# CHAPTER 2 ALTERNATIVES

This chapter provides information about alternatives development and the evaluation process used to identify a Preferred Alternative. The identification, consideration, and analysis of alternatives are essential to the NEPA process and the goal of objective decision making. Regulations for implementing NEPA require the following in an alternatives chapter:

**What's in Chapter 2?**



- Rigorous exploration and objective evaluation of all reasonable alternatives and brief discussion of the reasons for elimination of any alternatives from detailed study
- Devotion of substantial treatment to each alternative considered in detail
- Inclusion of reasonable alternatives not within the jurisdiction of the lead agency (FHWA)
- Inclusion of the No-Action Alternative

This Final EIS presents the environmental impacts of the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision makers and the public.

This chapter is organized into the following three sections:

- **Section 2.1** *Description of Process* presents the process of developing and screening alternatives.
- **Section 2.2** *Alternatives Advanced for Detailed Evaluation* provides a textual and graphical description of the reasonable alternatives advanced for full evaluation.
- **Section 2.3** *Other Alternatives Considered* summarizes all alternatives considered and why they were either screened out from further consideration or advanced as part of a build package.

The *Alternatives Development and Screening Report* (FHU and Jacobs, 2011a) is incorporated by reference per CEQ 40 CFR 1502.21. This report includes additional detailed information about the alternatives development and evaluation process conducted in support of the EIS. This report compiles the three levels of alternatives development and screening that took place as part of the North I-25 EIS study process. It describes how alternatives were developed, how they were evaluated on their ability to meet the project's Purpose and Need, environmental impact and practicability. It also describes how the alternatives were combined to create the two build packages that were included in the Draft EIS. The *Alternatives Development and Screening Report* (FHU and Jacobs, 2011a) will be available for review along with this Final EIS.

All alternatives described in this chapter were developed with assumptions about current available technologies. In the future, as projects are implemented, it is anticipated that newer technologies will be implemented as appropriate.

# 2.1 DESCRIPTION OF PROCESS

A wide range of alternatives was initially developed that included multiple transit technologies on various feasible alignments and highway improvements on both existing and new alignments. The process of developing and screening alternatives took into account the following:

- State and federal requirement
- The purpose and need for the project
- The reasonableness of an alternative
- Ability to avoid or minimize environmental impacts
- The regional planning context
- Public input

## 2.1.1 State and Federal Requirements

Federal agencies are required by NEPA to prepare an EIS for major federal actions that significantly affect the quality of the human and natural environment. The intent of the North I-25 EIS is to identify a multi-modal transportation solution along the corridor through a process that complies with NEPA policies and procedures.

The lead federal agency, FHWA, has signature authority on the Record of Decision (ROD). CDOT is preparing this EIS under the guidance of the lead agency.

Requirements of other applicable laws were incorporated throughout the process. State and federal agency representatives were involved as this was occurring. Other laws that influenced the location and configuration of the alternatives include:

- **Section 404 of the Clean Water Act.** The North I-25 EIS was conducted using a NEPA/Section 404 merger process as documented in a letter dated February 5, 2004 from FHWA and FTA to USACE. This included coordination with the USACE, U.S. Environmental Protection Agency (EPA), and U.S. Fish and Wildlife Service (USFWS). Written concurrence from USACE has been received for the first two concurrence points: 1) at acceptance of Purpose and Need 2) at acceptance of the reasonable alternatives to be fully evaluated in the Draft EIS. Along with issuance of the Final EIS, concurrence is being requested for the final two steps in the process. This correspondence is provided in **Appendix B.** Reasonable alternatives in this document, including the Least Environmentally Damaging Practicable Alternative, were located to avoid and minimize impacts to waters of the U.S., including wetlands.

  The next two steps of the NEPA/Section 404 merger process are: 1) concurrence that the Preferred Alternative appears to be the Least Environmentally Damaging Practicable Alternative and 2) concurrence with the Compensatory Mitigation Plan. The request for concurrence with these final two steps has occurred in the Section 404 permit application which has been submitted to the US Army Corps of Engineers. The public review for the Section 404 permit application will occur at the same time as the public review process for this Final EIS. The US Army Corps of Engineers will provide their concurrence with these two final steps at the same time they issue the Section 404 permit for the project.

- **Section 106 of the National Historic Preservation Act.** The Section 106 process included consultation with the State Historic Preservation Officer (SHPO) and other consulting parties (mainly interested local governments) to identify historic properties potentially subject to project impacts. The SHPO has formally concurred that this project

will use a document substitution process, whereby this EIS is used for consultation of effects of the undertaking upon historic properties.

- **Clean Air Act as Amended 1990.** Coordination occurred with CDPHE and EPA to obtain concurrence on the methodology used for the air quality analysis for this project.
- **Section 4(f) of the 1966 U.S. Department of Transportation (DOT) Act.** A number of historic, park, and wildlife refuge properties protected by this legislation are located along the alternatives. These properties were avoided where feasible and prudent.

### 2.1.2 Purpose and Need, Reasonableness, and Potential to Impact Environmental Resources

Alternatives were developed to address the project's purpose and need, which included addressing safety concerns along I-25, increasing mobility, improving accessibility, providing multi-modal transportation alternatives, and replacing aging infrastructure along I-25. These are described in detail in **Chapter 1** *Purpose and Need*. Alternatives were evaluated based on their reasonableness, as defined by whether or not it is practical or feasible from a technical and economic standpoint, whether or not it meets purpose and need, and whether or not it has environmental impacts that are acceptable.

Concerted efforts were taken as all alternatives were developed to avoid or minimize the effect of the alternatives on wetlands and other waters of the U.S., on sensitive wildlife species, on historic properties, and on park properties. This effort influenced highway and transit corridor alignment selection, highway and transit corridor design recommendations, highway interchange configurations, transit station locations, and maintenance facility locations.

Additional avoidance and minimization efforts will be undertaken as the NEPA process proceeds through the ROD, and during final design.

### 2.1.3 Regional Planning Context

Consideration of regional plans throughout the regional study area also helped to shape the development of alternatives. Plans considered in the development process are depicted in **Figure 2-1**. Understanding the regional planning context helped the alternatives development process to avoid precluding other public transportation investments. It also improved the cost effectiveness of alternatives by connecting them with planned and funded projects, such as FasTracks and the Mason Transportation Corridor. Regional plans considered include:

- **Mason Transportation Corridor.** This plan involves a bus rapid transit system, called MAX, running from Mason and Maple Streets to Mason Street and Harmony Road in Fort Collins.
- **North Front Range Transportation Alternatives Feasibility Study (commonly referred to as TAFS).** TAFS examined how to increase mobility from the North Front Range to Denver; it was completed in 2001. TAFS recommended that commuter rail be built from Denver to a point just south of US 34, where it would branch, with one line extending to Fort Collins, and one line extending to Greeley. It also recommended that HOV lanes be added to I-25 and bus service be offered along I-25 until rail service was available.
- **Access Control Plans.** CDOT and local communities have worked together to develop and adopt Access Control Plans on a number of State Highways within the regional study area including: US 85, SH 14, US 34, SH 392, SH 56, and SH 60. These plans provide

guidance about the location and configuration of future access points along these State Highways.

- **DRCOG Metro Vision.** DRCOG's 2035 Metro Vision RTP (2035 MVRTP) includes new general purpose lanes and HOV lanes on I-25 from US 36 to SH 7 and a new interchange at Sheridan Parkway (north of SH 7). The fiscally constrained plan includes general purpose lanes from US 36 to Thornton Parkway. An amendment to this plan is proposed to include tolled express lanes from CR 38 to SH 66 and to modify the general purpose lane widening to tolled express lanes between US 36 and 120th Avenue. This amendment is anticipated to be adopted in September 2011.
- **RTD FasTracks.** This Denver metro area transit expansion project will include two commuter rail lines extending north toward the regional study area, terminating in Longmont and in Thornton. It also includes right-of-way preservation for additional transit service between Commerce City and Brighton.
- **North Front Range Regional Transportation Plan.** The NFR Fiscally Constrained 2035 RTP is being updated to include tolled express lanes from the NFRMPO southern boundary at CR 38 to SH 56 and auxiliary lanes from SH 392 to SH 14. It will also include commuter rail right of way preservation and express bus and commuter bus stations. The updated plan is anticipated to be adopted in September 2011.

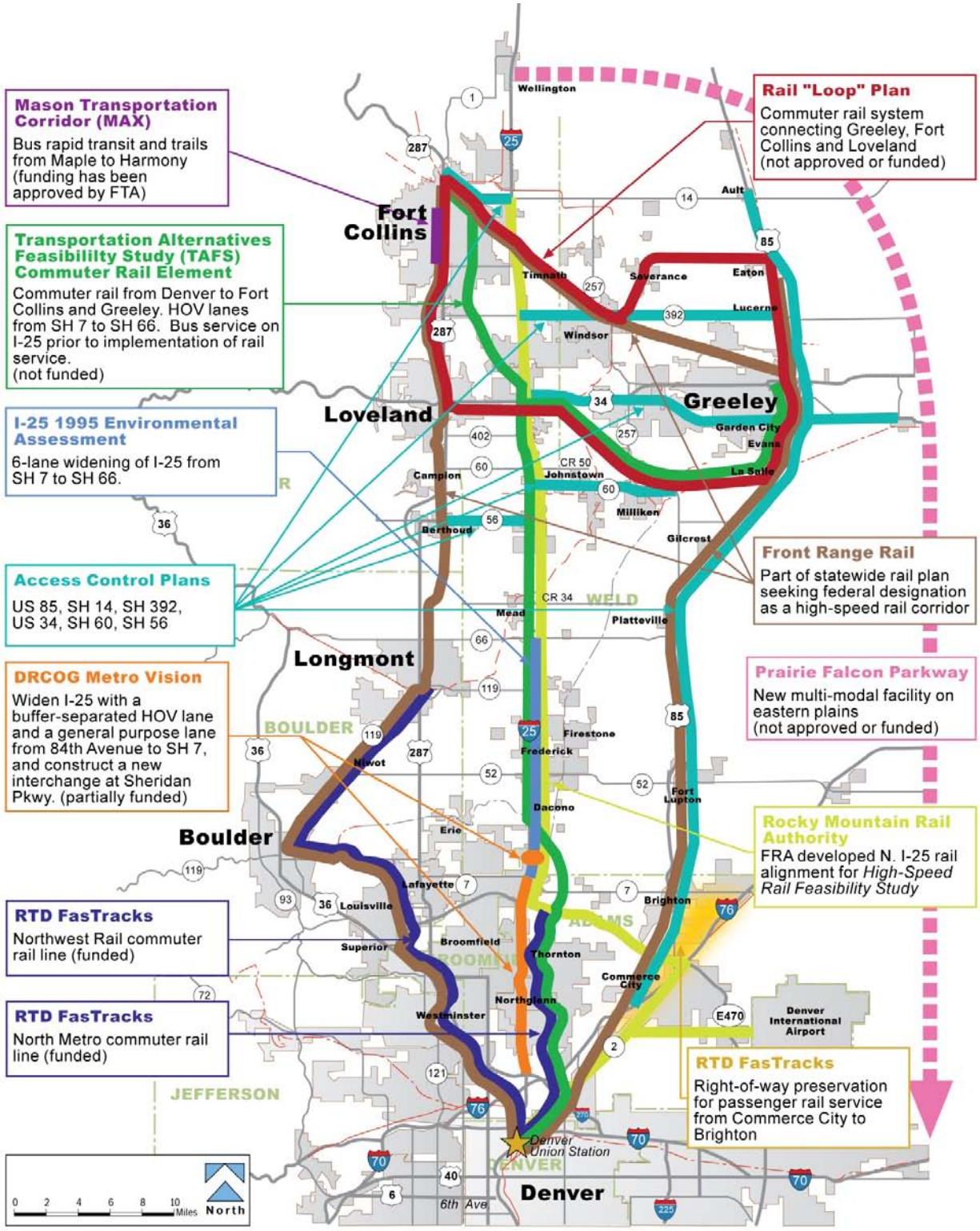
In addition, there are several private initiatives under discussion within the regional study area that influence public and agency opinion toward new transportation investments. These discussions have been presented to various groups, communities, and agencies, but are not included on a publicly adopted transportation plan, nor have they begun a NEPA process. They include:

- **Rail "Loop" Plan.** There is private and community interest in building a rail transit system in the North Front Range that would allow residents in Fort Collins, Greeley, and Loveland to connect by rail to the FasTracks system, DIA, and each of the three cities.
- **Front Range Rail.** There is continuing private and citizen interest in rail service that could extend from Wyoming to New Mexico, primarily utilizing the BNSF railroad line for the northern part of the service.
- **Prairie Falcon Parkway.** There is a private interest pursuing the feasibility of building a new multi-modal facility that would relocate long-distance travelers and freight traffic, including trucks and rail, to the eastern plains of Colorado.
- **High Speed Rail Feasibility Study.** A publicly funded study by the Rocky Mountain Rail Authority (RMRA) was completed in 2010 evaluating the potential for constructing high speed rail service in the I-70 and I-25 corridors. The study recommends further consideration of high-speed rail in the I-25 corridor.

The effect of the planning context on the North I-25 project was substantial. It resulted in:

- Consideration of opportunities for connecting with and potentially interlining with the FasTracks system and Mason Transportation Corridor.
- The need to avoid precluding future freight or passenger rail service on active and abandoned rail corridors in the regional study area.
- The need to provide a flexible solution south of SH 7 to accommodate improvements planned and included in DRCOG's Fiscally Constrained 2035 RTP.
- The need to avoid precluding I-25 high-speed rail opportunities.

**Figure 2-1 Regional Planning Context**



### 2.1.4 Public Input

A substantial proactive public and local agency involvement program was conducted to provide input to the alternatives development and evaluation process. This program included:

- **Executive Oversight Committee (EOC).** An EOC was established, consisting of representatives from the lead agency (FHWA) and CDOT, which met to determine policy decisions relating to the project. The EOC met at key project milestones.
- **Regional Coordination Committee (RCC).** The RCC was established at the beginning of the project. It consisted of elected officials from the 45 municipalities and counties that chose to participate as well as RTD and the metropolitan planning organizations in the North I-25 regional study area. The RCC met about every other month throughout the study. Between the Draft EIS and the Final EIS, the RCC meetings were combined with the Technical Advisory Committee (TAC) meetings and were held on an as-needed basis.
- **Technical Advisory Committee (TAC).** The TAC was established at the beginning of the project. It included staff representatives from the 45 municipalities and counties in the regional study area that chose to participate, as well as representatives from RTD, EPA, and metropolitan planning organizations. The TAC met approximately monthly throughout the early part of the study and every other month beginning in 2007. Between the Draft EIS and the Final EIS, TAC meetings were combined with the RCC meetings and held on an as-needed basis.
- **Project Website.** A project website was established in 2004.
- **Newsletters.** Seven issues of the NorthLink newsletters were prepared and distributed to a mailing list of 5,007 people. In addition, six issues of an electronic newsletter, E-Link, were e-mailed to an electronic mailing list of 1,632 people.
- **Public Meetings and Working Groups.** To date, 30 public meetings or working group meetings have been held; 11 in 2004, 4 in 2005, 12 in 2006, and 3 public hearings after the release of the Draft EIS, in addition to the TAC and RCC meetings. In addition, 45 interchange working group meetings were held with adjacent property owners between spring and fall 2006 to solicit input regarding interchange layout options. Eight transit station working group meetings were held to solicit input regarding locations for bus and rail transit stations. In 2008, during the Draft EIS process, three public hearings were held to solicit comments from the community. During development of the Final EIS, in 2009 and 2010, other meetings were held to solicit input from the public, including targeted populations and various city councils.
- **Other Community Meetings.** A total of 47 small group meetings were held to provide presentations to civic organizations, such as Kiwanis, Rotary, and Lions clubs, and other community groups. A total of 11 meetings were held specifically to solicit input about the EIS process from low income and minority groups.
- **Community Events.** Project representatives had booths or participated in a total of 17 community events, such as the Taste of Fort Collins and the Milliken Beef and Bean Festival.

This public outreach effort helped the team to understand the various transportation needs in northern Colorado and the public's strong desire to see a multi-modal solution included in this Final EIS, specifically a rail alternative.

## 2.1.5 Alternatives Screening Process

The alternatives screening process was based on three primary project objectives: 1) address the project's purpose and need, 2) provide a solution that is practical (defined by cost and ability to implement), and 3) avoid or minimize environmental impacts. Evaluation criteria were used to determine how well each alternative could address the project's three objectives.

The criteria were applied to the alternatives three successive times, using increasingly detailed measures, in order to screen and develop the alternatives that were ultimately identified for inclusion in this EIS. Applying the criteria narrowed the range of alternatives considered and provided a means of comparison between them as the project progressed. The three phases of screening were as follows:

- The first phase of screening used select evaluation criteria to eliminate alternatives considered to have a fatal flaw, such as compromised safety or excessive cost.
- The second phase of screening compared alternatives against each other to identify which met the project's purpose and need and which had the least potential to impact environmental resources.
- The third phase of screening used evaluation criteria such as miles of congestion, accessibility to population and employment centers, cost, and impacts to built and natural resources to identify which combinations or "packages" of alternatives would work best together (that is, create the most mobility benefits with the least redundancy and the least environmental impact).

These three levels of screening resulted in two build packages developed and evaluated in the Draft EIS. The evaluation of these two packages, as well as input from the project's advisory committees and the public was used to develop the Preferred Alternative that is evaluated in this Final EIS. The primary considerations for development of the Preferred Alternative included the ability to address the project's Purpose and Need, including the project's ability to address aging infrastructure, future mobility corridor actions, the need to provide regional modal options, and the ability to address growing travel demand including freight traffic on I-25. More information about the development of the Preferred Alternative and the elimination of Package A and Package B is included in **Section 2.3** *Other Alternatives Considered*.

## 2.1.6 Decision Making Process

A collaborative decision making process was used to develop consensus among the 45 communities and agencies (including CDOT and FHWA) on the elements in the Preferred Alternative. A collaborative decision making process was used because of the need for broad community support and limited financial resources available for transportation improvements in the region. Broad community support sets the stage for local agency participation, partnerships, and commitment to implementation through policies, zoning, adoption of complementary land use and transportation plans. Broad community support is also more likely to attract funding. The collaborative decision making process is the mechanism for achieving broad community support for a Preferred Alternative which addresses Purpose and Need in a manner that allows FHWA and CDOT to take responsibility for the decision and implement it.

The format of the decision making process is consensus. Operating guidelines were discussed with the stakeholders. These guidelines included the definition of consensus which does not necessarily mean unanimity. Some parties may strongly support a particular recommendation while other may accept it as a workable agreement. In a consensus agreement the parties recognize that given the combination of gains and tradeoffs, the resulting agreement is the best one the parties can make at that time. If consensus is not possible then the level of support and dissention will be noted and all deliberations and products of the collaborative decision making will be considered by CDOT and FHWA in their decision making. After each major discussion each of the stakeholders present were asked to indicate their level of support.

The discussion process that led to the Preferred Alternative entailed several steps. First, the stakeholders identified the goals and values important to their respective communities or agencies. Next, the stakeholders considered these values in relation to the major transportation system components under evaluation in the EIS. In support of this effort, data describing the components was distributed to the stakeholders - for example, the information included safety effectiveness of the components. The next series of meetings formed an iterative discussion process with the stakeholders requesting additional information, and subsequent provision of data as the stakeholders revisited the importance of their respective community values. In this way the stakeholders developed a recommended Preferred Alternative. At this point, the recommended Preferred Alternative was brought to the Executive Oversight Committee for consideration and review. Upon receiving direction from the EOC, the stakeholders finalized the recommended Preferred Alternative and all participants indicated their support for the Preferred Alternative, thus establishing consensus. **Appendix B** provides detailed description of the workshops conducted with the stakeholders during this collaborative decision making process.

## 2.2 Alternatives Advanced for Detailed Evaluation

The following section describes the four packages (No-Action, Package A, Package B, and the Preferred Alternative) that were developed through the screening process. These packages are fully evaluated in this EIS. A detailed description of the screening and evaluation process used to identify these four packages is described in **Section 2.3** of this chapter.

Improvements identified in the four packages assume that currently funded, programmed projects will be added to the existing transportation system. Some of the key programmed projects include:

- New tight diamond interchange at SH 392/I-25
- New bridge at 84th Avenue/I-25 interchange
- Construction of RTD FasTracks commuter rail lines

Construction of the South Transit Center near Mason Street and Harmony Road has received funding. The South Transit Center is part of the Mason (MAX) BRT Project. The Environmental Assessment for this project has been completed, with a Finding of No Significant Impact issued in September, 2008. In addition, the Mason Corridor project was recommended for 2009 funding in the FTA New Starts report. This Final EIS assumes this project will be constructed as planned.

Each of the build alternatives were developed with assumptions about current available technologies. In the future, as projects are implemented, FHWA and CDOT anticipated that newer technologies will be incorporated as appropriate. Examples of assumed technologies that could be upgraded include, by are not limited to, toll collection equipment, transit fare collection systems and tension cable barrier systems.

While interim improvements are not identified or evaluated in this EIS, it is possible for interim improvements to be made to improve traffic operations and/or safety as necessary until funding is available to implement the Preferred Alternative. Interim projects that are consistent with and support the decision could take place under this Final EIS ROD. Other interim projects would require a re-evaluation to revise or issue another ROD under this Final EIS or could be completed through a separate action which would require separate NEPA documentation. CDOT and FHWA will determine which course of action should be undertaken on a case by case basis.

## 2.2.1 No-Action Alternative

The No-Action Alternative is a conservative estimate of safety improvements and maintenance requirements that would be necessary if a build alternative were not constructed. It is presented for comparison with the build alternatives in accordance with NEPA requirements. This alternative could have environmental impacts and costs associated with it. It will be evaluated on the same set of criteria as, and compared against, the build alternatives. No-Action Alternative improvements are described below and graphically summarized in **Figure 2-2**. Typical cross sections for the No-Action Alternative are illustrated in **Figure 2-3** through **Figure 2-5**.

### 2.2.1.1 Maintenance of Structures

From US 36 to SH 1, 64 structures would require minor rehabilitation and 4 would require major rehabilitation by 2035. Minor and major rehabilitation is included in the cost of the No-Action Alternative.

### 2.2.1.2 Maintenance of Pavement

Pavement north of SH 66 would need to be replaced by 2035. Replacement of the pavement is assumed to include milling and replacing the top 6 inches of pavement. This pavement maintenance/replacement is included and evaluated as part of the No-Action Alternative.

### 2.2.1.3 Safety Considerations

Minor improvements would be necessary to address safety concerns along I-25. A small amount of improvement can be realized through the installation of traffic signals at ramp terminals that are currently unsignalized. This improvement is included in the No-Action Alternative at SH 1, Mountain Vista, SH 56, and WCR 34. At Prospect Road, widening the I-25 off-ramps is included to minimize queuing into the I-25 mainline.

## Figure 2-2 No-Action Alternative

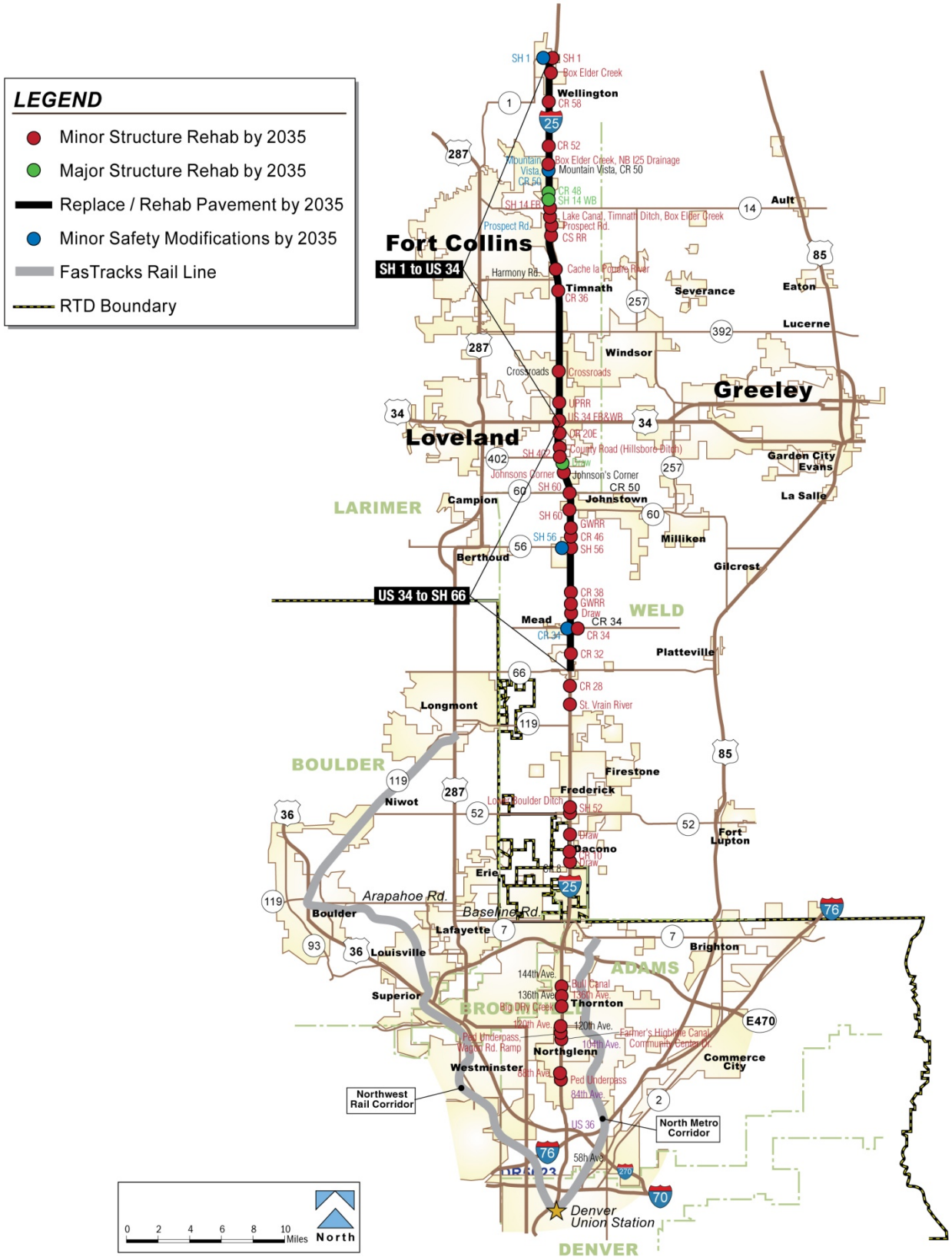


**Figure 2-3 No-Action Alternative Typical I-25 Cross Section – SH 1 to SH 66**

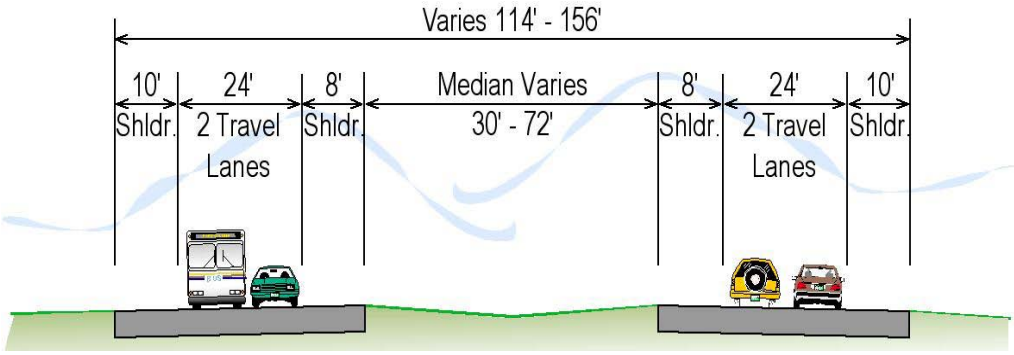



**Figure 2-4 No-Action Alternative Typical I-25 Cross Section – SH 66 to SH 7**

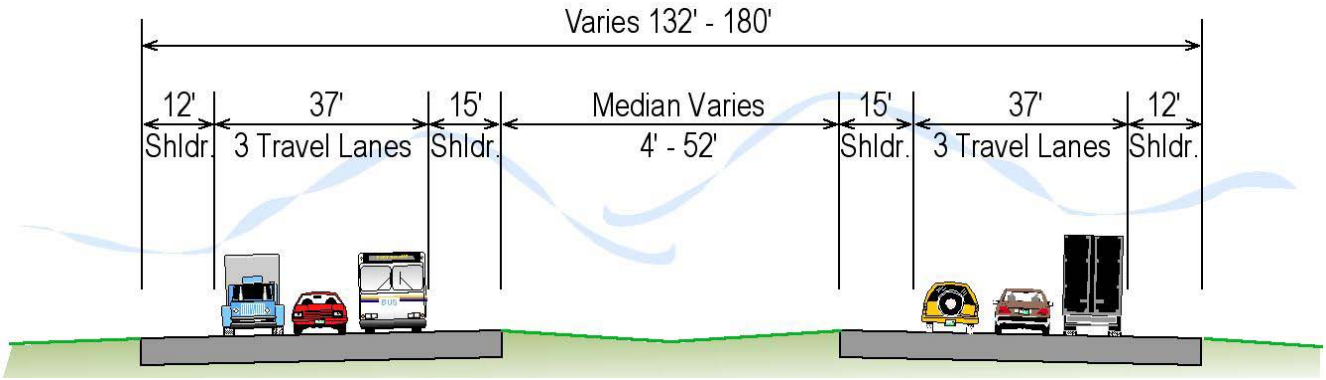
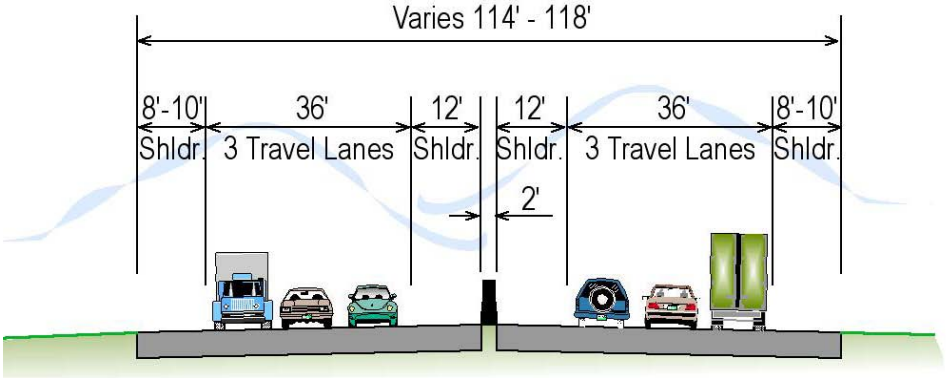



**Figure 2-5 No-Action Alternative Typical I-25 Cross Section – South of SH 7**



## 2.2.2 Package A

**Figure 2-6** illustrates Package A. It includes new general purpose lanes, interchange reconstruction/upgrades, a commuter rail line, commuter bus service, feeder bus service, and congestion management measures. These are described in detail in the following sections. The *Package Concept Plans* (FHU and Jacobs, 2011b) illustrate the layout of Package A in more detail.

### 2.2.2.1 Package A New General Purpose Lanes

This package would add one additional general purpose lane from SH 14 to SH 66 for a six-lane cross section and from SH 52 to E-470 for an eight–lane cross section. North of SH 66, widening I-25 would include reconstructing the entire interstate cross section and rebuilding it to today's standards. This includes improving horizontal and vertical alignment, widening both the inside and outside shoulders, and reconstructing aging interchanges and structures. Design criteria were established by CDOT for the highway improvements. Design guidelines recommend avoiding use of median barrier where practical. Consistent with the existing wide median and rural setting, the design criteria for the proposed highway improvements includes a grass median for I-25 north of SH 66. South of SH 52, the interstate cross section has recently been rebuilt; additional widening would generally occur within the median in those locations. **Table 2-1** lists the interchange improvements included in Package A compared to No-Action Alternative.

Frontage roads along I-25 would be rebuilt approximately where they exist today. At the interchanges, frontage roads would be relocated east or west away from the ramp terminals to address storage and safety concerns at the intersections. Along the I-25 mainline, the frontage roads would be offset 40 feet, based on current design standards.

Typical I-25 cross sections are depicted in **Figures 2-7** through **2-13**. To maintain the ability to accommodate future (post 2035) transportation needs, a grass median would be maintained from SH 52 north. South of SH 52, where the densely urbanized areas abut I-25, Package A highway widening would occur toward the center using portions of the median. As a safety measure, a tension cable barrier would be included in all locations with an open median.

#### *Avoidance and Minimization*

Minor shifts in I-25 interchange ramp and frontage road horizontal alignments were used in conceptual design to minimize impacts to wetlands at the following locations:

- SH 14
- Prospect Road
- Harmony Road
- SH 392
- LCR 16
- SH 56
- WCR 34

I-25 horizontal alignment modifications were also made at SH 402 and SH 56 to improve safety. Minor modifications to the I-25 vertical alignment were implemented to improve safety at SH 56, SH 402 and LCR 16, and to avoid impacts to a historic ditch north of US 34.

**Figure 2-6 Package A**

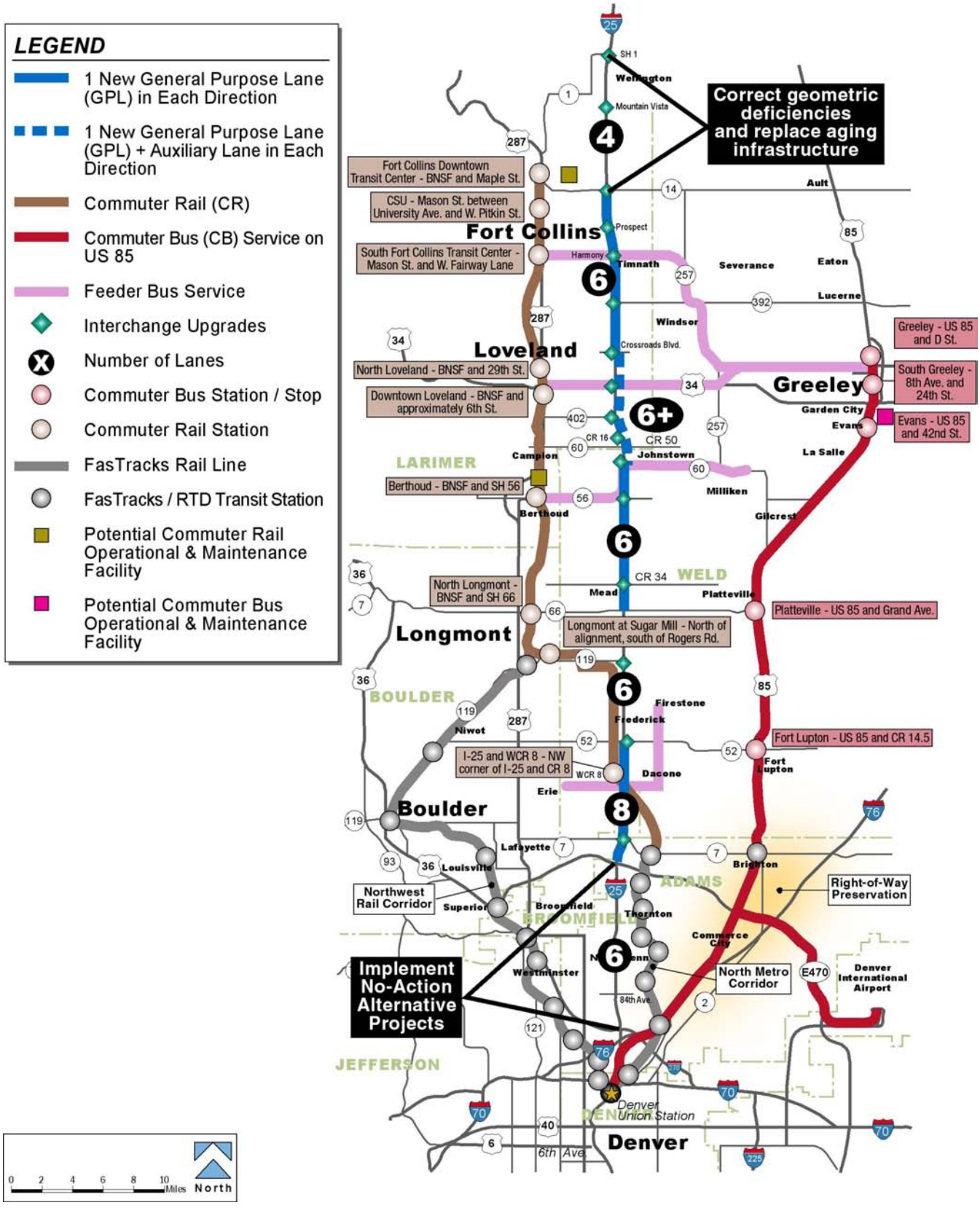


**Figure 2-7 Package A Typical I-25 Cross Section – SH 1 to SH 14**

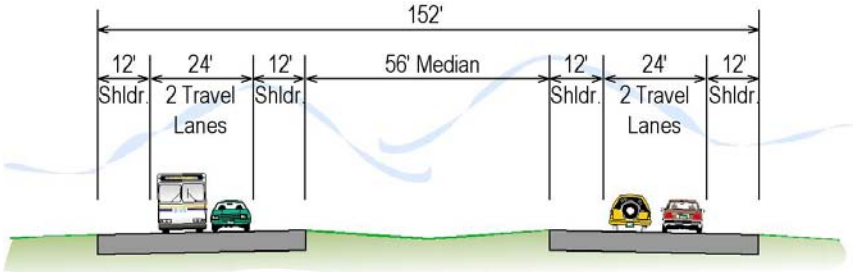



**Figure 2-8 Package A Typical I-25 Cross Section – SH 14 to Crossroads Boulevard**

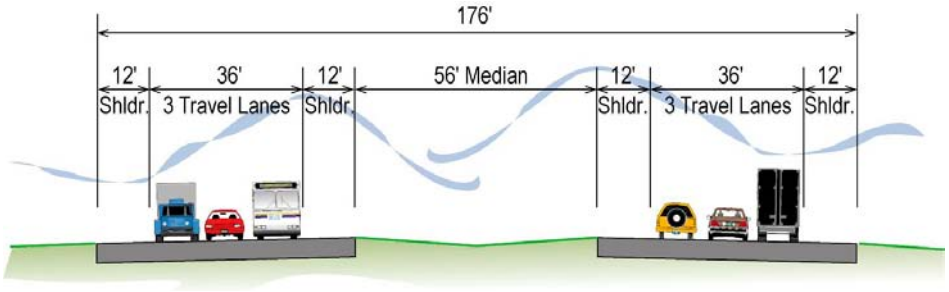



**Figure 2-9 Package A Typical I-25 Cross Section – Crossroads Boulevard to SH 60**

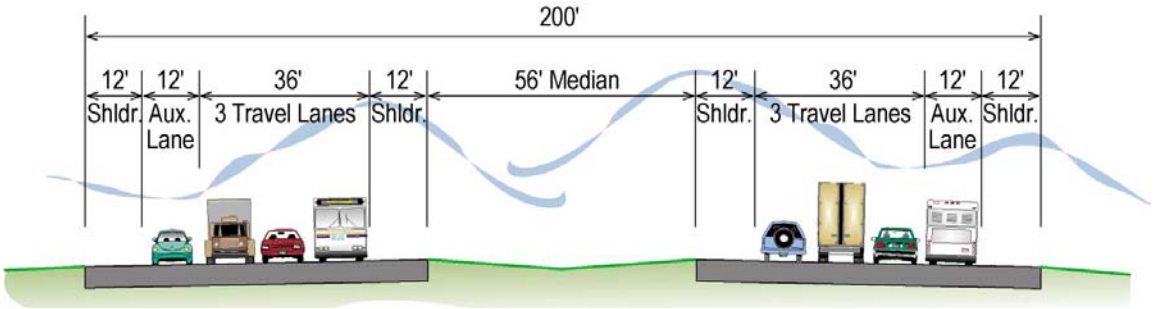



**Figure 2-10 Package A Typical I-25 Cross Section – SH 60 to SH 66**

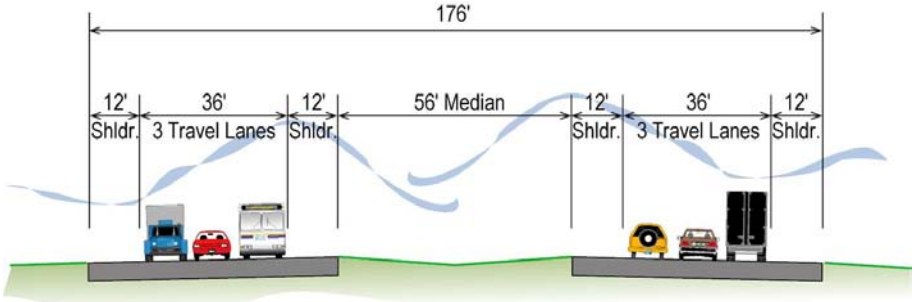


**Figure 2-11 Package A Typical I-25 Cross Section (same as No-Action)– SH 66 to SH 52**

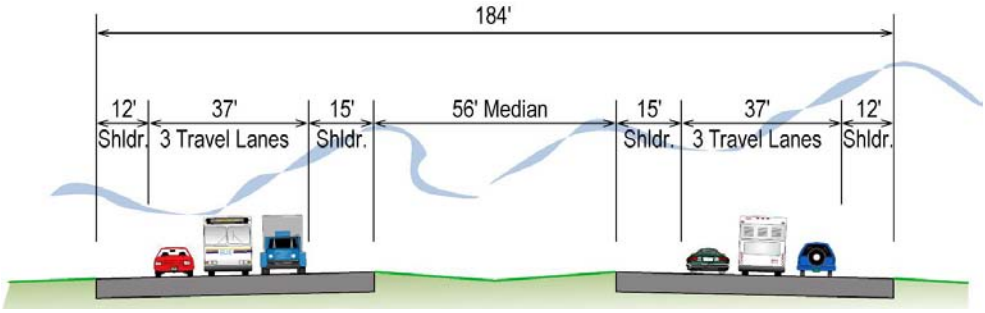



**Figure 2-12 Package A Typical I-25 Cross Section – SH 52 to SH 7**

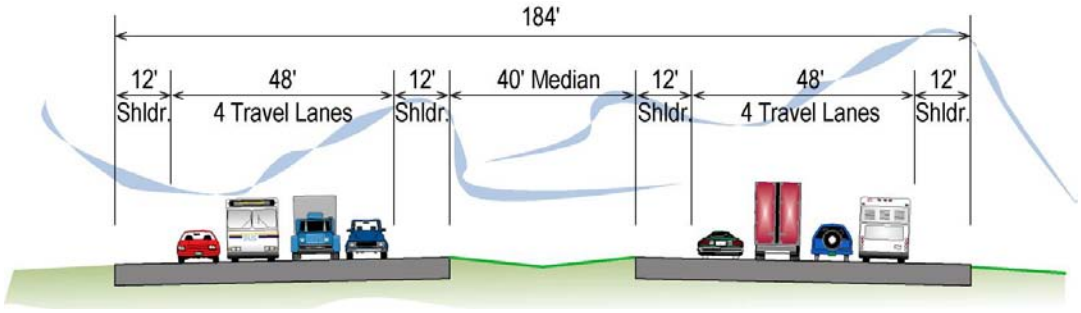
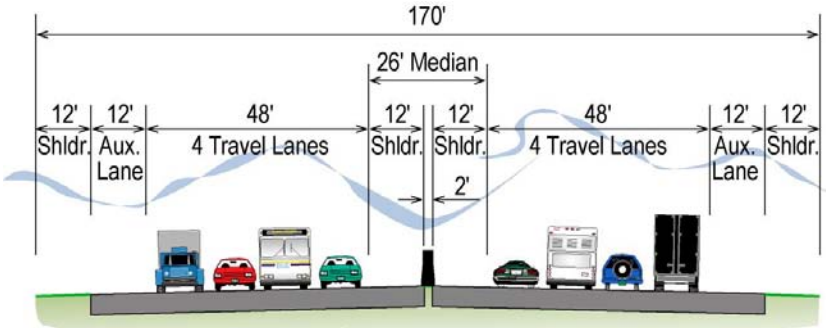



**Figure 2-13 Package A Typical I-25 Cross Section –SH 7 to E-470**




### 2.2.2.2 PACKAGE A INTERCHANGES

A reconstructed diamond interchange that increases capacity and meets current design standards could accommodate projected traffic volumes at most existing interchange locations for the lowest cost. At locations where environmental considerations, traffic volumes, or property impacts were unfavorable for a typical diamond configuration, other configurations were identified. These are described below and illustrated in **Figures 2-14** through **2-19.** **Table 2-1** summarizes the interchange improvements associated with Package A. A more detailed description of the interchange configurations screening process is included in **Section 5.2.1** of the *Alternatives Development and Screening Report* (FHU and

Jacobs, 2011a), accompanying this EIS as a separate volume. Additional information about the traffic operations evaluation of each interchange is included in the *Transportation Analysis Technical Report* (FHU and Jacobs, 2008; 2011c), available on request at CDOT Region 4 in Greeley.

## Table 2-1 Package A Interchange Improvements Compared to No-Action

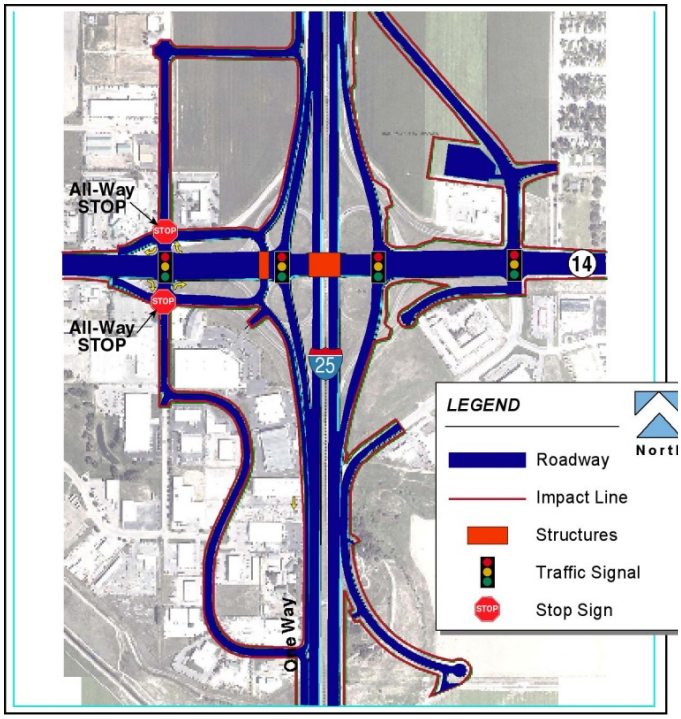
| Existing Interchange Location | No-Action Configuration | Package A Improvement |
|---|---|---|
| SH 1 | substandard diamond | reconstructed diamond |
| Mountain Vista | substandard diamond | reconstructed diamond |
| SH 14 | substandard partial cloverleaf | reconstructed diamond |
| Prospect Road | substandard diamond | reconstructed diamond |
| Harmony Road | standard diamond | reconstructed diamond* |
| SH 392 | reconstructed tight diamond | no improvement |
| Crossroads Boulevard | substandard diamond | reconstructed diamond |
| US 34 | substandard partial cloverleaf | dual directional/diamond |
| SH 402 | substandard diamond | reconstructed diamond |
| LCR 16 | substandard off ramps | reconstructed diamond |
| SH 60 | substandard diamond | reconstructed diamond |
| SH 56 | substandard diamond | reconstructed diamond |
| WCR 34 | substandard diamond | reconstructed diamond |
| SH 66 | standard diamond | no improvement |
| SH 119 | standard diamond | bridge widening |
| SH 52 | standard diamond | bridge widening |
| WCR 8 | standard diamond | reconstructed diamond |
| SH 7 | standard diamond | reconstructed diamond |
| E-470 | fully directional | no improvement |
| 144th Avenue | standard diamond | no improvement |
| 136th Avenue | standard diamond | no improvement |
| 120th Avenue | standard diamond | no improvement |
| 104th Avenue | standard diamond | no improvement |
| Thornton Parkway | standard diamond | no improvement |
| 84th Avenue | standard diamond | no improvement |

*Existing structure retained.

### *SH 14*

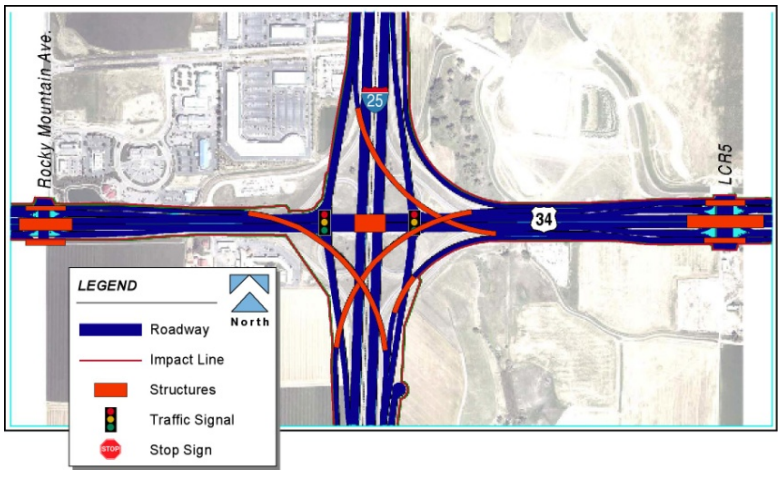
An enhanced new diamond interchange with northbound to westbound triple left-turns would accommodate the projected 2030 traffic volumes. However, to minimize impacts to the properties in the southwest quadrant, special consideration for placement of the frontage roads along I-25 and along SH 14 was required. As shown in **Figure 2-14**, the southwest frontage road would be pulled in close to I-25 and restricted to one-way southbound movement. The SH 14 frontage road/I-25 west frontage road intersection just west of the southbound ramps would be grade-separated at SH 14. Though Stockton Avenue at SH 14 would be signalized, it would be restricted to right-in/right-out movement.

**Figure 2-14 SH 14 Interchange**




### *US 34*

**Figure 2-15 US 34 Interchange**

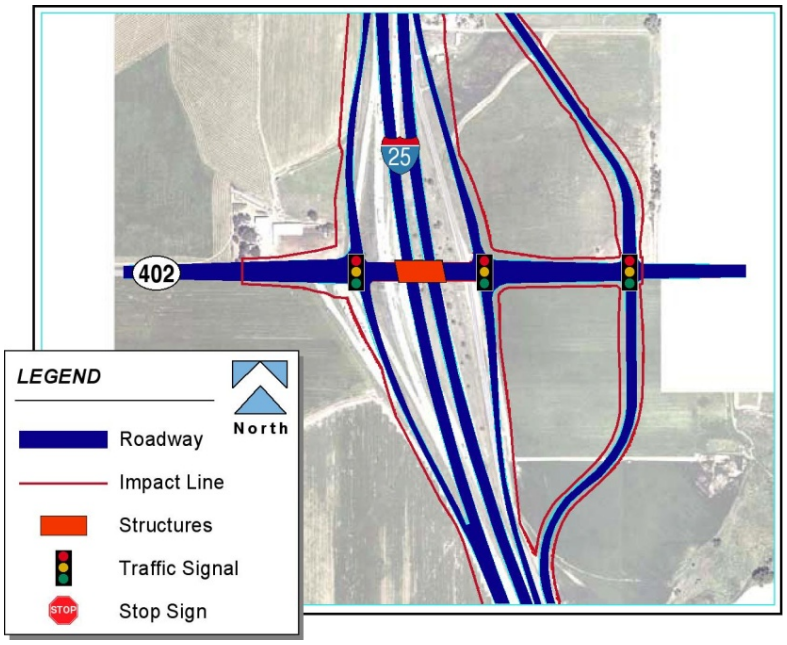



As the primary interchange access/egress point for Loveland and Greeley, projected volumes at this interchange exceed the volumes that can be handled by a typical diamond interchange. In order to achieve an acceptable level-of-service (LOS) and maintain access to the existing and rapidly growing commercial development centers at this interchange, a new dual directional/diamond interchange with single-point urban interchanges at adjacent intersections is proposed. Direct-connect ramps are planned for southbound-to-eastbound movement, northbound-to-westbound movement, and westbound-to-southbound movement. As shown in **Figure 2-15** these would provide access to trips destined to Loveland and Greeley. The eastbound-to-northbound flyover ramp was eliminated to avoid impacts to a historic property located south of US 34 and west of I-25. The diamond interchange would include dual left-turn lanes and exclusive right-turn lanes and would provide local access to the developments adjacent to the interchange.

### *SH 402*

A new diamond interchange with additional lanes on the ramps at SH 402 would accommodate anticipated demand. This is shown in **Figure 2-16**. The interchange upgrade would also include reversing the grade separation between SH 402 and I-25. Today, I-25 is on a structure and passes over the top of SH 402. The proposed configuration reverses this so that SH 402 would pass over I-25. This reconfiguration would improve the vertical alignment and safety of I-25 at this location.

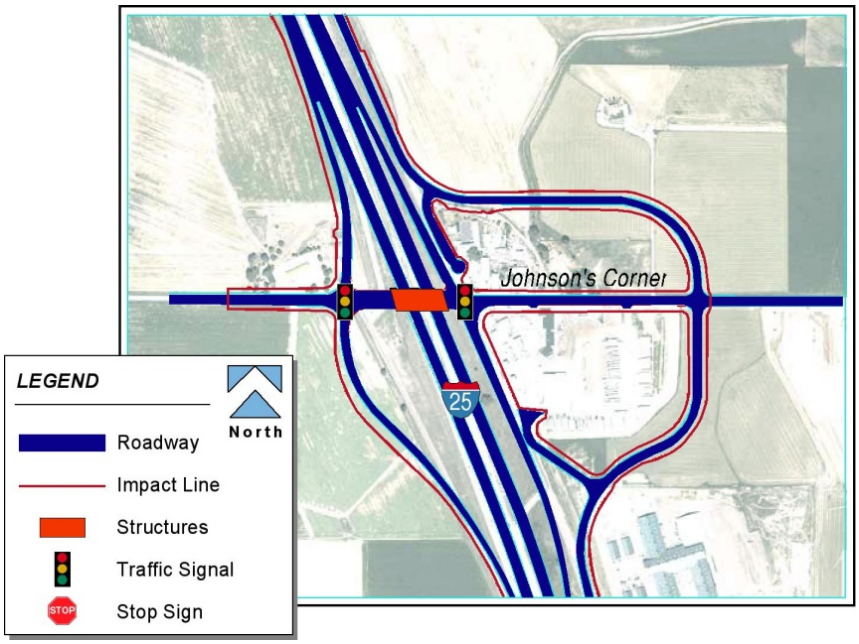
**Figure 2-16 SH 402 Interchange**




### *LCR 16*

Similar to SH 402, the profile of LCR 16 would be modified to go over I-25, thereby improving the vertical alignment of I-25. In addition, on-ramps that are not included in today's configuration would be added to improve accessibility and operation at this interchange. This is shown in **Figure 2-17**.

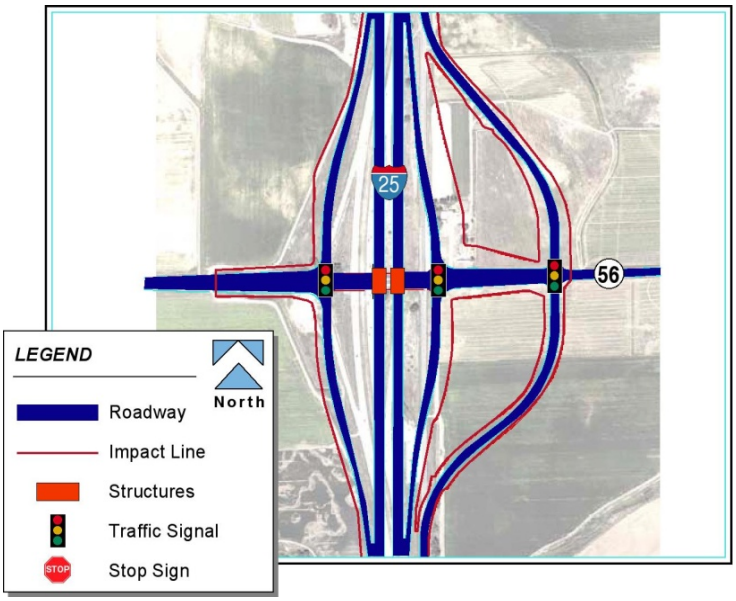
**Figure 2-17 LCR 16 Interchange**



### *SH 56*

A new diamond interchange with additional lanes on the ramps at SH 56 would accommodate anticipated demand. While the design itself is fairly straightforward, this interchange upgrade also would include reversing the grade separation between SH 56 and I-25. Today, I-25 passes under SH 56. The proposed configuration would reverse this so that I-25 would pass over SH 56, as shown in **Figure 2-18**. This reconfiguration would improve the horizontal and vertical alignment and safety of I-25 at this location.

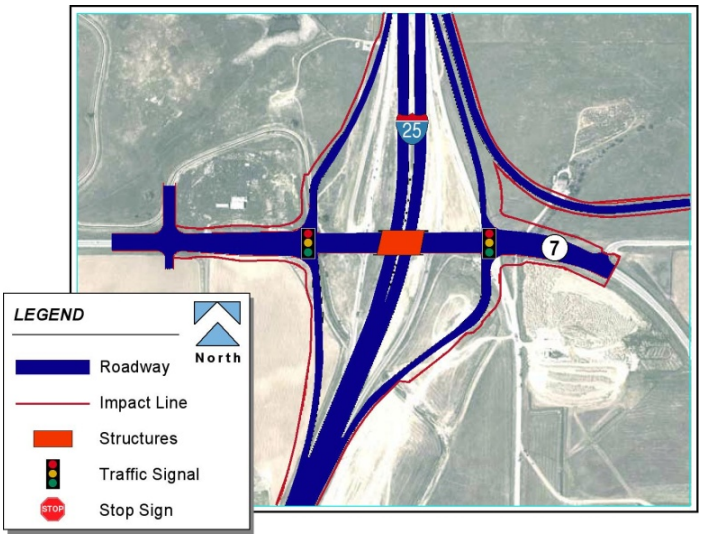
**Figure 2-18 SH 56 Interchange**




### *SH 7*

The new SH 7 diamond interchange is depicted in **Figure 2-19**. The City and County of Broomfield and the City of Thornton have expressed a desire for a partial cloverleaf configuration (loop ramps for the westbound-to-southbound and eastbound-to-northbound movements) provided at this location. To accommodate this request, without substantially increasing the impacts or expenditure for this project, ramp terminal spacing has been increased to 1,150 feet. This spacing would allow local governments to modify this interchange to a partial cloverleaf design in the future without major reconstruction of the interchange. Evaluation conducted as part of the Final EIS indicated that a partial cloverleaf design would be needed to accommodate 2035 traffic. The partial cloverleaf configuration is included in the Preferred Alternative.

**Figure 2-19 SH 7 Interchange**



### 2.2.2.3 PACKAGE A COMMUTER RAIL

**WHAT IS COMMUTER RAIL?**

A passenger rail service that often operates within freight rail right-of-way and serves regional trips. It may use locomotives with passenger cars or self-propelled passenger cars, known as diesel multiple units. Commuter rail trains could be diesel-powered (most common) or electrically-powered.

Package A track design would be built to specifications for locomotive hauled coaches to be the most flexible in accommodating different rail vehicles. For planning evaluation purposes, diesel multiple units are assumed as a vehicle technology. In recognition that rail vehicle technology is evolving rapidly, vehicle technologies will be reassessed prior to implementation of North I-25 commuter rail. In this way, interoperability with FasTracks system will be maintained.

This package includes a robust double track system for commuter rail to provide an estimate of the ridership potential along the corridor. Because Package A commuter rail includes a double track system, a parallel maintenance road would not be absolutely necessary. Maintenance access would be provided by the second track (see **Section 2.3.4.5** for discussion of the maintenance road included in the Preferred Alternative).

A regional transit operator has not yet been identified to operate the commuter rail service. CDOT has authority to operate commuter rail service. Funding to operate and maintain the service would need to be identified by the communities or by the State prior to implementation. This could happen through the identification of a service district, and implementation of sales tax, property tax or other allowable funding mechanism. This effort could be initiated by a community, the NFRMPO or by CDOT's Division of Rail and Transit.

The commuter rail service would run every 30 minutes during the AM and PM peak periods when demand is highest and every hour in the off-peak periods. Hours of operation are assumed to be 4:00 AM to 1:30 AM. Service to Denver would travel through Longmont and along the FasTracks North Metro Corridor; a transfer would not be necessary. Every other North Metro train would operate to/from Fort Collins. To reach Boulder, northern Colorado riders would transfer to the Northwest Rail Corridor at the Sugar Mill station in Longmont.

While specific fares have not yet been identified, the typical national average commuter rail peak period fare is $0.22 per mile (2009 dollars). Based on this rate, it would cost a rider about $14.00 one way to travel from the Fort Collins South Transit Center to Denver Union Station.

#### *Fort Collins to Longmont*

As part of Package A, a double-tracked commuter rail system would be developed from downtown Fort Collins at University Avenue and Maple Street along the BNSF right-of-way to 3rd Street in downtown Longmont, using the existing BNSF railroad track plus one new track. New commuter rail track would be added to the east of the existing freight track and both sets of tracks would be used by commuter rail and freight rail. On the alignment's northern end in Fort Collins from Mason Street and University Avenue to Mason Street and Maple Street, commuter rail service would be added to the existing single-track BNSF line.

An additional double-track segment would be constructed in Longmont between the Sugar Mill station and the proposed Northwest Rail Corridor end-of-line at 1st and Terry to allow FasTracks proposed Northwest Rail Corridor service to be extended to the North I-25 rail corridor.

### *Avoidance and Minimization*

Retaining walls were added along the east side of the commuter rail alignment to minimize impacts to wetlands along the corridor and avoid impacts to a historic structure north of Prospect Road in Fort Collins. The new second track was eliminated for a 500-foot segment of the corridor in Loveland to avoid the historic Loveland Depot and in a second location – adjacent to a historic residential property at 122 8th Avenue in Longmont. This results in bi-directional service along the existing single-track BNSF line near the proposed Loveland station and adjacent to the residential property in Longmont.

### *Longmont to Thornton*

In addition, a new double track commuter rail line would be built from 3rd Street south and east to FasTracks North Metro Corridor end-of-line in Thornton. Nineteen alternatives were analyzed for this alignment in order to identify the best rail connection from Longmont to the proposed FasTracks North Metro Corridor end-of-line at 162nd Avenue. The selected alignment follows the BNSF and GWRR tracks from 3rd Street southeast to the Sugar Mill site, then east along the south side of SH 119 to CR 7, where it would turn south along CR 7 to the Union Pacific Railroad (UPRR). Once the alignment meets the railroad, it follows the UPRR corridor east across I-25 and then southeast to the North Metro Corridor end-of-line at 162nd Avenue. This alignment was chosen because relative to other options it:

- Avoided sensitive wildlife and water resources associated with St. Vrain and Left Hand creeks, including two active bald eagle nests.
- Avoided two resources on the north side of SH 119, including a community facility which serves as a home for at-risk youth and an eligible historic property, the Dickens House.
- Minimized out-of-direction travel, utilized more existing rail corridors and avoided more utilities.
- Had 22 fewer residential right-of-way acquisitions and fewer impacts to one existing park, and 2 open space properties and wetlands associated with 5 additional creek crossings.

**Appendix F** of the *Alternatives Development and Screening Report* (FHU and Jacobs, 2011a) provides a detailed, quantitative comparison of the 19 alignments considered between Longmont and Thornton.

### *Low-Cost Rail Options*

Reduced cost options were considered for the entire commuter rail corridor. This includes single tracking, or jointly using the existing freight rail corridor for passenger service as well as reduced service plans with a minimal number of trains per day. A reduced service plan is consistent with some commuter rail projects that have been implemented across the country, such as in Seattle, Albuquerque, San Jose and San Diego. It is also consistent with portions of the approved Denver FasTracks projects, which have been subject to cost-

cutting measures such as single tracking. RTD has developed these types of options for cost-cutting (along with other options such as cutting certain corridors back in overall length) to provide more limited rail service in a corridor while saving capital costs of building an entire second track and operating costs of scaling back train operations to focus on the peak periods of travel only. Such cost-cutting options were considered by RTD on the Northwest Rail commuter rail corridor, the North Metro commuter rail corridor, the I-225 light rail corridor and portions of the Gold Line commuter rail Corridor. RTD is already implementing this cost cutting measure on the West Corridor (light rail) for a short section, from the Denver Federal Center to the Jefferson County Government Center end of line.

The low-cost options that were considered for the North I-25 project are fully documented in **Appendix I** of the *Alternatives Development and Screening Report* (FHU and Jacobs, 2011a). Two major low-cost options were developed. Both included use of single tracking from the 1st and Terry Station in Longmont to the South Transit Center in Fort Collins. Both assumed fairly limited rail service of three trips per direction in each peak period and no service during the rest of the day. Both assumed a reduced number of stations (four instead of eight.) Both assumed limited passing tracks that would be provided. Both applied only to the Longmont to Fort Collins component of the commuter rail because that is the only component that had operating freight rail service. The difference between the two options was that one option would require a transfer at 1st and Terry to continue into downtown Denver. The second assumed that passengers could get on a train from Fort Collins and continue into Denver via Boulder without needing to transfer to a second train in Longmont.

These options were not advanced to full analysis in this EIS because of the very noticeable reductions in ridership that would result. The reductions in ridership would occur due to:

- The substantial reduction in service provided (a reduction from trains running every thirty minutes during peak periods and every hour during off-peak periods to only three trips every peak period and no trains during off-peak periods. This reduction means rather than a train every thirty minutes during a peak period there would be a train every sixty minutes); and
- The reduction in travel time because the current freight track rail only allows for a maximum speed of 49 mph; and
- The reduction in number of stations.

These reductions in daily ridership (from approximately 5,850 with Package A to around 1,000 with one of the options and around 250 with the other option) made the major low-cost options uncompetitive with the other transit options.

Because these options would not include constructing a new track adjacent to the existing freight rail track, they would result in substantially less construction and thus result in substantially less environmental impacts. Less right of way would be needed from parks and historic properties, which would reduce impacts to resources protected by the National Historic Preservation Act and Section 4(f) of the DOT Act. At river crossings, since there would be no new track, no new bridges or culverts would be needed, so there would be fewer temporary and permanent impacts to wetlands and waters of the US. Noise and vibration impacts would be lessened for residences adjacent to the new track, but about the same as Package A impacts for residences adjacent to the freight rail track. Water

quality impacts would not be much different except at station areas, because there would be fewer stations. Wildlife habitat impacts would be lessened with the single track options because substantially less habitat would be permanently removed due to fill for the new track. From a social standpoint, however, these options would not provide as much service to low income and minority populations and to the general population. It would be more difficult for new riders or transit dependent riders to use the system since stations would be farther apart. The system would also be operating so infrequently that its usefulness as a mode of transportation would be compromised.

These two major low-cost options were evaluated and found to not meet the Purpose and Need. The primary reasons these options were not retained for Package A include:

- The reduced number of stations did not provide adequate accessibility to the rail system for the communities along the corridor.
- The limited number of trains per day did not satisfy the multimodal travel needs of the region.
- Single tracking limited flexibility associated with track maintenance that could result in stranding transit dependent population.
- Single tracking compromised the train schedule reliability. Single tracking also precludes the ability to expand service with more frequent train service.
- Reduced service to downtown Fort Collins, necessitated because of single tracking, did not satisfy the travel demand generated by the area.
- It was found that the major low-cost options attracted less than 1,000 riders per day, substantially less than the full service rail system of Package A.

Another low-cost option was considered with a less severe reduction in capital investment. This option consisted of single tracking (with passing track), but added back in a full station set and an all-day service plan. This was the same commuter rail configuration and service plan ultimately included in the Preferred Alternative. For Package A however, this option was still not found to meet the Purpose and Need. The primary reason this option was not retained for inclusion in Package A include:

- Single tracking limited flexibility associated with track maintenance that could result in stranding transit dependent population. Single tracking compromised the train schedule reliability. This issue does not affect the Preferred Alternative because of the additional Express Bus service along the I-25 corridor.
- Single tracking also precludes the ability to expand service with more frequent train service.
- Reduced rail service to downtown Fort Collins, necessitated because of single tracking, did not satisfy the transit travel demand generated by the area.
- Single tracking does not respond to the projected transit demand from the Fort Collins area for the I-25 and US 287 corridors. The level of service that could be provided would result in unmet transit demand along these two corridors.

In conclusion, a rail service scenario with only single tracking and no transit service along I-25 would not meet the project Purpose and Need. The element of purpose and need related to mode choice and meeting projected demand for transit service along both the I-25 and the US 287 corridors is not met.

### *Grade Crossings*

The track design includes grade crossing treatments, as described below.

**Table 2-2** summarizes the grade crossing improvements included in Package A. The table uses the following terms:

- **Passive:** A crossing with signs and pavement markings as traffic control devices that are not activated by trains.
- **Gates:** A crossing that consists of lights, bells, and moveable barriers on the highway approaches that are activated by trains.
- **Four quadrant gates with medians:** A crossing that includes all elements of the gated crossing plus a raised center divider to further discourage vehicles from entering the crossing.
- **Grade separation:** A crossing that includes constructing a rail overpass or overpass for cars, trucks, bicyclists, and pedestrians, eliminating the need to cross at-grade.

Special consideration has been given to downtown Longmont, where the existing BNSF alignment runs in the median of Atwood Street between 3rd Avenue and 8th Avenue. In this area, minor roadway improvements would be made to enable the installation of the second track, and the grade crossings would be upgraded as shown in the grade crossing table. The existing BNSF tracks run in a dense urban / campus area between Harmony Road and University Avenue in Fort Collins. Similar minor roadway and grade crossing improvements would be made in this area. Between Maple Street and University Avenue, the single BNSF track would be in Mason Street. This area would be maintained as a single track with grade crossing improvements as part of the project.

## Table 2-2 Package A Train/Roadway Grade Crossing Treatments

| LOCATION | EXISTING | PACKAGE A |
|---|---|---|
| BNSF – Maple Street - Fort Collins | Lights | Gates |
| BNSF – Laporte Avenue - Fort Collins | Lights | Gates |
| BNSF – Mountain Avenue - Fort Collins | Lights | Gates |
| BNSF – Oak Street - Fort Collins | Passive | Gates |
| BNSF – Olive Street - Fort Collins | Lights | Gates |
| BNSF – Magnolia Street - Fort Collins | Passive | Gates |
| BNSF – Mulberry Street - Fort Collins | Lights | Gates |
| BNSF – Myrtle Street - Fort Collins | Passive | Gates |
| BNSF – Laurel Street - Fort Collins | Lights | Gates |
| BNSF – Old Main/Plum Street - Fort Collins | Passive | Gates |
| BNSF – University Avenue - Fort Collins | Passive | Gates |
| BNSF – Pitkin Street - Fort Collins | Gates | Gates |
| BNSF – Lake Street - Fort Collins | Passive | Gates |
| BNSF – Prospect Road - Fort Collins | Gates | 4-quadrant gates with medians |
| BNSF – Drake Road - Fort Collins | Gates | 4-quadrant gates with medians |
| BNSF – Swallow Road - Fort Collins | Gates | Gates |
| BNSF – Horsetooth Road - Fort Collins | Gates | 4-quadrant gates with medians |
| BNSF – Harmony Road - Fort Collins | Gates | 4-quadrant gates with medians |
| BNSF – Trilby Road – SE Larimer Co. | Gates | Gates |
| BNSF – West 57th St. - SE Larimer Co. | Gates | 4-quadrant gates with medians |
| BNSF – West 37th Street - Loveland | Gates | Gates |
| BNSF – West 29th Street - Loveland | Gates | 4-quadrant gates with medians |
| BNSF – Garfield Street - Loveland | Gates | Gates |
| BNSF – US 34 - Loveland | Grade separation | Grade separation |
| BNSF - 10th Street - Loveland | Gates | Gates |
| BNSF – 7th Street - Loveland | Gates | Gates |
| BNSF – 6th Street - Loveland | Gates | Gates |
| BNSF – 4th Street - Loveland | Gates | Gates |
| BNSF – 1st Street - Loveland | Gates | Gates |
| BNSF – South Railroad Avenue – SE Larimer Co. | Gates | Gates |
| BNSF – 14th Street SW – SE Larimer Co. | Gates with barrier curbs | 4-quadrant gates with medians |
| BNSF – 28th Street SW / LCR 16–SE Larimer Co. | Gates | Gates |
| BNSF – 42nd Street SW – SE Larimer Co. | Gates | Gates |
| BNSF – US 287 – SE Larimer Co. | Grade separation | Grade separation |
| BNSF – Berthoud Road / LCR 10E - Berthoud | Gates | Gates |
| BNSF – Water Ave / LCR 10 - Berthoud | Gates | Gates |
| BNSF – Bunyan Avenue - Berthoud | Gates | Gates |
| BNSF – Mountain Avenue/SH 56 - Berthoud | Gates | Gates |
| BNSF – Welch Avenue – Berthoud | Gates | Gates |
| BNSF – LCR 15a – NE Boulder Co. | Passive | Gates |
| BNSF – LCR 15a – NE Boulder Co. | Gates | Gates |
| BNSF – LCR 2E – NE Boulder Co. | Gates | Gates |

## Table 2-2 Package A Train/Roadway Grade Crossing Treatments (cont'd)

| LOCATION | EXISTING | PACKAGE A |
|---|---|---|
| BNSF – North County Line Rd. – NE Boulder Co. | Passive | Gates |
| BNSF – North 115th St. – NE Boulder Co. | Passive | Gates |
| BNSF – Vermillion Road – NE Boulder Co. | Passive | Gates |
| BNSF – Ute Highway / SH 66 - Longmont | Gates | Gates |
| BNSF – 21st Avenue - Longmont | Gates | Gates |
| BNSF – 17th Avenue - Longmont | Gates with barrier curbs | 4-quadrant gates with medians |
| BNSF – Mountain View Ave. - Longmont | Passive | Gates |
| BNSF – 9th Avenue - Longmont | Passive | Gates |
| BNSF – Longs Peak Avenue - Longmont | Gates | Gates |
| BNSF – 6th Avenue - Longmont | Passive | Gates |
| BNSF – 5th Avenue - Longmont | Passive | Gates |
| BNSF – 4th Avenue - Longmont | Passive | Gates |
| BNSF – 3rd Avenue - Longmont | Gates | 4-quadrant gates with medians |
| BNSF – Emery Street - Longmont | Passive | Gates |
| BNSF – Main Street - Longmont | Gates | 4-quadrant gates with medians |
| BNSF – Coffman Street - Longmont | Passive | Gates |
| BNSF – Terry Street - Longmont | Passive | Gates |
| BNSF - Martin Street - Longmont | Passive | Gates |
| GWR – Sugar Mill Road - Longmont | Passive | Gates |
| GWR – Sugar Mill Road - Longmont | Passive | Gates |
| SH 119 - Longmont | N/A | Grade separation |
| East County Line Road – SW Weld Co. | N/A | 4-quadrant gates with medians |
| SH 119 – SW Weld Co. | N/A | Gates |
| Fairview Street/Sandstone Dr. – SW Weld Co. | N/A | Gates |
| WCR 3 – SW Weld Co. | N/A | Gates |
| WCR 5 – SW Weld Co. | N/A | Gates |
| Harbor Drive – SW Weld Co. | N/A | Gates |
| Shoreline Drive – SW Weld Co. | N/A | Gates |
| WCR 20.5 – SW Weld Co. | N/A | Gates |
| WCR 20 – SW Weld Co. | N/A | Gates |
| Private Drive – SW Weld Co. | N/A | Gates |
| Private Drive – SW Weld Co. | N/A | Gates |
| Private Drive – SW Weld Co. | N/A | Gates |
| WCR 18 – SW Weld Co. | N/A | Gates |
| Private Drive – SW Weld Co. | N/A | Gates |
| Lower Boulder Ditch Road – SW Weld Co. | N/A | Gates |
| WCR 16 – SW Weld Co. | N/A | Gates |
| Wyndham Hill Parkway – SW Weld Co. | N/A | Grade separation |
| SH 52 – SW Weld Co. | N/A | Grade separation |
| WCR 12 – SW Weld Co. | N/A | Gates |
| WCR 7 – SW Weld Co. | N/A | Gates |
| UPRR - WCR 10 – SW Weld Co. | Passive | Gates |

**Table 2-2 Package A Train/Roadway Grade Crossing Treatments (cont'd)**

| LOCATION | EXISTING | PACKAGE A |
|---|---|---|
| UPRR - I-25 – SW Weld Co. | Grade separation | Grade separation |
| UPRR - I-25 East Frontage Rd – SW Weld Co. | Grade separation | Grade separation |
| UPRR - Summit Blvd. / WCR 8 – SW Weld Co. | Passive | Gates |
| UPRR - York Street / WCR 11 – SW Weld Co. | Passive | Gates |
| UPRR - WCR 6 – SW Weld Co. | Passive | Gates |
| UPRR - East 168th Avenue – SW Weld Co. | Passive | Gates |

N/A=Not Applicable

#### 2.2.2.4 PACKAGE A COMMUTER RAIL STATIONS

Once the commuter rail alignment was determined, a station site selection process was set in motion. Seventeen potential station locations were identified and evaluated using a set of screening criteria that screened if the potential station location met the following criteria:

- Serves a population center
- Provides east/west access across the regional study area
- Supported by existing transit infrastructure
- Has committee and stakeholder support

A transit working group that consisted of the general public and municipality representatives met three times throughout the station design process. At the first transit working group meeting the potential station locations were presented to this group. Stations were added and screened out per their input. As a result of the station site selection process seventeen potential station locations were screened down to nine new stations.

After determining the general vicinity of station locations, a more detailed evaluation was conducted for each station location. The primary criteria were: minimal neighborhood and environmental impacts, connectivity, opportunity for joint development, and compatibility with adjacent land use. A more detailed description of the station sites considered and the screening process is included in **Section 2.3.2** of this document and a full description of the station screening process is found in the *Alternatives Development and Screening Report* (FHU and Jacobs, 2011a). As a result, a preferred site(s) was identified at each station to include the platform, park-and-ride and bus activity. **Table 2-3** lists the stations included in Package A along the commuter rail alignment. The connection at the Sugar Mill station in Longmont would allow patrons to transfer to FasTracks proposed Northwest Rail Corridor. Patrons remaining on the train would continue southeast, eventually traveling along the FasTracks North Metro Corridor into downtown Denver. While the Package A commuter rail would serve all of the planned North Metro Corridor stations, it does not include any additional improvements at these stations.

## Table 2-3 Package A Commuter Rail Stations

| Station Name | Location | Parking Spaces |
|---|---|---|
| Fort Collins Downtown Transit Center | BNSF and Maple Street | 100 |
| Colorado State University (CSU) | On Mason Street between University Avenue and West Pitkin Street | none |
| South Fort Collins Transit Center* | Mason Street and West Fairway Lane | 110 |
| North Loveland | BNSF and 29th Street | 140 |
| Downtown Loveland | BNSF and approximately 6th Street | 40 |
| Berthoud | BNSF and SH 56 | 70 |
| North Longmont | BNSF and SH 66 | 30 |
| Longmont at Sugar Mill | North of alignment, south of Rogers Road | 150 |
| I-25 and WCR 8 | NW corner of I-25 and CR 8 | 210 |
| FasTracks North Metro Corridor | All planned FasTracks North Metro Corridor stations | No new spaces proposed as part of this project |

*The Mason BRT Corridor was not funded at the time of the Draft EIS Package A design development; therefore, the South Transit Center was designed for commuter rail and did not accommodate the proposed Mason BRT. After release of the Draft EIS, the Mason project was funded so this station was redesigned to function for both Mason BRT and N I-25 commuter rail.

The typical station layout proposed two side-loaded platforms within the double-tracked alignment, with vertical circulation for pedestrian access across the tracks connecting the platform to the park-and-ride and surrounding community as shown in **Figure 2-20** and **Figure 2-21**. For additional information on the commuter rail station process, refer to *Alternatives Development and Screening Report* (FHU and Jacobs, 2011a).

## Figure 2-20 Package A Typical Commuter Rail Station Design

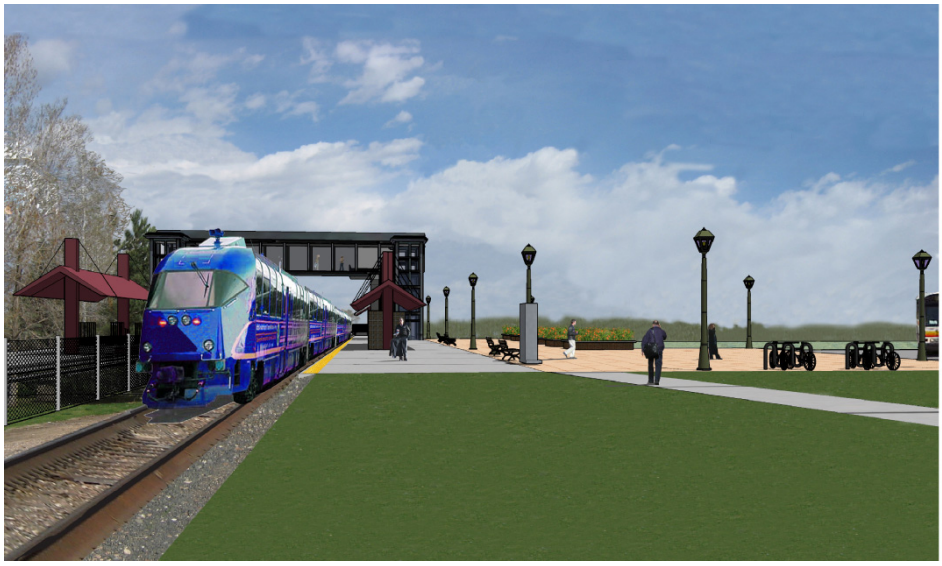
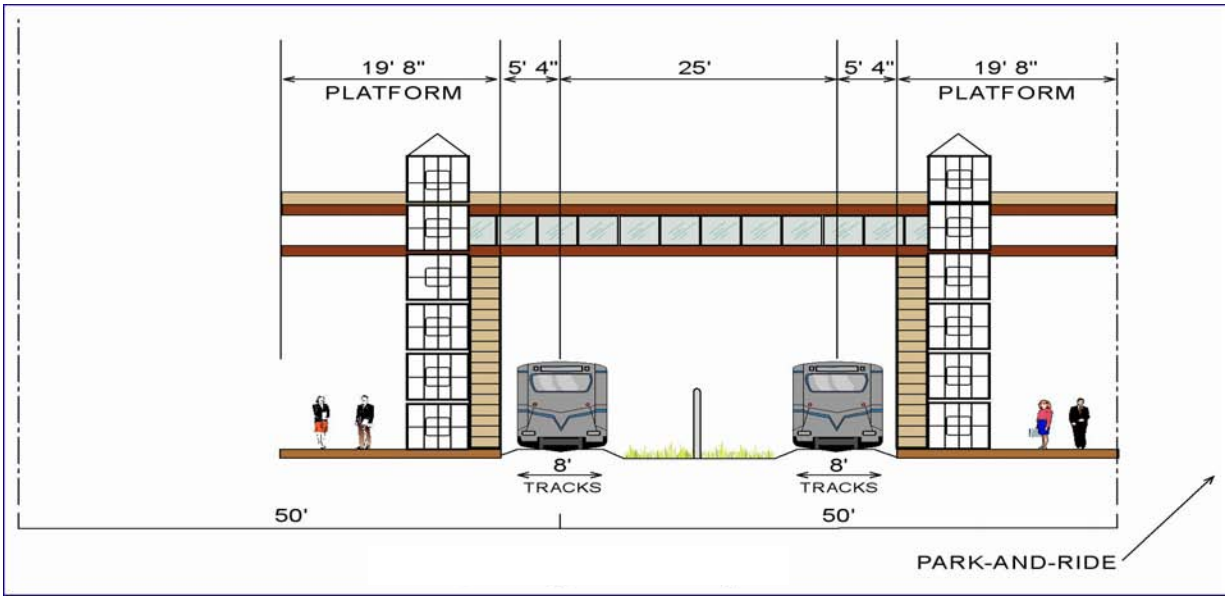


**Figure 2-21 Package A Typical Commuter Rail Station Cross Section**




### 2.2.2.5 Package A Commuter Rail Maintenance Facility

The layout of the commuter rail maintenance facility would require a minimum of 30 acres, including facilities for vehicle maintenance, cleaning, fueling and storage; track maintenance; parts storage; and vehicle operator facilities. The commuter rail maintenance facility would accommodate an estimated 90 employees. The potential locations are:

- Vine Drive and Timberline Road in Fort Collins
- LCR 10 and LCR 15 in Berthoud

The site identified in Fort Collins is 76.1 acres, while the site identified in Berthoud is 61.6 acres. Either could accommodate the necessary uses. They are being evaluated as part of Package A to determine the most favorable location based on impacts to environmental resources, community impacts, and costs.

The commuter rail service defined in Package A will serve as an extension of planned RTD services. The RTD commuter rail maintenance facility design process has not proceeded far enough to evaluate the feasibility of using that facility to maintain the additional vehicles required for Package A commuter rail service. In addition, it is probable that an overnight layover facility within the North I-25 regional study area will be required even if trains are maintained within the RTD area. Hence, it has been assumed that a maintenance facility will be required as part of the North I-25 process to ensure the independent utility of Package A.

### 2.2.2.6 PACKAGE A COMMUTER BUS

Package A includes a commuter bus service along US 85 connecting Greeley to downtown Denver and DIA. This service would operate every 30 minutes in AM and PM peak hours and every hour during off-peak periods. Queue jumps, allowing buses to bypass queued traffic at some signalized intersections, would be included to help achieve reliable speeds for bus services.

**WHAT IS COMMUTER BUS?**

Commuter bus service is regional transit service with limited stops in order to operate faster than other bus services. This type of transit service usually operates on roads designated as arterials or higher and has park-and-ride facilities located at its stops.

Queue jumps typically require modifying an intersection to provide a short lane for the bus between the right-turn lane and the through lanes. Signal equipment also would be upgraded to sense the presence of a bus and provide a short signal phase where the bus is able to travel through the intersection first, bypassing the queued traffic. Intersection control, traffic volumes, speed limits, road configuration, and community plans were taken into consideration when recommending locations for queue jumps. Additional information on queue jump location screening is available in *Alternatives Development and Screening Report* (FHU and Jacobs, 2011a).

The following queue jump or transit signal enhancement locations are included in Package A along the US 85 corridor:

| | | |
|---|---|---|
| 31st Street – Evans | CR 34 – Platteville | 136th Avenue – Brighton |
| 37th Street – Evans | Grand Avenue (CR 32) – Platteville | 124th Avenue – Brighton |
| 42nd Street – Evans | SH 66 – Platteville | 120th Avenue – Commerce City |
| 1st Avenue – LaSalle | 168th Avenue – Brighton | 112th Avenue – Commerce City |
| CR 42 – Gilcrest / Weld County | Bromley Lane – Brighton | 104th Avenue – Commerce City |
| Elm Street – Gilcrest | 144th Avenue – Brighton | |

While specific fares have not been identified, a review of commuter bus systems nationwide indicates that a typical fare would be about $0.12 per mile (2009 dollars). Based on this rate, it would cost a rider traveling from downtown Greeley to downtown Denver approximately $6.60 one-way.

A transit operator has not yet been identified to operate the commuter bus service. However, in the southern Front Range a similar commuter style service is operated by the City of Colorado Springs in partnership with CDOT and the other communities served. This would indicate that one of the local transit providers in the area (Greeley, Loveland and Fort Collins) could operate this service. CDOT also has authority to operate regional transit services. In either scenario, funding to operate and maintain the service would need to be identified by the communities or by the State prior to implementation. This could happen through the identification of a service district, and implementation of sales tax, property tax or other allowable funding mechanism. This effort could be initiated by a community, the NFRMPO or by CDOT's Division of Rail and Transit. These entities could also apply for CMAQ funding to initiate service through a three-year demonstration project.

### 2.2.2.7 PACKAGE A COMMUTER BUS STATIONS AND STOPS

Station design for commuter bus assumed that the passenger would access the bus from the proposed park-and-ride or an on-street bus stop with no formal platform. The station site selection process was similar to those applied to the commuter rail stations. Thirteen potential station locations were screened down to five new stations and connections to four existing RTD stations: Brighton, Commerce City, downtown Denver and DIA. No improvements are proposed at the RTD stations as part of this EIS.

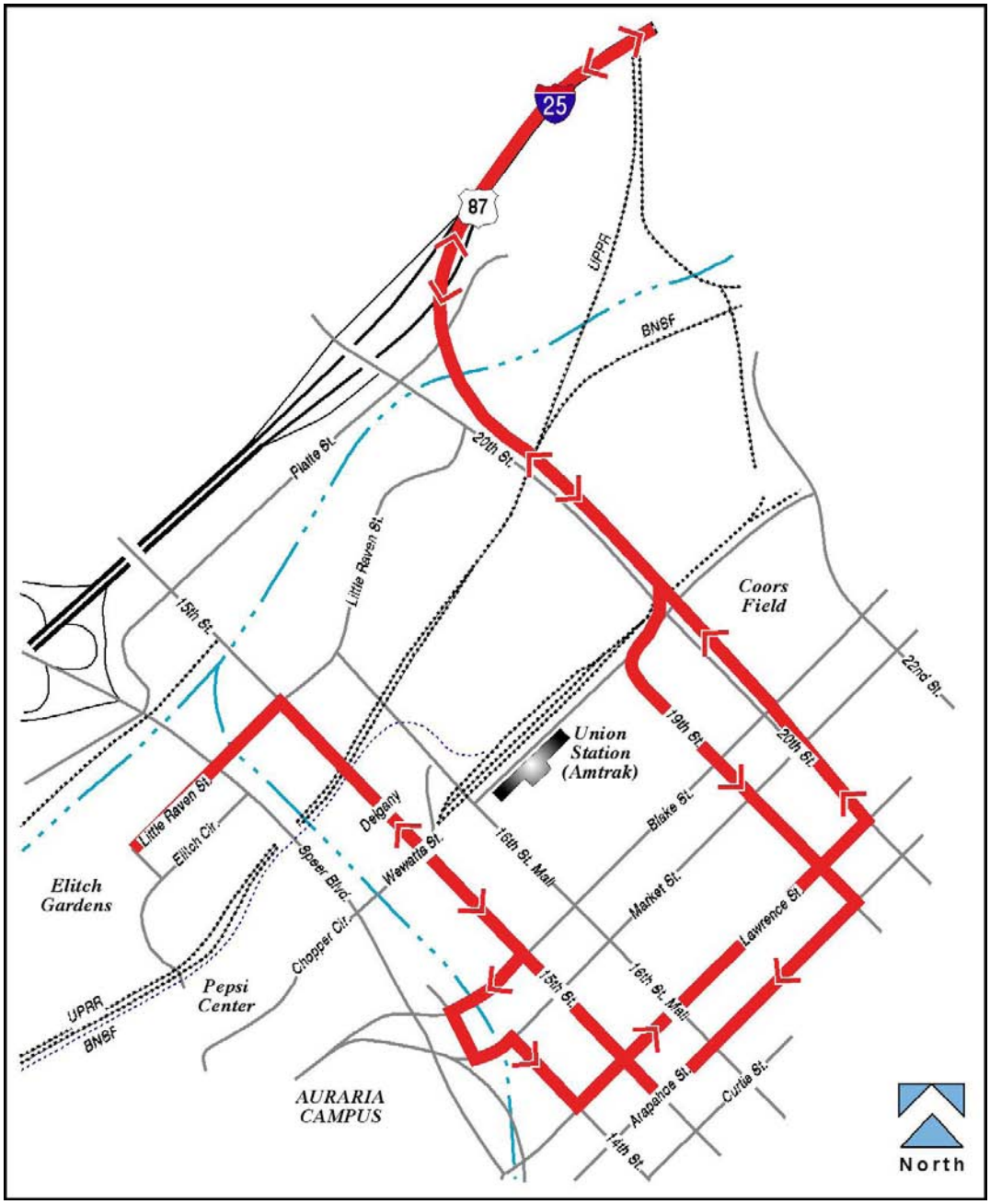
A range of two to thirteen sites were evaluated for each station location. As a result of the station site evaluation, one preferred site was identified at each location to house the park-and-ride and bus activity. A more detailed description of the station sites considered and the screening process is included in **Section 2.3.2** of this document and a full description of the station screening process is found in the *Alternatives Development and Screening Report* (FHU and Jacobs, 2011a). **Table 2-4** lists the station sites and stops for the commuter bus service.

**Table 2-4 Package A Commuter Bus Stations and Stops**

| Station/Stop Name | Description | Parking Spaces |
|---|---|---|
| Greeley | US 85 and D Street | 40 |
| South Greeley | 8th Avenue and 24th Street | 80 |
| Evans | US 85 and 42nd Street | 70 |
| Platteville | US 85 and Grand Avenue | 60 |
| Fort Lupton | US 85 and 14th Street (CR 14.5) | 110 |
| Brighton | US 85 and SH 7 | Existing RTD park-n-Ride |
| Commerce City | Colorado Blvd and 72nd Ave. | Proposed RTD park-n-Ride |
| Denver | Downtown Denver | 0 |
| DIA | Denver International Airport | 0 |

During the AM peak hours, southbound buses would enter downtown Denver via the North I-25 express lanes and go into downtown using 19th Street, turning southwest on Arapahoe and providing stops at 17th and 15th Streets. From there, buses would turn right on 15th Street, left at Little Raven Street, and proceed to Elitch Gardens to layover before making the return trip. Downtown circulation is shown in **Figure 2-22**. This downtown route is similar to the route of the current Front Range Express (FREX) bus from Colorado Springs to Denver. During hours when the reversible express lane flow is headed northbound, southbound buses would enter downtown Denver via the 20th Street interchange, take 20th Street to Arapahoe, and follow the remainder of the route described above.

**Figure 2-22 Commuter Bus (and Express Bus) Downtown Denver Circulation**




During the PM peak hours, northbound buses would exit downtown Denver by turning right out of Elitch Gardens onto 15th Street, turning right again to access 14th Street and eventually turning left on Lawrence Street, picking up passengers at 15th and 17th Streets, and proceed to the I-25 HOV entrance ramp on 20th Street. During hours when the reversible express lane flow is headed southbound, northbound buses would access I-25 via the 20th Street interchange.

Planned improvements at Denver Union Station may allow these buses to access and egress the HOV lanes from 18th and 19th Streets and serve Denver Union Station via Wewatta Street. In addition, provided there is enough space, the commuter bus service may

also be able to layover at Denver Union Station before making the return trip instead of traveling the extra distance to Elitch Gardens. These possible connections could be further evaluated as planning for Denver Union Station moves forward.

### 2.2.2.8 Package A Feeder Bus

Four feeder bus routes are proposed to enable riders to access the commuter rail and commuter bus services in Package A. These services would travel:

- Along SH 257, connecting Windsor and Timnath to the commuter rail and the commuter bus.
- Along US 34, connecting Greeley and Loveland to both services.
- Along SH 60 / SH 56, connecting Milliken, Johnstown, and Berthoud to the commuter rail.
- Along WCR 13 / WCR 8, connecting the tri-towns (Frederick, Firestone, and Dacono) and Erie to the commuter rail.

**WHAT IS FEEDER BUS?**

Feeder bus service connects communities throughout the region to a major transit investment such as passenger rail or bus rapid transit. It provides an alternative to driving alone and improves accessibility to transit-dependent passengers.

These feeder bus services would operate every 30 minutes during AM and PM peak periods and every 60 minutes during off-peak periods. They have been designed to coincide with commuter rail and commuter bus schedules. A transit operator has not yet been identified to operate the feeder bus service. Funding to operate and maintain the service would need to be identified by the communities or by the State prior to implementation. This could happen through the identification of a service district, and implementation of sales tax, property tax or other allowable funding mechanism. This effort could be initiated by a community, the NFRMPO or by CDOT's Division of Rail and Transit. These entities could also apply for CMAQ funding to initiate service through a three-year demonstration project.

### 2.2.2.9 Package A Bus Maintenance Facility

In Package A, two sites were evaluated for the bus maintenance facility: Portner Road and Trilby Road in Fort Collins, and 31st Street and 1st Avenue in Greeley. The site in Fort Collins is 7.8 acres, while the site in Greeley is 4.6 acres. Both sites meet the size requirements for the layout of the facility. The two sites were evaluated to determine the more favorable site based on impacts to environmental resources, community impacts, and costs. The commuter bus maintenance facility would accommodate an estimated 85 employees, including staff for the maintenance and operation of buses for both the commuter bus and the feeder bus routes.

### 2.2.2.10 Package A Congestion Management

Many potential congestion management measures were considered as enhancements to the packages. Detailed documentation of the Congestion Management Alternative development and screening process is provided in *Alternatives Development and Screening Report* (FHU and Jacobs, 2011a). **Table 2-5** summarizes congestion management measures that were identified for Package A.

## Table 2-5 Package A - Congestion Management Measures

| Congestion Management Strategy | Description of Application |
|---|---|
| **Local Transit Service** | Existing local routes would connect to rail service at the Downtown and South Transit centers in Fort Collins; at US 34 in Loveland; and at Sugar Mill in Longmont. Package A local routes would connect to commuter bus service at 8th Street and D, Greeley South, the Brighton park-n-Ride, and the FasTracks North Metro Corridor rail stations. |
| **Carpool and Vanpool** | Carpool/Vanpool lots would replace and be in addition to the existing carpool/vanpool lots. They would be paved, have lighting, and have security cameras. These lots would be provided along I-25 at:<br>**Location** — **Spaces**<br>SH 1 — 80<br>SH 14 — 150<br>Prospect Rd. — 130<br>Harmony Rd. — 300<br>SH 392 — 90<br>SH 402 — 340<br>**Location** — **Spaces**<br>SH 60 — 80<br>SH 56 — 30<br>SH 66 — 70<br>SH 119 — 90<br>SH 52 — 80<br>SH 7 — 180 |
| **Incident Management Program** | Courtesy patrols - Tow trucks with fuel, coolant, air, etc. would drive up and down I-25 from SH 14 to SH 7 during peak period travel times (6:15 AM to 8:45 AM and 3:15 PM to 6:45 PM). These vehicles would pick up debris, help stalled motorists, and assist with other incidents as needed. |
| **Signal Coordination and Prioritization** | Timing at signals at interchanges along I-25 would be optimized as part of the interchange design process. Queue jumps, including signal treatments, would be incorporated into the commuter bus design along US 85. |
| **Ramp Metering** | Based on a CDOT Region 6 precedent and policy along the Transportation Expansion (T-REX) corridor, ramp meters would be installed along the freeway in order to prevent trip detouring. At such time when volumes dictate ramp metering along I-25, ramp meters would be recommended at the following interchanges:<br>SH 14<br>Prospect Rd.<br>Harmony Rd.<br>SH 392<br>Crossroads Blvd.<br>US 34<br>SH 402<br>SH 119<br>SH 52<br>WCR 8<br>SH 7 |
| **Real-Time Transportation Information** | The CDOT Region 4 intelligent transportation plan would be implemented in its entirety with additional variable message signs northbound and southbound north of SH 14. |
| **Bicycle / Pedestrian Facilities** | Station areas would be designed to provide pedestrian links to the nearest local road. A 12-ft. wide multi-use path and 6-ft tree lawn would provide connectivity between the bus drop-off, park-and-ride and connectivity to the closest road. All stations would be designed in accordance with the accessibility standards set forth in the Americans with Disabilities Act (ADA). |
| **Travel Demand Measures** | During construction, proactive measures could be taken by the contractor to encourage use of alternative modes. |

### 2.2.2.11 Other Package A Features

Package A also includes retaining walls, water quality ponds, and drainage features.

#### *Retaining Walls*

Retaining walls would be used along highway general purpose lanes and commuter rail lines to minimize impacts to environmentally sensitive areas and existing commercial buildings or other developments.

#### *Water Quality*

To conform to CDOT's Municipal Separate Storm Sewer System (MS4) permit, roadway runoff would need to be treated within urbanized areas. Using land use projections from the NFRMPO, urban areas were determined and potential treatment locations have been identified in Package A. These would be located along highways and at transit stations, maintenance facilities, and parking lots. Suggested locations for the water quality features are included in the Package A concept plans. Various methods for treating stormwater runoff, such as ponds, vaults, and infiltration basins would be considered during final design.

#### *Floodplains and Drainage Features*

Almost all of the existing drainage structures are undersized; they cannot pass the 100-year storm flows under the rail routes, I-25, or US 85. Final design would include a detailed hydraulic analysis for each crossing. This would include addressing allowable backwater and methods for mitigating impacts to the environment. Additional items that would be considered include costs for construction, maintenance, and operations. Federal Emergency Management Agency floodplain regulations and CDOT drainage criteria would be followed.

### 2.2.2.12 Package A Preliminary Cost Estimates

The capital cost for Package A is estimated to be approximately $1.963 billion (2009 dollars). Additionally, the roadway would continue to require ongoing maintenance and the new rail and bus service would have annual operating and maintenance cost associated with it. The total operating and maintenance cost is estimated to be $45 million annually.

## 2.2.3 Package B

**Figure 2-23** illustrates Package B. As shown, Package B includes tolled express lanes (TEL), interchange upgrades, bus rapid transit (BRT), feeder bus service, and congestion management measures. Each of these features is described in more detail below. The *Package Concept Plans* (FHU and Jacobs, 2011b) illustrate the layout of Package B in more detail.

### 2.2.3.1 Package B New Tolled Express Lanes

Package B consists of adding one buffer-separated tolled express lane in each direction along the entire corridor except between Harmony Road and SH 60 where two barrier-separated lanes would be added in each direction. Lane configuration is depicted in **Figure 2-25** through **Figure 2-29**. Design criteria were established by CDOT for the highway improvements. Design guidelines recommend avoiding use of median barrier where practical. Consistent with the existing wide median and rural setting, the design criteria for the proposed highway improvements includes a grass median for I-25 north of SH 66. The buffer-separated section would consist of a painted 4-foot strip separating the tolled express lanes from the general purpose lanes. The barrier-separated section would consist of a raised concrete barrier separating the tolled express lanes from the general purpose lanes, which would be approximately 4 feet high and 2 feet wide. Where possible, the grass median would be maintained north of SH 66 with the exception of the BRT median stations. The median would be used to accommodate median BRT stations from SH 7 north. South of SH 66, where the more densely urbanized areas abut I-25, highway widening would occur toward the center using portions of the median. As a safety measure, a tension cable barrier would be included in all locations with an open median.

**WHAT ARE TOLLED EXPRESS LANES?**

Lanes separated from general purpose lanes by a striped buffer or a raised median barrier. Lanes whose demand is managed to maintain reliable, fast operation even during peak periods. The lanes are managed by allowing use only by single-occupant vehicle drivers willing to pay a toll or by high-occupant vehicles. These would be similar to the existing High Occupancy Tolled (HOT) lanes between 84th Avenue and 20th Street in Denver.

Frontage roads along I-25 would be rebuilt approximately where they exist today. At the interchanges, frontage roads would be relocated east or west away from the ramp terminals to address storage and safety concerns at the intersections. Along the I-25 mainline, the frontage roads would be offset 40 feet, based on current design standards.

1 **Figure 2-23 Package B**

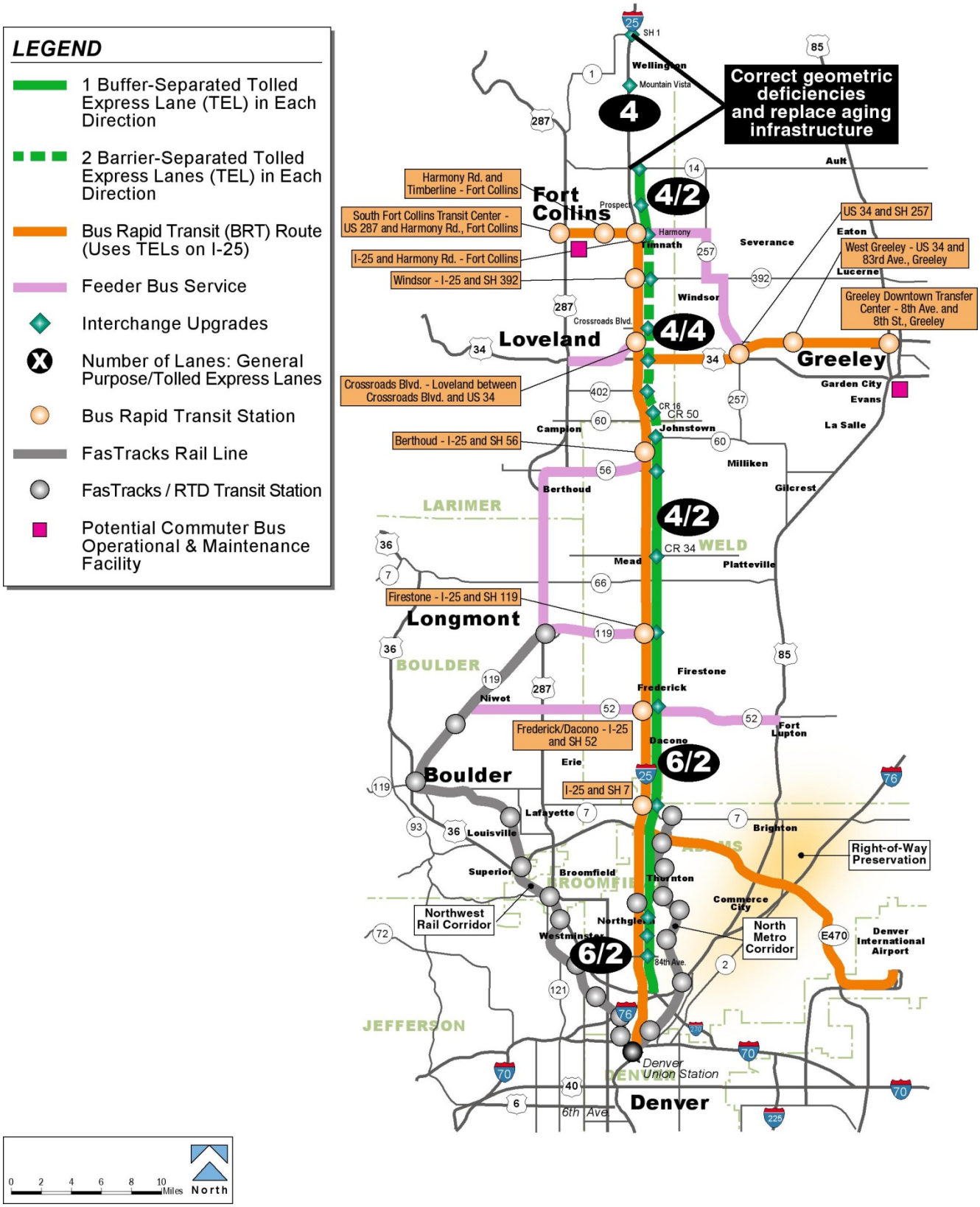


**Figure 2-24 Package B Typical I-25 Cross Section – SH 1 to SH 14**

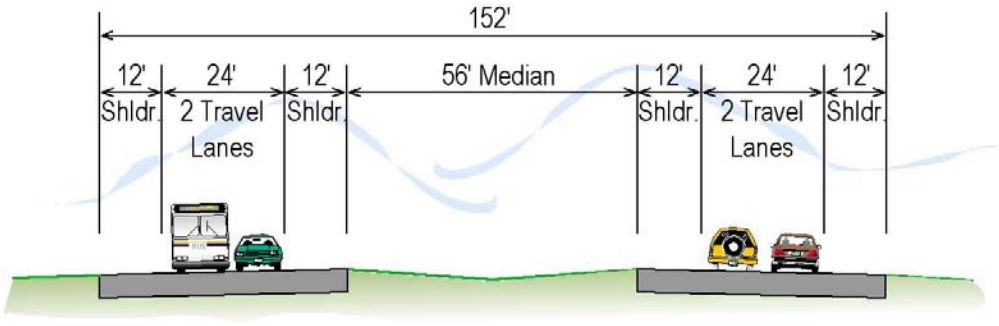



**Figure 2-25 Package B Typical I-25 Cross Section – SH 14 to Harmony Rd.**

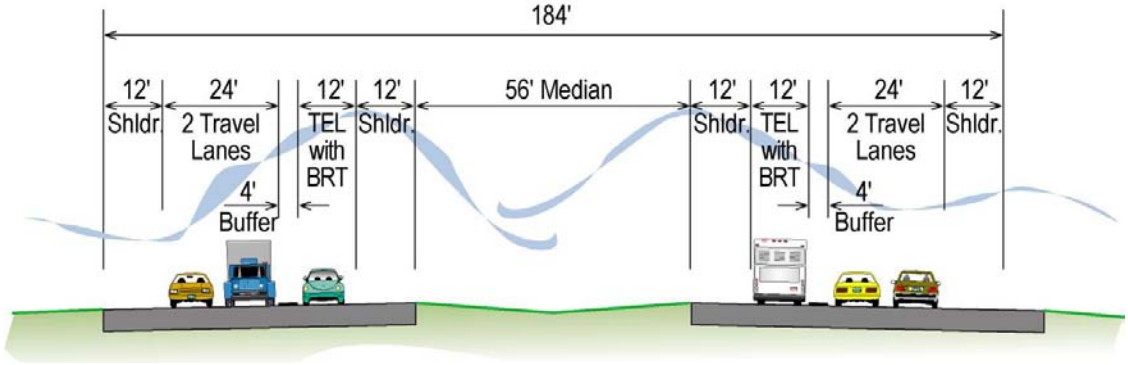



**Figure 2-26 Package B Typical I-25 Cross Section – Harmony Rd. to SH 60**

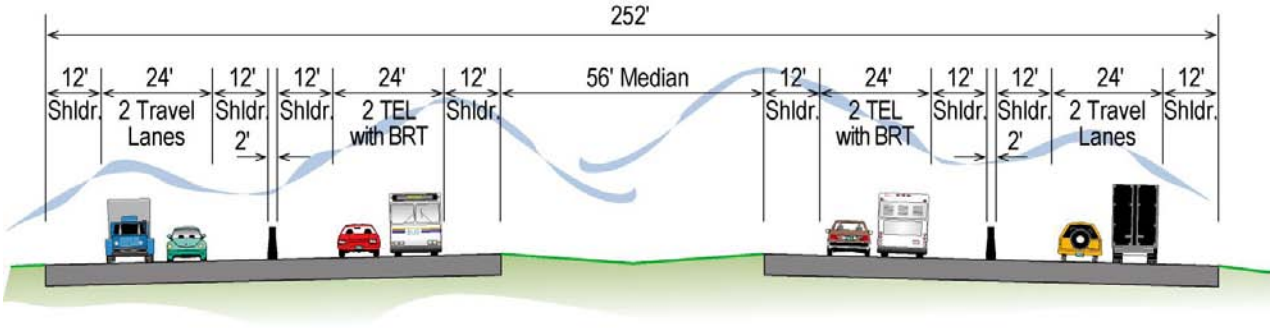


**Figure 2-27 Package B Typical I-25 Cross Section – SH 60 to SH 66**

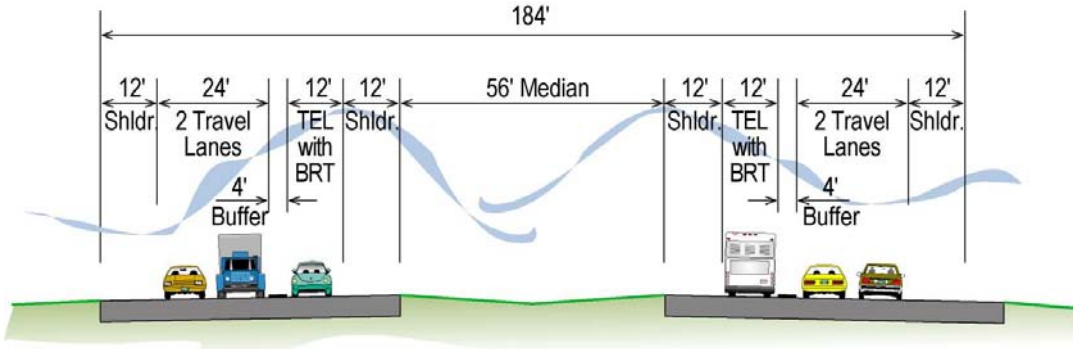



**Figure 2-28 Package B Typical I-25 Cross Section – SH 66 to SH 7**

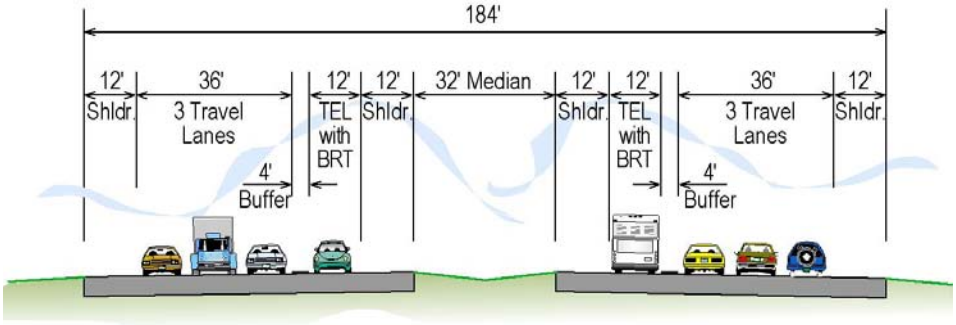
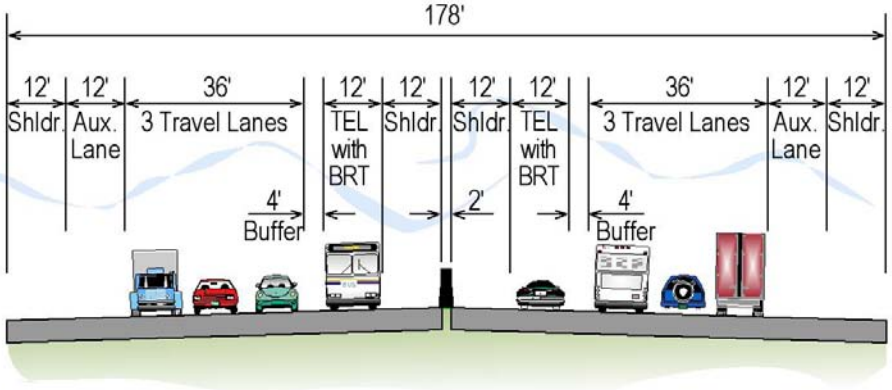



**Figure 2-29 Package B Typical I-25 Cross Section – SH 7 to US 36**



The tolled express lanes would require a transponder for all vehicles. The transponder would be automatically scanned as the vehicle travels in the lane; for single-occupant vehicles the transponders would collect a toll via the credit card on file for that transponder. Transponders registered to HOVs would not be assessed a toll. In some cases video tolling may be applied. Regardless, there would be no toll booths and no cash would be accepted with this video or transponder-required system. The pricing used for evaluation of the system in 2035 is shown in **Table 2-6. These** tolls would vary by time of day, and will be modified to manage congestion in tolled express lanes and ensure that these lanes would be less congested than the general purpose lanes.

**Table 2-6 Tolled Express Lane Peak Direction Single-Occupant Vehicle Toll Rates (2009 dollars)**

| Location on I-25 | AM Peak Hour Southbound | PM Peak Hour Northbound |
|---|---|---|
| North of E-470 | $0.13/mi | $0.10/mi |
| South of E-470 | $0.75/mi | $0.75/mi |

*Source: Wilbur Smith Associates, October 2010.*

Based on this pricing, it would cost an AM peak-hour traveler $5.33 to use the tolled express lanes from SH 14 to E-470.

Access to the tolled express lanes would be provided via slip ramps connecting the general purpose lanes to the tolled express lanes. **Figure 2-30** illustrates the slip-ramp access and egress locations included in Package B. **Figure 2-31** illustrates the design of the slip ramps in more detail. A 12-foot inside shoulder is included in the design of the tolled express lanes to enable safe and efficient enforcement along the entire corridor.

### *Avoidance and Minimization*

In Package B, minor shifts in I-25, interchange ramps, and frontage road horizontal alignments were included in the conceptual design that would minimize impacts to wetlands at WCR 34, SH 56, LCR 16, SH 392, Prospect Road, Harmony Road, and SH 14. I-25 horizontal alignment modifications also were included at SH 402 and SH 56 that would improve safety.

Minor modifications to the I-25 vertical alignment were included to improve safety at SH 56, SH 402, and LCR 16 and to avoid impacts to a historic ditch north of US 34.

**Figure 2-30 Tolled Express Lanes Access and Egress Locations**

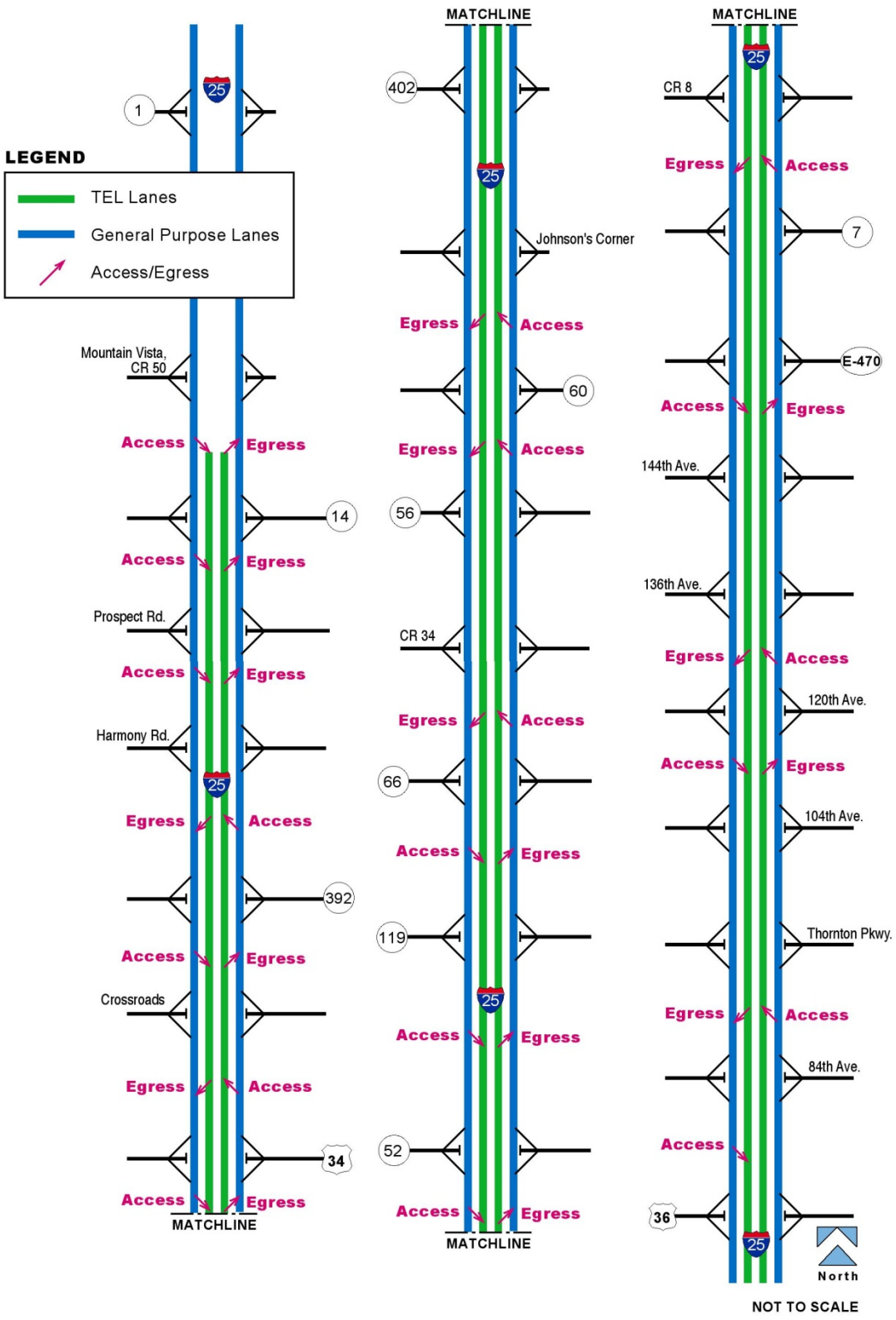
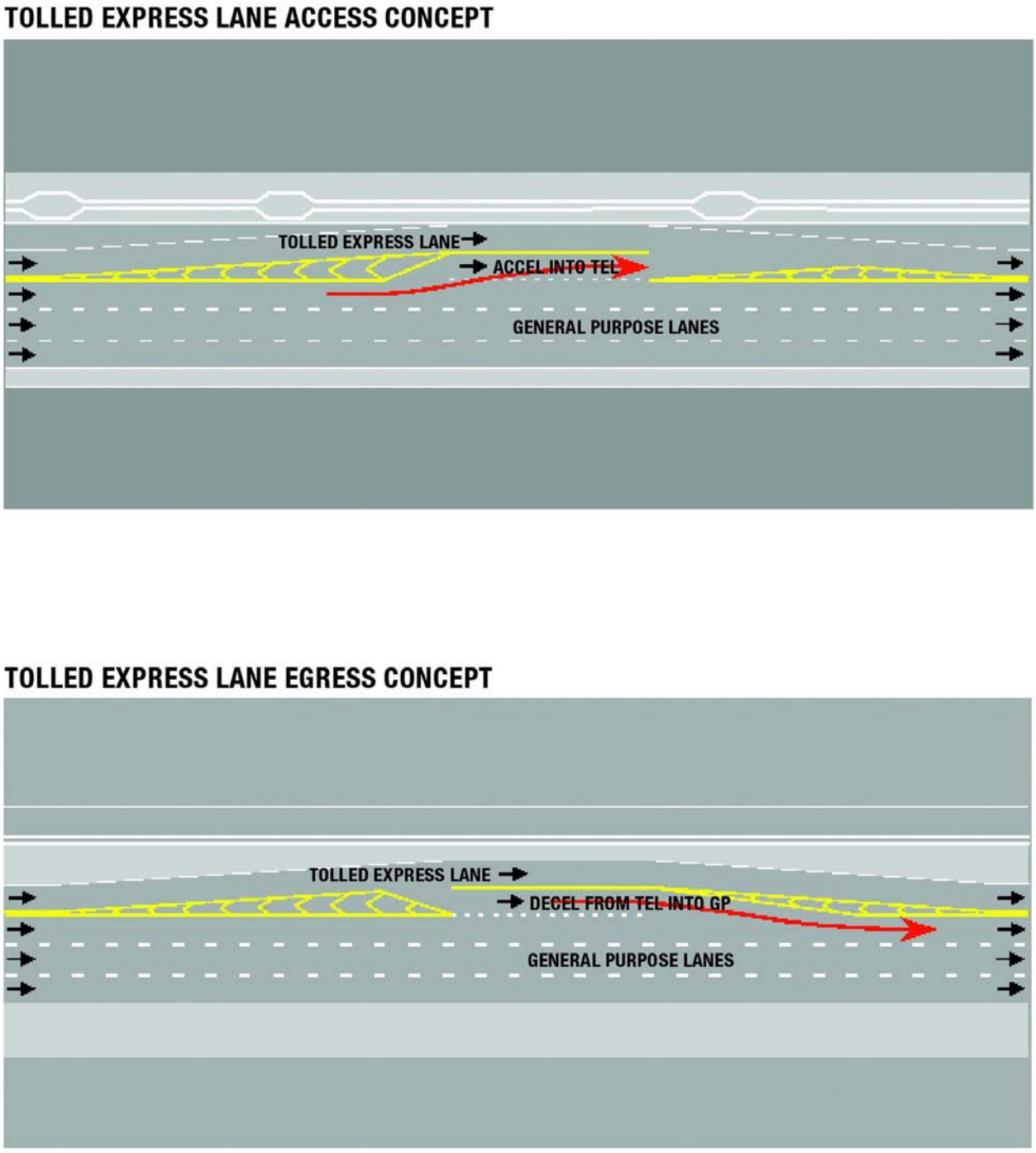


**Figure 2-31 Slip-Ramp Design Concept**




*Source: Wilbur Smith Associates 12-06*

### 2.2.3.2 PACKAGE B INTERCHANGES

Preliminary travel demand forecasts indicate that Packages A and B would have similar travel demand in 2035 north of E-470. Therefore, while the design details would be somewhat different to accommodate mainline I-25, the interchange configurations north of E-470 would be similar between the two packages. **Table 2-7** lists the interchange improvements included in Package B. Unlike Package A, Package B includes a new structure at Harmony Road and upgrades south of E-470. The differences in interchange design between the two packages are described below.

- **Harmony Road.** Unlike Package A, the wider cross section of Package B and the Preferred Alternative improvements on I-25 would require replacement of this relatively new structure.

A more detailed description of the interchange configurations considered and the screening process is included in **Section 5.2.1** of the *Alternatives Development and Screening Report* (FHU and Jacobs, 2011a). Additional information about the traffic operations evaluation of each interchange is included in the *Transportation Analysis Technical Report* (FHU and Jacobs, 2008; 2011c).

**Table 2-7 Package B Interchange Improvements Compared to No-Action**

| Existing Interchange Location | No-Action Configuration | Package B Improvement |
|---|---|---|
| SH 1 | substandard diamond | reconstructed diamond |
| Mountain Vista | substandard diamond | reconstructed diamond |
| SH 14 | substandard partial cloverleaf | reconstructed diamond |
| Prospect Road | substandard diamond | reconstructed diamond |
| Harmony Road | standard diamond | reconstructed diamond |
| SH 392 | reconstructed tight diamond | no improvement |
| Crossroads Boulevard | substandard diamond | reconstructed diamond |
| US 34 | substandard partial cloverleaf | dual directional/diamond |
| SH 402 | substandard diamond | reconstructed diamond |
| WCR 16 | substandard off ramps | reconstructed diamond |
| SH 60 | substandard diamond | reconstructed diamond |
| SH 56 | substandard diamond | reconstructed diamond |
| WCR 34 | substandard diamond | reconstructed diamond |
| SH 66 | standard diamond | no improvement |
| SH 119 | standard diamond | bridge widening |
| SH 52 | standard diamond | bridge widening |
| WCR 8 | standard diamond | reconstructed diamond |
| SH 7 | standard diamond | reconstructed diamond |
| E-470 | fully directional | no improvement |
| 144th Avenue | standard diamond | no improvement |
| 136th Avenue | standard diamond | no improvement |
| 120th Avenue | standard diamond | no improvement |
| 104th Avenue | standard diamond | no improvement |
| Thornton Parkway | standard diamond | no improvement |
| 84th Avenue | standard diamond | no improvement |

### 2.2.3.3 PACKAGE B BUS RAPID TRANSIT

**WHAT IS BUS RAPID TRANSIT?**

A transit service that combines features of a passenger rail system with the flexibility of a bus system. It can travel in an exclusive lane along an arterial street, or a managed lane, such as the tolled express lanes.

BRT services would operate from Fort Collins and Greeley to downtown Denver, utilizing the express lanes along I-25. The service from Fort Collins would begin at the South Transit Center and operate along Harmony Road in mixed traffic until accessing I-25 at its interchange with Harmony Road. In addition, BRT service would operate from Fort Collins to DIA, using Harmony Road in shared general purpose lanes to access I-25. During the peak period, there would be three buses per hour, with two going to downtown Denver and one going to DIA. During off-peak hours, buses would depart every 30 minutes with, one going to downtown Denver and one going to DIA.

Service from Greeley would begin at the 8th Street and 8th Avenue Transit Center in downtown Greeley and serve stops along US 34 in mixed traffic. It would access I-25 at US 34 and access the tolled express lanes via a slip ramp south of US 34. It then would serve the same stations along I-25 as the service from Fort Collins to downtown Denver. During peak hours, buses would depart every 20 minutes from Greeley to downtown Denver; during off-peak hours, buses would depart every 30 minutes.

Stations along I-25 would be located in the median. This configuration was chosen to make this BRT service as competitive as possible with commuter rail service. Stops on interchange ramps could instead be considered, which would reduce capital costs. “Queue jumps” (intersection and signal treatments that allow buses to bypass queues) were considered along US 34 and Harmony Road in Package B. Intersection control, traffic volumes, speed limits, road configuration, and community plans for those roads were taken into consideration when recommending locations for queue jumps. No queue jumps were included along Harmony Road because the City of Fort Collins has designated it as an enhanced travel corridor that would include undefined transit amenities. The following US 34 queue jump locations are included in Package B:

- 26th Avenue
- 28th Avenue
- 35th Avenue
- 37th Avenue
- 39th Avenue
- Country Club Access
- 43rd Avenue
- 47th Avenue
- 59th Avenue
- 71st Avenue
- Promontory Parkway
- Promontory Circle

Circulation in downtown Denver would be similar to the commuter bus route shown in **Figure 2-22** and described below. During AM peak hours, southbound buses would enter downtown Denver via the North I-25 express lanes and go into downtown using 19th Street, turning southwest on Arapahoe and providing stops at 17th and 15th Streets. From there, buses would turn right on 15th Street, left at Little Raven and proceed to Elitch Gardens to layover before making the return trip. This downtown route is similar to the route of the current Front Range Express (FREX) bus from Colorado Springs to Denver. During hours when the reversible express lane flow is headed northbound, southbound buses would enter downtown Denver via the 20th Street interchange, take 20th Street to Arapahoe, and follow the remainder of the route described above.

During the PM peak hours, northbound buses would exit downtown Denver by turning right out of Elitch Gardens onto 15th Street, turning right again to access 14th Street and eventually turning left on Lawrence Street, picking up passengers at 15th and 17th Streets, and proceeding to the I-25 HOV entrance ramp on 20th Street. During hours when the reversible express lane flow is headed southbound, northbound buses would access I-25 via the 20th Street interchange.

Planned improvements at Denver Union Station might allow these buses to access and egress the HOV lanes from 18th and 19th Streets and serve Denver Union Station via Wewatta Street. In addition, provided there is enough space, the commuter bus service also might be able to layover at Denver Union Station before making the return trip instead of traveling the extra distance to Elitch Gardens. These possible connections could be further evaluated as planning for Denver Union Station moves forward.

A transit operator has not yet been identified to operate the bus rapid transit service. However, in the southern front range a similar commuter style service is operated by the City of Colorado Springs in partnership with the other communities served. This would indicate that one of the local transit providers in the area (Greeley, Loveland and Fort Collins) could operate this service. CDOT also has authority to operate this regional transit service. In either scenario, funding to operate and maintain the service would need to be identified by the communities or by the State prior to implementation. This could happen through the identification of a service district, and implementation of sales tax, property tax or other allowable funding mechanism. This effort could be initiated by a community, the NFRMPO or by CDOT's Division of Rail and Transit. These entities could also apply for CMAQ funding to initiate service through a three-year demonstration project.

While fares have not yet been determined, it is estimated that a BRT fare may be 25 percent higher than a commuter bus fare. This would yield a rate of approximately $0.15 per mile (2009 dollars). Based on this rate, a BRT patron traveling from Fort Collins South Transit Center to downtown Denver would pay $8.70 one-way. A similar fare would be charged for a patron traveling from downtown Greeley to downtown Denver.

#### 2.2.3.4 PACKAGE B BUS RAPID TRANSIT STATIONS

BRT is proposed to travel on arterial roads and on I-25. When BRT travels on arterial roads, it would function similar to commuter bus. The BRT would load and unload passengers in the park-and-ride or at an on-street bus stop. When BRT travels on I-25, the BRT would stop at a platform located in the median of I-25. A pedestrian overpass would be provided from the median platform over I-25 to the proposed park-and-ride with the exception of SH 7 where the grade separated cross street would be utilized for pedestrian connectivity. The proposed overpass would only cross one side of I-25 but would not preclude a municipality or private developer from continuing the connection to the other side of the highway.

The station design at the South Transit Center in Fort Collins was developed before funding was committed for the South Transit Center; therefore does not incorporate the Mason Corridor South Transit Center. As detailed engineering occurs for the South Transit Center, the North I-25 EIS will coordinate with the Mason Corridor to appropriately accommodate both projects.

Conceptual station layouts are shown in **Figure 2-32** and **Figure 2-33**.

**Figure 2-32 BRT Station Layout at Windsor (Northbound Lanes with Barrier Separation)**

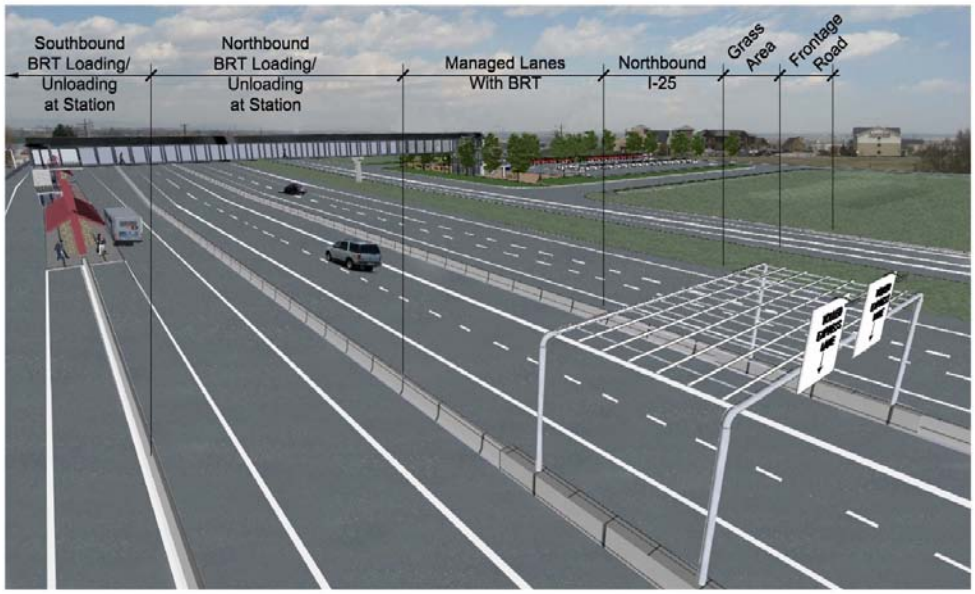
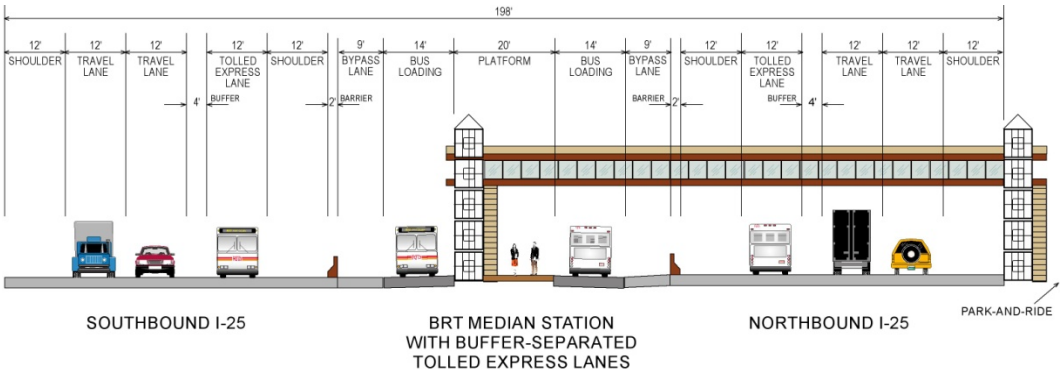



**Figure 2-33 Package B Typical BRT Station Cross Sections**




Station site selection criteria were similar to those applied to Package A commuter rail and commuter bus stations. Twenty-four potential station locations were screened down to twelve new stations and connections to three existing RTD stations. A range of three to sixteen sites were evaluated for each station location with the exception of the Fort Collins South Transit Center where one site was evaluated because the City of Fort Collins has an approved plan that identifies a location for a transit center. The South Transit Center is proposed to serve as the end of line for the Mason Street BRT system. In order to maximize ridership and access for the community it is important that the North I-25 commuter rail station connect to the proposed Mason Street BRT system. As a result of the station site evaluation, one to three preferred site(s) were identified at each station to house the platform, park-and-ride and bus activity. A more detailed description of the station sites considered and the screening process is included in **Section 2.3.6.2** of this document and a full description of the station screening process is found in the *Alternatives Development and Screening Report* (FHU and Jacobs, 2011a). As a result of the screening process, the following station sites were selected, as shown in **Table 2-8**. While bus rapid transit would serve three sites in the RTD district, no improvements or additional parking spaces are proposed as part of this EIS. Additional parking information is provided in **Section 2.2.3.8**.

## Table 2-8 Package B BRT Stations

| BRT Station/Stop | Location |
|---|---|
| South Fort Collins Transit Center* | US 287 and Harmony Road - Fort Collins |
| Harmony Road and Timberline | Fort Collins |
| I-25 and Harmony Road | Fort Collins |
| Windsor | I-25 and SH 392 |
| Crossroads Boulevard | Loveland Between Crossroads Boulevard and US 34 |
| Greeley Downtown Transfer Center | 8th Avenue and 8th Street - Greeley |
| West Greeley | US 34 and 83rd Avenue – Greeley |
| US 34 and SH 257 | US 34 and SH 257 – Greeley |
| Berthoud | I-25 and SH 56 |
| Firestone | I-25 and SH 119 |
| Frederick/Dacono | I-25 and SH 52 |
| I-25 and SH 7 | I-25 at SH 7 |
| Wagon Road | I-25 at 120th Avenue |
| Denver | Downtown Denver |
| DIA | Denver International Airport |

* Station design will be coordinated with the recently funded Mason Corridor project.

### 2.2.3.5 PACKAGE B FEEDER BUS

Package B includes four feeder bus routes that would enable riders to access BRT service from the communities located along US 85 and US 287. These services would travel:

- Along SH 257, connecting Windsor and Timnath to the BRT
- Along US 34, connecting Loveland to the BRT
- Along SH 56, US 287, and SH 119, connecting Berthoud and Longmont to the BRT
- Along SH 52, connecting Fort Lupton, the tri-town area, and Niwot to the BRT

These feeder bus services would operate every 30 minutes during AM and PM peak periods and every 60 minutes during off-peak periods and would be scheduled to coincide with BRT service when possible.

A transit operator has not yet been identified to operate the feeder bus service. Funding to operate and maintain the service would need to be identified by the communities or by the State prior to implementation. This could happen through the identification of a service district, and implementation of sales tax, property tax or other allowable funding mechanism. This effort could be initiated by a community, the NFRMPO or by CDOT's Division of Rail and Transit. These entities could also apply for CMAQ funding to initiate service through a three-year demonstration project.

### 2.2.3.6 PACKAGE B BUS MAINTENANCE FACILITY

The two potential bus maintenance facility site locations being considered in Package A also are being considered in Package B.

The BRT maintenance facility would accommodate an estimated 90 employees, including staff for the maintenance and operation of buses for both the BRT and the North I-25 feeder bus routes. Approximately 200 daily trips would be generated to and from this facility, including visitor trips. An estimated 150 bus trips, including BRT and feeder bus trips, would occur to and from the site each day. Bus trips also would be spread throughout the day with little to no bus activity during peak hours, as nearly all buses would be in service during those times.

### 2.2.3.7 PACKAGE B CONGESTION MANAGEMENT

As with Package A, congestion management measures were developed based on further analysis and coordination with agencies, as well as more specific information about traffic congestion and other conditions associated with Package B. The tolling in the tolled express lanes constitutes the primary method of congestion management with Package B. **Table 2-9** summarizes congestion management measures that were identified for Package B in addition to tolling. Additional parking information is provided in **Section 2.2.3.8**.

## Table 2-9 Package B Congestion Management Measures

| Congestion Management Strategy | Description of Application |
|---|---|
| **Local Transit Service** | Local routes would connect to BRT at the South Transit Center (Fort Collins), Harmony and Timberline (Fort Collins), the Harmony Transit Center, the Downtown Transfer Center (8th and 8th) in Greeley; Crossroads Boulevard (Jitterbug – Loveland); and SH 7 in Broomfield. |
| **Carpool and Vanpool** | Carpool/vanpool lots would be in addition to and replace the existing carpool/vanpool lots. The lots would be paved and have lighting and security cameras. These lots along I-25 would be provided at:<br>▸ SH 1<br>▸ SH 14<br>▸ Prospect Rd.<br>▸ Harmony Rd.<br>▸ SH 392<br>▸ SH 402<br>▸ SH 60<br>▸ SH 56<br>▸ SH 66<br>▸ SH 119<br>▸ SH 52<br>▸ SH 7 |
| **Incident Management Program** | Courtesy patrols – Tow trucks with fuel, coolant, air, etc. would drive up and down I-25 from SH 14 to SH 7 during peak-period travel times (6:15 AM to 8:45 AM and 3:15 PM to 6:45 PM). These vehicles would pick up debris, help stalled motorists, and assist with other incidents as needed. |
| **Signal Coordination and Prioritization** | Timing at signals at interchanges along I-25 would be optimized as part of the interchange design process. Queue jumps, including signal treatments, would be included as part of the BRT design along US 34. |
| **Ramp Metering** | Based on a CDOT Region 6 precedent and policy along the T-REX corridor, ramp meters must be installed along continuous sections of a freeway in order to prevent trip detouring. At such time when volumes dictate ramp metering along I-25, they would be recommended at the following interchanges:<br>▸ SH 14<br>▸ Prospect Rd.<br>▸ Harmony Rd.<br>▸ SH 392<br>▸ Crossroads Blvd.<br>▸ US 34<br>▸ SH 402<br>▸ SH 119<br>▸ SH 52<br>▸ WCR 8<br>▸ SH 7 |
| **Real-Time Transportation Information** | The CDOT Region 4 intelligent transportation plan would be implemented in its entirety with additional variable message signs northbound and southbound north of SH 14. |
| **Bicycle / Pedestrian Facilities** | Station areas would be designed to provide pedestrian links to the nearest local road. A 12-ft. wide multi-use path and 6-ft wide tree lawn would provide connectivity between the bus drop-off, park-and-ride and connectivity to the closest road. All stations would be designed in accordance with the accessibility standards set forth in the Americans with Disabilities Act (ADA). |
| **Travel Demand Measures** | During construction, proactive measures could be taken by the contractor to encourage use of alternative modes. |

### 2.2.3.8 PACKAGE B PARKING

Parking in Package B would be provided for BRT patrons and for carpoolers. **Table 2-10** summarized the number of parking spaces for each travel mode and the total number of spaces at each location that would be included as part of this build package.

**Table 2-10 Package B Parking Summary**

| Parking Location | BRT Station/Stops Spaces | Carpool/Vanpool Spaces | Total Spaces |
|---|---|---|---|
| SH 1 at I-25 | N/A | 80 | 80 |
| SH 14 at I-25 | N/A | 170 | 170 |
| Prospect at I-25 | N/A | 140 | 140 |
| South Fort Collins Transit Center | 70 | N/A | 70 |
| Harmony Road and Timberline | 40 | N/A | 40 |
| I-25 at Harmony | 30 | 320 | 350 |
| Windsor | 40 | 100 | 140 |
| Crossroads Boulevard | 80 | N/A | 80 |
| Greeley Downtown Transfer Center | 0 | N/A | 0 |
| West Greeley | 100 | N/A | 100 |
| US 34 and SH 257 | 40 | N/A | 40 |
| SH 402 at I-25 | N/A | 360 | 360 |
| Berthoud | 160 | 80 | 240 |
| SH 56 at I-25 | N/A | 40 | 40 |
| Firestone | 350 | 100 | 450 |
| Frederick/Dacono | 210 | 80 | 290 |
| I-25 and SH 7 | 280 | 180 | 460 |
| Wagon Road | 0 | 0 | 0 |
| Downtown Denver | 0 | 0 | 0 |
| Denver International Airport | 0 | 0 | 0 |

N/A=Not Applicable

### 2.2.3.9 OTHER PACKAGE B FEATURES

Package B would also include retaining walls, water quality ponds, and drainage structures.

#### *Retaining Walls*

Retaining walls were used in the conceptual design along highway general purpose lanes to minimize impacts to environmentally sensitive areas and existing commercial buildings/ developments.

### *Water Quality*

To conform to CDOT's MS4 permit, roadway runoff would need to be treated within urbanized areas. Using land use projections from the NFRMPO, urban areas were determined and potential treatment locations have been identified within Package B. These would be located along highways and at transit stations, maintenance facilities, and parking lots. Suggested locations for the water quality features are included in the Package B concept plans. Various methods for treating stormwater runoff, such as ponds, vaults, and infiltration basins would be considered during final design.

### *Floodplains and Drainage*

Almost all of the existing drainage structures are undersized and cannot pass the 100-year storm flows under I-25. Final design would include a detailed hydraulic analysis for each crossing. This would include addressing allowable backwater and methods for mitigating impacts to the environment.

#### 2.2.3.10 Package B Preliminary Cost Estimates

The capital cost for Package B is estimated to be approximately $1.715 billion (2009 dollars). Additionally, the I-25 roadway would continue to require ongoing maintenance and the new bus services would have annual O&M costs associated with them. The total operating and maintenance cost is estimated to be $22.5 million annually.

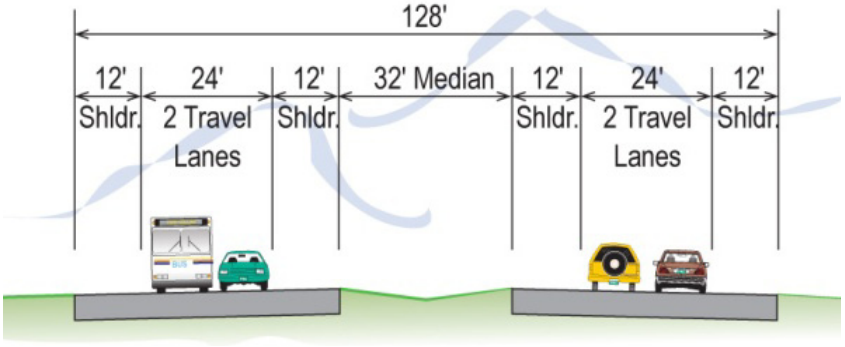
## 2.2.4 Preferred Alternative

The Preferred Alternative was developed based on the evaluation of Packages A and B, public input received during the Draft EIS and through a series of workshops held with the project's advisory committees. It is a combination of elements included and evaluated in Packages A and B. The Preferred Alternative is described below and illustrated in **Figure 2-34**.

#### 2.2.4.1 Preferred Alternative I-25 Improvements

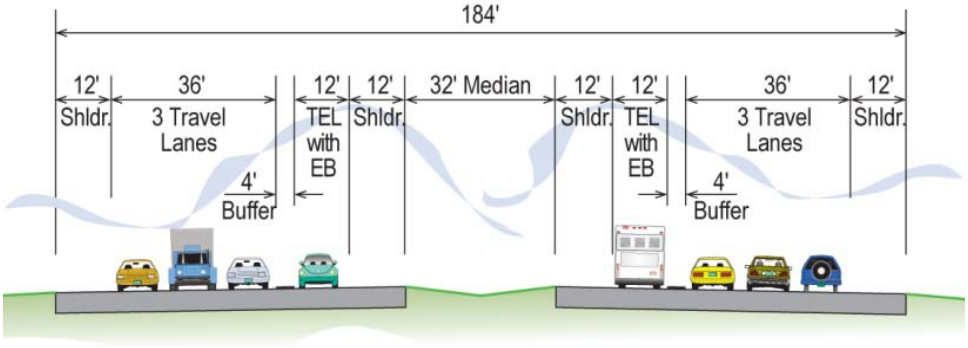
The Preferred Alternative would widen I-25 with general purpose lanes and tolled express lanes (lanes restricted to high-occupant vehicles and tolled single occupant vehicles). Substandard interchanges and frontage roads would be reconstructed or upgraded to accommodate future travel needs. A total of 555 lane miles/61 linear miles of I-25 would be reconstructed and/or widened. This section describes the I-25 improvements.

### *SH 1 to SH 14*




North of SH 14, up to SH 1, the Preferred Alternative would reconstruct I-25 to improve it to today's design standards. This reconstruction would correct the horizontal and vertical alignment, and widen both the inside and outside shoulders. The ultimate cross section would utilize some of the existing grass median but retain 32 feet (similar to the existing section of I-25 between SH 66 and SH 7). As a safety measure, a tension cable barrier would be included in all locations with a grass median.

### *SH 14 to SH 66*

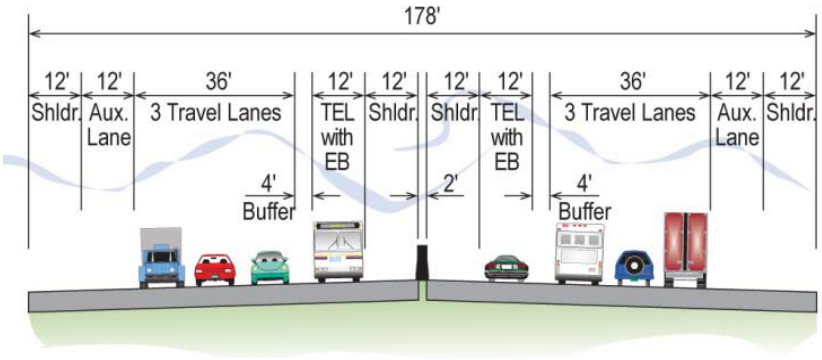



The Preferred Alternative would add one additional general purpose lane and one buffer-separated tolled express lane in each direction of I-25 from SH 14 to SH 66. The buffer-separated lanes would be separated from the general purpose lanes with a painted four-foot strip. This widening would require reconstruction of the entire cross section to correct the horizontal and vertical alignment, and widen both the inside and outside shoulders. The ultimate cross section would retain 32 feet of the existing grass median (similar to the existing section of I-25 between SH 66 and SH 7). As a safety measure, a tension cable barrier would be included in all locations with a grass median. I-25 vertical alignment modifications would be made at SH 402 and LCR 16 interchanges to improve safety. These modifications would result in SH 402 and LCR 16 traveling over the top of I-25 rather than I-25 being bridged over the cross street. At SH 56, this modification would result in I-25 traveling over SH 56.

### *SH 66 to SH 7*

The Preferred Alternative would add one buffer-separated tolled express lane in each direction of I-25 from SH 66 to SH 7. The buffer-separated lanes would be separated from the existing general purpose lanes with a painted 4-foot strip. Because this section of I-25 has recently been upgraded, the widening does not require reconstruction of the entire cross section. The widening would result in the same cross section shown between SH 14 and SH 66. The existing 32-foot grass median would be maintained. As a safety measure, a tension cable barrier would be included in all locations with a grass median.

### *SH 7 to US 36*

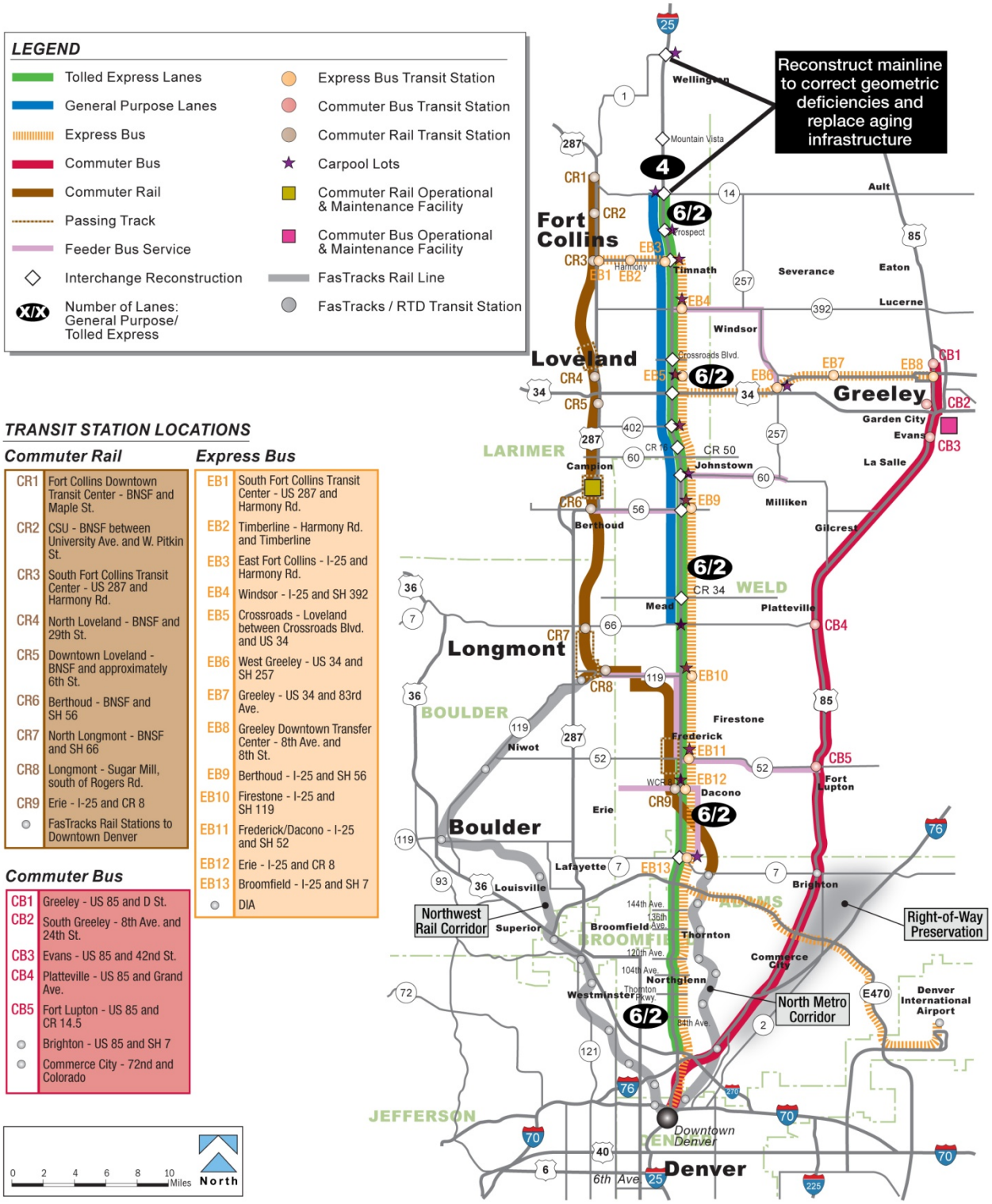



The Preferred Alternative would add one buffer-separated tolled express lane in each direction of I-25 from SH 7 to US 36. The buffer-separated lanes would be separated from the existing general purpose lanes with a painted four-foot strip. The new tolled express lanes would tie in to the existing reversible HOT lanes north of US 36. The widening does not require reconstruction of the entire cross section. However, all the widening would occur to the outside in this section because the existing cross section does not include a median. Similar to the existing cross section, northbound and southbound lanes would be separated with a concrete barrier.

### *Frontage Roads*

Frontage roads along I-25 would be rebuilt approximately where they exist today. At the interchanges, frontage roads would be relocated east or west away from the ramp terminals to address storage and safety concerns at the intersections. Along the I-25 mainline, the frontage roads would be offset 40 feet, based on current design standards. This is similar to what was included in Packages A and B.

## Figure 2-34 Preferred Alternative



### *Tolled Express Lane Operation*

The tolled express lanes would only allow high occupant vehicles and tolled single occupant vehicles. All vehicles traveling in the tolled express lanes would require a transponder unless newer technology becomes available when this is implemented. The transponder would be automatically scanned as the vehicle travels in the lane; for single-occupant vehicles the transponders would collect a toll via the credit card on file for that transponder. Transponders registered to HOVs would not be assessed a toll. There would be no toll booths and no cash would be accepted with this transponder-required system. These tolls would vary by time of day, and will be modified to manage congestion in tolled express lanes to ensure that these lanes are less congested than the general purpose lanes. **Table 2-11** summarizes the anticipated toll rate by peak direction for traffic volumes anticipated in 2035.

Access to the tolled express lanes would be provided via slip ramps connecting the general purpose lanes to the tolled express lanes. A 12-foot inside shoulder is included in the design of the tolled express lanes to enable safe and efficient enforcement along the entire corridor. Conceptual design of the access and egress to the tolled express lanes and a graphic illustrating where access and egress locations would be provided is included in the description of Package B.

The tolled express lanes would connect directly to the existing HOT lanes on I-25 that end near 84th Avenue. The existing HOT facility is a two-lane, barrier-separated, reversible operation. Both lanes flow toward downtown Denver in the AM peak period and out of downtown (northbound) in the PM peak period. Unlike the existing HOT lanes, the tolled express lanes included in this alternative would be a single, buffer-separated lane in each direction. These lanes would not be reversible in the peak periods. A slip ramp to/from the general purpose lanes is provided for the off-peak direction tolled express lanes traffic to enter or exit the tolled express lanes.

**Table 2-11 Tolled Express Lanes Toll Rates, Peak Direction Single-Occupant Vehicle (2009 dollars)**

| Location on I-25 | AM Peak Hour Southbound | PM Peak Hour Northbound |
|---|---|---|
| North of E-470 | $0.075/mi | $0.10/mi |
| South of E-470 | $0.5/mi | $0.75/mi |

Source: Wilbur Smith Associates, October 2010.

Based on this pricing, it would cost an AM peak-hour traveler $8.65 (in 2009 dollars) to use the tolled express lanes from SH 14 to US 36.

### *Preferred Alternative Interchanges*

All substandard interchanges along the corridor would be reconstructed. No new interchange locations have been identified as part of this process. **Table 2-12** lists the interchanges and their configuration included as part of the Preferred Alternative. While much effort was taken to develop interchange configurations consistent with each communities' transportation vision during the EIS process, over time the needs of the communities may change. When necessary, communities can work with CDOT and FHWA, at their own expense, to reevaluate alternative interchange configurations and intersection control options to meet their changing needs.

## Table 2-12 Preferred Alternative I-25 Interchange Configuration

| Existing I-25 Interchange Location | Preferred Alternative Improvement |
|---|---|
| SH 1 | reconstructed diamond |
| Mountain Vista | reconstructed diamond |
| SH 14 | reconstructed diamond |
| Prospect Road | reconstructed diamond |
| Harmony Road | reconstructed diamond |
| SH 392 | ramp modifications due to I-25 mainline improvements |
| Crossroads Boulevard | reconstructed diamond |
| US 34 | dual directional/diamond |
| SH 402 | reconstructed diamond |
| LCR 16 | reconstructed diamond |
| SH 60 | reconstructed diamond |
| SH 56 | reconstructed diamond |
| WCR 34 | reconstructed diamond |
| SH 66 | ramp modifications due to I-25 mainline improvements |
| SH 119 | ramp and cross-street modifications due to I-25 mainline improvements and express bus station |
| SH 52 | ramp and cross street modifications due to I-25 mainline improvements and express bus station |
| WCR 8 | no improvements |
| SH 7 | partial cloverleaf |
| E-470 | ramp modifications due to I-25 mainline improvements |
| 144th Avenue | ramp modifications due to I-25 mainline improvements |
| 136th Avenue | ramp modifications due to I-25 mainline improvements |
| 120th Avenue | ramp modifications due to I-25 mainline improvements |
| 104th Avenue | ramp modifications due to I-25 mainline improvements |
| Thornton Parkway | ramp modifications due to I-25 mainline improvements |
| 84th Avenue | ramp modifications due to I-25 mainline improvements |

13 interchanges to be fully reconstructed
11 interchanges to receive ramp and/or cross-street modifications due to I-25 mainline improvements and/or express bus stations
1 interchange requires no improvements (WCR 8)

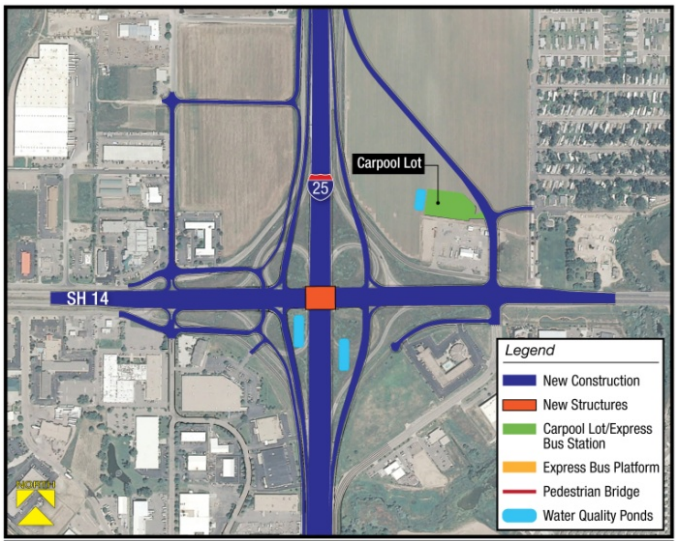
**Table 2-13** illustrates the Preferred Alternative interchange configurations and, where applicable, carpool lots, express bus stations, new structures and water quality ponds adjacent to I-25. Additional information on carpool lots and express bus stations not located along I-25 is included in subsequent sections.

## Table 2-13 Preferred Alternative Interchange Configurations

SH 1 Interchange

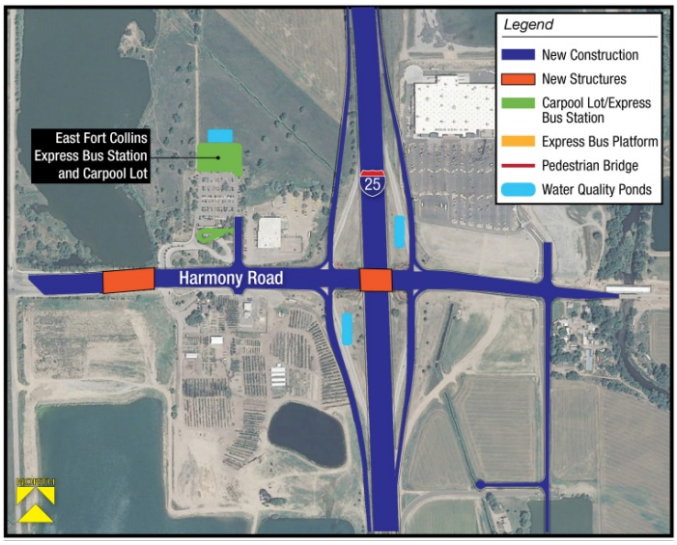
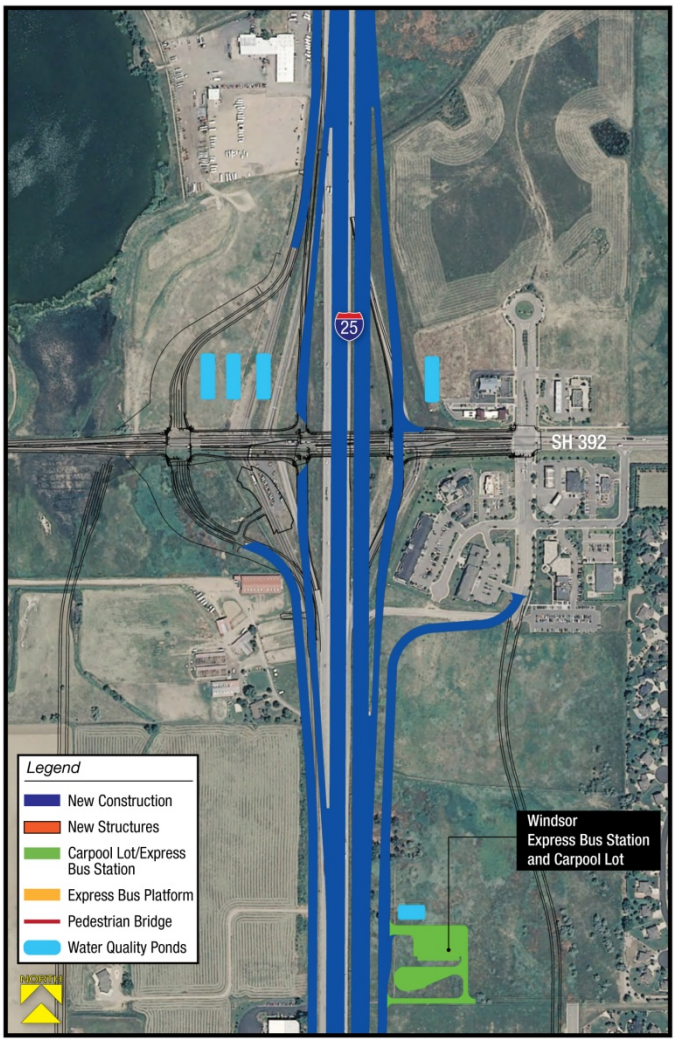

Mountain Vista Interchange


SH 14 Interchange



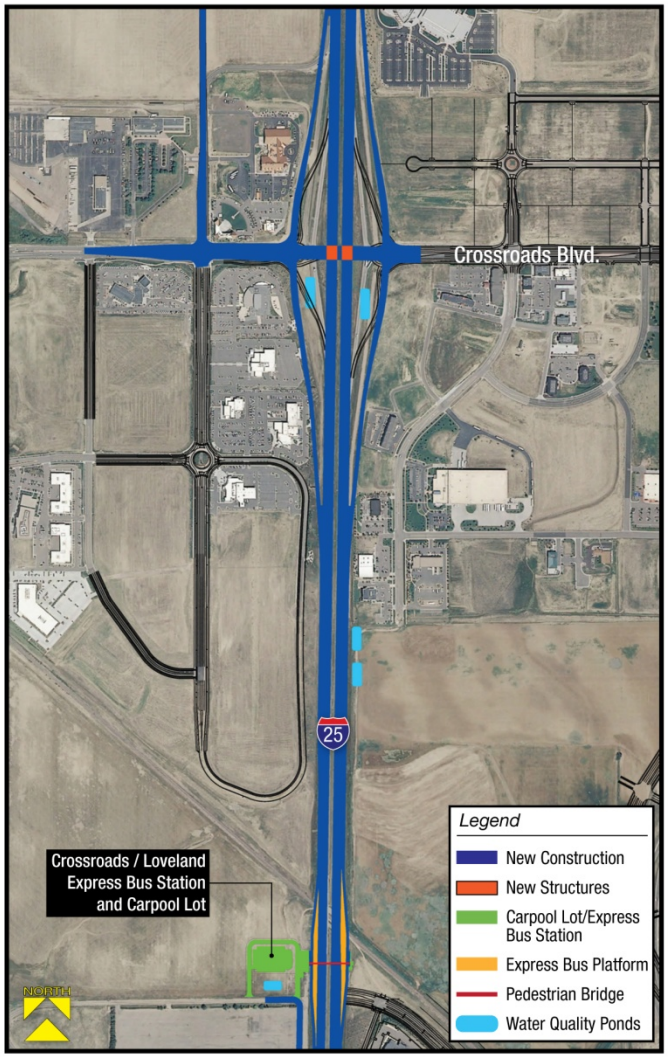

Prospect Interchange

## Table 2-13 Preferred Alternative Interchange Configurations (cont'd)

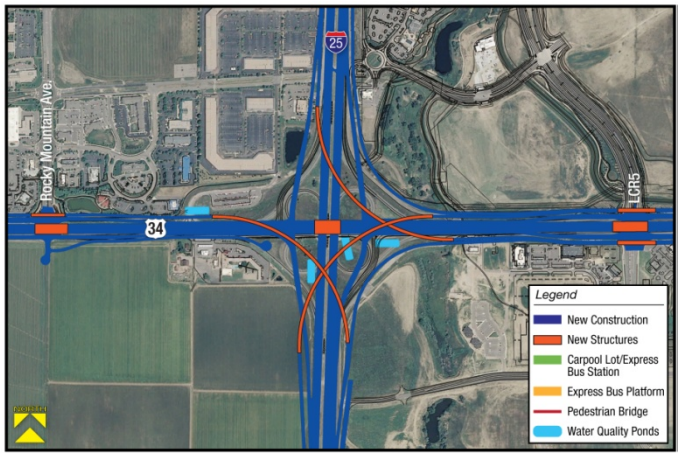
| Harmony Road Interchange | SH 392 Interchange (No-Action Improvement) |
|---|---|
|  |  |

## Table 2-13 Preferred Alternative Interchange Configurations (cont'd)

### Crossroads Interchange



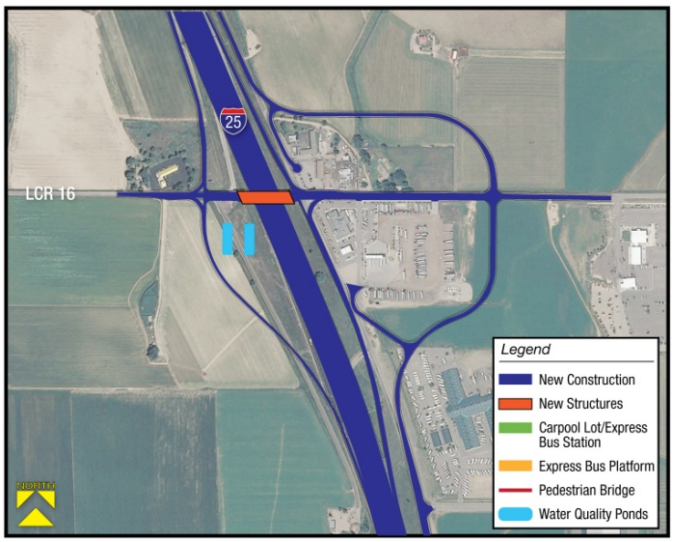

### US 34 Interchange



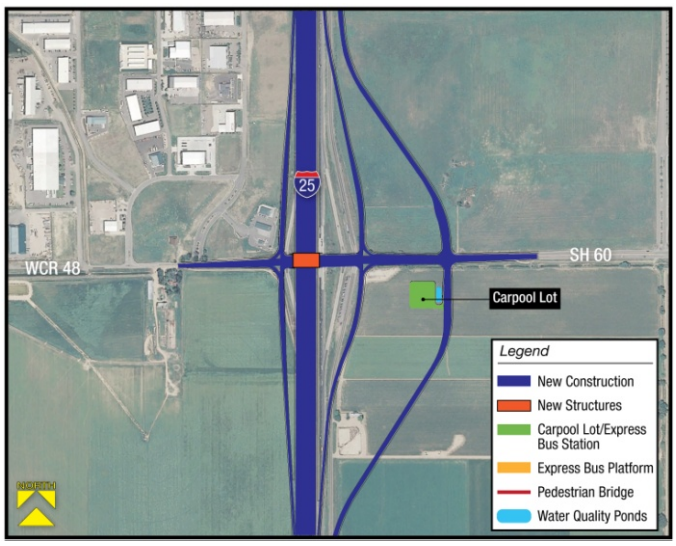

### SH 402 Interchange

**Table 2-13 Preferred Alternative Interchange Configurations (cont'd)**

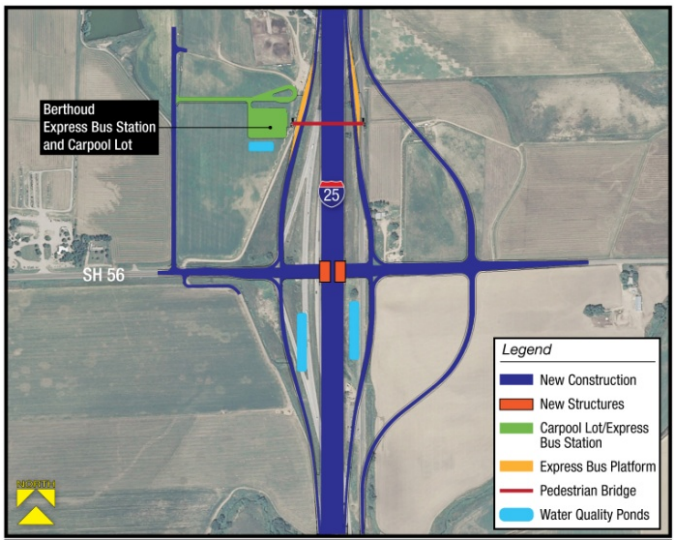
LCR 16 Interchange



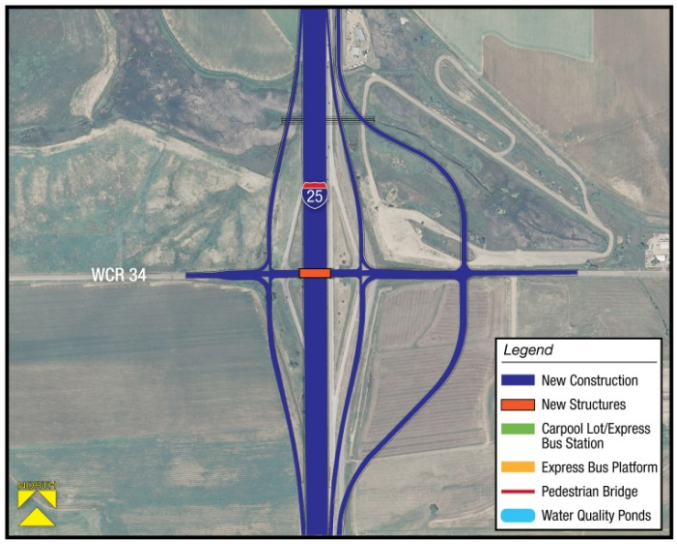

SH 60 Interchange




SH 56 Interchange



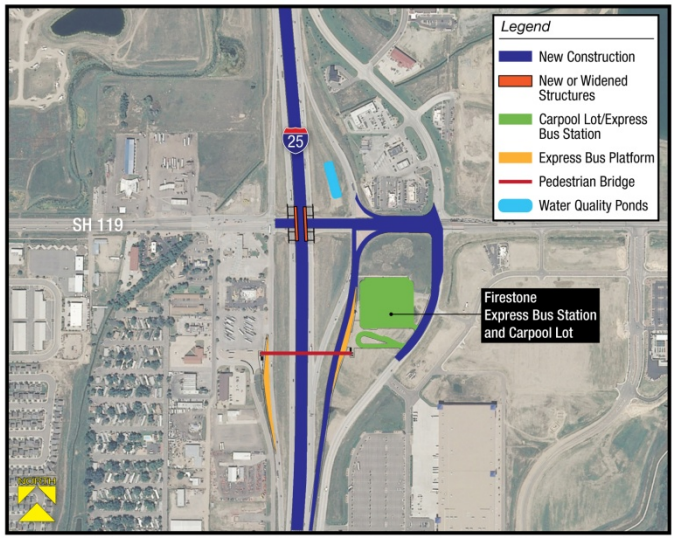

WCR 34 Interchange



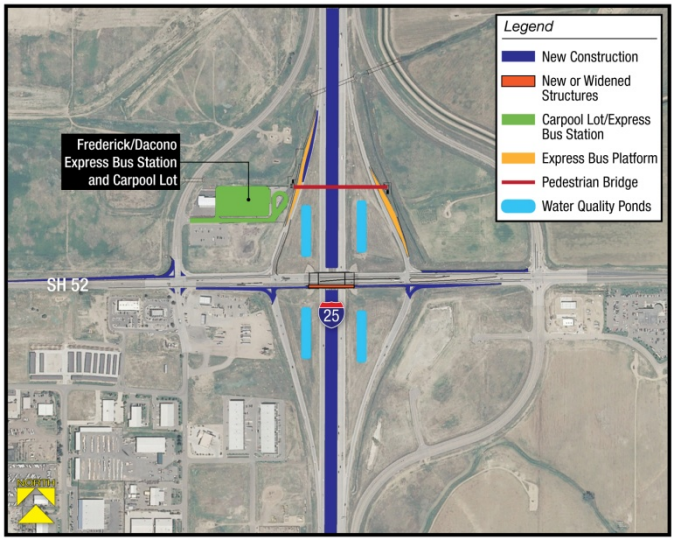
## Table 2-13 Preferred Alternative Interchange Configurations (cont'd)

SH 66 Interchange


SH 119 Interchange




SH 52 Interchange




WCR 8 Interchange

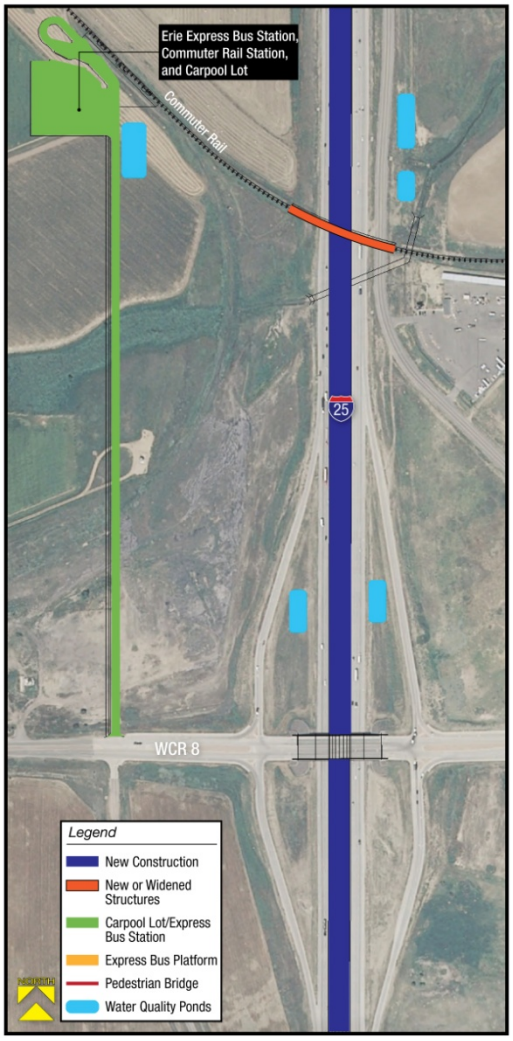
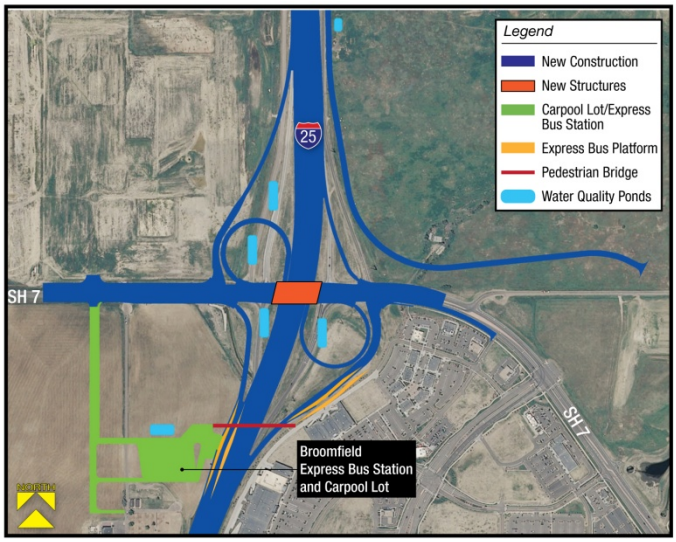
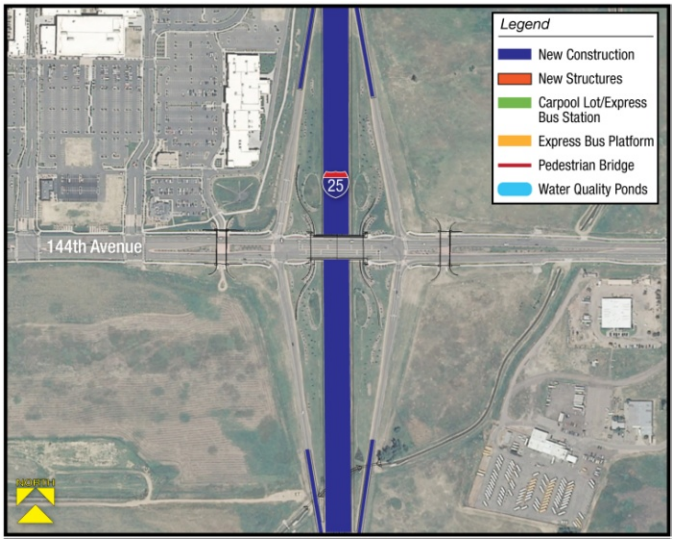


**Table 2-13 Preferred Alternative Interchange Configurations (cont'd)**

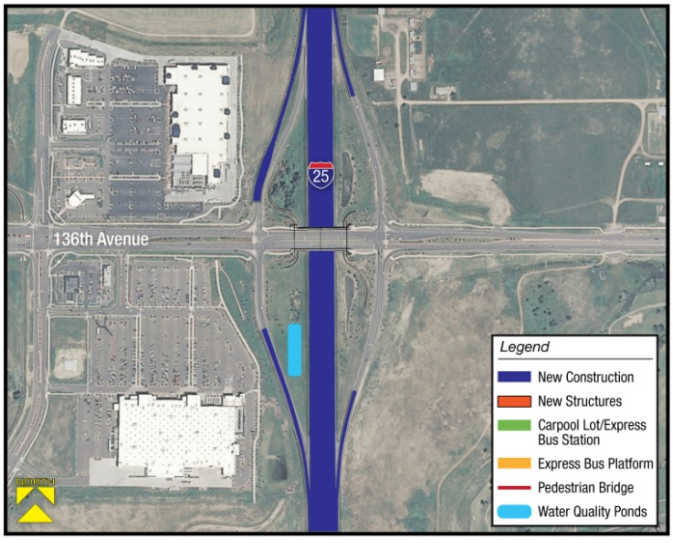
SH 7 Interchange




144th Avenue Interchange



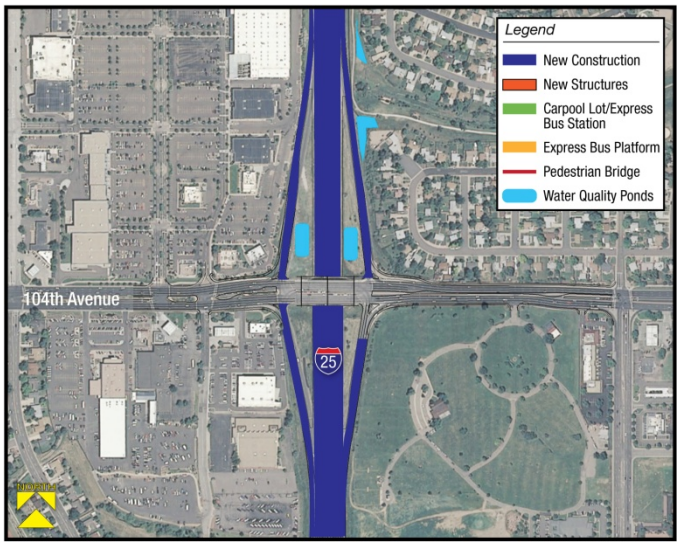

136th Avenue Interchange



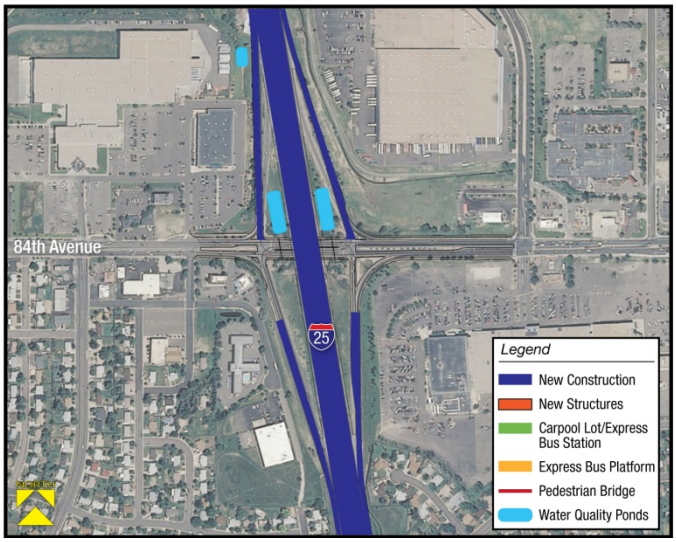

120th Avenue Interchange

## Table 2-13 Preferred Alternative Interchange Configurations (cont'd)

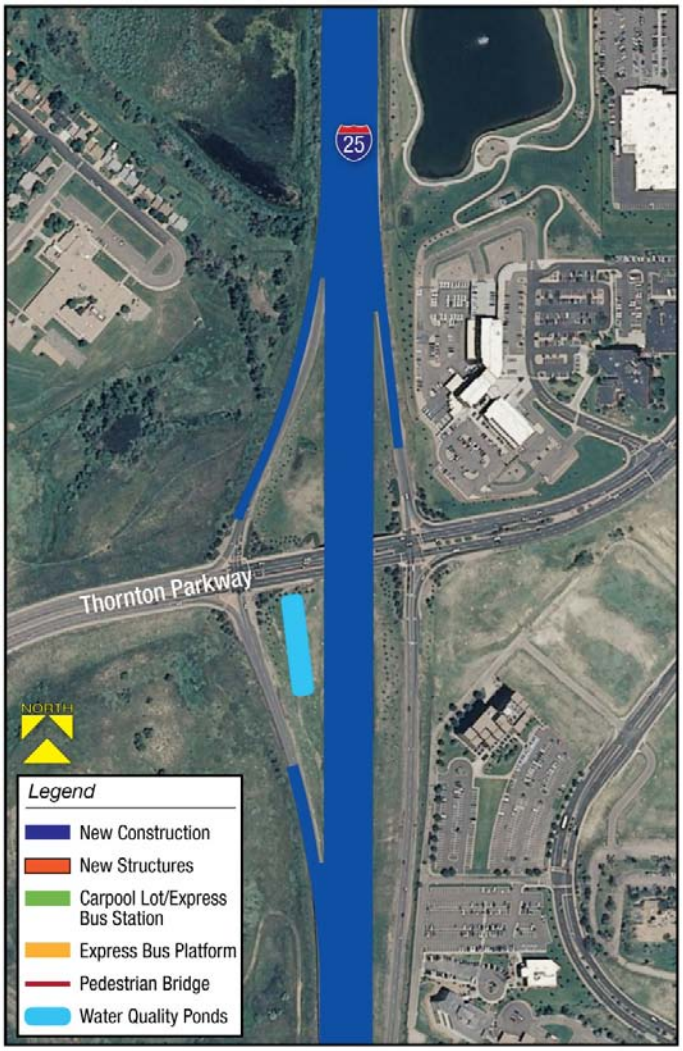
104th Avenue Interchange




84th Avenue Interchange




Thornton Parkway



### 2.2.4.2 PREFERRED ALTERNATIVE CARPOOL LOTS

Carpool lots would be located near many interchanges along the I-25 corridor to serve HOV users of the TEL. In several locations, the parking facility would be a shared facility with Express Bus stations. The carpool lots are listed in **Table 2-14**.

**Table 2-14 Preferred Alternative Carpool Parking**

| Interchange | New Carpool Parking |
|---|---|
| SH 1 | 40 spaces |
| SH 14 | 150 spaces |
| Prospect Road | 112 spaces |
| Harmony Road | Included in 350 express bus parking spaces |
| SH 392 | Included in 95 express bus parking spaces[1] |
| Crossroads Boulevard | Included in 132 express bus parking spaces |
| SH 402 | 290 spaces |
| SH 60 | 90 spaces |
| SH 56 | Included in 144 express bus parking spaces |
| SH 119 | Included in 380 express bus parking spaces |
| SH 52 | Included in 114 express bus parking spaces |
| WCR 8 | Included in 185 express bus/commuter rail parking spaces |
| SH 7 | Included in 280 express bus parking spaces |

Notes:
New carpool parking is presented. Two existing carpool parking areas at SH 66, and US 34/WCR 257 will be utilized, but no improvements are planned.
[1] When this is implemented, coordination will occur with Fort Collins to determine the exact location of this lot.

### 2.2.4.3 PREFERRED ALTERNATIVE EXPRESS BUS

Express Bus services would connect northern Colorado communities to downtown Denver and to DIA, utilizing the express lanes along I-25.

Service from Fort Collins would begin at the South Transit Center and operate along Harmony Road in mixed traffic until accessing I-25 at its interchange with Harmony Road. On I-25 the bus would utilize the tolled express lanes when possible. Throughout the day, a regional route would operate at 60 minute headways, serving the South Transit Center, the Harmony/Timberline stop, Harmony Road park and ride, SH 392, Crossroads, SH 56, SH 119, SH 52, WCR 8, and SH 7 along the way to downtown Denver. During peak periods, an express route would be initiated at the Harmony Road park and ride and operate on 30-minute headways, stopping only at SH 392, Crossroads, and SH 7 along the way to downtown Denver. No express service would be operated in the off-peak period.

**WHAT IS EXPRESS BUS?**

Express bus service is regional transit service with limited stops in order to operate faster than other bus services. This type of service typically operates on freeways or expressways. It has park and ride facilities with transit priority amenities such as slip ramps and queue jumps to improve travel time over a traditional regional bus service. When available, the service will utilize the TELs. When adjacent to a freeway, pedestrian structures provide access to park and rides from either direction of bus travel to reduce out of direction travel and improve travel time.

Service from Greeley would begin at the 8th Street and 8th Avenue Transit Center in downtown Greeley and serve stops along US 34 in mixed traffic with queue jumps at most intersections. It would access I-25 at US 34 and access the tolled express lane via a slip ramp south of US 34, and stop at SH 56 and SH 7 along the way to downtown Denver. This express route would operate on 20-minute headways during the peak periods. Off peak service would be provided via the US 85 commuter bus service described later.

A third express route pattern would originate at SH 119 and operate on 30-minute headways during the peak hours, stopping at SH 52 along the way to downtown Denver.

A fourth route would connect the commuter rail and express bus station at CR 8 to DIA. This route will operate on 60-minute headways during both the peak and off peak periods.

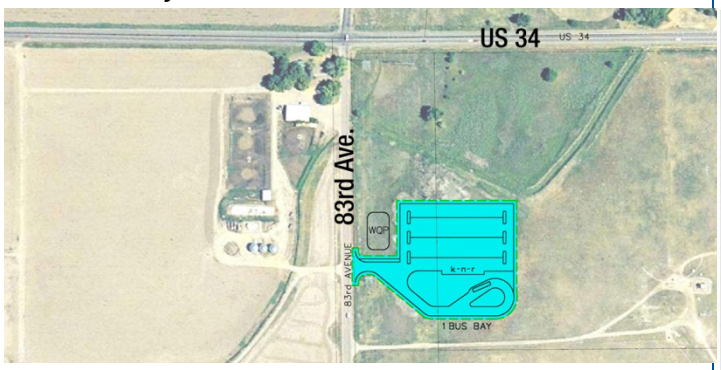
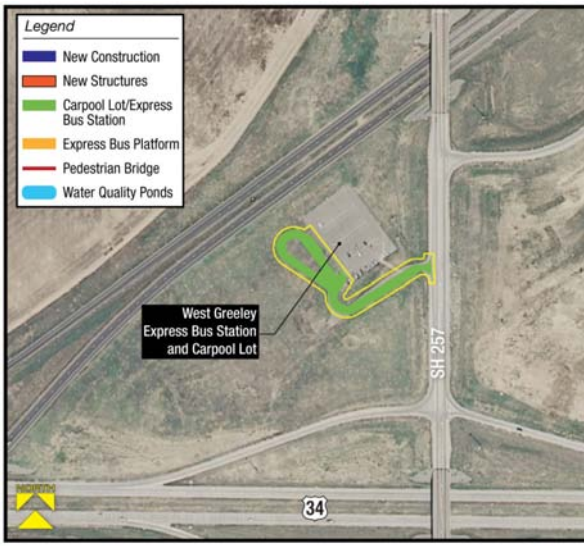
### *Preferred Alternative Express Bus Stations*

For each Express Bus station, the location, number of parking spaces, and accommodation of pedestrian movements with an overpass are described in the **Table 2-15**.

**Table 2-15 Preferred Alternative Express Bus Stations**

| | |
|---|---|
| South Transit Center*<br>(Express Bus, Commuter Rail and Mason BRT Station)<br>130 spaces<br>No Pedestrian Overpass | Harmony Road and Timberline<br>0 Spaces<br>No Pedestrian Overpass |
| I-25 and Harmony Road<br>(Expanded Harmony Road Multi-Modal Transfer Center)<br>350 Spaces<br>No Pedestrian Overpass | Windsor (SH 392)**<br>Southeast quadrant of I-25 and SH 392<br>95 Spaces<br>No Pedestrian Overpass |
| Crossroads Boulevard<br>West of I-25 and South of Crossroads Boulevard-Loveland<br>132 Spaces<br>Pedestrian Overpass | West Greeley<br>(See illustration at end of table)<br>South of US 34 and East of 83rd Avenue<br>198 Spaces<br>No Pedestrian Overpass |
| US 34 and SH 257<br>(See illustration at end of table)<br>(Existing carpool lot improved)<br>0 New Spaces<br>No Pedestrian Overpass | Berthoud (SH 56)<br>Northwest quadrant of I-25 and SH 56 interchange<br>52 Spaces<br>Pedestrian Overpass |
| Firestone (SH 119)<br>Southeast quadrant of I-25 and SH 119<br>280 Spaces<br>Pedestrian Overpass | Frederick/Dacono (SH 52)<br>Northwest quadrant of I-25 and SH 52<br>114 Spaces<br>Pedestrian Overpass |
| I-25 and SH 7<br>Southwest quadrant of I-25 and SH 7<br>280 Spaces<br>Pedestrian Overpass | I-25 and Weld County Road 8 *<br>(Express Bus and Commuter Rail Station)<br>Northwest quadrant of I-25 and WCR 8<br>185 Spaces<br>No Pedestrian Overpass |
| Downtown Denver<br>0 Spaces<br>No Pedestrian Overpass | Denver International Airport (DIA)<br>0 Spaces<br>No Pedestrian Overpass |

**Table 2-15 Preferred Alternative Express Bus Stations (cont'd)**

| West Greeley | US 34 and SH 257 |
|---|---|
|  |  |



* See **Table 2-18** Commuter Rail Stations for illustration of this station.
** Will coordinate with Fort Collins new carpool facility at this location

A transit operator has not yet been identified to operate the express bus service. However, in the southern front range a similar commuter style service is operated by the City of Colorado Springs in partnership with the other communities served. This would indicate that one of the local transit providers in the area (Greeley, Loveland and Fort Collins) could operate this service. CDOT also has authority to operate this regional transit service. In either scenario, funding to operate and maintain the service would need to be identified by the communities or by the State prior to implementation. This could happen through the identification of a service district, and implementation of sales tax, property tax or other allowable funding mechanism. This effort could be initiated by a community, the NFRMPO or by CDOT's Division of Rail and Transit. These entities could also apply for CMAQ funding to initiate service through a three-year demonstration project.

While fares have not yet been determined, it is estimated that a express bus fare may be 25 percent higher than a commuter bus fare. This would yield a rate of approximately $0.15 per mile (2009 dollars). Based on this rate, an express bus patron traveling from Fort Collins South Transit Center to downtown Denver would pay $8.70 one-way. A similar fare would be charged for a patron traveling from downtown Greeley to downtown Denver.

### *Preferred Alternative Queue Jumps*

Queue jumps would be provided for the Express Bus to improve travel time and reliability along US 34. The queue jumps typically include signal priority upgrades and sometimes include modifying an intersection or island to provide a short lane for the buses to bypass the standing queue of through vehicles. The lane is typically shared with an existing right turn lane. **Table 2-16** summarizes the Preferred Alternative queue jump locations and the planned improvement at each location.

**Table 2-16 Preferred Alternative Queue Jumps**

| Queue Jump Summary | US 34 Business Eastbound | US 34 Business Westbound |
|---|---|---|
| Promontory Circle | Use existing right turn lane as queue jump with signal priority | Use existing right turn lane as queue jump with signal priority |
| Promontory Parkway | Use existing right turn lane as queue jump with signal priority | Use existing right turn lane as queue jump with signal priority |
| 71st Avenue | Signal priority only | Signal priority only |
| 59th Avenue | Island modification to create right turn queue jump with signal priority | Island modification to create right turn queue jump with signal priority |
| 47th Avenue | Island modification to create right turn queue jump with signal priority | Use existing right turn lane as queue jump with signal priority |
| Country Club | Signal priority only | Island modification to create right turn queue jump with signal priority |
| 43th Avenue | Use existing right turn lane as queue jump with signal priority | Island modification to create right turn queue jump with signal priority |
| 39th Avenue | Use existing right turn lane as queue jump with signal priority | Use existing right turn lane as queue jump with signal priority |
| 37th Avenue | Use existing right turn lane as queue jump with signal priority | Use existing right turn lane as queue jump with signal priority |
| 35th Avenue | Island modification to create right turn queue jump | Island modification to create right turn queue jump |
| 28th Avenue | Signal priority only | Signal priority only |
| 26th Avenue | Signal priority only | Use existing right turn lane for queue jump |

### *Downtown Denver Express Bus Circulation*

During the AM peak hours, southbound buses would enter downtown Denver via the North I-25 express lanes and enter downtown using 19th Street, turning southwest on Arapahoe and providing stops at 17th and 15th Streets. From there, buses would turn right on 15th Street, left at Little Raven Street, and proceed to Elitch Gardens to layover before making the return trip. Downtown circulation is shown in **Figure 2-22**. This downtown route is similar to the route of the current Front Range Express (FREX) bus from Colorado Springs to Denver. During hours when the reversible express lane flow is headed northbound, southbound buses would enter downtown Denver via the 20th Street interchange, take 20th Street to Arapahoe, and follow the remainder of the route described above.

During the PM peak hours, northbound buses would exit downtown Denver by turning right out of Elitch Gardens onto 15th Street, turning right again to access 14th Street and eventually turning left on Lawrence Street, picking up passengers at 15th and 17th Streets, and proceeding to the I-25 HOV entrance ramp on 20th Street. During hours when the reversible express lane flow is headed southbound, northbound buses would access I-25 via the 20th Street interchange.

Planned RTD improvements at Denver Union Station might allow these buses to access and egress the HOV lanes from 18th and 19th Streets and serve Denver Union Station via Wewatta Street. In addition, provided there is enough space, the commuter bus service also might be able to layover at Denver Union Station before making the return trip instead of traveling the extra distance to Elitch Gardens. These possible connections could be further evaluated in the future.

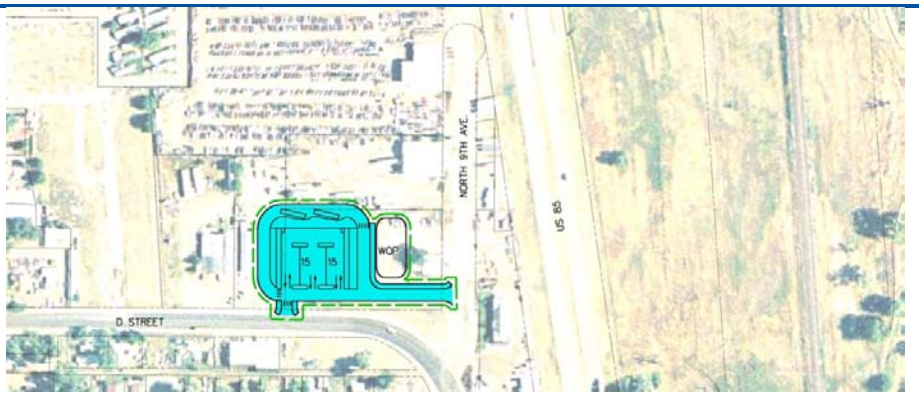
### 2.2.4.4 PREFERRED ALTERNATIVE COMMUTER BUS

The Preferred Alternative includes commuter bus service along US 85 connecting Greeley to downtown Denver. This service would operate every 60 minutes during both the peak and off peak periods.

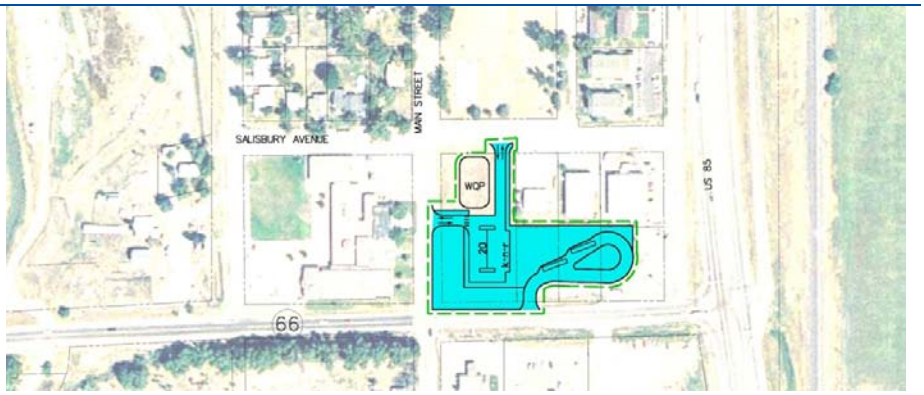
#### *Preferred Alternative Commuter Bus Stations*

Virtually all Commuter Bus station locations identified in Package A would remain the same in the Preferred Alternative. However, in Fort Lupton, the preferred Commuter Bus station site identified for inclusion in the Preferred Alternative is different than Package A. The Preferred Alternative site was considered too small for Package A and therefore infeasible. The addition of express bus on I-25 reduced parking demand for the Commuter Bus in the Preferred Alternative making this site (Site D) a viable option for the Preferred Alternative. This site was identified as the preferred location because it is compatible with existing zoning and has good accessibility from County Road 14.5. The stations are illustrated in **Table 2-17**.

**Table 2-17 Preferred Alternative Commuter Bus Stations and Stops**

| | |
|---|---|
| Greeley<br>US 85 and D Street- West of US 85 and north of D Street<br>20 Spaces |  |
| South Greeley<br>8th Avenue and 24th Street- West of 8th Avenue and south of 26th Street<br>30 Spaces |  |

## Table 2-17 Preferred Alternative Commuter Bus Stations and Stops (cont'd)

| | |
|---|---|
| Evans<br>US 85 and 42nd Street- East of US 85 and south of 42nd Street<br>30 Spaces |  |
| Platteville<br>US 85 and Grand Avenue- North of Grand Avenue and west of US 85<br>20 Spaces |  |
| Fort Lupton<br>US 85 and 14th St. (CR 14.5) - East of US 85 and South of 14th St. (CR 14.5)<br>20 Spaces |  |
| Brighton<br>US 85 and SH 7 | No parking added. Commuter Bus would use existing RTD park-n-Ride. |
| Commerce City<br>Colorado Blvd and 72nd Ave. | No parking added. Commuter Bus would use proposed RTD North Metro park-n-Ride. |
| Denver | Downtown Denver bus circulation described in Express Bus section. |

While specific fares have not been identified, a review of commuter bus systems nationwide indicates that a typical fare would be about $0.12 per mile (in 2009 dollars). Based on this rate, it would cost a rider traveling from downtown Greeley to downtown Denver approximately $6.60 one-way.

A transit operator has not yet been identified to operate the commuter bus service. However, in the southern front range a similar commuter style service is operated by the City of Colorado Springs in partnership with CDOT and the other communities served. This would indicate that one of the local transit providers in the area (Greeley, Loveland and Fort Collins) could operate this service. CDOT also has authority to operate regional transit services. In either scenario, funding to operate and maintain the service would need to be identified by the communities or by the State prior to implementation. This could happen through the identification of a service district, and implementation of sales tax, property tax or other allowable funding mechanism. This effort could be initiated by a community, the NFRMPO or by CDOT's Division of Rail and Transit. These entities could also apply for CMAQ funding to initiate service through a three-year demonstration project.

#### 2.2.4.5 Preferred Alternative Commuter Rail

The Preferred Alternative includes commuter rail transit service from Fort Collins to the planned FasTracks North Metro end-of-line. Service to Denver would travel through Longmont and along the FasTracks North Metro Corridor; a transfer would not be necessary. To reach Boulder, northern Colorado riders would transfer to the Northwest Rail Corridor at the Sugar Mill station in Longmont. For planning evaluation purposes, diesel multiple units are assumed as a vehicle technology. In recognition that rail vehicle technology is evolving rapidly, vehicle technologies will be reassessed prior to implementation of North I-25 commuter rail. In this way, interoperability with FasTracks system will be maintained.

A regional transit operator has not yet been identified to operate the commuter rail service. CDOT has authority to operated rail service. Funding to operate and maintain the service would need to be identified by the communities or by the State prior to implementation. This could happen through the identification of a service district, and implementation of sales tax, property tax or other allowable funding mechanism. This effort could be initiated by a community, the NFRMPO or by CDOT's Division of Rail and Transit.

While specific fares have not yet been identified, the typical national average commuter rail peak period fare is $0.22 per mile (2009 dollars). Based on this rate, it would cost a rider about $14.00 one way to travel from the Fort Collins South Transit Center to Denver Union Station.

One of the low-cost options examined for Package A, single tracking commuter rail, was also considered for evaluated for the Preferred Alternative. The advantage of single tracking was cost savings and a reduction of resource impacts. Analysis showed that when paired with Express Bus serving Fort Collins and the I-25 corridor, the commuter rail could be single tracked and still meet the Purpose and Need. The primary reasons for this are:

- The addition of bus service on I-25 would provide an alternate form of transportation for transit dependent riders if for some reason one service was not operable (i.e. track maintenance), improving transit service reliability in the region.
- The addition of bus service on I-25 splits travel demand in the region between the rail corridor and the express bus resulting in less demand on the commuter rail system and less long-term expansion need.

- Express Bus service would tie into the planned Fort Collins BRT route providing additional regional transit service to meet the travel demand of Fort Collins.
- There is inter-connectivity between the US 85 Commuter Bus and the I-25 Express Bus improving mobility and accessibility throughout the region.

In conclusion, the use of Express Bus to complement Commuter Rail service in the Preferred Alternative provides reliable, expandable transit service of sufficient capacity in the I-25 corridor and western communities. Together, these two services provide the reliability, expansion benefit, and capacity comparable to the double track commuter rail system evaluated in Package A.

The single tracked line would have passing track in four locations. The length of the passing track is a main factor regarding the ability to accommodate early and late arriving trains. Long passing tracks provide more flexibility. The design of the Preferred Alternative provides the longest passing track possible without impacting sensitive environmental resources.

Passing track would be located at the following four locations:

- North of the North Loveland Station between 3.0 and 5.8 miles long
- North of Berthoud Station between 2.4 and 5.7 miles long
- South of the North Longmont Station between 2.1 and 3.8 miles long
- North of the I-25/CR 8 Station between 4.6 and 7.7 miles long

RTD has recently purchased the rail ROW beginning north of the North Metro Corridor end-of-line and ending at approximately CR 8 at I-25.

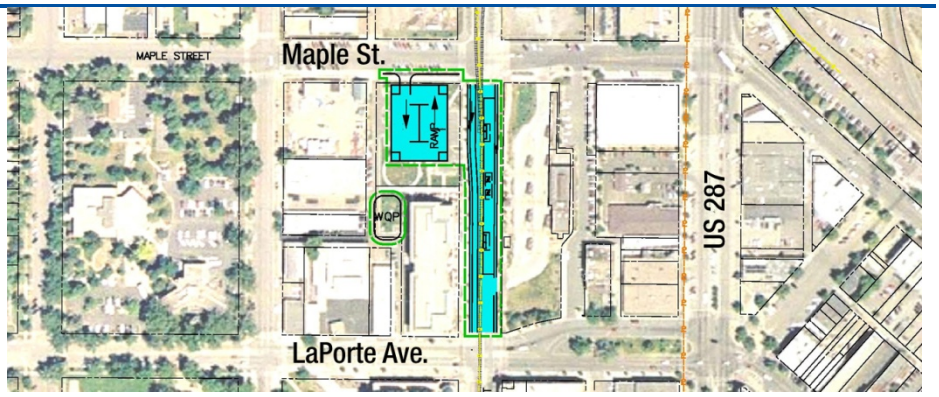
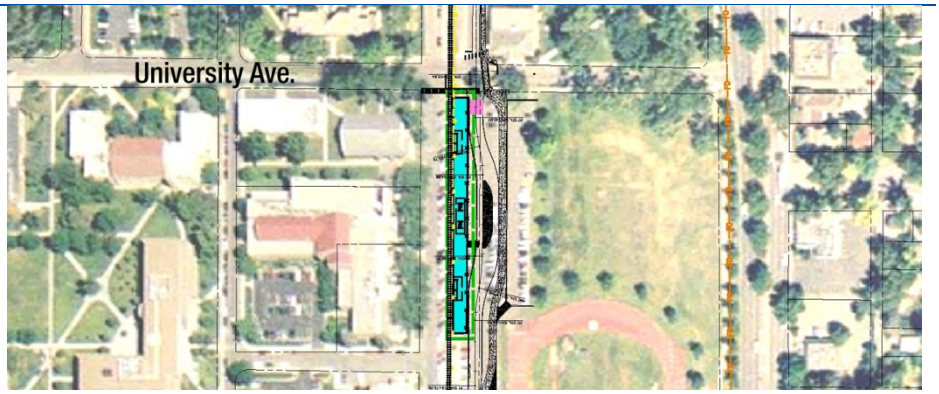
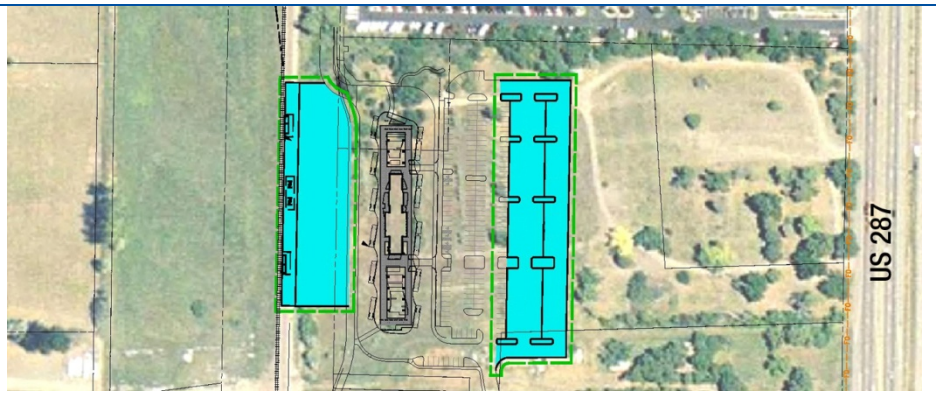
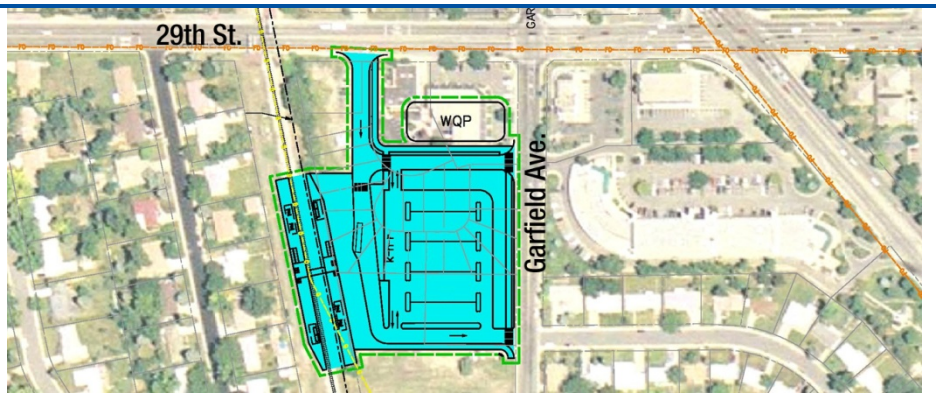
### *Preferred Alternative Commuter Rail Service Plan*

North of the South Transit Center in Fort Collins, the commuter rail would operate on 60 minute headways during both the peak and off peak periods. Between the South Transit Center and the FasTracks' North Metro end of line, rail service would be provided every 30 minutes during the peak periods and every 60 minutes during the off peak periods. The FasTracks North Metro rail line will operate on 15-minute peak period headways and 30 minute off peak headways. The North I-25 commuter rail would operate as an extension of the FasTracks North Metro service, with every other North Metro train traveling on to Fort Collins.

### *Preferred Alternative Commuter Rail Stations*

Stations would be at the same locations as the Commuter Rail service included in Package A, but the number of parking spaces provided has changed somewhat. **Table 2-18** specifies the location, number of parking spaces, and the accommodation of pedestrian movements for each commuter rail station.

## Table 2-18 Preferred Alternative Commuter Rail Stations

| | |
|---|---|
| Downtown Transit Center*<br>BNSF and Maple Street - Fort Collins<br>60 Spaces<br>No Pedestrian Overpass |  |
| Colorado State University*<br>On Mason Street south of University Avenue and West Pitkin Street<br>0 Spaces<br>No Pedestrian Overpass |  |
| South Transit Center*, **<br>Mason Street and West Fairway Lane - Fort Collins<br>130 Spaces<br>No Pedestrian Overpass |  |
| North Loveland<br>BNSF and 29th Street<br>Pedestrian Overpass<br>120 Spaces |  |

## Table 2-18 Preferred Alternative Commuter Rail Stations (cont'd)

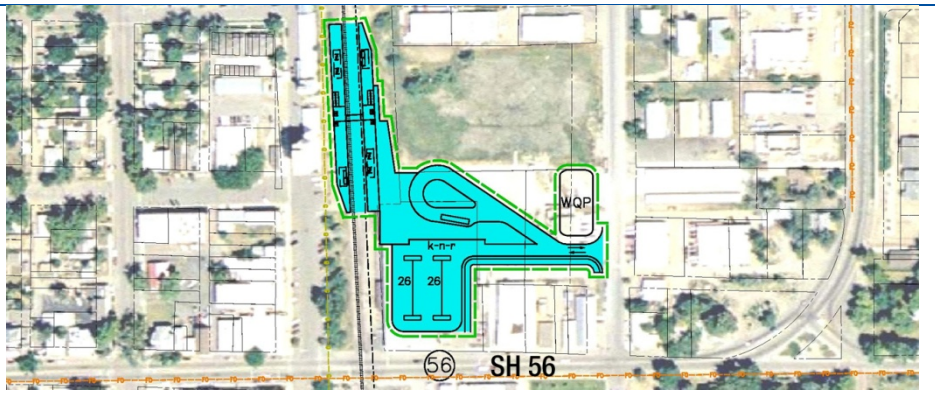
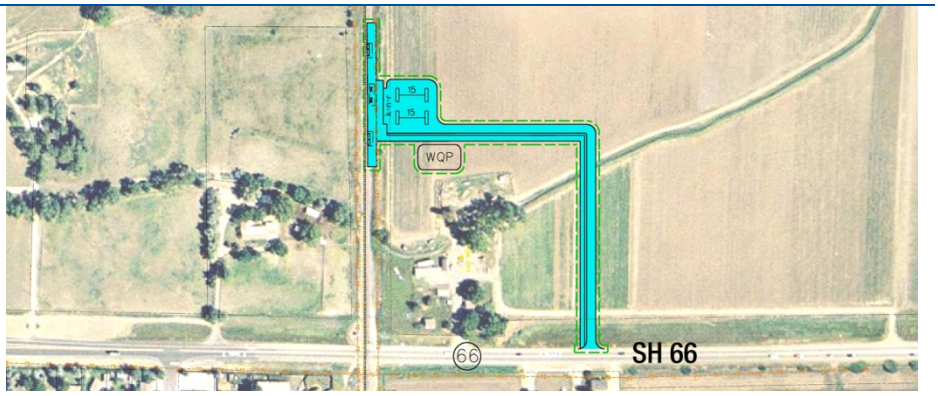
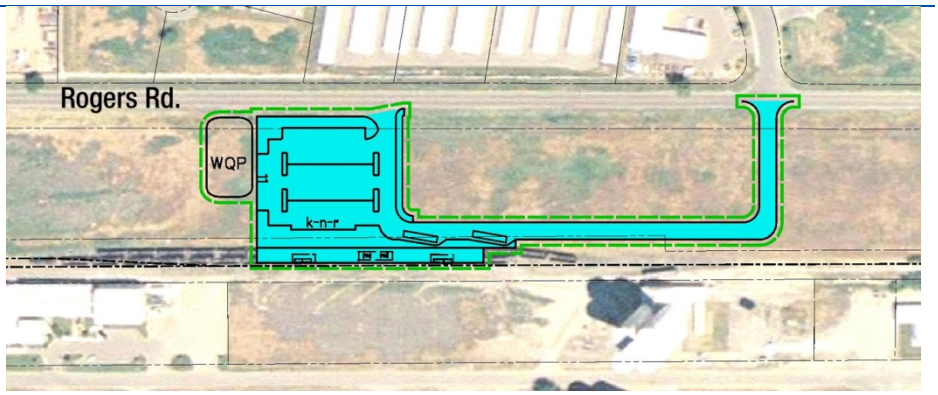
| | |
|---|---|
| Downtown Loveland<br>BNSF and approximately 6th Street<br>40 Spaces<br>No Pedestrian Overpass |  |
| Berthoud<br>East of the BNSF and north of SH 56<br>50 Spaces<br>Pedestrian Overpass |  |
| North Longmont<br>East of BNSF and north of SH 66<br>30 Spaces<br>No Pedestrian Overpass |  |
| Longmont at Sugar Mill<br>North of alignment, south of Rogers Road<br>90 Spaces<br>No Pedestrian Overpass |  |

**Table 2-18 Preferred Alternative Commuter Rail Stations (cont'd)**

| | |
|---|---|
| WCR 8**<br>NW corner of I-25 and CR 8<br>185 Spaces<br>No Pedestrian Overpass |  |
| FasTracks North Metro Corridor Stations<br>No new spaces proposed as part of this project | |

* Station design will be coordinated with the recently funded Mason Corridor project.
**Station will serve both the express bus and commuter rail service.

### *Preferred Alternative Grade Separated Crossings*

Four new grade separated crossings would be provided for the commuter rail service. Other intersection treatments would include gates or four-quadrant gates with a median. The following locations would be provided grade-separated railroad crossings of roadways:

- I-25 south of CR 8 (replaces a previous crossing)
- SH 52 and Wyndham Hill, west of I-25
- SH 119 near 3rd Avenue in Longmont
- US 287 north of Berthoud
- US 34 in Loveland (existing crossing)

A comprehensive list of grade crossings and the treatments recommended as part of the Preferred Alternative is included under the description of Package A.

### *Preferred Alternative Maintenance Road*

The BNSF railroad is requiring that commuter rail facilities utilizing BNSF track upgrade BNSF facilities to include a maintenance road where maintenance access is not available. The Preferred Alternative design includes a maintenance road parallel to the BNSF line between Longmont and Fort Collins. Commuter rail track that is not within the BNSF right of way does not include a maintenance road.

### 2.2.4.6 Preferred Alternative Maintenance Facilities

A bus maintenance facility serving both the I-25 express bus and the US 85 commuter bus would be located at 31st Street and 1st Avenue in Greeley. The facility would include staff for the maintenance and operation of buses for the US 85 commuter bus service, I-25 bus service, and the feeder bus routes.

The recommended commuter rail maintenance facility site included in the Preferred Alternative is located at LCR 10 and LCR 15 in Berthoud. The commuter rail maintenance facility would require a minimum of 30 acres, including facilities for vehicle maintenance, cleaning, fueling and storage; track maintenance; parts storage; and vehicle operator facilities. The commuter rail maintenance facility would employ an estimated 90 workers.

### 2.2.4.7 Preferred Alternative Feeder Bus

Local bus service would be provided to enable local riders to access the commuter rail and express bus regional services. The feeder services would operate hourly, timed to meet the regional services. Four routes would operate as follows:

- Along SH 257 and SH 392 connecting the Windsor and Timnath communities to I-25 Express Bus
- Along SH 60 and SH 56 connecting the Milliken, Johnstown and Berthoud communities to Express Bus on I-25 and Commuter Rail in Berthoud
- Along SH 52 and SH 119 connecting the Fort Lupton, Dacono, Frederick, Firestone and Longmont communities with Express Bus on I-25 and Commuter Rail in Longmont
- Along CR 8 connecting the Erie and Broomfield communities with Express Bus on I-25 and Commuter Rail in Erie

CDOT has the authority to operate this service, but a transit operator has not been identified to operate the feeder bus service at this time. Funding to operate and maintain the service would need to be identified by the communities or by the State prior to implementation. This could happen through the identification of a service district, and implementation of sales tax, property tax or other allowable funding mechanism. This effort could be initiated by a community, the NFRMPO or by CDOT's Division of Rail and Transit. These entities could also apply for CMAQ funding to initiate service through a three-year demonstration project.

### 2.2.4.8 Preferred Alternative Congestion Management

As with Package A and Package B, congestion management measures were developed based on further analysis and coordination with agencies, as well as more specific information about traffic congestion and other conditions associated with the Preferred Alternative. The tolling in the TEL constitutes the primary method of congestion management with the Preferred Alternative. **Table 2-19** summarizes congestion management measures that were identified for the Preferred Alternative in addition to tolling.

## Table 2-19 Preferred Alternative Congestion Management Measures

| Congestion Management Strategy | Description of Application |
|---|---|
| **Local Transit Service** | Local routes would connect to the Express Bus at the South Transit Center (Fort Collins), Harmony and Timberline (Fort Collins), the Harmony Transit Center, the Downtown Transfer Center (8th and 8th) in Greeley; Crossroads Boulevard (Loveland); SH 7 in Broomfield; and Sugar Mill in Longmont. |
| **Carpool and Vanpool** | Carpool/vanpool lots would be in addition to and replace the existing carpool/vanpool lots. The lots would be paved and have lighting and security cameras. These lots along I-25 would be provided at:<br>▸ SH 1<br>▸ SH 14<br>▸ Prospect Rd.<br>▸ Harmony Rd.*<br>▸ SH 392*<br>▸ Crossroads Blvd.*<br>▸ US 402<br>▸ SH 60<br>▸ SH 56*<br>▸ SH 119*<br>▸ SH 52*<br>▸ WCR 8*<br>▸ SH 7*<br>*Carpool lot combined with express bus station parking. |
| **Incident Management Program** | Courtesy patrols – Tow trucks with fuel, coolant, air, etc. would drive up and down I-25 from SH 14 to SH 7 during peak-period travel times (6:15 AM to 8:45 AM and 3:15 PM to 6:45 PM). These vehicles would pick up debris, help stalled motorists, and assist with other incidents as needed. |
| **Signal Coordination and Prioritization** | Timing at signals at interchanges along I-25 would be optimized as part of the interchange design process. Queue jumps, including signal treatments, would be included as part of the Express Bus design along US 34. |
| **Ramp Metering** | Based on a CDOT Region 6 precedent and policy along the T-REX corridor, ramp meters must be installed along continuous sections of a freeway in order to prevent trip detouring. At such time when volumes dictate ramp metering along I-25, they would be recommended at the following interchanges:<br>▸ SH 14<br>▸ Prospect Rd.<br>▸ Harmony Rd.<br>▸ SH 392<br>▸ Crossroads Blvd.<br>▸ US 34<br>▸ SH 402<br>▸ SH 119<br>▸ SH 52<br>▸ WCR 8<br>▸ SH 7 |
| **Real-Time Transportation Information** | The CDOT Region 4 intelligent transportation plan would be implemented in its entirety with additional variable message signs northbound and southbound north of SH 14. (Detailed locations to be developed.) |
| **Bicycle / Pedestrian Facilities** | Station areas would be designed to provide pedestrian links to the nearest local road. A 12-ft. wide multi-use path and 6-ft. wide tree lawn would provide connectivity between the bus drop-off, park-and-ride and connectivity to the closest road. All stations would be designed in accordance with the accessibility standards set forth in the Americans with Disabilities Act (ADA). |
| **Travel Demand Measures** | During construction, proactive measures could be taken by the contractor to encourage use of alternative modes. |

#### 2.2.4.9 OTHER PREFERRED ALTERNATIVE FEATURES

The Preferred Alternative would also include retaining walls, water quality ponds, and drainage structures.

***Retaining Walls***

Retaining walls were used in the conceptual design along I-25 to minimize impacts to environmentally sensitive areas and existing commercial buildings/ developments.

***Water Quality***

To conform to CDOT's MS4 permit, roadway runoff would need to be treated within urbanized areas. Using land use projections from the NFRMPO, urban areas were determined and potential treatment locations have been identified within the Preferred Alternative. These would be located along highways and at transit stations, maintenance facilities, and parking lots. Suggested locations for the water quality features are included in the Preferred Alternative concept plans. Various methods for treating stormwater runoff, such as ponds, storm ceptors, and infiltration basins would be considered during final design.

***Floodplains and Drainage***

Almost all of the existing drainage structures are undersized and cannot pass the 100-year storm flows under I-25. The Preferred Alternative final design will include a detailed hydraulic analysis for each crossing. This would include addressing allowable backwater and methods for mitigating impacts to the environment.

## 2.2.5 Preliminary Opinions of Probable Cost Comparison

Preliminary opinions of probable costs for the No-Action Alternative, Package A, Package B and the Preferred Alternative are compared in **Table 2-20.** Capital costs include construction of the alternative; purchase of transit vehicles; and, where appropriate, purchase of toll collection and enforcement equipment. Annualized capital estimates are over a 30-year period. O&M costs include annual costs of operating transit, toll collection and enforcement, and maintenance of general purpose lanes. All costs are presented in 2009 dollars. Costs presented do not take into account anticipated toll or transit revenues. Toll and transit revenues are presented in **Chapter 6** *Financial Analysis Section 6.3 Revenue Projections.* As shown in **Table 2-20**, the capital cost of the Preferred Alternative is approximately 11 percent higher than Package A and 27 percent higher than Package B. Additionally, the cost to operate the commuter rail service annually is over $30 million compared to the BRT system included in Package B, which would have annual O&M costs of approximately than $12 million.

**Table 2-20 Preliminary Opinion of Probable Costs**

| | Cost in millions (2009 dollars) | | | |
|---|---|---|---|---|
| **Cost Element** | **No-Action** | **Package A** | **Package B** | **Preferred Alternative** |
| Bus Rapid Transit with Feeder Bus | 0 | 0 | $126 | $0 |
| Express Bus | 0 | 0 | 0 | $114 |
| Commuter Rail with Feeder Bus* | 0 | $848 | 0 | $649 |
| Commuter Bus | 0 | $18 | 0 | $12 |
| General Purpose Lanes | $57 | $1,097 | $1,192 | $1,052 |
| Tolled Express Lanes | 0 | 0 | $397 | $351 |
| **Total:** | **$57** | **$1,963** | **$1,715** | **$2,178** |
| **Annualized Capital** | **No-Action** | **Package A** | **Package B** | **Preferred Alternative** |
| Bus Rapid Transit with Feeder Bus | 0 | 0 | $1.02 | 0 |
| Express Bus | 0 | 0 | 0 | $9.2 |
| Commuter Rail with Feeder Bus* | 0 | $68 | 0 | $52.4 |
| Commuter Bus | 0 | $1.5 | 0 | $1 |
| General Purpose Lanes | $4.6 | $88.5 | $96.2 | $84.9 |
| Tolled Express Lanes | 0 | 0 | $32 | $28.3 |
| **Total:** | **$4.6** | **$158.4** | **$138.4** | **$175.8** |
| **Annual O&M** | **No-Action** | **Package A** | **Package B** | **Preferred Alternative** |
| Bus Rapid Transit with Feeder Bus | 0 | 0 | $12 | 0 |
| Express Bus | 0 | 0 | 0 | $5.1 |
| Commuter Rail with Feeder Bus* | 0 | $33.6 | 0 | $33.7 |
| Commuter Bus | | $4.7 | 0 | $2.1 |
| General Purpose Lanes | $5.8 | $6.7 | $8.5 | $9 |
| Tolled Express Lanes | 0 | 0 | $1.8 | $1.8 |
| **Total:** | **$5.8** | **$45** | **$22.5** | **$51.7** |

* US 85 Commuter Bus service to DIA included in Package A only.

** Package B BRT estimates include feeder bus. Feeder bus is included in commuter rail costs in Package A and the Preferred Alternative.

## 2.3 OTHER ALTERNATIVES CONSIDERED

This section describes the development of the primary transportation improvements in Packages A and B through the evaluation and screening process as well as the development of the Preferred Alternative. The development and screening are described in detail in *Alternatives Development and Screening Report* (FHU and Jacobs, 2011a). However, to simplify presentation of the process and its outcomes, results of the development and screening process are summarized below in a series of four primary questions and responses:

- Where should alternatives begin and end?
- What alignments should be used?
- What highway facility type and transit mode should be selected?
- How do the transit and highway alternatives fit together?

## 2.3.1 Question 1: Where should alternatives begin and end?

Various northern and southern endpoints were analyzed for both the transit and highway components to determine the project's "logical termini." The main considerations were the alternatives' accessibility to and from major population centers in the regional study area (shown in **Figure 2-35**), and the alternatives' potential connections to other facilities and services, as discussed in **Section 2.1.3**. Major population centers on the northern end included Fort Collins, Loveland, and Greeley, as shown. By contrast, there are several southern population centers, and the trip patterns destined to them from areas north of SH 66 are very diverse. Therefore, selecting the southern terminus depended less on population concentrations and more on connecting transportation facilities and services.

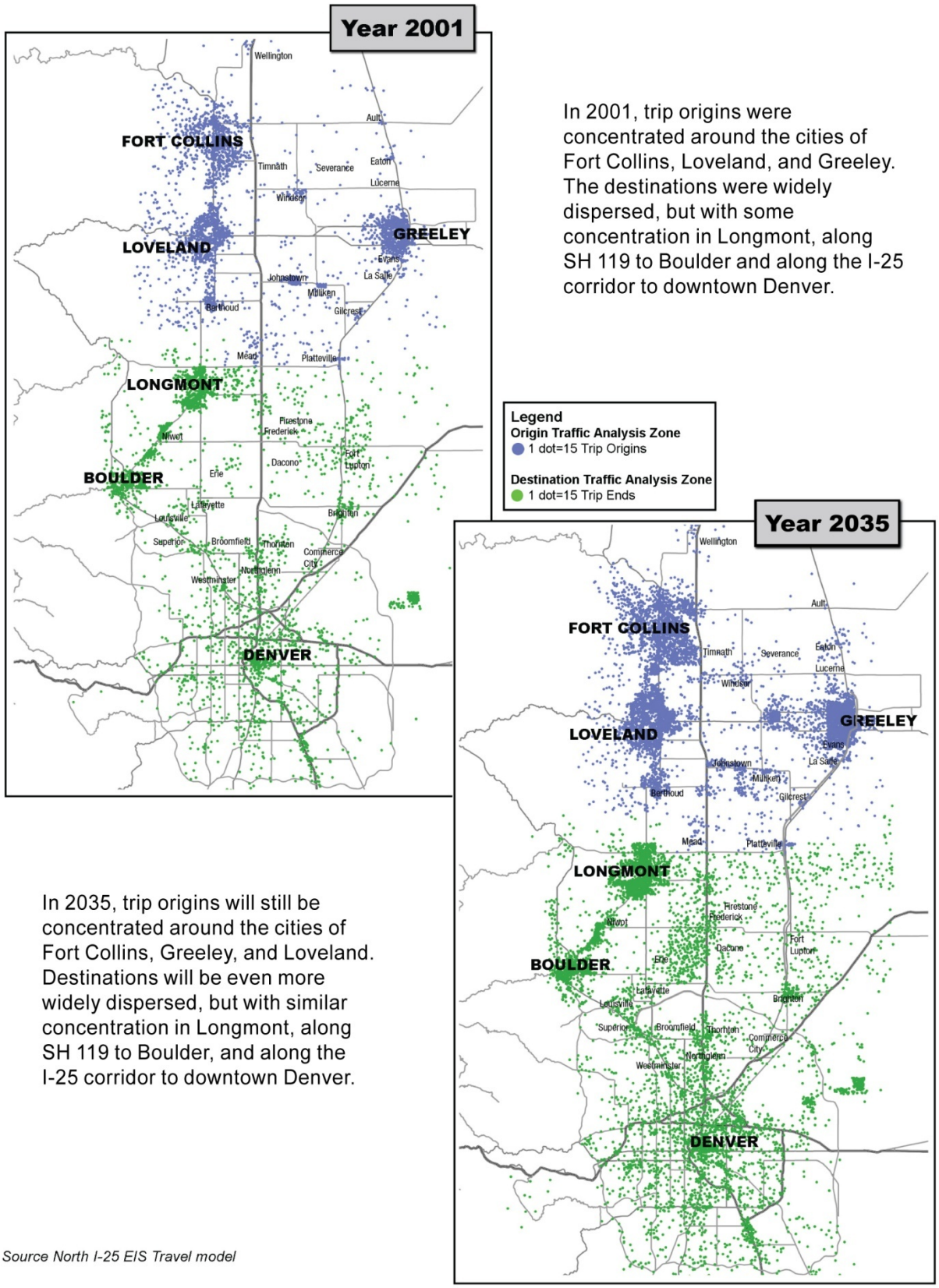
### 2.3.1.1 HIGHWAY TERMINI

The following logical termini were established based on the project's purpose and need and a review of travel patterns, roadway volumes, travel time, land use, population growth, employment growth, and travel modes:

- While traffic volumes drop off noticeably north of SH 14, a northern highway terminus of Wellington (SH 1) was selected to address existing safety concerns between SH 14 and SH 1. Improvements north of SH 14 would address the existing safety concerns but would not add capacity to this stretch of I-25. A 2002 household survey by the North Front Range MPO indicated that only a small portion of trips have destinations north of Wellington.

Two different southern termini were established based on the different lane types being considered. For highway improvements focused on high-occupancy vehicles, such as HOT or HOV lanes, a southern terminus of US 36 was found to provide the best continuity of travel by providing a direct connection to the existing HOT reversible facility in the Denver metro area that currently has a northern terminus near US 36/84th Avenue. Terminating the lanes north of the exiting HOT facility would require users to exit the manage lanes and travel on the general purpose lanes on the section of I-25 with the slowest travel speeds. This would result in reducing the overall demand and possible revenue to proposed HOV and HOT lanes. For traditional toll and general purpose lane improvements, a southern terminus of E-470 (and the Northwest Parkway) was identified. This terminus would address the northern Colorado auto travel patterns that distribute throughout the Denver metro area with a limited volume actually continuing on to downtown Denver. In addition, it provides independent utility, and it would not preclude consideration of other reasonably foreseeable transportation improvements along the corridor.

1 **Figure 2-35 Origins and Destinations from North Front Range to South of SH 66**




In 2001, trip origins were concentrated around the cities of Fort Collins, Loveland, and Greeley. The destinations were widely dispersed, but with some concentration in Longmont, along SH 119 to Boulder and along the I-25 corridor to downtown Denver.

In 2035, trip origins will still be concentrated around the cities of Fort Collins, Greeley, and Loveland. Destinations will be even more widely dispersed, but with similar concentration in Longmont, along SH 119 to Boulder, and along the I-25 corridor to downtown Denver.

*Source North I-25 EIS Travel model*

2

### 2.3.1.2 TRANSIT TERMINI

Various forms of both bus and rail technologies were considered for the North I-25 EIS, which influenced how the end-of-line locations were selected.

- **Northern Terminus.** The logical northern terminus would need to demonstrate accessibility by the projects' main population centers: Fort Collins, Greeley, and Loveland. Communities decrease substantially in size north of these communities. In addition, Fort Collins, Greeley, and Loveland have local transit services and facilities that new transit services could connect to, where multi-modal ends of line would provide greater accessibility for passengers. A northern transit terminus of SH 14 was found to adequately address multi-modal transportation opportunities in northern Colorado.
- **Southern Terminus.** Denver's RTD has committed funding for two commuter rail lines that extend into the regional study area through the FasTracks program, a referendum that funded the extensive passenger rail expansion program that will include service to Longmont and Thornton, among other corridors. Consequently, the North I-25 project focused on providing service to points with maximum transit connectivity without duplicating or competing for service, and all rail alternatives were designed to either end or begin coordinating with RTD service at the FasTracks corridors' ends-of-line, which terminate at Denver Union Station. Because the FasTracks rail corridors end in downtown Denver, bus alternatives also were designed to end in downtown Denver, in order to provide comparable end-of-line services and amenities to the rail alternatives. Terminating bus service north of downtown Denver would result in longer travel time for bus riders and a transfer which would result in a substantial reduction in bus ridership.

#### OUTCOME OF QUESTION 1: WHERE SHOULD ALTERNATIVES BEGIN AND END?

The need to address mobility needs, replace aging infrastructure and address safety concerns necessitated that capacity improvements extend north to Fort Collins and safety improvements on I-25 extend north to SH 1.

The need to provide accessibility screened out transit options that did not connect northern Colorado communities to the Denver metro area, such as the North Front Range Rail Loop.

The effect of the termini on the project had the following outcomes:

- General purpose lanes and toll lane alternatives need to connect to E-470 as a southern terminus to distribute northern Colorado auto travelers throughout the Denver metro area
- HOV and HOT alternatives need to connect to the HOT facility at US 36 as a southern terminus to be a competitive travel mode and provide a facility for BRT/express bus improvements
- Highway widening needs to extend north to SH 14 as a northern terminus
- Highway safety improvements need to extend to SH 1 to address current safety concerns
- Transit alternatives need to connect to existing and planned transit services
- Transit alternatives need to serve a major transit destination(s) such as downtown Denver and DIA
- Transit alternatives need to connect to the northern population centers of Fort Collins and Greeley to attract ridership

## 2.3.2 Question 2: What alignment(s) should be used?

Various north/south alignments along existing transportation corridors were considered. This question was analyzed separately for highway and transit improvements.

### 2.3.2.1 Highway Alignment

Alignments included widening I-25 with additional lanes; upgrading existing parallel facilities such as US 85, US 287 or arterials parallel to I-25; and building a new highway along existing county roads. The alignments considered are depicted in **Figure 2-36.**

Evaluation of the initial range of alignments found that improvements that paralleled I-25, such as upgrading US 85 or US 287 or a new highway or parallel arterial, did not divert sufficient traffic from I-25 to relieve anticipated congestion. This includes the proposed Prairie Falcon Parkway, a multi-modal toll facility approximately 25 miles east of I-25, connecting Larimer and Pueblo counties. While some interstate travel may divert to this new facility, the majority of residents in the regional study area would experience lengthy out-of-direction travel to connect to the Denver metro area if they used this facility. Without other improvements, the proposed parkway alone would not have the ability to address the mobility needs of northern Colorado residents traveling to the Denver metro area. Potential environmental impacts were also taken into consideration. New roadway alignments and upgrading roads through communities had more potential to impact environmental resources.

The alignment evaluation found that improvements located on I-25 (general purpose lanes or managed lanes) best addressed the anticipated congestion on I-25. In addition, these improvements had the most potential to also address safety concerns along I-25 and replace the aging infrastructure on I-25. These improvements also had a lower potential to impact the natural and human environment when compared to new highway and roadway alternatives.

### 2.3.2.2 Rail Alignments

The potential rail transit alignments considered are pictured in **Figure 2-37**. Both active and abandoned railroad right-of-way were considered as well as new alignments along other existing transportation corridors. Alignments were evaluated based on the following:

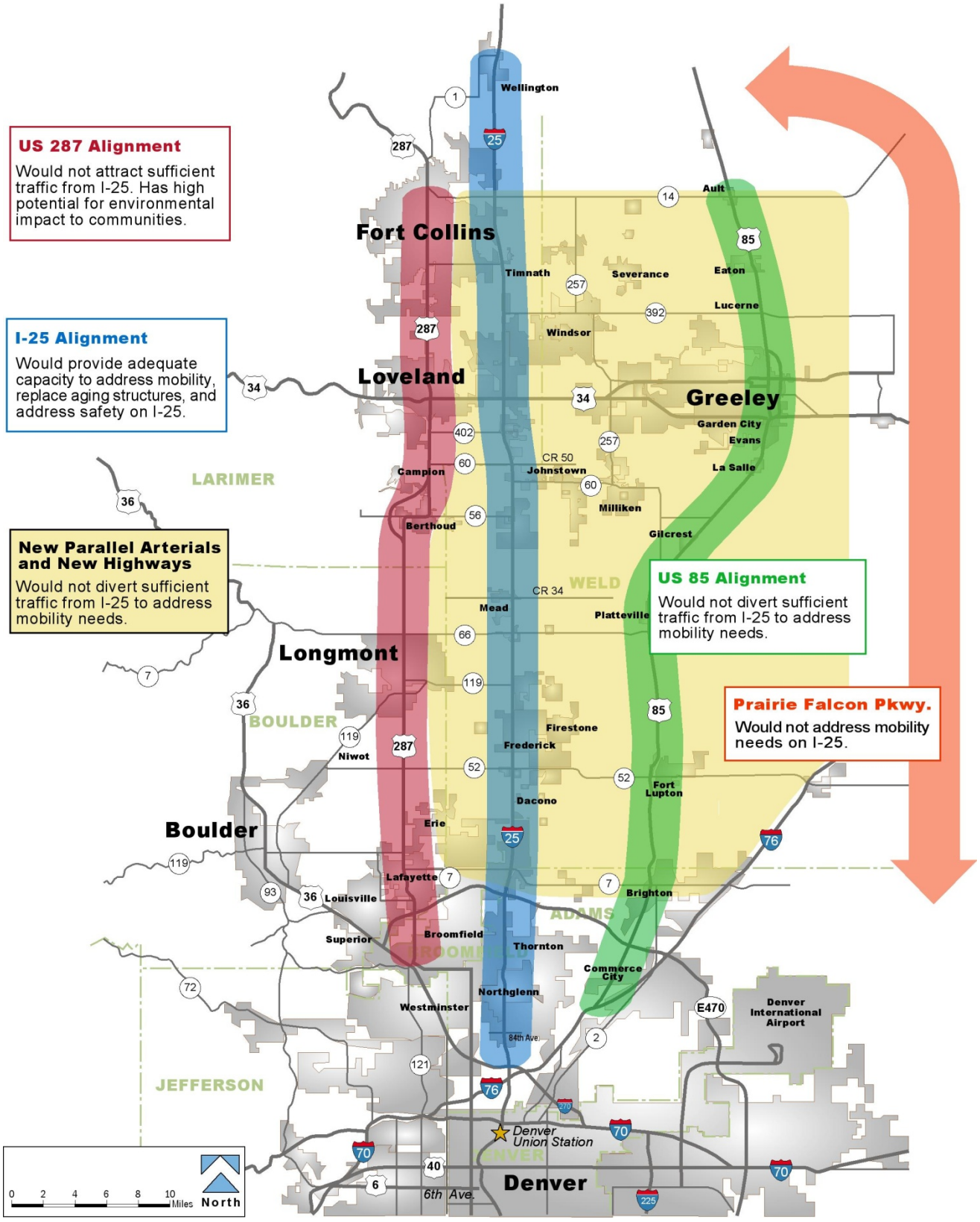
- Concentration of employment and population centers served
- Ability to connect to other existing transit systems
- Travel time
- Anticipated trip patterns served
- Cost effectiveness
- Potential to adversely impact natural and built environmental resources

Detailed documentation of the evaluation of rail alignments considered is provided in *Alternatives Development and Screening Report* (FHU and Jacobs, 2011a).

The western side alignment was more favorable than the central or eastern alignment alternatives for the following reasons:

Alternatives on the western side of the corridor would provide greater access to population and employment concentrations.

1 **Figure 2-36 Highway Alignments Considered**

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The initial alignment analysis found that an estimated 14,975 future work trips occur between western communities and the Denver area. Similarly, an estimated 9,075 future work trips occur between eastern communities and the Denver area. However, this analysis was inconclusive with respect to the travel patterns along the central area of the regional study area.

A more detailed analysis of the central and western alignments was subsequently undertaken. The quantity of existing population and employment within four miles of the preliminary station sites along each alignment was calculated. The preliminary station sites included the following:

**Central rail alignment**

- I-25 at Harmony Road – Fort Collins
- I-25 at SH 392 – Windsor
- I-25 at Crossroads – Loveland
- I-25 at US 34 – Loveland
- I-25 at SH 56 – Berthoud
- I-25 at SH 119 – Longmont
- I-25 at SH 52 – Frederick

**Western rail alignment**

- BNSF north of downtown – Fort Collins
- BNSF at SH 14 – Fort Collins
- BNSF at Harmony Road – Fort Collins
- BNSF at US 34 – Loveland
- BNSF at SH 402 – Loveland
- BNSF at SH 56 – Berthoud
- BNSF south of SH 66 – Longmont
- 1st and Terry – Longmont

- The evaluation showed that the western alignment currently has more than double the population and employment surrounding stations than the central alignment. This difference in the concentration of population and employment is projected to continue into the future, but at less pronounced levels. In 2030 (which was the year used for comparison purposes), there will be about 30 percent more population and employment along the west corridor compared to the central corridor.
- Western and central rail lines would attract a similar amount of ridership. However, the western rail lines would cost approximately 35 percent less than a comparable length of central rail line because the western line would utilize the existing BNSF rail line while the central line would require construction of new track.
- Commuter rail service down the UPRR line on the eastern side of the corridor was considered less feasible than service on either the western or central alignments due to the higher number of grade crossings which are a safety concern, the number of active trains running daily along that line which would restrict the availability of the line for commuter traffic, and the restricted capacity available at the Sand Creek Junction used to connect that line to Denver Union Station. All of these factors would degrade safety and reliability.

Despite more potential to impact the communities along US 287, the BNSF alignment is compatible with the land use plans for cities such as Fort Collins, Berthoud, Loveland, and Longmont. Their land use plans include rail to strengthen their downtown areas through redevelopment opportunities and improved travel choices.

There are numerous existing freight rail corridors in the regional study area. Any of these could be used in the future for inter-regional transit purposes.

Rail spurs to cross corridor communities were also considered if they could provide more direct service from the North Front Range to the Denver area. A spur between Longmont and Thornton and a spur to DIA were considered.

A spur from Longmont to Thornton was developed to retain connections to two FasTracks corridors (the FasTracks Northwest Rail Corridor, terminating in Longmont, and the FasTracks North Metro Corridor, terminating in Thornton) and providing faster service to downtown Denver. Its exact placement considered specific environmental analysis that determined the tradeoffs in locating the new alignment to the west or east of CR 7. The western alignment was considered more favorable because of impacts to 4 prairie dog towns, 0.36 acres of wetlands, and impacts to 66 properties, of which 22 are identified as low income associated with the alignment east of CR 7.

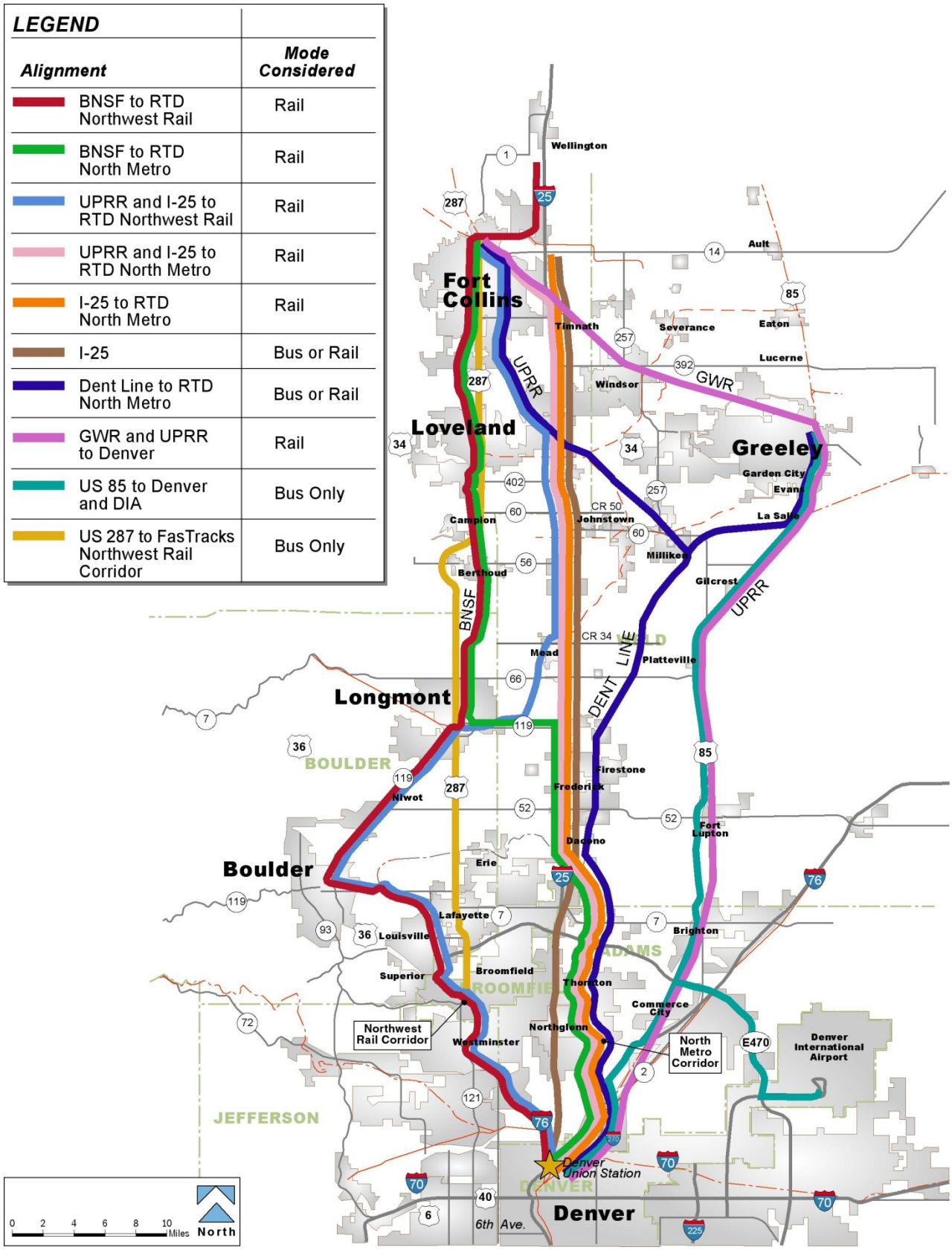
The rail spur connection to DIA was eliminated because it would be redundant service to RTD's East Corridor rail from downtown Denver to DIA.

#### 2.3.2.3 BUS ALIGNMENTS

The potential bus alignments considered are also pictured in **Figure 2-37**. Based on travel-time analysis, and the location of population centers, I-25 and US 85 alignments were considered to be the most promising. Bus alternatives traveling along I-25 would begin in Fort Collins and Greeley in order to provide similar service to both sides of the corridor. (Fort Collins, rather than Loveland, was chosen as the northern terminus for bus service due to the connection to more transit services and facilities, such as the South Transit Center at the southern end of the Mason Street corridor). Bus alignments traveling along US 85 would begin in Greeley to connect with their local bus service. The Dent line was not advanced because it did not serve population and employment centers as well as other potential alignments. The US 287 alignment was not advanced because travel times along this facility were not competitive for regional service and therefore ridership was low.

A bus connection to DIA also was included, prompted by stakeholder interest, and after analysis showed that service to DIA could increase the line's ridership.

## Figure 2-37 Transit Alignments Considered



***Outcome of Question 2: What alignment(s) should be used?***

The need to replace aging infrastructure on I-25 and address safety and mobility concerns in the project area screened out highway alignments off I-25, such as Prairie Falcon Parkway, as well as the upgrading of US 85 or US 287. It was found that these alignments diverted less than 20 percent of the necessary 55,000 vehicles per day from I-25 to address the mobility concerns along the I-25 corridor. Therefore, I-25 would continue to operate at LOS E or lower even with improvements to those alignments.

The need to provide accessibility to population and employment centers and be practicable screened out eastern and central transit alignments along the UPRR and Dent lines. A western rail line along the BNSF corridor would serve about twice as many residents and jobs as a central rail line. In addition, the 2030 model results indicated that about 65 percent more Denver destined work trips occur between the western communities compared to the eastern communities in the regional study area. Eastern and central rail alignments as well as those that connect east/west movement would still be available for inter-regional transit purposes.

Therefore, it was determined that:

- Highway improvements would be on the I-25 alignment
- Rail improvements would be on the BNSF corridor between Fort Collins and Longmont
- Bus improvements on I-25 or US 85 compete for ridership

### 2.3.3 Question 3: What facility type and transit mode should be evaluated?

A wide variety of highway modes and configurations including buffer and barrier-separated toll lanes, freeway lanes, HOV lanes, and arterial upgrades were evaluated to determine which had the potential to address project needs and were practical. Similarly, all type of transit modes were evaluated to determine if they would improve accessibility and if they were cost-effective.

**Figure 2-38** describes all of the highway facility types and transit modes that were considered in the screening process. These descriptions are helpful when comparing the travel modes considered in the following section. For example, understanding the differences between the various tolled express lanes/managed lane concepts is important: Toll lanes toll all vehicles using the facility, HOT lanes toll single-occupant vehicles and allow HOVs to the use the lanes for free, HOV lanes allow only high occupant vehicles to travel in the lane. Each of these three concepts falls under the tolled express lanes/managed lane category but result in different traffic operations along the corridor.

Early stages of screening eliminated many of these initial options. The more promising highway facility types and transit modes were evaluated with more detail as described below.

**Figure 2-38 Highway and Transit Modes Considered in Screening Process**

TRANSIT

**Bus Rapid Transit** is a flexible rubber-tired transit service that typically operates in exclusive or semi-exclusive managed lanes for all or part of the route. There is no specific guidance on how much of a route must be in a managed lane but to qualify for FTA New Starts or Small Starts funding 50% of the route must be in a fixed-guideway. However, FTA's Very Small Starts program does not have this particular restriction. For the purpose of this evaluation BRT is defined as traveling in a semi exclusive or exclusive travel lane for 50% or more of the route. Bus options with less than 50% of the route in a managed lane would be considered commuter bus.

**Express/regional/commuter bus service** is regional transit service with limited stops in order to operate faster than other regional bus services. This type of transit service usually operates on roads designated as arterials or higher and has park-and-ride facilities located at its stops.

**Local bus** is regularly scheduled fixed-route bus service with frequent stops in local communities.

**Demand response service** operates in response to calls from qualified passengers, who are then provided door-to-door service.

**Jitneys** provide service based on market driven demand without fixed schedules or stops.

**Commuter rail** typically operates within freight rail right-of-way and services long distance trips. It may use locomotives with passenger cars or self-propelled passenger cars, known as diesel multiple units. Commuter rail trains could be diesel-powered (most common) or electrically-powered.

**Personal rapid transit** is service using small cars that carry one to four people on a fixed guideway.

**Heavy rail** is commonly referred to as metros or subways. Heavy rail usually provides high capacity, medium-speed service in densely populated urban areas on steel tracks in an exclusive right-of-way. Power is provided by a third rail along the tracks or by overhead electric cables.

**Figure 2-38 Highway and Transit Modes Considered in Screening Process (cont'd)**

TRANSIT

**Rail transport cars** would transport drivers in their private autos on a rail car. This service would be similar to a ferry.

**Light rail** typically provides medium capacity, medium speed service in urban areas. Light rail can operate in exclusive rights-of-way or share city streets. Power is generally provided by overhead electric cables.

**Automated guideway transit** describes a fully automated and driverless transit system that operates in an exclusive right-of-way guideway. These systems are generally found in major airports, activity centers, and downtown areas. Automated guideway transit systems can be self-propelled or powered by overhead electrical cables. This category includes monorail which can be fully automated or driver-operated.

**High speed rail** typically provides intercity service, operating on an exclusive guideway system of steel tracks, which can be located at-grade (usually existing rail lines), elevated, or below ground. Power is usually provided by overhead electrical cables.

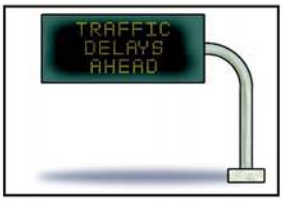
HIGHWAY

**Additional lanes** are the most common method of adding travel capacity along a corridor. Lanes could be added to any existing road in the corridor.


**Tolled Express Lanes/Managed Lanes** are lanes whose demand is managed to maintain reliable, fast operation even during peak periods. HOV lanes can be used by high occupancy vehicles only. HOT lanes can be used by high-occupant vehicles for free and single-occupant vehicles for a toll. Toll lanes can be used by drivers willing to pay a toll. The lanes are separated from general purpose lanes by a striped buffer or a raised median barrier.

**Figure 2-38 Highway and Transit Modes Considered in Screening Process (cont'd)**

HIGHWAY




**Congestion management** includes travel demand management measures, intelligent transportation systems, and transportation systems management measures that are geared towards improving the efficiency of travel without major construction. These include carpool programs, telecommuting, dynamic message signing, ramp metering, and incident management strategies.

**Interchange replacement/upgrade** would include improving or reconstructing existing interchanges that currently operate inefficiently or are expected to have operating deficiencies in the future.


**Horizontal and vertical alignment improvements** address specific stretches of a road that have been identified as having inadequate or unsafe geometric configurations. These include but are not limited to sight distance considerations and superelevation.

**Intersection upgrades** address lane configurations and safety issues at existing intersections. These include but are not limited to adding turn lanes or signalizing an intersection that is currently stop-sign controlled.

**Frontage road revisions** address the need to improve the capacity and layout of the frontage roads along I-25.

**New highway, parallel arterial or local road** includes construction of a new road facility on an alignment somewhere within the regional study area.

**Figure 2-38 Highway and Transit Modes Considered in Screening Process (cont'd)**

HIGHWAY

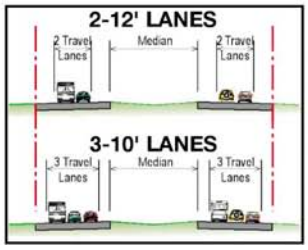
**New interchanges** are grade-separated access and egress points between a highway and a local street or between two highways.

**Limited access lanes** are grade-separated lanes that carry motorists through an intersection or interchange without providing the ability to get on or off at that location.

**Climbing lanes** are added for the upgrade direction of a road where high traffic volumes and heavy truck traffic combine to cause delays and platooning along the facility.

**Truck lanes** are exclusive lanes that carry trucks only. They may be separated from, or adjacent to, general purpose lanes and may provide only limited access to local intersections or interchanges.

**Double deck I-25** would increase capacity by building elevated lanes over existing I-25 lanes.




**Lane width reconfiguration** would restripe I-25 to provide additional lanes within the existing cross section. This improvement would create narrower lanes and shoulders.

### 2.3.3.1 HIGHWAY FACILITY TYPES

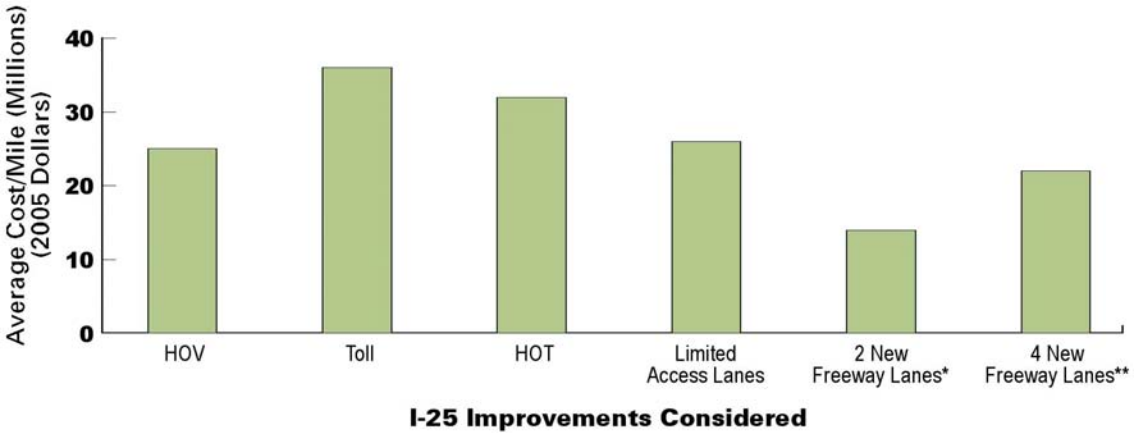
Preliminary estimates indicate that north/south travel demand would exceed capacity by approximately 55,000 vehicles per day in 2030, which was the year used for comparison purposes. Therefore the identified improvements would need to accommodate this anticipated capacity deficiency. **Figure 2-39** illustrates the typical daily capacity achieved with key roadway expansion projects. As shown, upgrading the classification of an existing arterial facility to an expressway would result in the smallest capacity increase while adding lanes to a freeway would result in the largest capacity increase. As shown, four additional HOT lanes, toll lanes, or four new freeway lanes could accommodate this demand.

Limited access lanes would provide a similar capacity to four new freeway lanes. However, these lanes would cost slightly more and have more potential for environmental impacts, due to their wider cross section. The wider cross section and need for limited access infrastructure also limited the flexibility of the cross section capacity (i.e., the ability to re-stripe or re-designate the lanes in the future).

**Figure 2-39 Typical Capacity of Facility Types Considered**


**Figure 2-40** compares the costs per mile of the different variations of these lane types on I-25. As shown, adding four new HOT/toll lanes would cost the most per mile. Two new freeway lanes would cost the least but would also not quite provide enough capacity to fully accommodate the anticipated 55,000 vehicle demand.

**Figure 2-40 Capital Cost of I-25 Lane Options Considered**



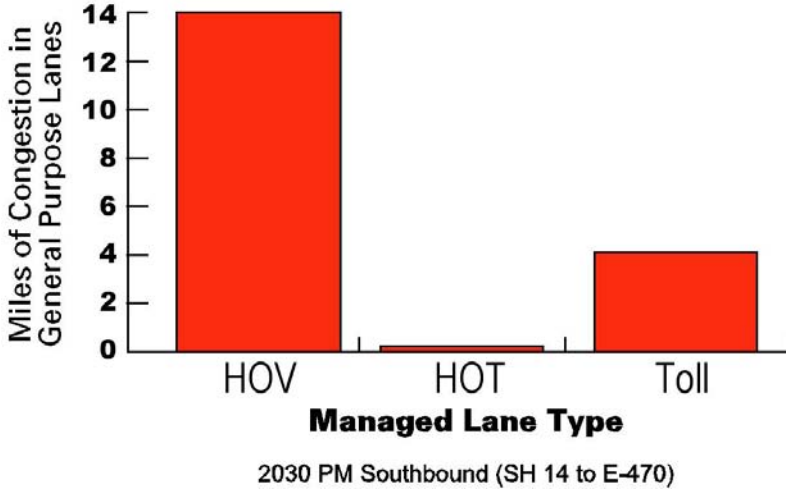

* Cost of two new freeway lanes is based on widening north of SH 66 only, resulting in a six-lane cross section on I-25.

** Cost of four new freeway lanes is based on adding four lanes north of SH 66 and two lanes south of SH 66, resulting in an eight-lane cross section north of SH 7.

Evaluation of the three management methods for express lanes (HOV, HOT, and toll) included consideration of both buffer- and barrier-separated cross sections. Buffer-separated sections consisted of a single managed lane in each direction separated from the general purpose lanes with a 4-foot painted strip (the buffer). Barrier-separated sections consisted of two lanes in each direction that would be separated from the general purpose lanes with a raised concrete barrier. Single-lane barrier separated sections were not considered for incident management and emergency response reasons. Like limited access lanes, four barrier-separated lanes would cost more and have more potential for environmental impacts due to their wider cross section. Because of this, barrier-separated cross sections with four additional lanes were only considered practical when traffic demand would warrant four additional lanes.

**Figure 2-41** depicts congestion for the three management methods for express lanes and illustrates how congestion would differ if HOV lanes were chosen. As shown, HOV lanes would result in substantial congestion in the general purpose lanes because fewer drivers would be diverted from the general purpose lanes to HOV lanes than HOT or Toll lanes. HOVs would therefore not address the project's need to improve mobility along I-25. This is the primary reason HOVs were eliminated.

**Figure 2-41 Miles of Congestion in I-25 General Purpose Lanes**



HOT lanes, which would toll single-occupant vehicles and allow HOV's to use the lane free of charge, were found to provide the most congestion reduction in the general purpose lanes, and would have the highest utilization along the corridor. This is because they would attract both HOV drivers and drivers willing to pay a toll into the new lanes. Toll lanes resulted in somewhat more congestion than HOT lanes but far less than HOV lanes.

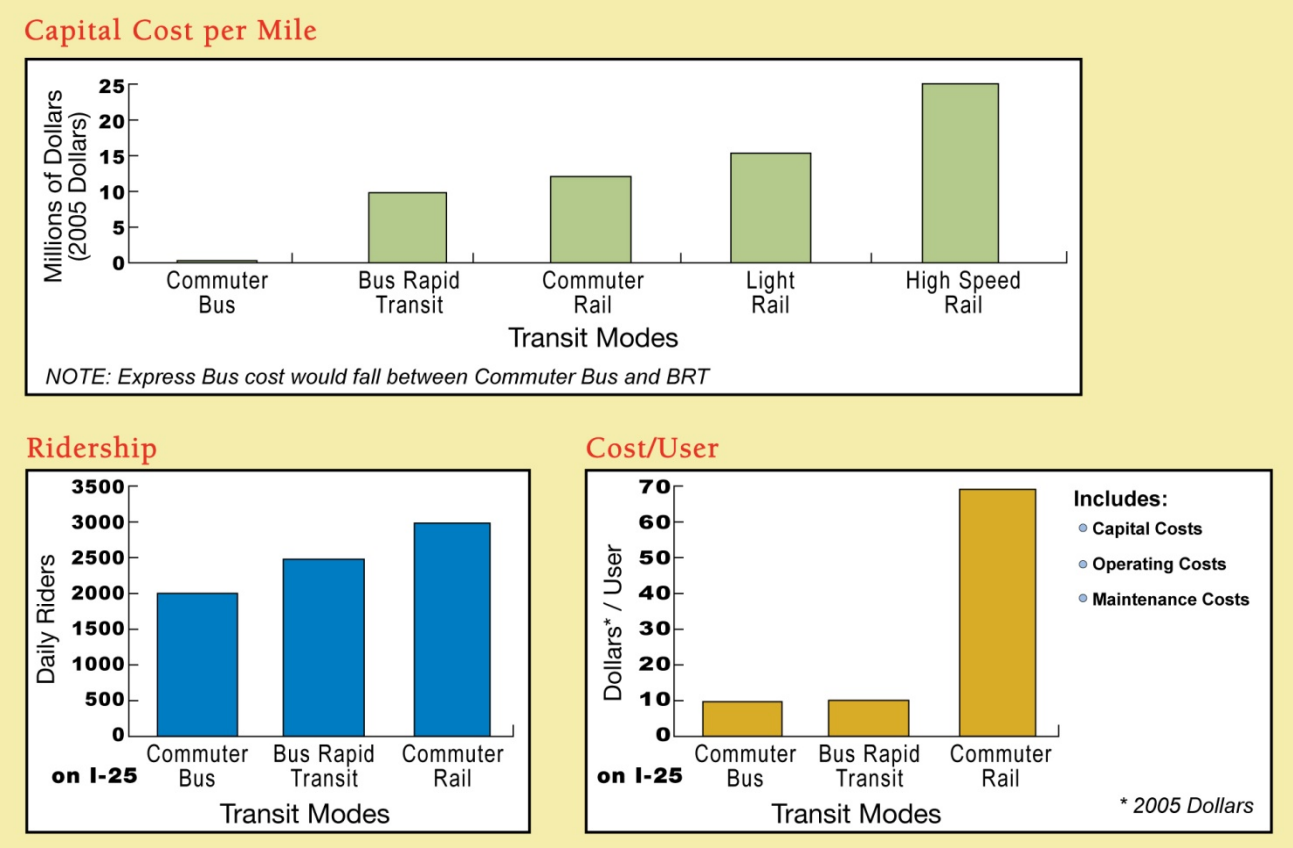
To understand more clearly the fiscal implications of the two remaining alternatives (HOT and Toll lanes), the EIS alternatives include tolled express lanes that could be managed in a variety of ways, including: toll all vehicles (Toll); toll single-occupant vehicles and allow HOVs to use the lanes for free (HOT); or toll single occupant vehicles and allow HOVs to use the lanes at a discount (Toll and HOT hybrid) to maximize the operations and available capacity of the additional lanes. These various management alternatives within the tolled express lanes category could result in small differences in travel time and congestion, but would all have the same physical impact.

#### 2.3.3.2 TRANSIT MODES

Along the BNSF corridor, commuter rail was found to be the most appropriate technology, as high-speed and super high-speed rail would not be able to operate along the curves present in the alignment. Light rail, monorail, and heavy rail are ill-equipped for long-distance travel and would take more time with fewer car amenities to suit potential regional passengers. In addition, high speed rail, super high speed rail and light rail (in addition to other technologies such as heavy rail, magnetic levitation, and automated guideway transit) are more costly per mile, as shown in **Figure 2-42**.

The evaluation and screening process identified the possibility of providing HOT or Toll lanes along I-25. The presence of these lanes would provide reliable and fast travel time conducive to implementation of BRT service. Commuter bus service could operate along I-25 or US 85 in general purpose lanes.

**Figure 2-42 Comparing Transit Alternatives by Cost and Ridership**




## 2.3.4 Outcome of Question 3: What facility type and transit mode should be evaluated?

The need to address safety and mobility concerns as well as provide a practical, cost-effective alternative screened out modes such as double decking I-25 and lane-width reconfiguration. In addition, non-traditional highway modes, such as congestion management measures and bike and pedestrian alternatives, alone would not adequately address mobility needs but were retained to be used in conjunction with other improvements that would.

The need to address the desire for multi-modal transportation options that are practical and cost-effective screened out some transit modes such as light rail, super high speed rail, and automated guideway transit systems. These systems were found to be excessively expensive or impractical for a corridor of this length.

After considering questions one through three, the reasonable highway and transit alternatives remaining included:

- General purpose lanes on I-25
- Tolled express lanes on I-25
- Commuter rail on the BNSF alignment
- Bus service on I-25 in tolled express lanes
- Commuter bus on US 85

### 2.3.5 Question 4: How do the highway and transit alternatives fit together?

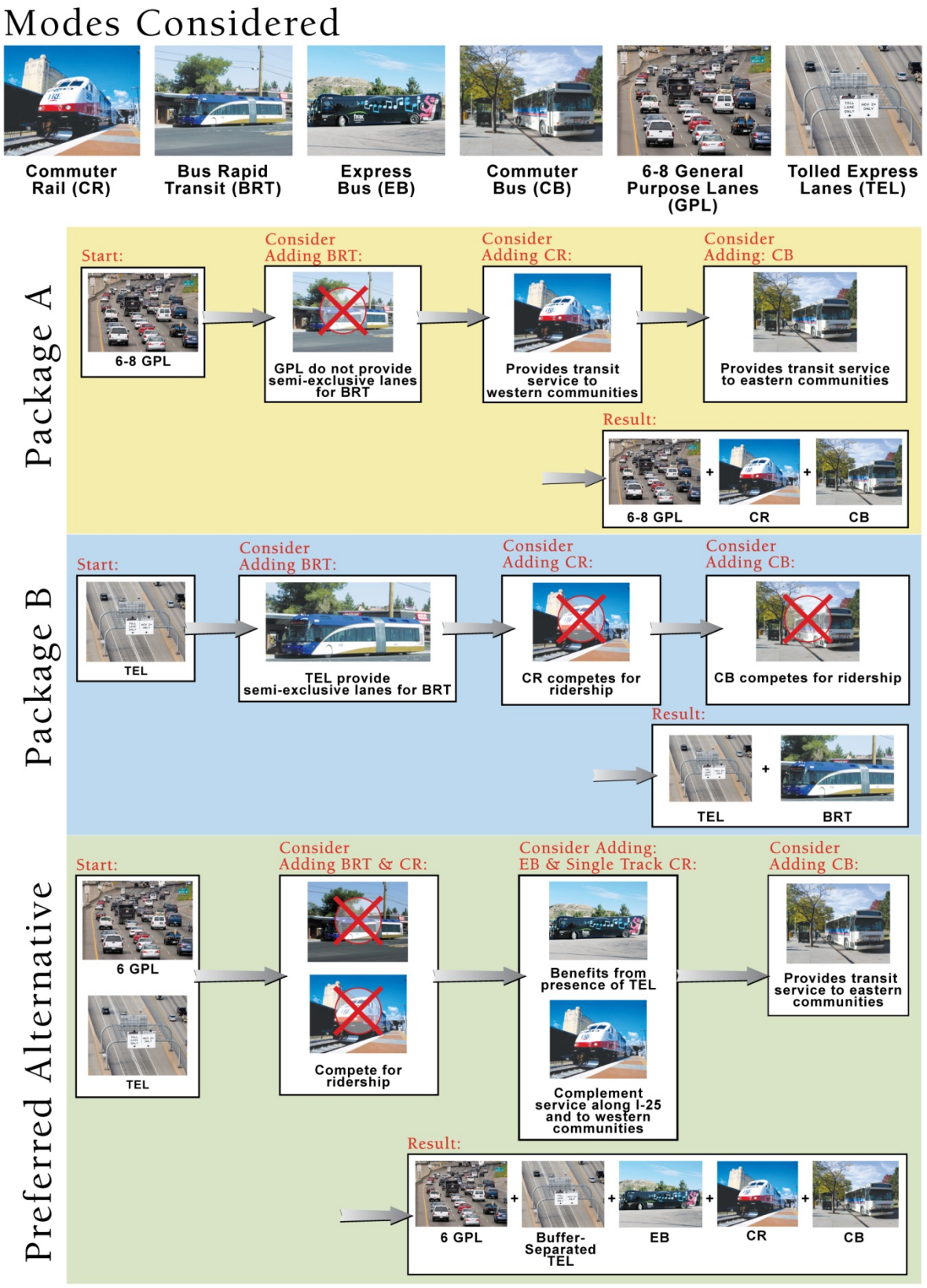
Packaging alternatives together began by ensuring that highway capacity needs would be met. Any combination of transit services was found to not reduce I-25 volumes enough to meet 2035 demand without additional highway improvements. Similarly, highway improvements alone would not address the multi-modal purpose and need. As depicted in **Figure 2-43**, to determine the most effective packages of highway and transit alternatives, various combinations were tested according to:

- The use and optimization of available operating environments for transit
- Potential competition between transit services

Based on the mode and alignment findings discussed in previous sections, commuter rail service along the BNSF rail line performed well and was paired with general purpose highway improvements. For equity throughout the regional study area, commuter bus service along US 85 with end points of both downtown Denver and DIA was added to this package of improvements. When additional transit elements were tested in combination with these elements, such as additional transit on I-25, a decrease in riders was observed on each component, though it would increase ridership overall. It was determined that to maintain maximum ridership on any one transit line, service might be offered on I-25 only or on the BNSF and US 85. Therefore, because more proximate services would decrease the cost-effectiveness of each line, commuter rail on the BNSF was paired with commuter bus service on US 85, with general purpose lanes (and no transit service) along I-25. This combination of improvements is Package A.

BRT and the tolled express lanes on I-25 were combined, due to the potential to use the semi-exclusive (less congested and more reliable) environment of the tolled express lanes for more rapid and reliable BRT service along I-25. In order to directly serve the communities which are offset from the interstate, BRT service on mixed-use lanes to Fort Collins and Greeley was provided. BRT destinations include both DIA and downtown Denver. This combination of improvements is Package B.

**Figure 2-43 Modes Considered for Combining into Packages**



A third combination is evaluated in this Final EIS. It combines commuter rail service along the BNSF with tolled express lanes along I-25. Express Bus would travel on I-25 in the tolled express lanes and commuter bus would operate on US 85. This package of improvements is the Preferred Alternative.

These three packages along with the No-Action Alternative package represent the reasonable alternatives to be fully evaluated in this EIS.

#### 2.3.5.1 Outcome of Question 4: How do the highway and transit alternatives fit together?

The need to provide a practical, multi-modal transportation solution led to the development of three packages for detailed evaluation in the Draft EIS:

- **Package A:** General purpose lanes on I-25 with the western alignment commuter rail and commuter bus service along US 85
- **Package B:** Tolled express lanes on I-25 with BRT
- **Preferred Alternative:** General purpose lanes and tolled express lanes on I-25, western alignment of commuter rail, express bus on I-25 and commuter bus on US 85

### 2.3.6 Question 5: What is the Basis for Identifying the Preferred Alternative?

The Preferred Alternative was identified based on the Purpose and Need. In addition to meeting the elements of the Purpose and Need, a number of other factors support identification of the Preferred Alternative. These other supporting factors included land use, system benefits, livability, and cost. Each new or revised element of the Preferred Alternative has been carefully considered and either has the same or reduced impacts compared to the comparable component analyzed in the Draft EIS or creates only minor new impacts. The following discussion characterizes the ability of all the alternatives to meet the Purpose and Need and other factors supporting the identification of the Preferred Alternative.

#### 2.3.6.1 Purpose and Need Elements

The Preferred Alternative meets the project purpose and need to a greater extent than the other two build alternatives.

***Need to Address the Increased Frequency and Severity of Crashes***

All three build alternatives have been designed to be safe. All three build alternatives would reduce the frequency and severity of crashes on I-25, when compared to the No-Action Alternative. Considering only I-25 in 2035, Package B would result in fewer crashes (4,061 average per year) than the Preferred Alternative (4,399) and fewer average crashes per vehicle miles traveled (1.32) than the Preferred Alternative (1.37). However when considering the entire regional system, the Preferred Alternative has the greatest reduction of crashes because of the reduced daily VMT on arterials compared to Package A or Package B. This reduced VMT is a result of the higher capacity provided by the Preferred Alternative on I-25 making I-25 a more attractive route than the adjacent arterial network. The crash rate on arterials is higher than the crash rate on access controlled facilities such as I-25. This results in improved safety under the Preferred Alternative for the entire regional transportation system because of the transfer of VMT from arterials to I-25.

The Preferred Alternative would result in only 11 average annual transit injuries compared to Package B, which would have 24 average annual injuries on transit. Package A would result in the fewest transit injuries per 1,000 revenue hours of service at 0.15; the Preferred Alternative is very similar with 0.16 injuries per 1,000 revenue hours of service. Package B would result in the highest transit injury rate at 0.32 injuries per 1,000 revenue hours of service.

### *Need to Address the Increasing Traffic Congestion on I-25, Leading to Mobility and Accessibility Problems*

The Preferred Alternative provides the most efficient operations for I-25 compared to Packages A and B. A comparison of the traffic elements of the mobility portion of the purpose and need demonstrates that the Preferred Alternative provides the highest benefit:

- Its remaining congested miles on I-25 general purpose lanes in the PM peak hour would be noticeably less at 17 miles, compared to 45 miles with Package B and 44 miles with Package A in 2035.
- In the AM peak hour, its remaining congested miles on general purpose lanes are only 11, compared to 30 with Package B and 16 with Package A in 2035.
- In 2035, it has the fewest number of interchange ramp merge/diverge locations operating at LOS E or F. The Preferred Alternative would have 13 of these in the AM peak period and 26 in the PM. Package B would have 34 in the AM and 52 in the PM. Package A would have 30 in the AM and 34 in the PM.
- It has the fastest highway travel time from SH 1 to 20th Street in the general purpose lanes (107 minutes compared to 117 minutes with the other two alternatives in 2035).
- It has the fastest travel time from SH 1 to 20$^{th}$ Street in the tolled express lanes in 2035 (64 minutes compared to 65 minutes with Package B and 102 minutes with Package A (which only uses a short section of existing tolled express lanes in the Denver metro area and the remaining trip is in general purpose lanes).
- It provides the most travel choices on I-25 allowing a motorist to pay a toll or carpool to avoid congestion, or choose to travel toll free in the general purpose lanes, or choose express bus.
- It has the fastest bus transit service from the South Transit Center to 20th Street at 63 minutes for an express bus, compared to 70 minutes for BRT with Package B.
- Similar to Package B the tolled express lanes provide an opportunity to maintain reliable travel time for buses, HOVs and toll paying users in perpetuity.
- Because the Preferred Alternative would have the best level of service in the general purpose lanes, it would have the best overall mobility for freight traffic.
- It would serve the highest number of users on I-25 at over 990,000 users (number of vehicles entering this length of I-25 multiplied by vehicle occupancy. See *Section 4.2.5 Highway Users* for an explanation of the calculation).
- It captures the second highest percentage of transit market share between the northern front range area and the downtown Denver CBD at 50 percent in 2035. Package A captures the highest percentage at 55 percent and Package B captures 45 percent.

- It has the second highest ridership with 6,500 daily riders while Package B captures the highest ridership at 6,800 daily riders as a result of its frequent and robust BRT service. Package A captures the fewest riders with 5,850 daily.
- Regional vehicle hours of travel are the least with the Preferred Alternative at 1.68 million compared to1.69 million with Package B and 1.70 million with Package A in 2035.
- It produces the highest amount of vehicle miles of travel at 52.81 million as a result of its higher capacity than the other two packages. Package B produces the least amount of regional VMT at 52.62 million and Package A produces 52.76 million.
- Its regional average speed (including freeways and other facilities) in 2035 is the highest (31.4 miles per hour) compared to 31.1 with the other two build alternatives – a notable increase considering the magnitude of the number of miles and number of hours in the region used to calculate average miles per hour.

### *Need to Replace Aging and Functionally Obsolete Infrastructure*

The Preferred Alternative and Package B both provide the most new structures which replace aging structures: 94, compared to 87 with Package A. All of the alternatives would replace all of the pavement that has exceeded its useful life.

### *Need to Provide Modal Alternatives*

The Preferred Alternative provides the most opportunity for improved mode choice throughout the regional study area. In addition, it allows the ability to implement transit service with minimal initial infrastructure investment. Overall the Preferred Alternative addresses this element of purpose and need in the following ways:

- The Preferred Alternative would provide the most opportunity to use multiple modes of travel, since two or more modes would be provided along three separate corridors: commuter rail would be provided on the US 287 corridor; express bus and carpooling on TELs on I-25; and commuter bus service would be provided on US 85. Package A would provide multiple modes on only two corridors and Package B would provide multiple modes on only one corridor.
- The express bus service provided as a part of the Preferred Alternative could be fairly easily implemented and implemented in phases, providing near term multimodal options to commuters traveling the North I-25 and US 85 corridors. BRT service provided as a part of Package B would be harder to implement in phases because stations are located in the median, requiring reconstruction of I-25.
- Given the uncertainty of the schedules for the FasTracks North Metro and Northwest Rail corridors, express bus service provided as a part of the Preferred Alternative could provide an additional mode choice that would first supplement and then complement the FasTracks commuter rail corridors.
- It would attract the highest level of special event ridership (transit trips to sporting events, the theater and other activities in downtown Denver), due to the range of transit options that can accessed for these discretionary trips.

### 2.3.6.2 OTHER SUPPORTING FACTORS

In addition to meeting the elements of the Purpose and Need, a number of other factors support identification of the Preferred Alternative. These other supporting factors included land use, system benefits, livability, and cost. These are described below.

#### *Land Use*

The three build alternatives meet the goals of the community land use plans to varying degrees. Western communities generally have a desire to revitalize and concentrate growth in the central core areas of their towns. This goal is reflected in the master plans for Larimer County and the cities of Fort Collins, Loveland, Berthoud and Longmont. Some of these same communities are also supporting development along the I-25 corridor in addition to within the core areas generally along the US 287 corridor. The eastern communities, although more dispersed, also have goals to revitalize growth along US 85.

The Preferred Alternative provides transit services along all three major corridors. The location of new transit stations, particularly for commuter rail and to a lesser extent for express bus and commuter bus, will focus growth in proximity to the station. This will help communities realize plans for downtown redevelopment or higher density, mixed use development. For this reason it best supports the land use goals of the communities.

While Package A also includes commuter rail along the BNSF corridor thus supporting the western communities land use plans and commuter bus along the US 85 corridor, it does not support goals for higher density, mixed use development along I-25 because it provides no transit service along I-25.

Package B focuses all improvements along I-25 and therefore does not support land use goals of revitalizing downtown areas within the western communities or along US 85. Package B could have a detrimental effect on downtown areas, tending to pull growth away from them and focusing it along I-25.

#### *System Benefits*

There are a variety of system benefits: regional connectivity, regional safety, and travel reliability. An assessment of the three build alternatives demonstrates the difference among system benefits.

#### *Regional Connectivity*

Regional connectivity to the greater Denver metropolitan transportation system is most improved with the Preferred Alternative. The Preferred Alternative:

- Connects to two planned RTD rail lines serving DUS as a hub for the entire metropolitan area.
- Extends the managed lane facility from US 36 on I-25 to the northern Colorado communities increasing travel options and improving travel reliability.
- Provides commuter bus service on US 85 connecting the eastern communities to the RTD transit system thereby increasing connectivity to employment and activity centers in the Denver metro area.

- Provides reliability through inclusion of multiple transit lines connecting the northern Colorado communities to the Denver metropolitan area.

- Provides multiple avenues to expand transit service as demand warrants.

Package A connects to the two RTD rail lines; but does not extend the managed lane facility north from US 36.

Package B extends the managed lane north from US 36. However, it does not provide any connection to the RTD rail lines nor does it improve the multimodal connections on US 85. Package B focuses all of the improvements along I-25 and therefore has less system wide benefits.

### *Regional Safety*

Regional safety is improved the most with the Preferred Alternative. Accident rates are higher on the arterial street system than on controlled access facilities. Under the Preferred Alternative VMT on the arterial system is less than the other two build alternatives. Therefore, there will be fewer system wide crashes with the Preferred Alternative compared to Package A and Package B. For the same reason, the Preferred Alternative will result in less congestion on the arterial system.

Package A and Package B also reduce travel on the arterial network but to a lesser degree.

### *Travel Reliability*

The Preferred Alternative also provides reliable travel times through 2035 and beyond because of the inclusion of both commuter rail and the managed lanes. The commuter rail is not affected by highway congestion nor inclement weather. Managed lanes can also maintain a high level of service through pricing and vehicle occupancy requirements. In contrast, travel time reliability is not guaranteed on general purpose lanes beyond 2035.

Package A offers travel time reliability through the commuter rail system but not on the highway. In contrast, Package B offers travel time reliability only on the managed lanes.

### *Livability*

Livability concepts refer to the synergy between transportation, land use and the environment. A livability evaluation of the three build alternatives accounts for the mobility issues surrounding transit dependent populations, the need for sustainable land use patterns, potential higher fuel prices, decreased availability of fossil fuels, and green house gas emissions. The three alternatives address these concepts to varying degrees.

The Preferred Alternative provides the greatest mix of transportation improvements in support of the livability concepts. In addition to traditional highway travel, the Preferred Alternative provides choices including commuter rail, commuter bus, express bus, carpooling, vanpooling, and tolled travel options. The livability concepts are addressed through the depth of alternative modes offered by the Preferred Alternative. In addition, these modal alternatives support the goals of the land use plans across the regional study area.

Package A also provides commuter rail and commuter bus travel options. However, it only provides general purpose lanes on I-25 and therefore does not provide an incentive for carpooling and vanpooling. In addition, it is geographically more limited than the Preferred Alternative for accessibility to transit dependent users.

Package B provides advantages for using express bus service, carpooling, vanpooling via the managed lanes. All of these improvements are focused on I-25 and is therefore far more geographically limited than Package A and the Preferred Alternative. This limits accessibility for the transit dependent population and requires more supporting transit service be provided by the local communities feeding the BRT on I-25. In addition, it does not support goals for land use plans of the western and eastern communities.

Energy consumption is a key livability concept. Over time (after 2035) it would be expected that the rail components of Package A and the Preferred Alternative would provide more options for lower energy consumption because train capacity could be readily expanded. The transit stations associated with the rail would serve as a stimulus to transit oriented development. This is also true of the Package B BRT stations along I-25 to a lesser degree. This transit oriented development would potentially reduce energy consumption due to mixed use and higher density development, which would reduce trips.

### *Cost*

A tabulation of costs for the three build alternatives shows that the Preferred Alternative is more than the other two build alternatives. Package A capital cost is $1.96 billion, Package B capital cost is $1.72 billion and the Preferred Alternative is $2.18 billion. However, the Preferred Alternative provides benefits that the other two alternatives do not. The Preferred Alternative:

- Better improves regional safety compared to the other two build alternatives
- Reduces congestion more effectively than Package A or Package B
- Is similar to the other alternatives in replacing aging and obsolete infrastructure
- Is superior to the other alternatives in providing modal options
- Better addresses goals of the land use plans in the northern Colorado communities
- Achieves system wide benefits that Package A and B do not provide such as regional connectivity and travel reliability
- Better supports livability concepts than Package A and Package B by providing a more comprehensive multimodal system of transportation improvements

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