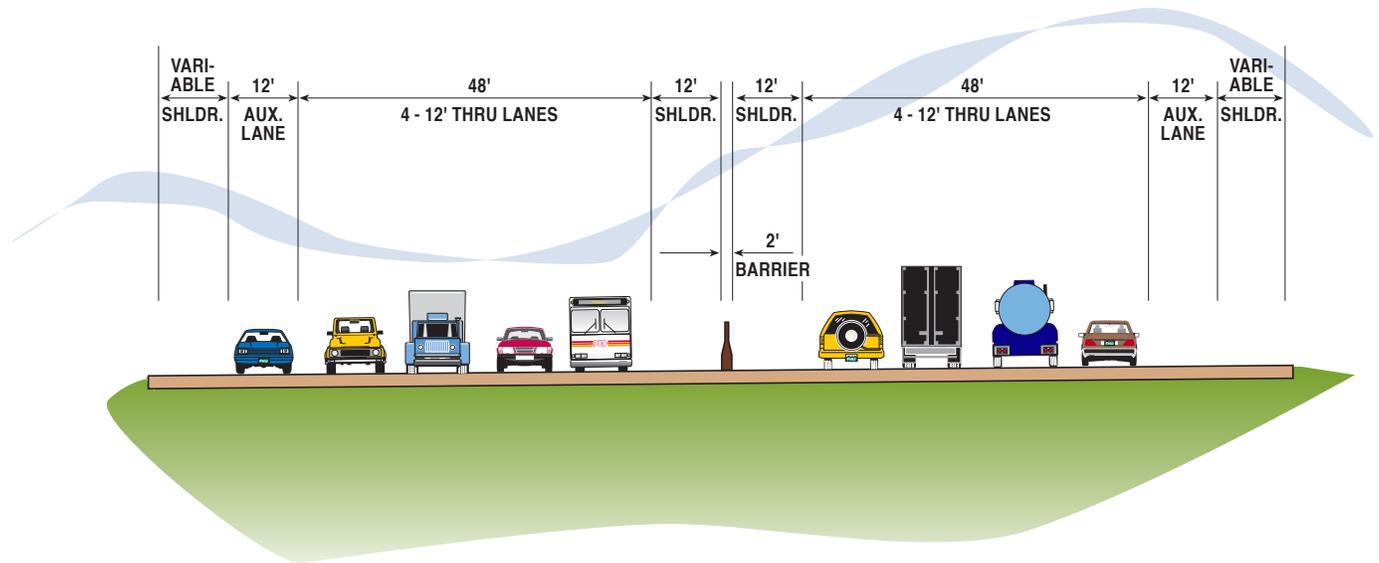
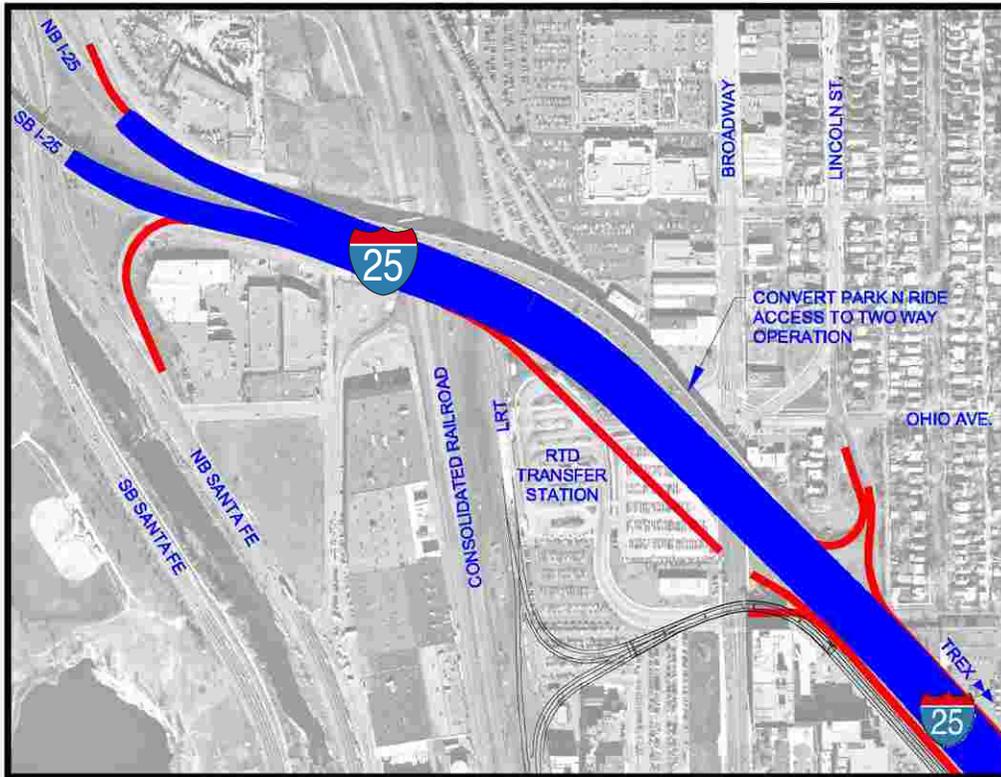
The three system alternatives and the No Action Alternative evaluated in the Draft EIS are described below and further evaluated in **Chapter 3 Transportation Analysis** and **Chapter 4 Environmental Consequences**. The system alternatives are presented in greater detail in *Concept Plan for the Valley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

2.4.1 No Action Alternative

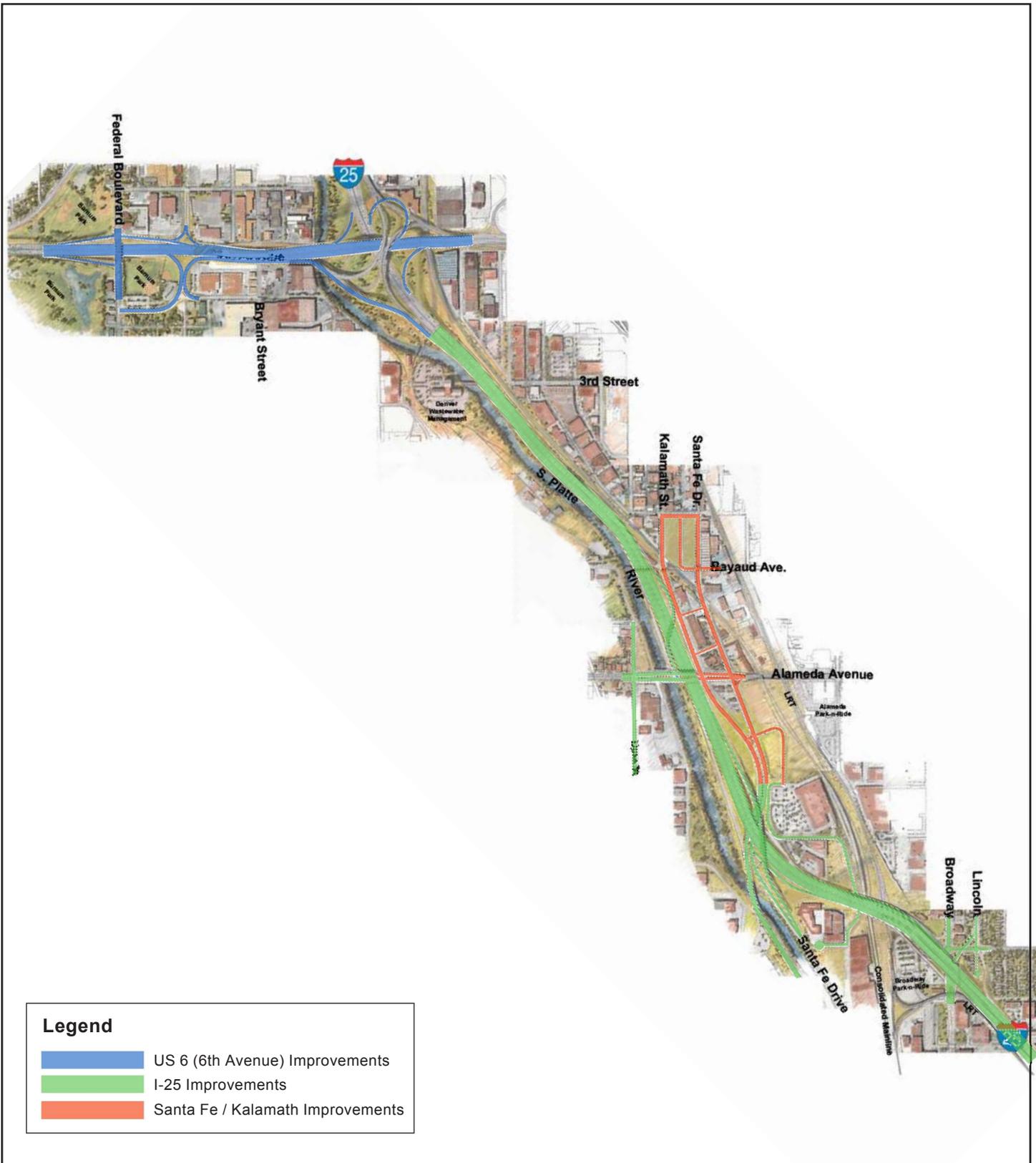
The No Action Alternative includes only those projects that have committed funds for improvements. These improvements would be made whether or not any other improvements are made to the Valley Highway corridor. This alternative is fully assessed as an alternative and is used as a baseline comparison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

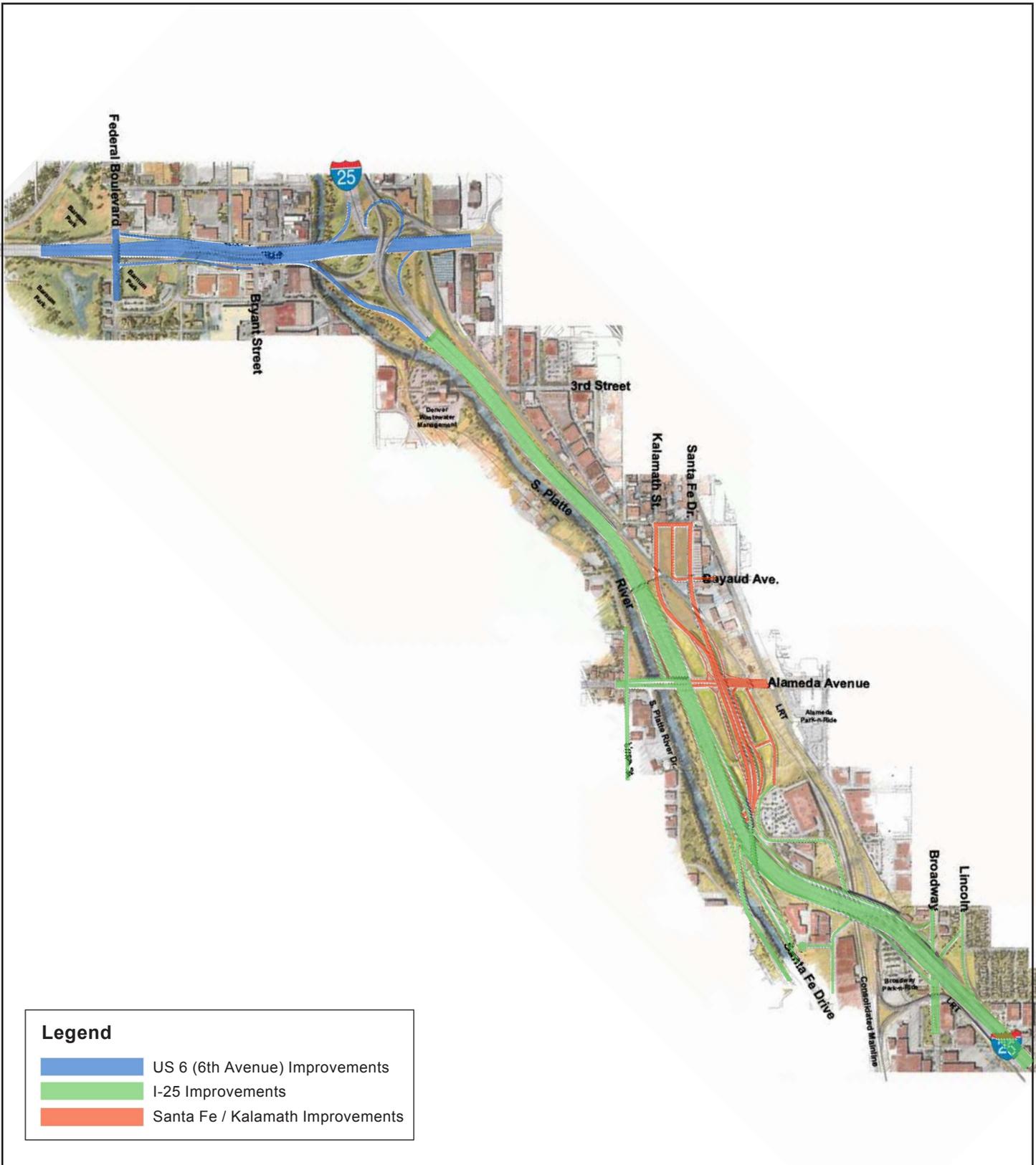


No Action Alternative



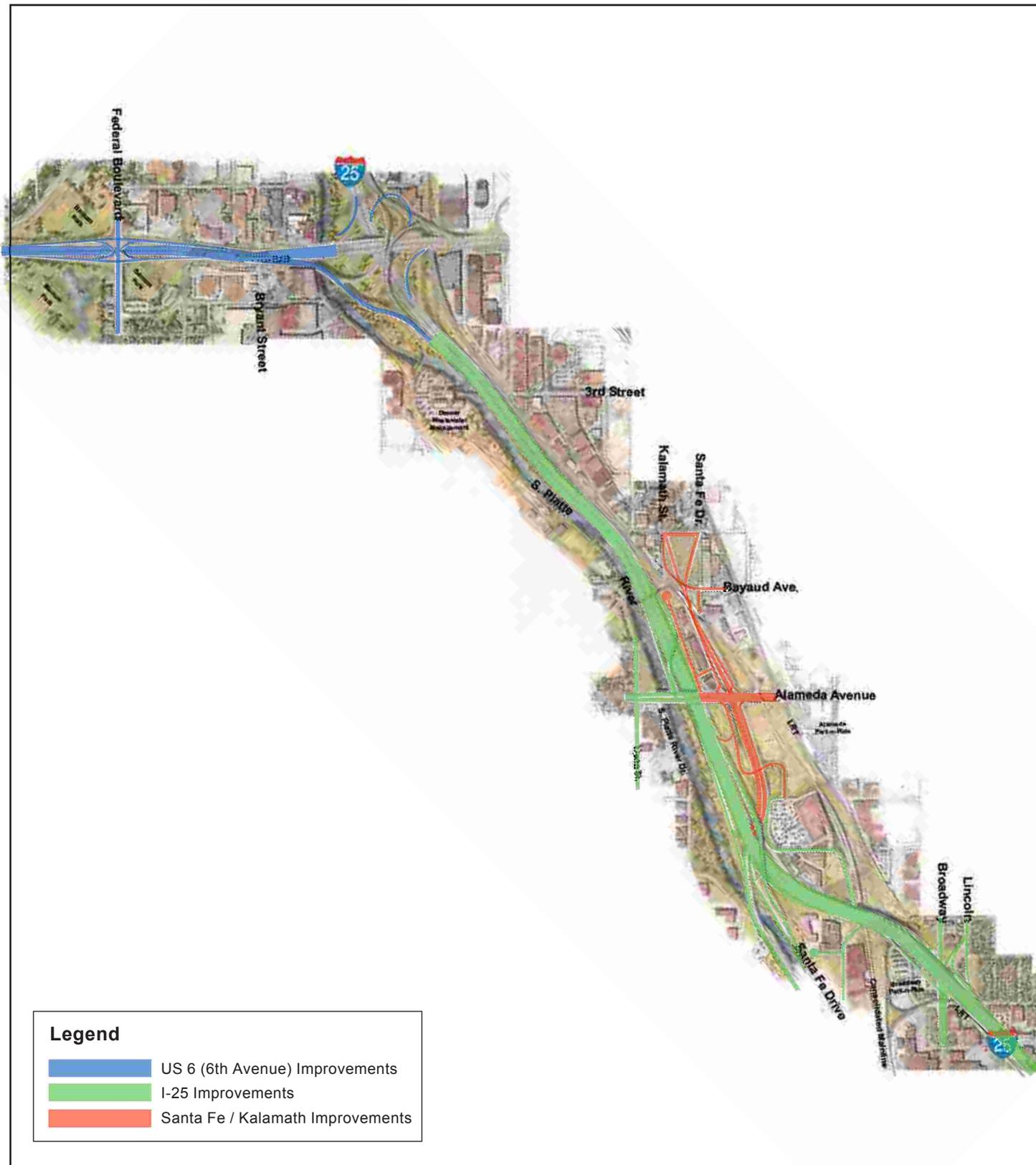
System Alternative 1 Maximize Use of Existing Right-of-Way





System Alternative 2 Maximize Operational Performance / Safety





System Alternative 3 Maximize Facilitation of Local Objectives



North

2.4.2 Elements Common to the System Alternatives

The three system alternatives share elements that are consistent in all three. **Table 2-8** summarizes 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	<ul style="list-style-type: none"> • Roadway alignment • Wider (12-foot) 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Northside ramps
Santa Fe Drive Interchange	<ul style="list-style-type: none"> • Northbound Santa Fe to northbound I-25 flyover ramp • Southbound I-25 to southbound Santa Fe Drive ramp • South side ramps
Alameda Avenue Interchange	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Ramps in all four quadrants of the interchange
Arterial Streets	<ul style="list-style-type: none"> • Typical roadway sections for Broadway / Lincoln Street, US 85 / Santa Fe Drive, Alameda Avenue, and Federal Boulevard
Transportation Management	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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

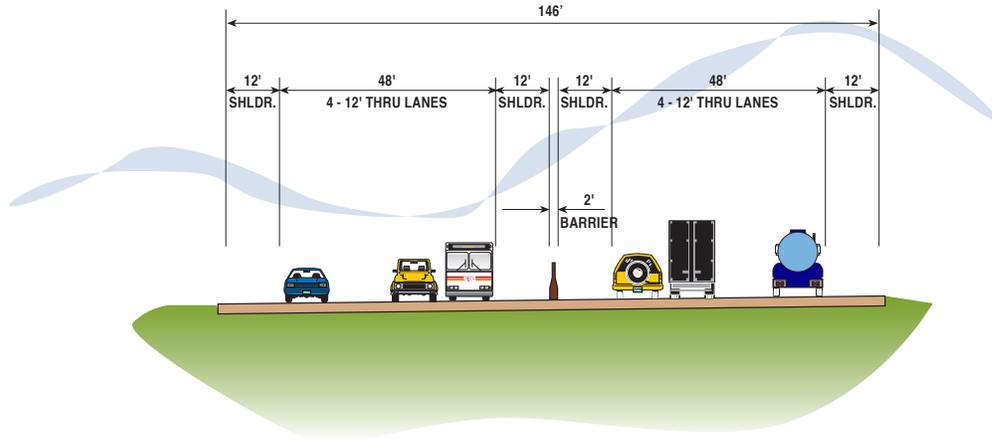
One additional highway lane in each direction would be added to I-25 between Broadway and Santa Fe Drive and one additional lane would be provided northbound between Santa Fe Drive and US 6.

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-foot) inside and outside shoulders would be provided. This would provide the following benefits:

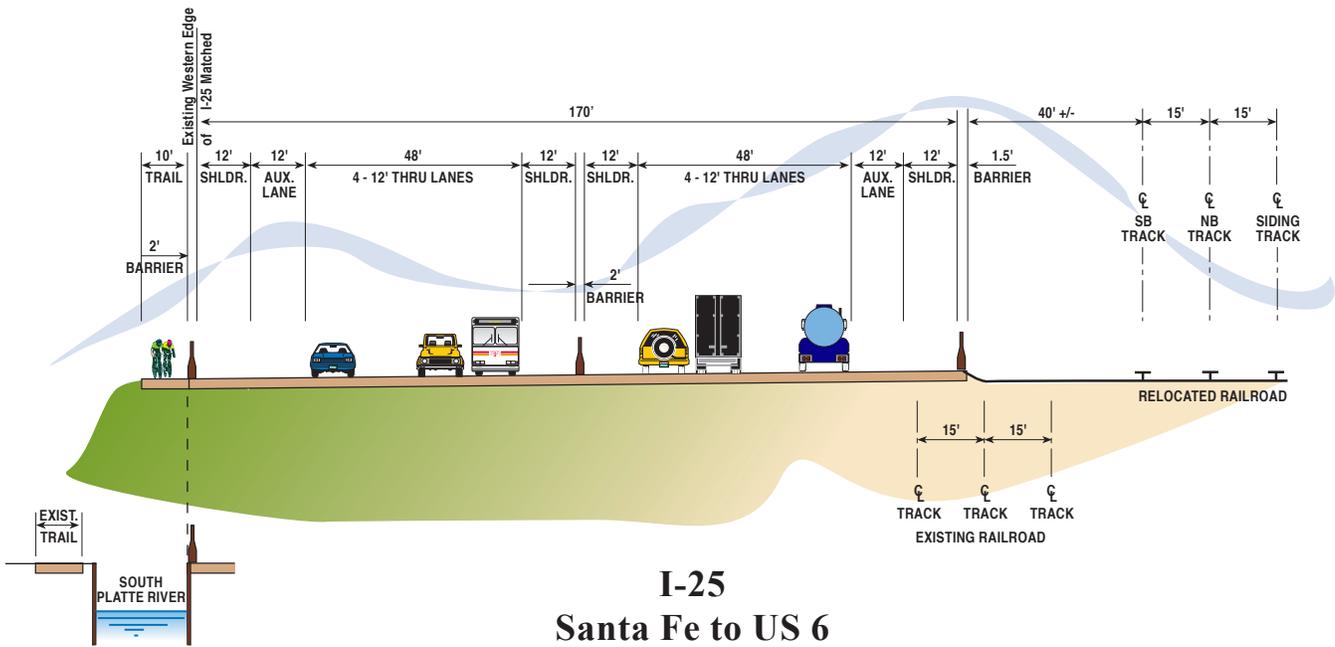
- Alleviates the bottleneck of three lanes in each direction between Broadway and Santa Fe Drive created once T-REX is complete
- Addresses the lane balance issue between Santa Fe Drive and US 6
- Provides a safety zone for stranded motorists
- Offers space for emergency vehicles and incident management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

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.

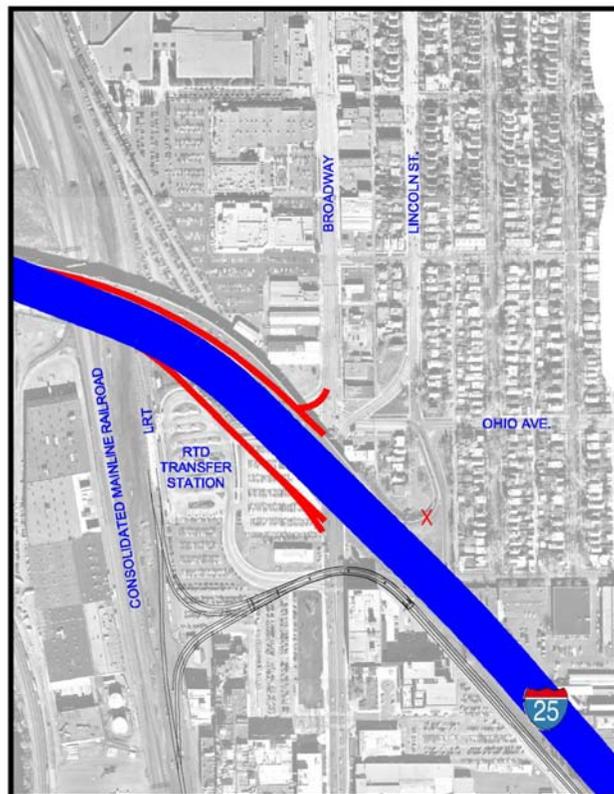


Figure 2-7 Common Elements at Broadway

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**.

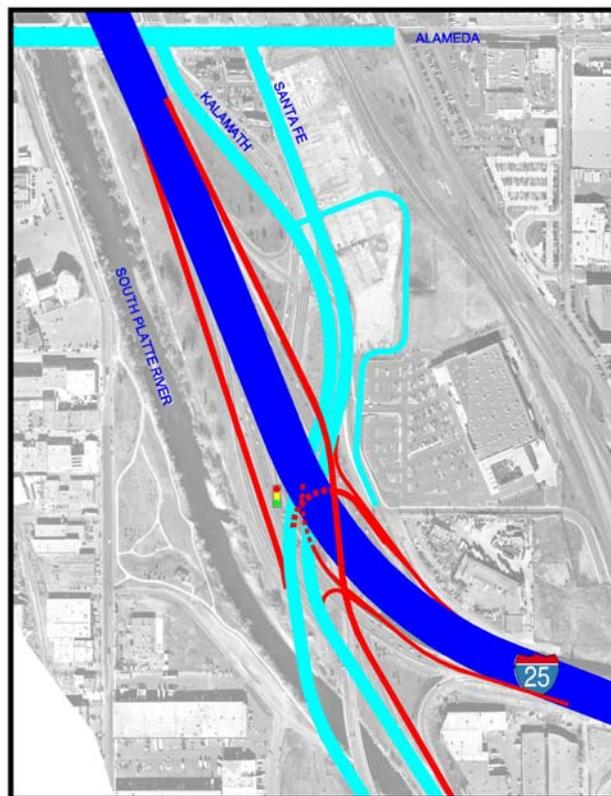


Figure 2-8 Common Elements at Santa Fe Drive

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.

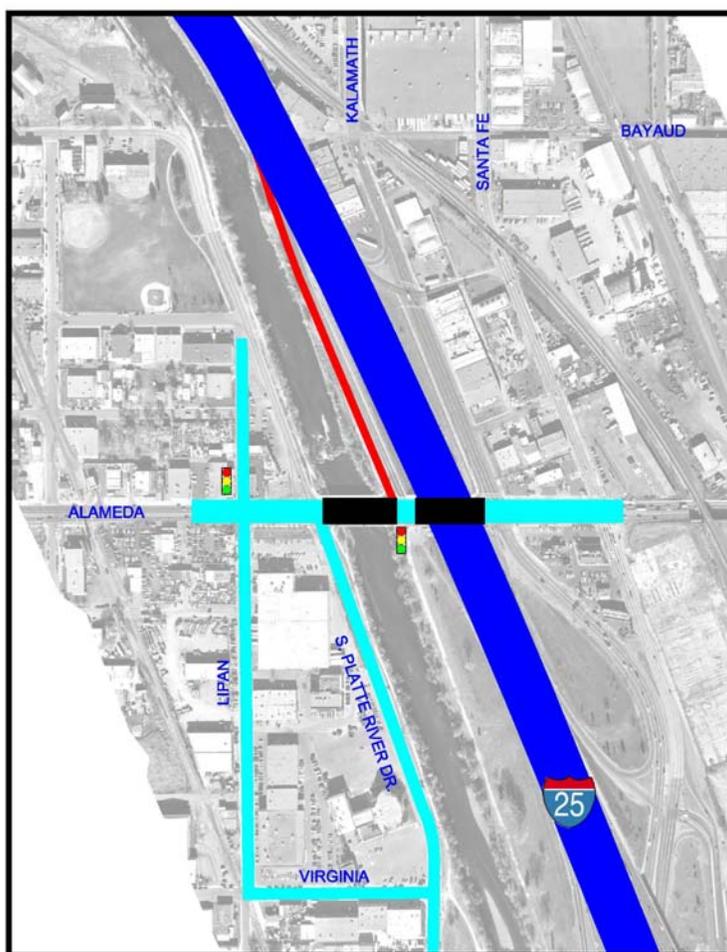


Figure 2-9 Common Elements at Alameda Avenue

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.

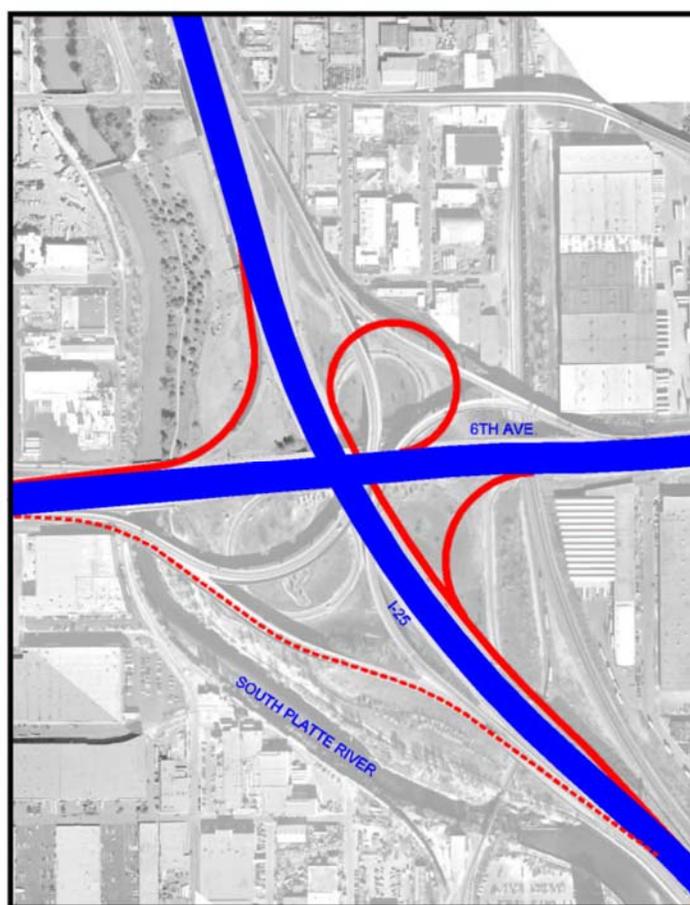
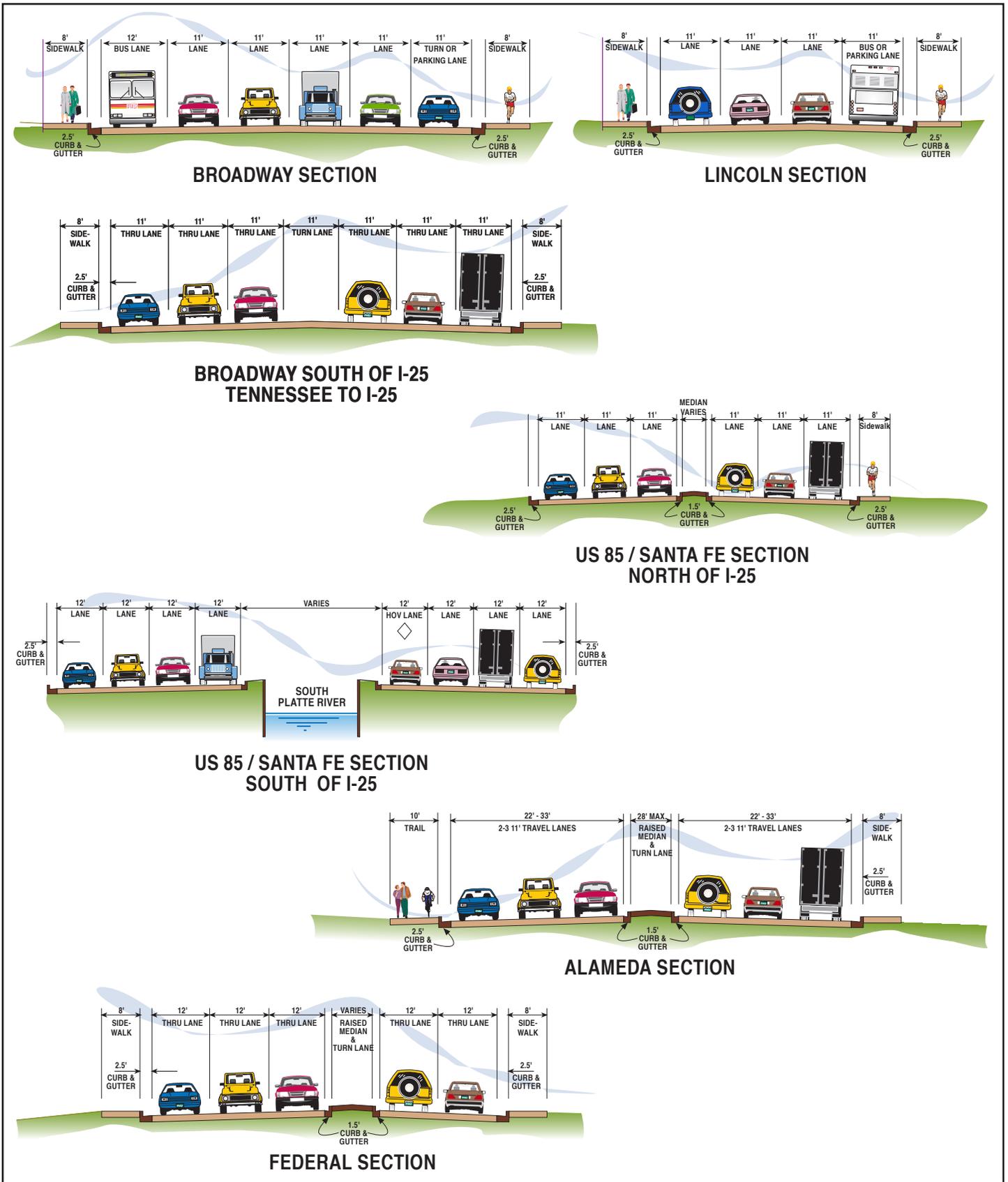


Figure 2-10 Common Elements at US 6 / I-25

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.



Arterial Streets Common Sections with System Build Alternatives

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	<ul style="list-style-type: none"> Continuous auxiliary lane between Broadway and Santa Fe Drive in both directions between ramps
US 6	<ul style="list-style-type: none"> Shifted Bryant Street interchange to align at Decatur Street Traffic signal and restriping improvements on 7th Avenue.
Broadway Interchange	<ul style="list-style-type: none"> Northeast quadrant ramp and Ohio Avenue as it exists today Southeast quadrant ramp as in No Action Alternative
Alameda Avenue Interchange	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Santa Fe Drive and Kalamath Street go under the railroad on their current alignments
Pedestrian and Bicycle Facilities	<ul style="list-style-type: none"> 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**.

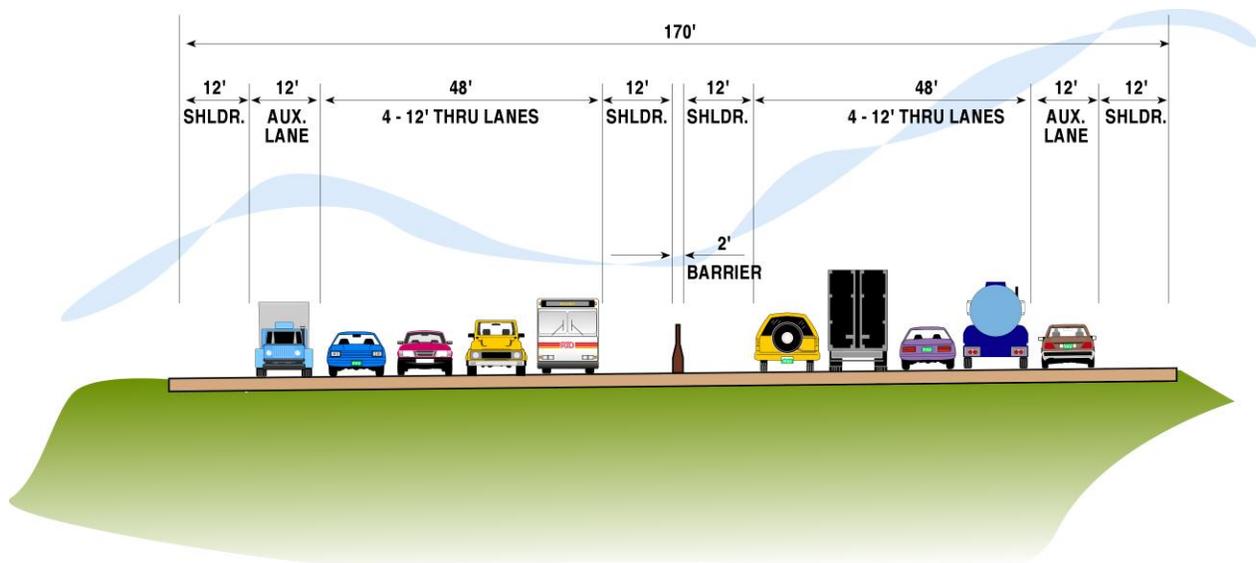


Figure 2-12 System Alternative 1, I-25 Typical Section, Broadway to Santa Fe Drive

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.

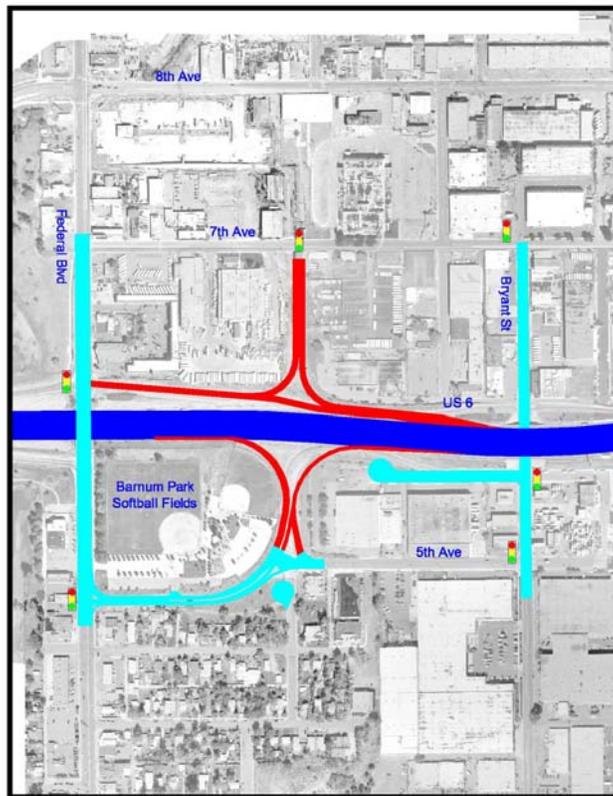


Figure 2-13 System Alternative 1, US 6 / Federal Boulevard / Bryant Street Improvements

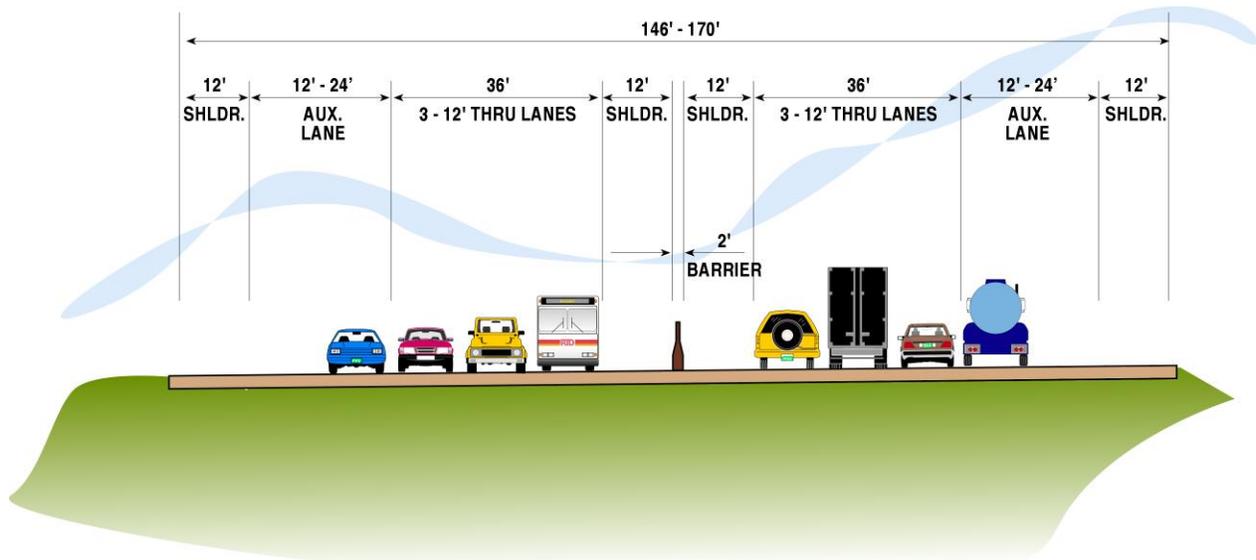


Figure 2-14 System Alternative 1, US 6 Typical Section, I-25 to Federal Boulevard

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**.

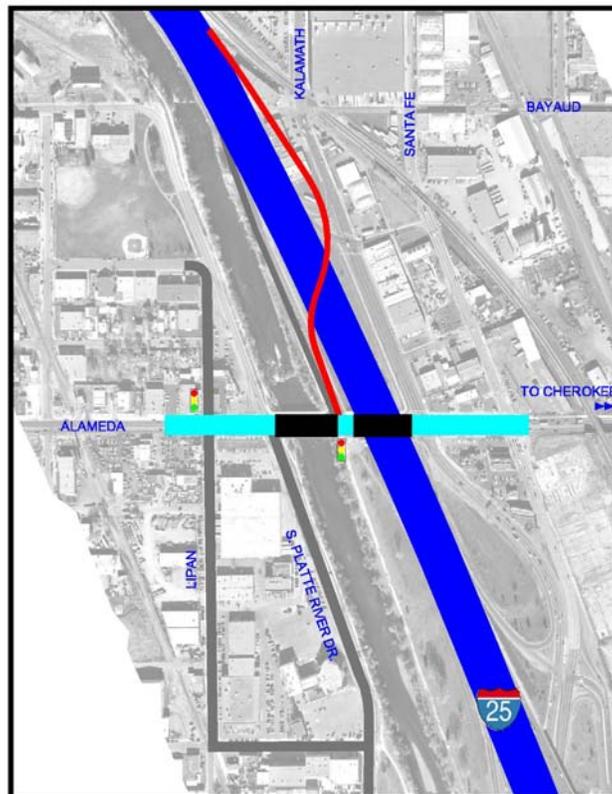


Figure 2-16 System Alternative 1, Alameda Avenue Interchange



Legend

 See Section 4.1 for Land Use Concept

**System Alternative 1 Simulation
Santa Fe / Kalamath / Alameda**



North

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**).

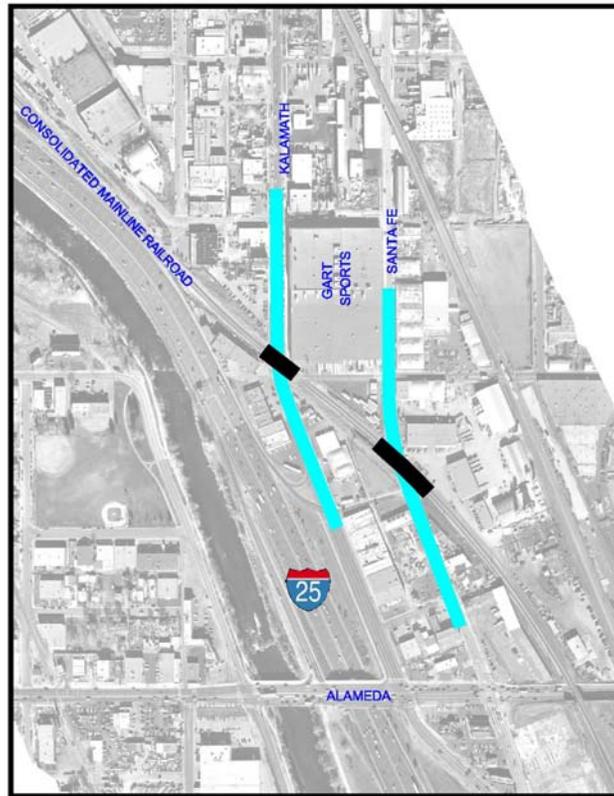


Figure 2-18 System Alternative 1, Santa Fe Drive and Kalamath Street Grade Separation

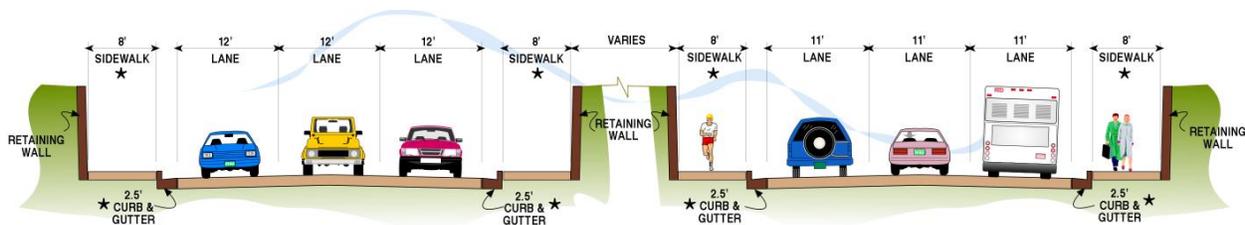


Figure 2-19 System Alternative 1, Santa Fe Drive and Kalamath Street Typical Section

*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.

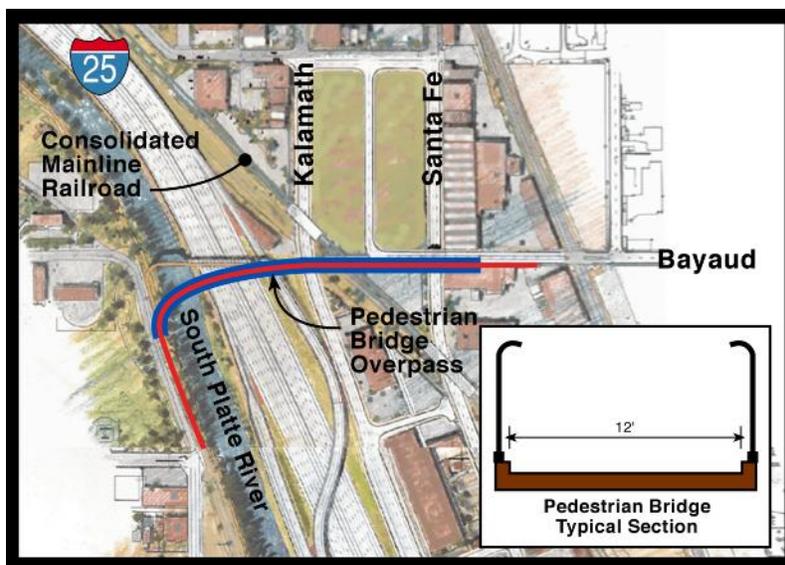


Figure 2-21 System Alternative 1, Bayaud Avenue Bicycle / Pedestrian Structure

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	<ul style="list-style-type: none"> • Continuous collector-distributor lanes between Broadway and Santa Fe Drive in both directions
US 6	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Add southbound I-25 to northbound Santa Fe Drive movement
Alameda Avenue Interchange	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Santa Fe Drive and Kalamath Street go under the railroad on their current alignments
Pedestrian and Bicycle Facilities	<ul style="list-style-type: none"> • 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**.

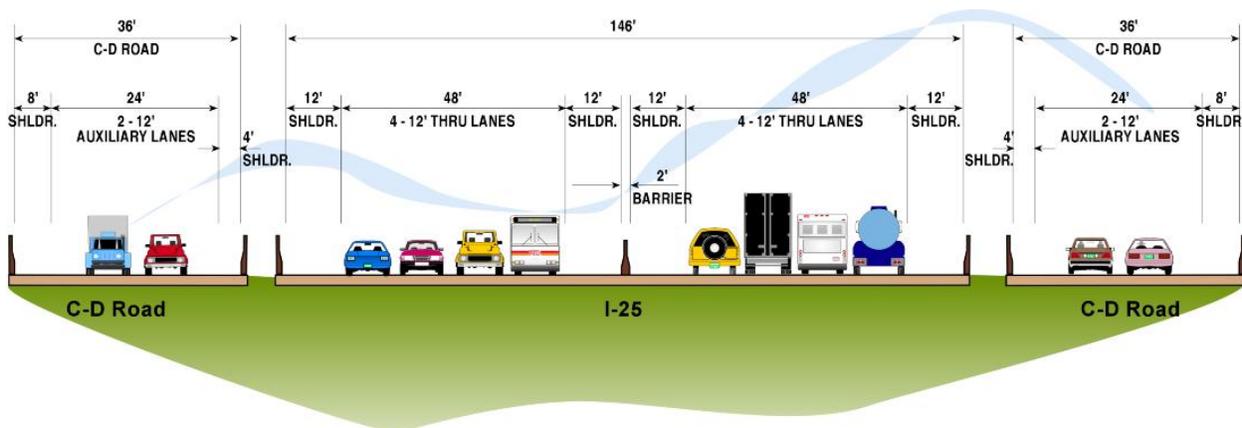


Figure 2-22 System Alternative 2, I-25 Typical Section, Broadway to Santa Fe Drive

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.

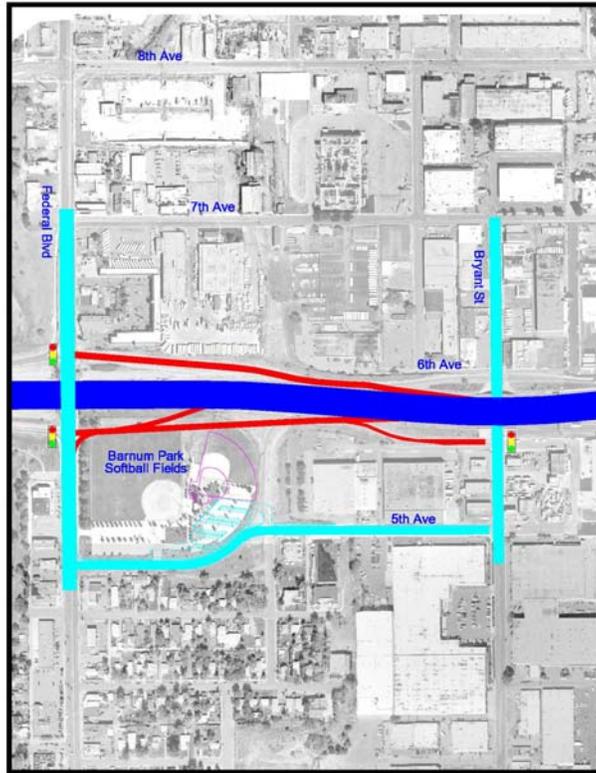


Figure 2-23 System Alternative 2, US 6 / Federal Boulevard / Bryant Street Interchange

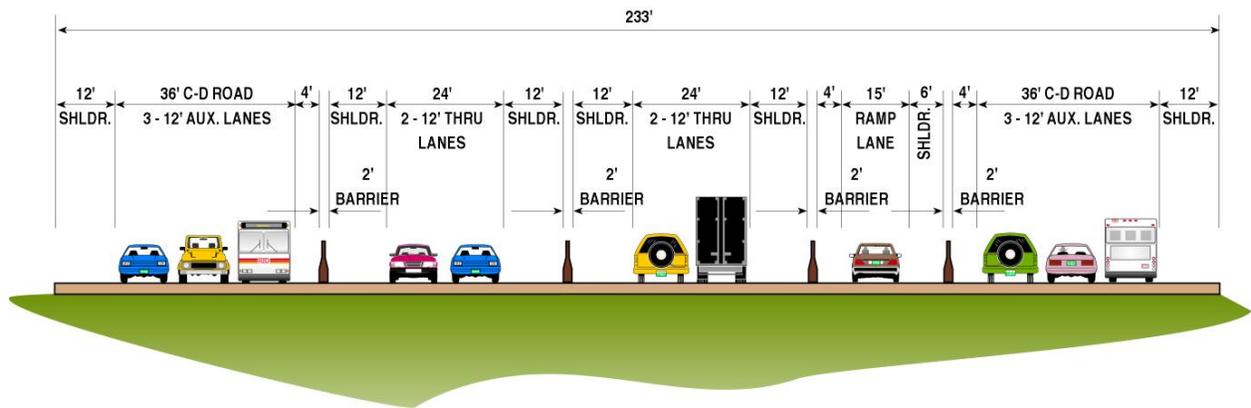


Figure 2-24 System Alternative 2, US 6 Typical Section, I-25 to Federal Boulevard

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.

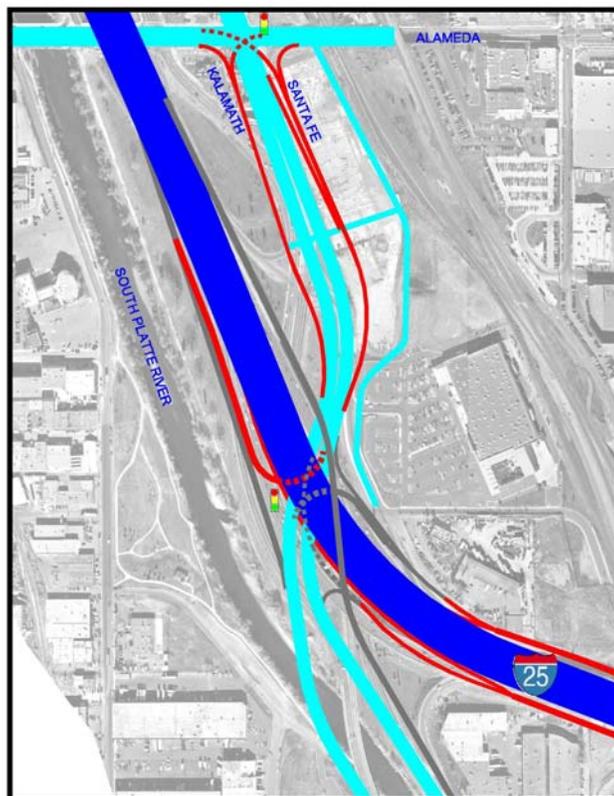


Figure 2-26 System Alternative 2, Santa Fe Drive Interchange

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.

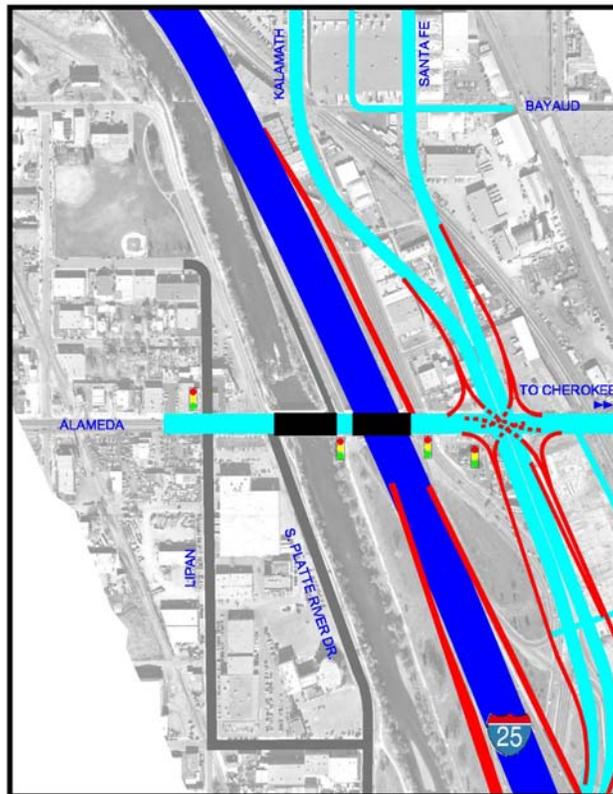


Figure 2-27 System Alternative 2, Alameda Avenue Interchange

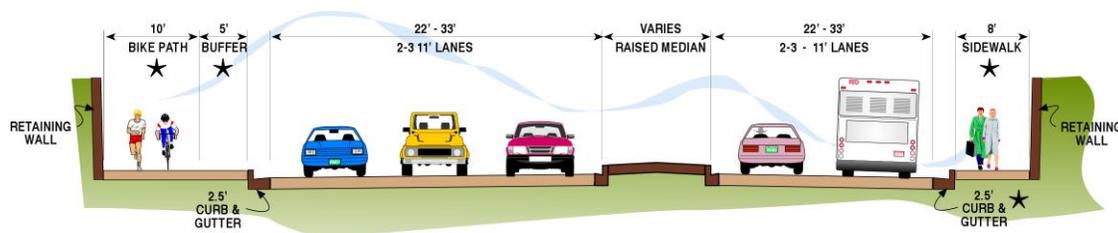


Figure 2-28 System Alternative 2, Alameda Avenue – Santa Fe Drive to Cherokee Street

*Subject to final refinement in final design.



Legend

 See Section 4.1 for Land Use Concept

**System Alternative 2 Simulation
Santa Fe / Kalamath / Alameda**



North

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.

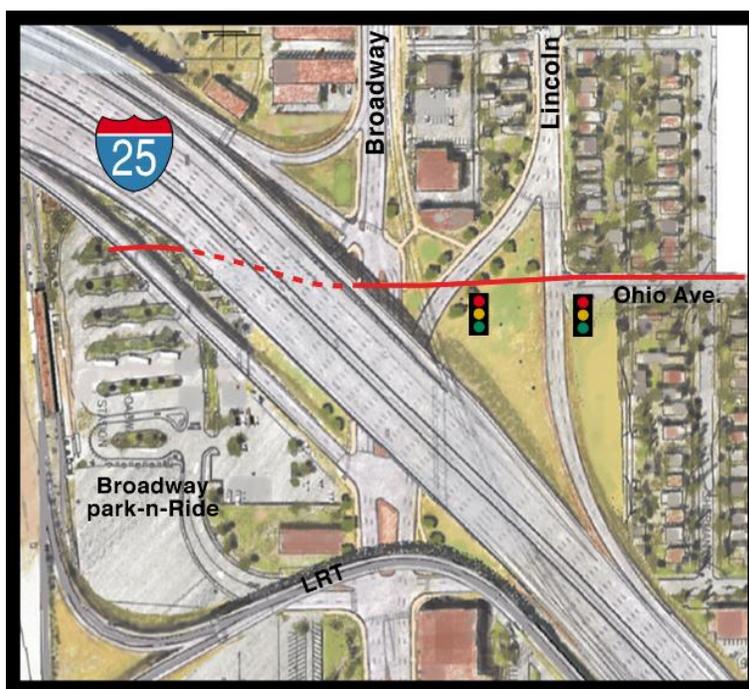


Figure 2-30 System Alternative 2, Broadway Bike / Pedestrian Facilities

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	<ul style="list-style-type: none"> • Continuous auxiliary lane between Broadway and Santa Fe Drive in both directions between ramps
US 6	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Santa Fe Drive and Kalamath Street go under the railroad on a combined alignment
Pedestrian and Bicycle Facilities	<ul style="list-style-type: none"> • 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.

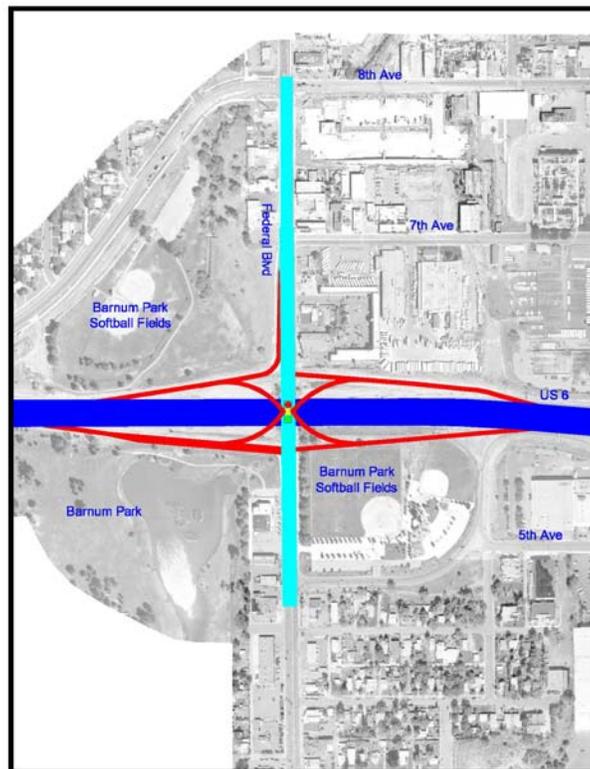


Figure 2-31 System Alternative 3, US 6 / Federal Boulevard / Bryant Street Improvements

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**).

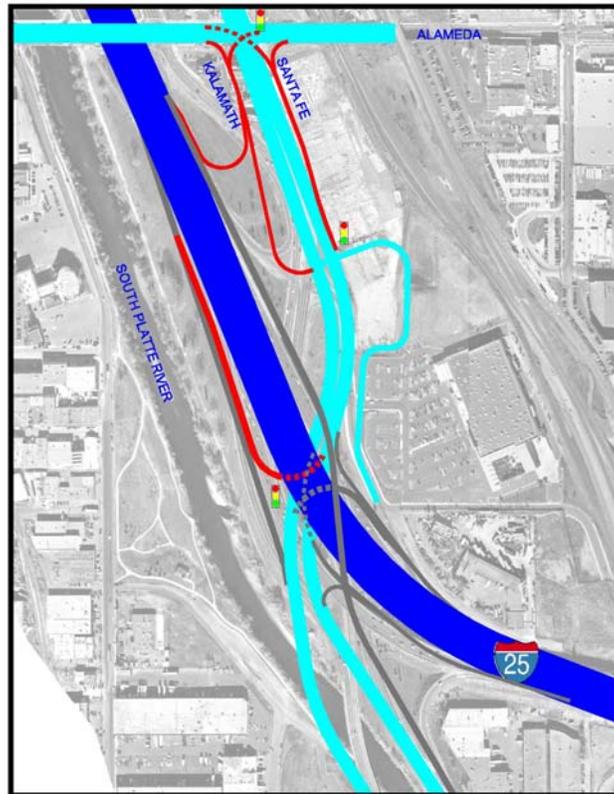


Figure 2-33 System Alternative 3, Santa Fe Drive Interchange

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.

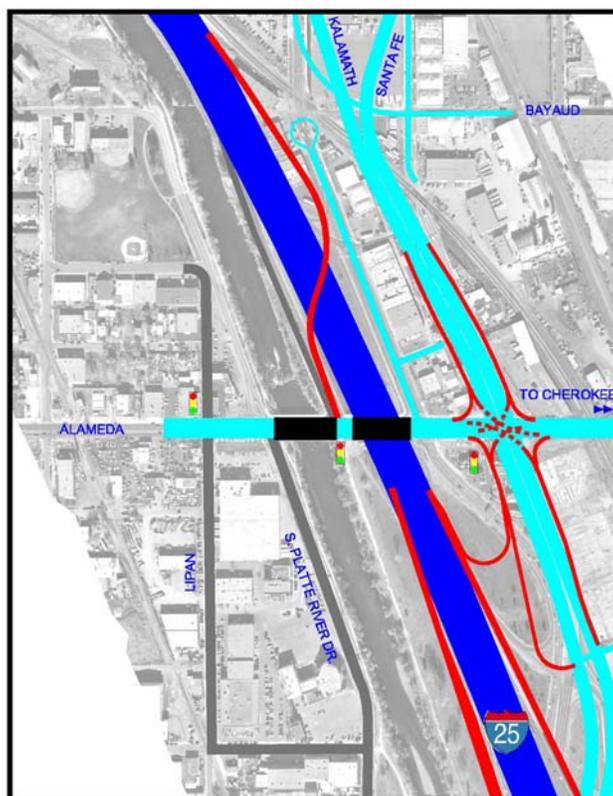


Figure 2-34 System Alternative 3, Alameda Avenue Interchange and Grade Separation



Legend



See Section 4.1 for Land Use Concept

**System Alternative 3 Simulation
Santa Fe / Kalamath / Alameda**



North

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

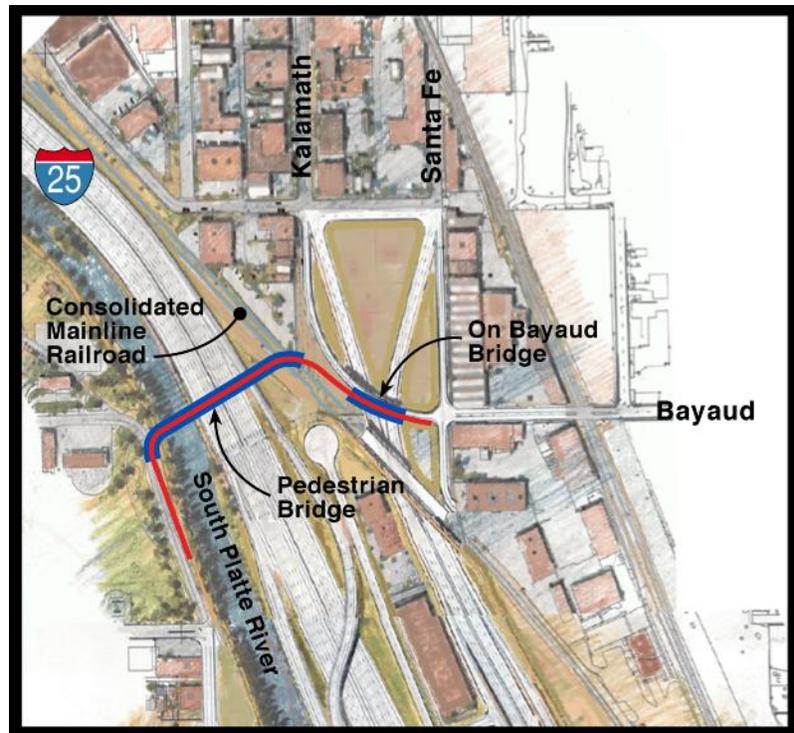


Figure 2-37 System Alternative 3, Bayaud Avenue Bike / Pedestrian Structure

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 preclude 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 of 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



Preferred Alternative

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 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)
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)
<i>Is this element alternative compatible with other planned transportation projects?</i>				
No other projects planned	NA	NA	NA	NA
<i>What are the key differentiating environmental impacts of the element alternative?*</i>				
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
<i>What is the relative cost of the element alternative?</i>				
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)
<i>How well does this element alternative address the purpose and need goals?</i>				
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
<i>Is this element alternative compatible with other planned transportation projects?</i>				
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
<i>What are the key differentiating environmental impacts of the element alternative?*</i>				
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
<i>What is the relative cost of the element alternative?</i>				
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 minimize 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

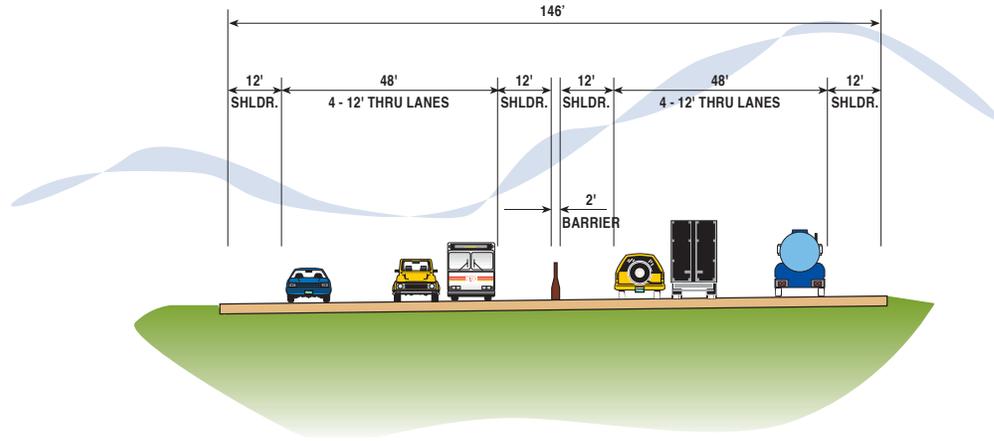
The Preferred Alternative would result in four through lanes plus auxiliary lanes in each direction through the project area. The existing auxiliary lane between US 6 and Alameda Avenue on southbound I-25 would be extended to Santa Fe Drive. Wider (12-foot) inside and outside shoulders would be provided.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

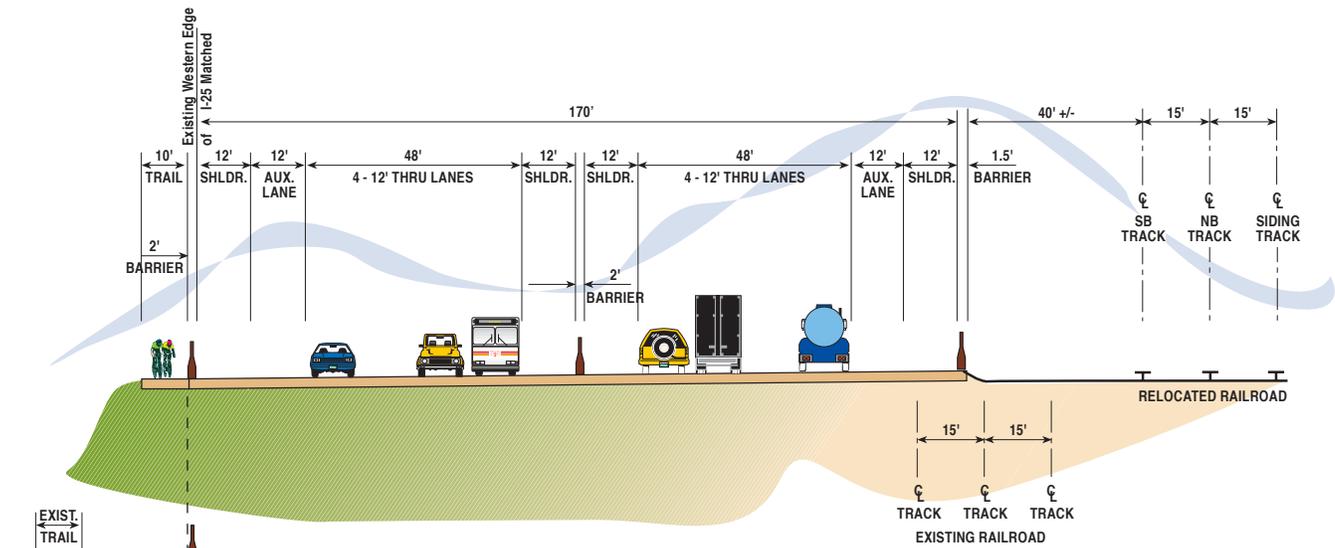
Typical sections of the new roadway are provided in **Figure 2-39**. Water quality improvements are included in the Preferred Alternatives, which include collection of roadway rainfall runoff in storm sewer pipes directed to water quality ponds before discharge into the South Platte River. See **Section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

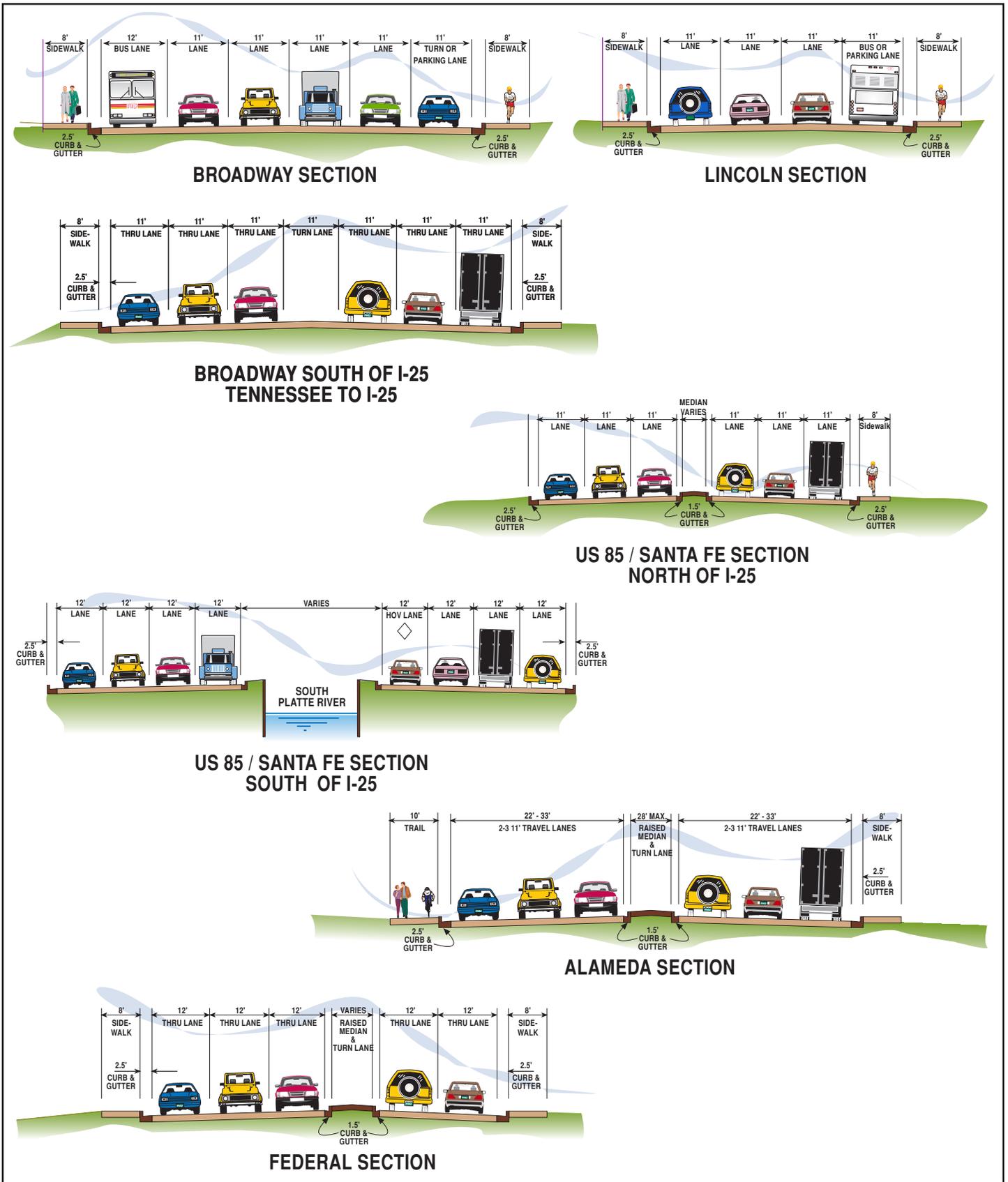


**I-25
Broadway to Santa Fe**



**I-25
Santa Fe to US 6**

**Preferred Alternative
I-25 Typical Sections**



Arterial Street Typical Sections with the Preferred Alternative

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.

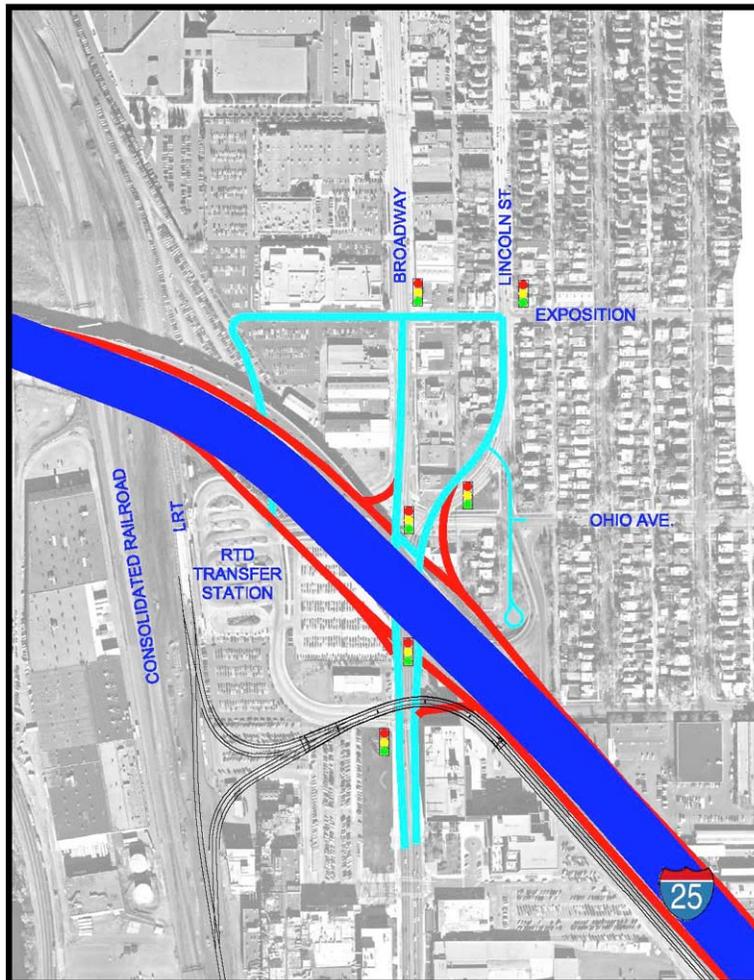


Figure 2-41 Preferred Alternative, Broadway Interchange

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.

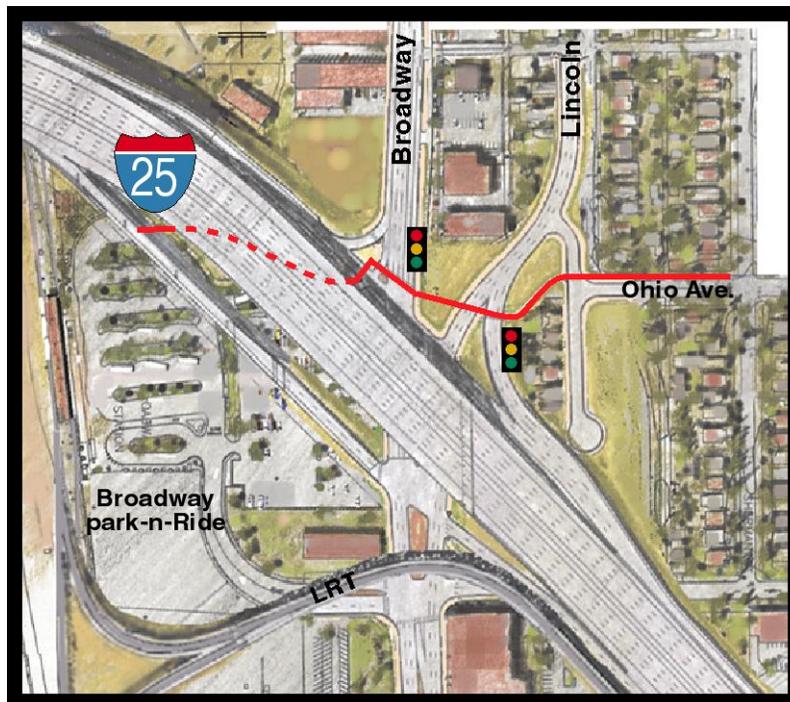


Figure 2-42 Preferred Alternative, Broadway Bicycle/Pedestrian Facilities

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.

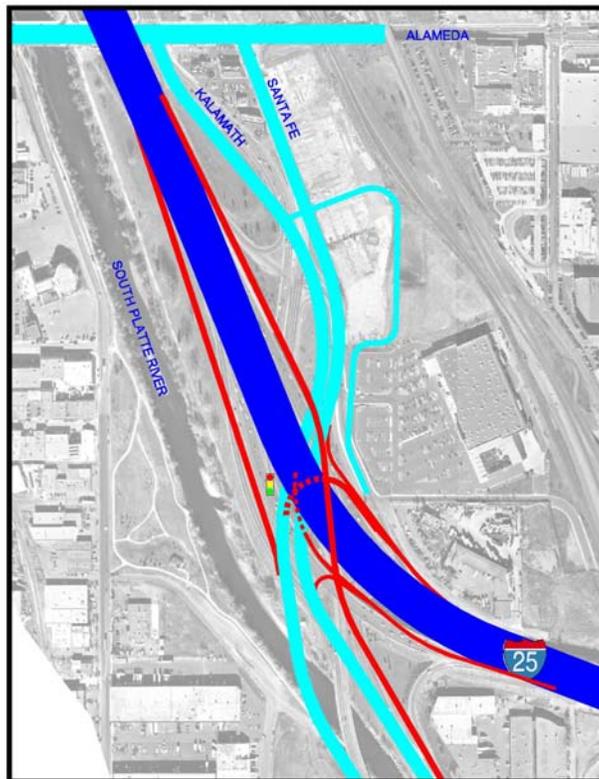


Figure 2-43 Preferred Alternative, Santa Fe Drive Interchange

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.

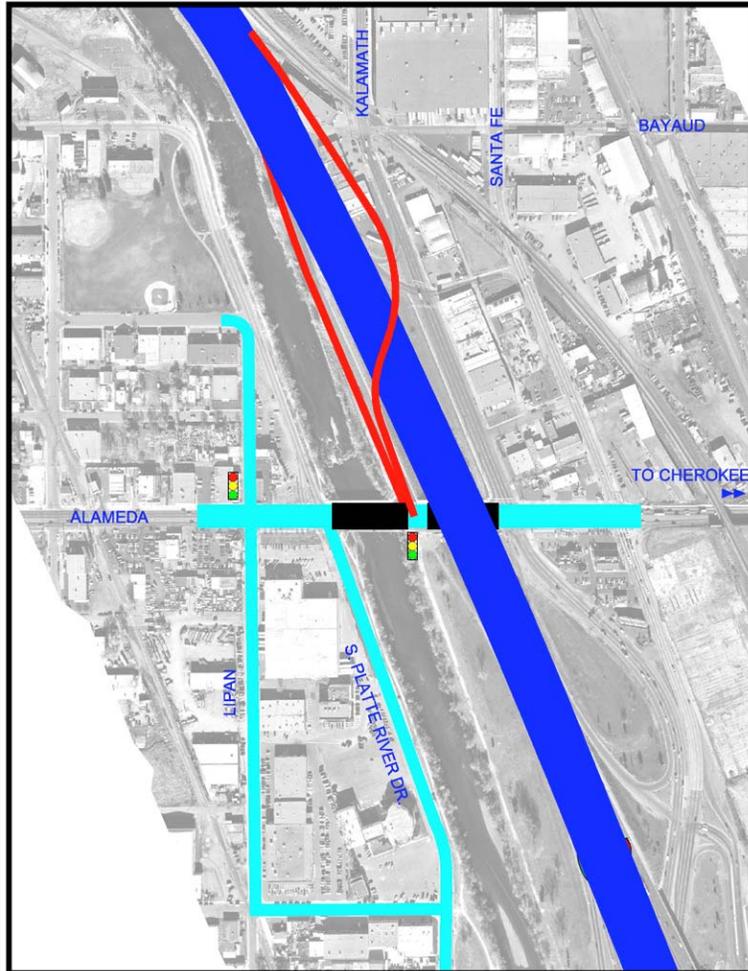


Figure 2-44 Preferred Alternative, Alameda Avenue Interchange



Legend

 See Section 4.1 for Land Use Concept

**Preferred Alternative Simulation
Santa Fe / Kalamath / Alameda**



North

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.

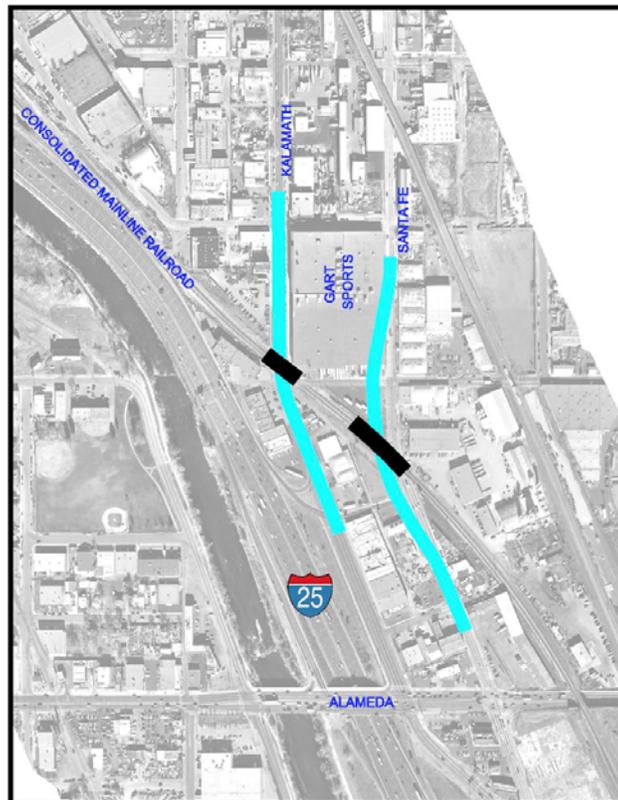


Figure 2-46 Preferred Alternative, Santa Fe Drive and Kalamath Street Grade Separation

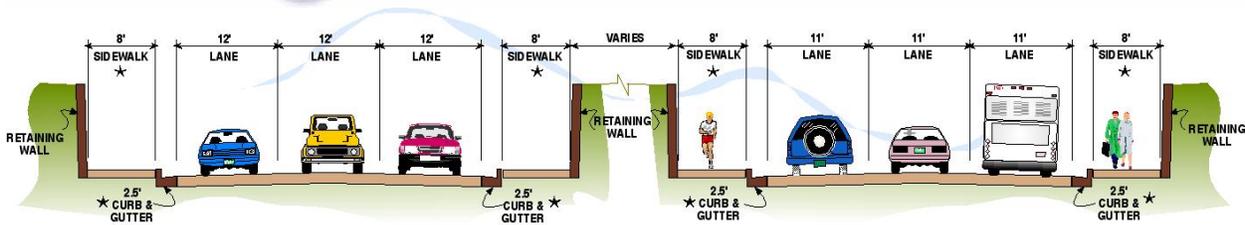


Figure 2-47 Preferred Alternative, Santa Fe Drive and Kalamath Street Typical Section

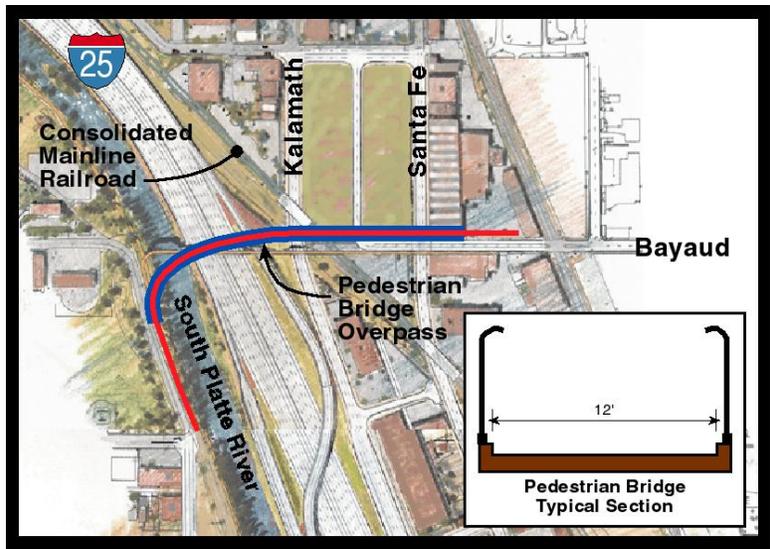


Figure 2-48 Preferred Alternative, Bayaud Avenue Bicycle/Pedestrian Structure

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.

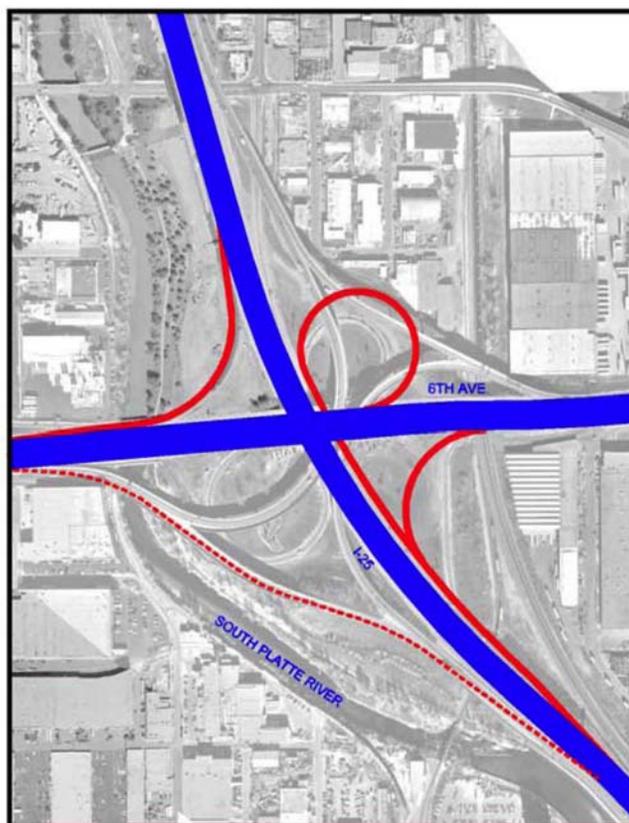


Figure 2-49 Preferred Alternative, US 6/I-25 Interchange

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.

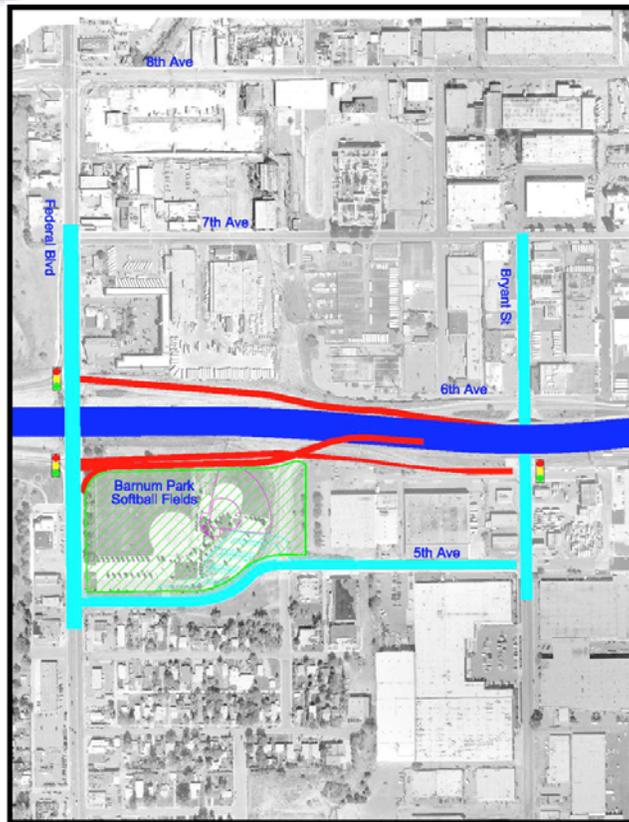


Figure 2-50 Preferred Alternative, US 6/Federal Boulevard/Bryant Street Interchange

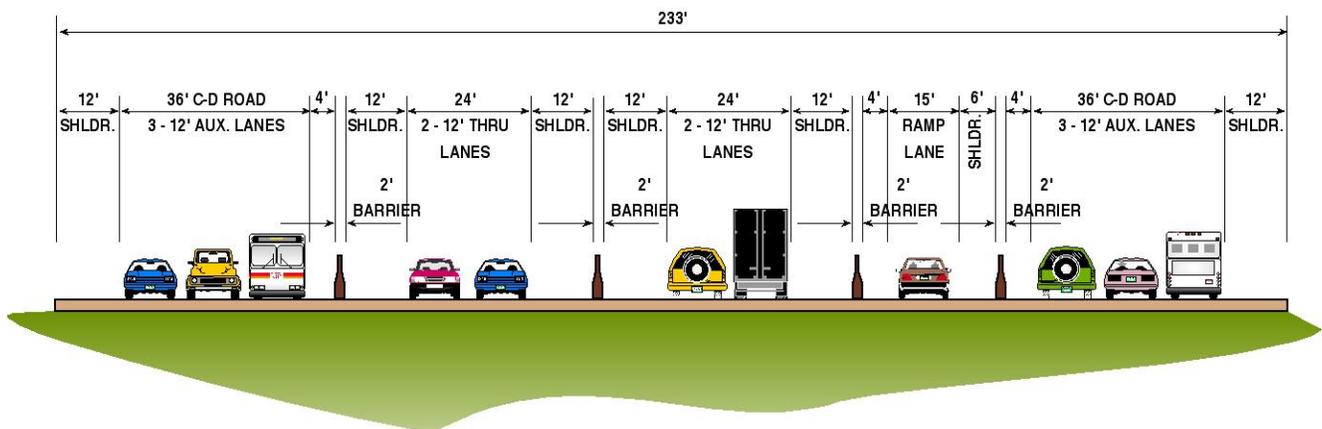


Figure 2-51 Preferred Alternative, US 6 Typical Section, I-25 to Federal Boulevard

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