

TRANSPORTATION RESOURCES  
TECHNICAL MEMORANDUM

FOR THE

Federal Boulevard Improvements between  
West 7<sup>th</sup> Avenue and West Howard Place  
Environmental Assessment

**CDOT Prepared for**

CITY AND COUNTY OF DENVER

COLORADO DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

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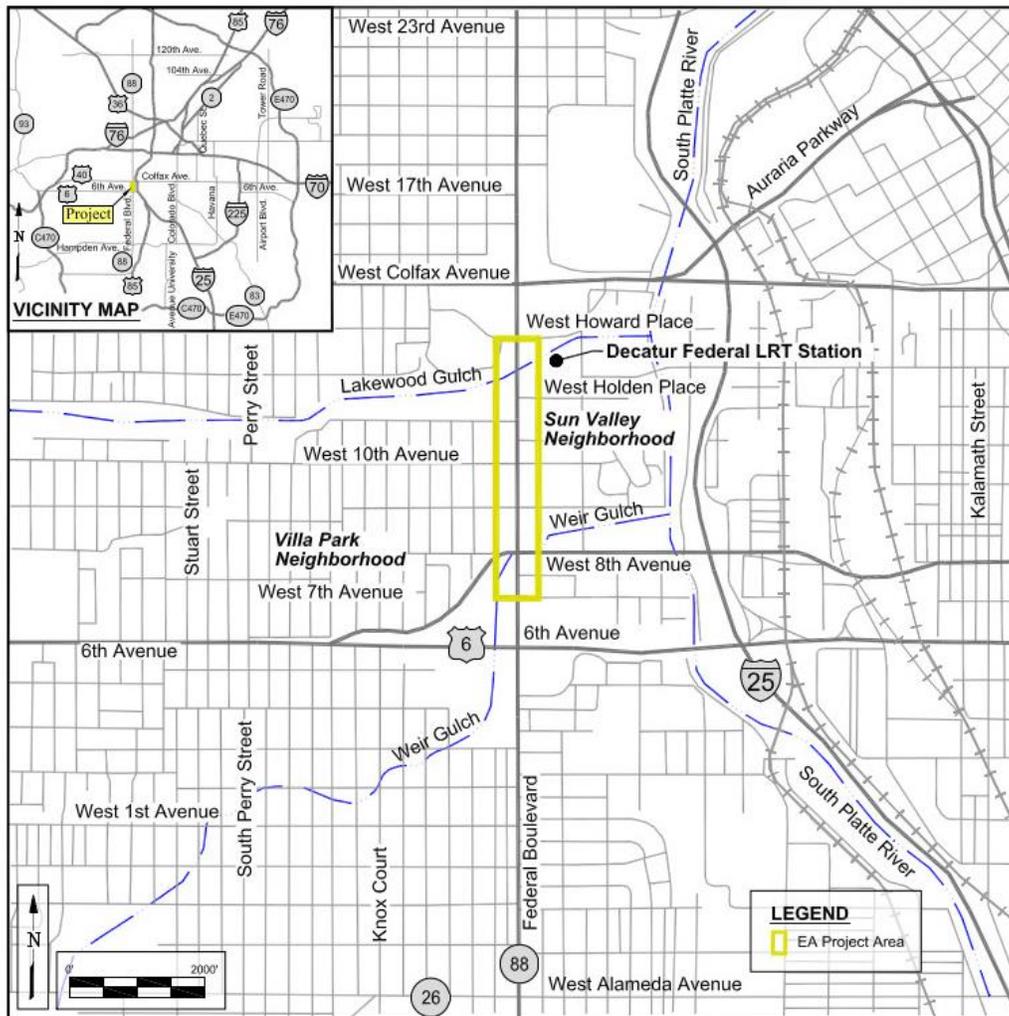
## ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
CCD	City and County of Denver
CDOT	Colorado Department of Transportation
DRCOG	Denver Regional Council of Governments
EA	Environmental Assessment
FHU	Felsburg Holt & Ullevig
FHWA	Federal Highway Administration
GDP	General Development Plan
LOS	Level of Service
LRT	Light Rail Transit
MAP-21	Moving Ahead for Progress in the 21st Century Act
MP	Milepost
MS4	Municipal Separate Storm Sewer System
NHS	National Highway System
PEL	Planning and Environmental Linkages
PL	Public Law
ROD	Record of Decision
RTD	Regional Transit District
SH	State Highway
TIGER	Transportation Investment Generating Economic Recovery
TOD	Transit-oriented Development
TSH	Tsiouvaras Simmon Holderness, Inc.
US	United States
VPD	Vehicles per Day

## INTRODUCTION

This Technical Memorandum has been prepared in support of the *Federal Boulevard Improvements Environmental Assessment* (EA). The general project area extends along Federal Boulevard between West 7<sup>th</sup> Avenue to West Howard Place (“Project Area,” Figure 1). This Memorandum evaluates the effects of the Federal Boulevard Improvement Project (the Proposed Action) and the No-Action Alternative with respect to existing and planned transportation facilities within the Study Area which is coincidental with the Project Area transportation resources.

Figure 1. EA Project Area



### *Federal, State, and Local Regulations or Policies*

This Technical Memorandum has been prepared to address potential project impacts to the existing and future transportation characteristics and facilities, in accordance with the *Moving Ahead for Progress in the 21st Century Act* (MAP-21), issued by Federal Highway Administration (FHWA) in 2012 (Public Law [PL]. 112-141) (FHWA, 2012).

### *Regional and Local Planning Context*

In addition, this study is consistent with the goals, vision, and strategies of the following local, regional, and state planning documents:

- *Bicycle Master Plan Update* (City and County of Denver [CCD], 2001)
- *Blueprint Denver* (CCD, 2002)
- *Denver Parks and Recreation Game Plan* (CCD, 2003)
- *Pedestrian Master Plan* (CCD, 2004)
- *Denver Moves* (CCD, 2011a)
- *2035 Metro Vision Regional Transportation Plan* (Denver Regional Council of Governments [DRCOG], 2011)
- *2035 Statewide Transportation Plan* (Colorado Department of Transportation [CDOT], 2008a)
- *Denver Strategic Transportation Plan* (CCD, 2008)
- *Denver Living Streets Initiative* (EPA, 2009)
- *Denver Complete Streets Policy* (2011b)
- *Regional Transportation District (RTD) Service Standards* (RTD, 2002)
- *RTD FasTracks Program* (RTD, 2014a)
- *Proposed West Corridor Service Plan* (RTD, 2012)

Numerous plans have also been developed specifically for Federal Boulevard and its vicinity that focus on adjacent neighborhoods or corridor-specific improvements. Plans with information pertinent to Federal Boulevard were considered during the alternatives development process for the Planning and Environmental Linkages (PEL) Study (Felsburg Holt & Ullevig [FHU], 2009a) and this Technical Memorandum; these are listed below.

- *Federal Boulevard Corridor Plan* (CCD, 1995; FHU, 2009a)
- *Sun Valley Neighborhood, Decatur-Federal Station Area Plan* (CCD, 2013)
- *Decatur-Federal Station General Development Plan* (GDP) and associated Transportation Memorandum (CCD, 2014)

The following sections summarize the regional, City-wide, and corridor-specific plans and policies as they pertain to the Project Area.

### **Denver Bicycle Master Plan Update**

The *Denver Bicycle Master Plan Update* is an update to the 1993 *Denver Bicycle Master Plan* that developed and implemented a comprehensive bicycling program and a

framework for a physical bicycle system. In the Project Area, Federal Boulevard is not a designated bicycle route (CCD, 2012a; DRCOG, 2014); however, two bicycle routes cross Federal Boulevard at West 10<sup>th</sup> Avenue (D-12) and Lakewood Gulch (D-10).

### **Denver Moves**

*Denver Moves* is a physical and action-oriented plan that builds upon the *Bicycle Master Plan Update*, *Denver Parks and Recreation Game Plan*, *Pedestrian Master Plan*, and *TOD Plans* (CCD, 2011a). The goals of *Denver Moves* include the establishment of a “biking and walking network where every household is within a quarter mile (a five-minute walk or a two-minute bicycle ride) of high ease and use of facility.” Furthermore, *Denver Moves* aims to “achieve a 15 percent bicycling and walking commute mode share by 2020.” The Plan includes a network-phasing concept, which identifies an intended priority order for the build-out of the *Denver Moves* network. The segment of Federal Boulevard between 6<sup>th</sup> Avenue and West 8<sup>th</sup> Avenue is depicted as a Proposed Trail associated with the existing Weir Gulch Trail.

### **Blueprint Denver**

Federal Boulevard within the Project Area has been identified as an Enhanced Bus Transit Corridor and an Area of Change within Blueprint Denver, a policy which provides a vision for integrated future land use and transportation within Denver (CCD, 2002). Blueprint Denver “encourages and promotes more efficient use of transportation systems, expanded transportation choices, appropriate and mixed land use, and the revitalization of declining neighborhoods—all of which will ultimately improve our quality of life” (CCD, 2002). Blueprint Denver identifies all areas of Denver as either Areas of Stability or Areas of Change. According to Blueprint Denver, Areas of Stability include primarily stable residential neighborhoods and their associated commercial areas where limited change is expected during the next 20 years. The goal for an Area of Stability is to identify and maintain the character of the area while accommodating some new development and redevelopment.

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

According to the Blueprint Denver, the areas along Federal Boulevard, just south of West Holden Place and south of West Howard Place, are planned for transit-oriented development (TOD) (CCD, 2002). The construction of the West Corridor light-rail transit (LRT) and associated Decatur-Federal LRT station is consistent with this planning. The area is a high priority for the City and County of Denver (CCD) in order to provide housing opportunities for existing residents.

### **Denver Game and Pedestrian Master Plans**

The *Denver Game Plan* is the master plan for Denver's parks and recreational facilities (CCD, 2003). Federal Boulevard is a designated parkway for its entire length within the City limits (CCD, 2003). Historically, Federal Boulevard was a tree-lined street from the Barnum neighborhood near Alameda Avenue in the south to the Regis University area at 50<sup>th</sup> Avenue in the north (CCD, 1995). Street cars ran on Federal Boulevard between Alameda Avenue and Colfax Avenue. Over the years, trees, and the associated tree lawns, have been lost to roadway widening. Residents in the area reportedly perceive Federal Boulevard as a barrier to parks access, as the busy arterial road prevents their children from visiting parks and recreational facilities on foot without adult accompaniment (CCD, 2003).

The *Pedestrian Master Plan* (CCD, 2004) builds upon the Enhanced Bus Transit Corridor designation for Federal Boulevard identified in Blueprint Denver (CCD, 2002) and presents a series of guidelines. In addition, the *Pedestrian Master Plan* identifies the need for a safe pedestrian crossing (i.e., signal improvements) along Federal Boulevard at West 12<sup>th</sup> Avenue.

### **2035 Metro Vision Regional Transportation Plan**

The *2035 Metro Vision Regional Transportation Plan* defines Federal Boulevard as an Urban Road, a multi-modal arterial that facilitates longer- and medium-distance regional trips (DRCOG, 2011). The primary goals for Urban Roads are to:

- Increase travel reliability and improve mobility for private and commercial vehicles
- Serve the proposed Urban Centers in the corridor
- Accommodate growth in personal motor-vehicle and freight travel
- Improve management of the existing facilities and travel demands
- Provide alternative modes of transportation to travelers
- Reduce motor-vehicle crash rates
- Eliminate design deficiencies
- Maintain or improve pavement to optimal conditions

It is noted in this Plan that fixed-route, public bus service would increase approximately 36 percent throughout the region including physical and operational improvements for Federal Boulevard, given that it is a high-frequency bus-service area.

### **2035 Statewide Transportation Plan**

The *2035 Statewide Transportation Plan* defines Federal Boulevard as an urban corridor from Belleview Avenue to Colfax Avenue with specific goals and improvement strategies as a multi-modal arterial (CDOT, 2008a). These goals include:

- Increase travel reliability and improve mobility for private and commercial vehicles
- Serve the proposed Urban Centers in the corridor
- Accommodate growth in personal motor-vehicle and freight travel
- Improve management of the existing facilities and travel demand
- Provide alternative modes of transportation to travelers
- Reduce motor-vehicle-crash rates
- Eliminate design deficiencies
- Maintain or improve pavement to optimal conditions

The improvement strategies include:

- Operate existing and new traffic signals using signal system(s) for surface-street control
- Regularly update traffic-signal timing/coordination plans
- Implement intersection improvements (e.g., turn lanes, acceleration/deceleration lanes) at existing and future signalized intersections
- Add signals as warranted, consistent with access-management requirements
- Implement network surveillance at key points
- Implement appropriate transit operational improvements
- Upgrade signals at railroad crossings and integrate them with CDOT traffic-signal system
- Widen selected roadway segments
- Improve bicycle and pedestrian accommodations and facilities
- Provide additional FastConnects bus-transit service as demand increases
- Provide feeder bus connections to rapid-transit stations

### **Denver Strategic Transportation Plan**

In the *Denver Strategic Transportation Plan*, Federal Boulevard is included in the analysis as part of the Southwest and West Side Travel Sheds (CCD, 2008). The Southwest Side Travel Shed is loosely bordered by Sheridan Boulevard to the west, Colfax Avenue to the north, Interstate 25 (I-25) to the east, and West Bowles Avenue to the south. Trips in this travel shed are predominantly to and from downtown Denver and the West Colfax or 6<sup>th</sup> Avenue (United States Highway 6 [US-6]) corridors. The Plan recommends future improvements along Federal Boulevard to focus on enhancements to transit systems, pedestrian amenities, safety improvements, and access controls. A complete multi-

modal reconstruction of Federal Boulevard is also referenced as a major improvement for future implementation (CCD, 2008).

The West Side Travel Shed is loosely bordered by Sheridan Boulevard to the west, West 17<sup>th</sup> Avenue to the north, I-25 to the east, and West 1<sup>st</sup> Avenue to the south. Trips in the West Travel Shed are predominantly “pass-through” trips. The total number of person trips in this Travel Shed is projected to increase more than 18 percent by 2030; trips originating in this Travel Shed are also anticipated to increase (CCD, 2008). The Plan recommends the West Side Travel Shed focus on improvements associated with the West Corridor light-rail line (i.e., better access to the light-rail station, increased connectivity for bicycle and pedestrian paths, and increased north-south street connections). Specific suggested future improvements for Federal Boulevard include signal retiming, turn-lane construction at the West 10<sup>th</sup> Avenue intersection, line balancing from West 7<sup>th</sup> Avenue to Colfax Avenue, and the development and implementation of an access-control plan (CCD, 2008).

### **Denver Living Streets Initiative and the Denver Complete Streets Policy**

As part of the Denver Living Streets Initiative (U.S. Environmental Protection Agency [EPA], 2009), the Denver Complete Streets Policy was established to support the vision of the region’s investing in a more sustainable, balanced, and multi-modal transportation system for all users (CCD, 2011b). The Denver Living Streets Initiative identifies business and commercial corridors in the region, such as Federal Boulevard, as Denver’s “next frontier for growth” given the opportunity to retrofit the major thoroughfare and create a “vital regional economic engine.”

### **RTD FasTracks Program**

The RTD FasTracks Program is a comprehensive transit expansion where 122 miles of commuter rail and light rail will be built as well as 18 miles of bus rapid transit, 21,100 new parking spaces at light-rail and bus stations, and enhanced bus connections across an eight-county district (RTD, 2014a). The Denver-area voters approved the FasTracks regional-transit initiative in 2004. The West Corridor LRT was the first rail line to be completed by the RTD FasTracks Program; this rail line serves the Project Area at the Decatur-Federal LRT Station as discussed below.

### **RTD Service Standards and Proposed West Corridor Service Plan**

The RTD Service Standards establish a means to evaluate existing services and proposals for new services, based upon a set of specific targets or minimum/maximum values for the standards (RTD, 2002). In general, the standards are used to identify routes and services that are in need of elimination or service adjustments (i.e., restructuring to eliminate lower-productivity segments, adjusting frequency to better reflect demand).

The *Proposed West Corridor Service Plan* was developed for the implementation of the new LRT line, as a restructured West Corridor bus network was considered necessary for a successful integration of West Corridor bus and rail services (RTD, 2012). As part of the

*Proposed West Corridor Service Plan*, north-south bus-route operations along Federal Boulevard were recommended to be streamlined in order to provide direct connections to LRT and downtown Denver. Routes 30 and 31 were proposed to be coordinated to form a single Federal Boulevard cross-town service, with a combined 7.5-minute average frequency at several of the same stops. However, Route 30 would ultimately terminate at the Colfax and Federal Transfer Center or Wadsworth and Hampden Park-n-Ride; Route 31 would terminate at the Federal/Evans Transfer Center with a new extension to the Front Range Community College and Westminster Center Park-n-Ride. The Plan recommends that limited routes 30L and 36L be maintained to downtown Denver (RTD, 2012). The Plan also notes that the need for high-capacity, east-west bus routes would be deemphasized, as the West Corridor LRT would attract the majority of east-west travel. Within the Project Area, segments of Route 9 along West 10<sup>th</sup> Avenue west of Federal Boulevard would be replaced by Route 49 and the Belmar-Westgate Call-n-Ride service. None of the routes within the Project Area were recommended for discontinuation due to low performance or duplication with other services. Improvements actually implemented from the *Proposed West Corridor Service Plan* are noted in the existing-conditions section of this Technical Memorandum.

### **Federal Boulevard Corridor Plan**

The *Federal Boulevard Corridor Plan* evaluated Federal Boulevard from Evans Avenue in the south to the City limit near 52<sup>nd</sup> Avenue to the north (CCD, 1995). This Plan identifies three goals for the corridor:

- Enhance the image of Federal Boulevard
- Improve safety and operating efficiency for pedestrians and vehicles
- Minimize land acquisition in order to achieve the other two goals

The *Federal Boulevard Corridor Plan* also recommends the addition of a third northbound lane for the segment of Federal Boulevard from Colfax Avenue to Jewell Avenue.

### **Decatur-Federal Station Area Plan**

The *Decatur-Federal Station Area Plan* provides guidelines on future growth and change near the West Corridor LRT station and in the Sun Valley neighborhood; the Project Area for this Plan included the segment of Federal Boulevard between 6<sup>th</sup> Avenue to north of Colfax Avenue. The Plan identifies Federal Boulevard as a Key Multi-modal Connection; the LRT station is designated as a Regional Activity Node that provides key connections to downtown Denver and the rest of the region (CCD, 2013).

### **Decatur-Federal Station GDP**

The *Decatur-Federal Station GDP* establishes a framework for large projects and provides guidelines for development in the Decatur-Federal station area (CCD, 2014). The Plan notes that the Decatur-Federal station, constructed in 2013, was the first transformative

element in the Sun Valley Neighborhood. A focus in the Plan is to improve the walkability and connectivity of the Sun Valley Neighborhood to surrounding areas.

The associated *Decatur-Federal Station GDP Transportation Information Memorandum* was prepared by Fehr and Peers to summarize a transportation-analysis approach to the Plan (Fehr, 2013). This Memorandum documented the anticipated densities and daily volumes, as well as any project roadway needs that would result from implementation of the *Decatur-Federal Station GDP*. Federal Boulevard and West 8<sup>th</sup> Avenue are referenced as being a part of the Arterial Network. The existing, average daily traffic (ADT) for Federal Boulevard is identified as 31,000 to 35,000; the existing ADT for West 8<sup>th</sup> Avenue is cited as 5,700. Decatur Street is included as part of the Collector Network, with an existing ADT of 3,800 to 6,100. Other streets within the Project Area, including West Howard Place, West Holden Place, West 12<sup>th</sup> Avenue, West 11<sup>th</sup> Avenue, West 10<sup>th</sup> Avenue, and West 9<sup>th</sup> Avenue, are included in the Local Network as carrying only local traffic.

Projections to 2035, which were derived using historic growth rates and distribution patterns generated from implementation of the *Decatur-Federal Station GDP*, include that the ADT along Federal Boulevard would increase to 36,300 to 46,300. Future total traffic conditions along West 8<sup>th</sup> Avenue are projected to increase to 18,000 ADT, and Decatur Street's would increase to 9,000 to 16,000 ADT (Fehr, 2013). The Memorandum recommends that Decatur Street be monitored as development expands through the area. In particular, it recommends that auxiliary lanes be designed at intersections to avoid additional through laneage, to maintain pedestrian and bicycle movement, and to avoid diversion of trips from Federal Boulevard.

## PEL STUDY SUMMARY

A PEL Study was prepared to evaluate transportation improvements along Federal Boulevard from West 5<sup>th</sup> Avenue to West Howard Place within CCD by FHU (FHU, 2009). In addition, a *Safety Assessment Report* and a *Traffic Report* were prepared as supporting documents to the PEL Study (FHU, 2009b; FHU, 2009c). Conclusions of the PEL Study and supporting documents, based upon a project description, location, and observations made within its study area at that time, are summarized below:

- Average weekday daily traffic volumes in 2005 were approximately 40,000 vehicles per day (vpd) between 5<sup>th</sup> Avenue (Milepost [MP] 1.12) and West Howard Place (MP 0.17). At that time, peak-hour traffic volumes were developed from vehicle counts taken for the *Baseline Traffic Analysis Report — Existing and 2030 No-Action Conditions*, a report completed in July 2006 as part of the *Environmental Assessment of Federal Boulevard from Alameda to 6<sup>th</sup> Avenue* (CDOT, 2007), as well as counts performed as part of the PEL Study in August and September 2008. Based upon that traffic-count information, Federal Boulevard experienced a directional split with approximately 47 percent of the peak daily traffic in the northbound direction and 53 percent in the southbound direction (FHU, 200c). This disparity was attributed to the lane difference created by two northbound

lanes and three southbound lanes. Traffic occurring in the peak hours increased by approximately 7 percent and 9 percent in the morning and evening hours, respectively; however, traffic flows were noted to remain heavy over long periods of the day. Furthermore, a lack of cross-section continuity along Federal Boulevard was noted given the varying lane and median widths and offset intersections.

- A capacity analysis of traffic operations along Federal Boulevard (between West 5<sup>th</sup> Avenue and West Howard Place) was conducted during the PEL Study according to methods documented in the Transportation Research Board's (TRB) *Highway Capacity Manual* (TRB, 2000). The analysis resulted in a level of service (LOS) rating that provides a qualitative assessment for a given roadway. The American Association of State Highway and Transportation Officials (AASHTO) uses the term "LOS," with values ranging from A to F to describe the operational characteristics of intersections and roadways. The designation "LOS A" represents the best possible operational conditions, while "LOS F" is characterized by severe congestion and extremely poor traffic operations (i.e., gridlock). In urbanized areas, "LOS D" is generally considered to be acceptable for peak-hour operations during the morning and afternoon, which coincide with the morning and evening commute (FHU, 2009b). Traffic operations at the time of the PEL Study and *Traffic Report* resulted in the following LOS ratings:
  - The Federal Boulevard and West 8<sup>th</sup> Avenue intersection was documented to operate at LOS F (or failing) during the afternoon peak hours.
  - Signalized intersections of Federal Boulevard at West 10<sup>th</sup> Avenue and West Holden Place were rated as acceptable (LOS D or better).
  - Operational forecasts incorporating projected 2035 traffic data indicated a continued degradation of the study area to an unacceptable LOS for both morning and afternoon peak hours, particularly at the intersections of West 8<sup>th</sup> and West 10<sup>th</sup> Avenue with Federal Boulevard, which were projected to operate at LOS F.
- The overall three-year-average crash rates within the study area identified for the PEL Study (based upon data obtained between 2001 and 2003) were three to four times higher than the Statewide average for crash types in that time period. A total of 511 crashes were reported for the three-year period; the majority of which occurred at either signalized intersections or mid-block intersections (i.e., non-signalized points). The greatest number of crashes occurred at the Federal Boulevard intersections with US 6 and West 8<sup>th</sup> Avenue. The majority of crashes consisted of rear-end collisions (40 percent), approach-turn (17 percent), and broadside crashes (16 percent). The PEL Study recommended that access be managed for left- and right-turn movements at non-signalized points in order to improve safety. The *Safety Assessment Report* concludes that there is a low frequency of crashes between West 10<sup>th</sup> Avenue and Holden Place, which

represents the only portion of Federal Boulevard in this EA’s Study Area, and that area has already been widened to six lanes (FHU, 2009b). The *Traffic Report* recommends that continued widening of Federal Boulevard be implemented throughout the remainder of the study area identified in the PEL Study through the addition of a third northbound lane between West 5<sup>th</sup> and 10<sup>th</sup> Avenues. Furthermore, signal-timing improvements, signage upgrades, access management (i.e., installation of a center median), bus-stop relocations, curb and sidewalk improvements, and fixed-object locations (i.e., relocation to standard distances and breakaway characteristics) are recommended as actions that could improve safety in the study area for the PEL Study (FHU, 2009b).

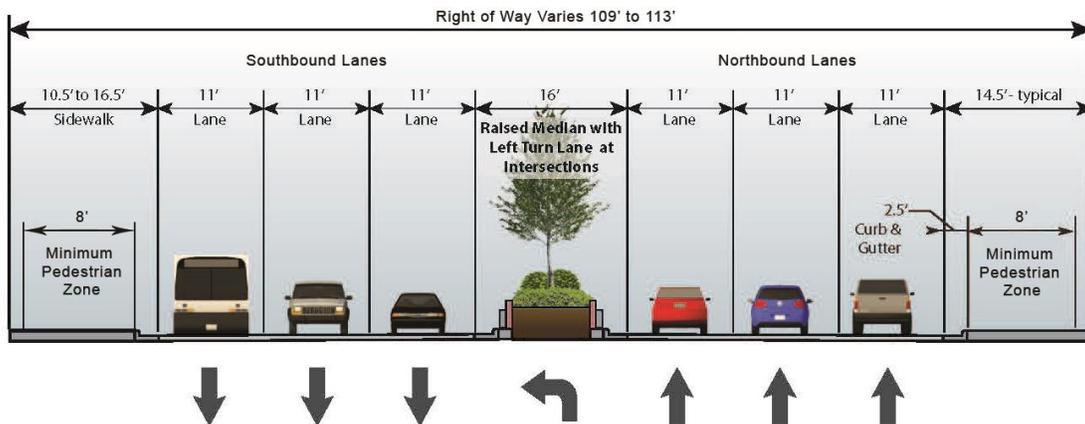
The analyses conclude that the proposed improvements to Federal Boulevard would provide substantial benefits to traffic operational performance and safety.

### PROPOSED ACTION

The Proposed Action is to add a third northbound lane between West 7<sup>th</sup> Avenue and West 10<sup>th</sup> Avenue and a raised median throughout the Project Area to improve mobility and safety (Figure 2). North of West 10<sup>th</sup> Avenue, the width of the existing three northbound lanes would be brought up to standard (11 feet). The existing southbound lanes would also be brought up to standard width in areas where they are currently substandard.

Note that this Project Area differs from that of the PEL Study as the portion of Federal Boulevard to the south of West 7<sup>th</sup> Avenue, including the interchange with United States Highway 6 (US 6), is being addressed by the US 6 Bridges Design-Build project. However, the proposed improvements are consistent with the Proposed Action in the PEL Study.

**Figure 2. Proposed Action**



The widening of Federal Boulevard during the Proposed Action will meet AASHTO and CDOT standards. Access will be limited by controlling left-turns at non-signalized points. In the Proposed Action, the existing signalized crosswalks at the intersections of Federal

Boulevard with West 8<sup>th</sup> Avenue and West 10<sup>th</sup> Avenue will be upgraded with new traffic and pedestrian signal indications and enhanced concrete crosswalks. Sidewalks on the west and east sides of the street will be brought up to Americans with Disabilities Act (ADA) standards; this will match the existing sections of Federal Boulevard to the north and south.

Access to bus service, which connects to local and regional destinations as well as the greater transit system, including the nearby West Line of RTD's LRT system, will be improved by upgrading the sidewalk to be consistent and compliant with ADA standards. Additionally, connectivity to the Weir Gulch Trail would be enhanced with better signage for the trail, reducing the curvature of the "T" intersection where the trail and sidewalk connect along West 8<sup>th</sup> Avenue, signage for the Trail, and a wider sidewalk along West 8<sup>th</sup> Avenue, all of which support the CCD's Bicycle Master Plan (CCD, 2001) and Denver Moves (CCD, 2011a). These improvements are anticipated to improve mobility, safety, and enhance multi-modal options within the Project Area.

In summary, the Proposed Action consists of the following elements:

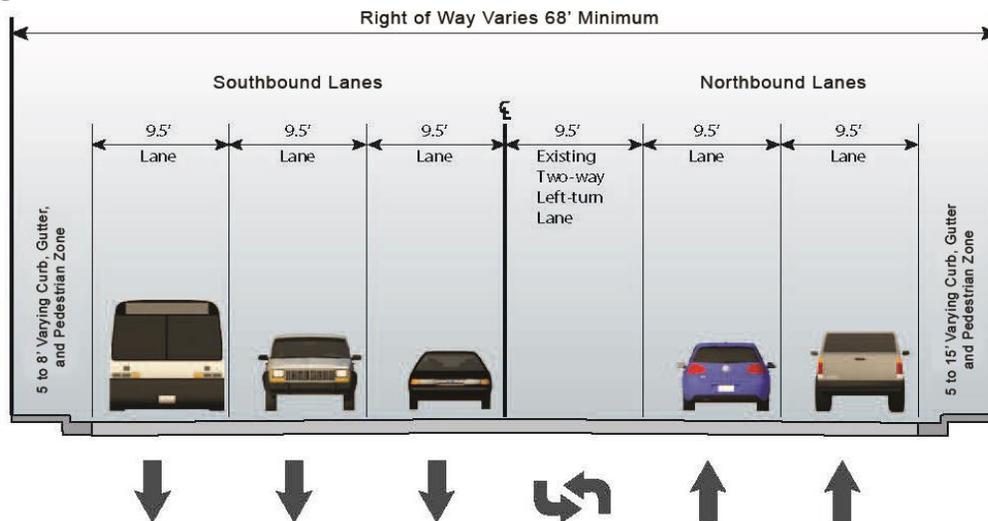
- Federal Boulevard roadway alignment and improvements
  - Widening Federal Boulevard from the ROW boundary on the west side of Federal Boulevard toward the east between West 7<sup>th</sup> Avenue and approximately West 10<sup>th</sup> Avenue with an additional 11-foot northbound lane
  - Restriping and widening the three northbound lanes on Federal Boulevard between approximately West 10<sup>th</sup> Avenue to approximately West Howard Place to be 11 feet wide
  - Restriping and widening the three southbound lanes on Federal Boulevard between approximately West 7<sup>th</sup> Avenue and West 10<sup>th</sup> Avenue to be 11 feet wide
- Bicycle and pedestrian improvements
  - Improving the sidewalks on the east side of Federal Boulevard between West 7<sup>th</sup> Avenue and West 10<sup>th</sup> Avenue to meet ADA standards and better accommodate pedestrians
  - Standardizing inconsistent sidewalk widths on both the east and west sides of Federal Boulevard with an 8-foot pedestrian zone consisting of either a detached 5-foot sidewalk with a 3-foot buffer or an attached 8-foot sidewalk with ADA-compliant curb ramps and driveway cuts
  - Enhancing access to the Decatur-Federal LRT station through improved multi-modal connectivity by improving the sidewalks throughout the Project Area
  - Upgrading existing pedestrian signals and constructing enhanced concrete crosswalks at the signalized intersections of Federal Boulevard with West 8<sup>th</sup> Avenue and West 10<sup>th</sup> Avenue

- Enhancing bicycle and pedestrian connectivity to the Weir Gulch Trail with better signage, wider sidewalks, and access ramps
- Enhancing bicycle connectivity to Routes D-10 and D-12 by adding signage in the Project Area that meets CCD and CDOT standards

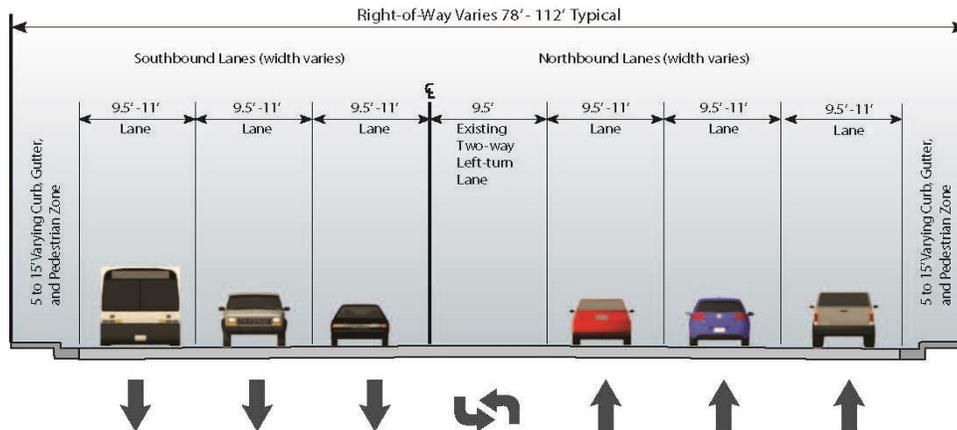
## NO-ACTION ALTERNATIVE

The No-Action Alternative would leave Federal Boulevard as it currently is configured and would not provide any improvements beyond typical maintenance activities. The roadway would remain the same, with 3 southbound and 2 northbound lanes (each 9.5 to 11 feet in width) and a continuous two-way, center, left-turn median between West 7<sup>th</sup> Avenue and West 10<sup>th</sup> Avenue (Figure 3). The segment of Federal Boulevard from West 10<sup>th</sup> Avenue to West Howard Place has three southbound and three northbound lanes, and a continuous two-way left-turn median over Lakewood Gulch (Figure 4). The existing sidewalks along the both sides of Federal Boulevard in the Project Area are either narrow or not well-defined, and the curb ramps at intersections do not meet current ADA or CDOT standards. As part of State Highway (SH) 88, normal maintenance of Federal Boulevard would continue to be performed by CDOT. This includes the current direct discharge of stormwater to the nearby gulches.

**Figure 3. No-Action Alternative between West 7<sup>th</sup> Avenue and West 10<sup>th</sup> Avenue**



**Figure 4. No-Action Alternative between West 10<sup>th</sup> Avenue and West Howard Place**



## METHODOLOGY

As part of this Technical Memorandum, Pinyon Environmental, Inc. (Pinyon) reviewed the PEL Study and its supplemental reports (FHU, 2009a, 2009b, and 2009c) and the *Federal Boulevard US 6 to US 40 Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grant Application* (CCD, 2012b).

Pinyon also reviewed existing traffic and safety information as documented in the *Federal Boulevard 2009 to 2013 Updated Corridor Accident Data Memorandum (Updated Corridor Accident Data Memorandum)* and the Updated Level of Service Analyses, prepared by Tsiouvaras Simmon Holderness, Inc. (TSH) using updated CDOT data and DRCOG traffic data (TSH, 2014a; TSH 2014b).

Pinyon also reviewed existing LRT and bus-route service information as provided by the RTD (Monroe, 2014; Miller, 2014). Furthermore, Pinyon completed a reconnaissance survey of the Study Area and Project vicinity on March 19, 2014, to evaluate existing conditions and other resources therein. The traffic forecasts that are presented and evaluated in this Technical Memorandum are for the year 2035 using the DRCOG 2035 regional travel-demand model as a basis, which is consistent with the data used as part of the PEL Study.

## EXISTING CONDITIONS

The roadway characteristics and traffic operations documented at the time of the PEL Study are generally consistent with current conditions. However, the Project Area was refined and no longer includes the segment of Federal Boulevard between West 5<sup>th</sup> and West 7<sup>th</sup> Avenues, which includes the high-volume interchange at the Federal Boulevard and US 6 (6<sup>th</sup> Avenue) interchange that is being addressed by the US 6 Bridges Design-Build project. Therefore, although current conditions are generally consistent with those documented in previous reports, results of the data (i.e., crash rates and traffic volumes) may vary reflecting this change. The sections below discuss currently existing traffic-facility conditions for the Study Area. The area adjacent to the roadway is predominantly

developed with and zoned for commercial properties, with most structures located in close proximity to the street.

### *General Description and Existing Typical Section*

Federal Boulevard is a principal north-south urban arterial roadway that operates under the jurisdiction of CDOT as SH 88. Federal Boulevard extends 20 miles between Bowles Avenue to the south and West 120<sup>th</sup> Avenue to the north; it is located on the west side of the Denver metropolitan area. Federal Boulevard provides access to several major east-west roadways, including US 285 (Hampden Avenue), US 6 (6<sup>th</sup> Avenue), US 40 (Colfax Avenue), I-70, and I-76. Federal Boulevard currently serves large volumes of vehicles combined with high-frequency bus service and pedestrian volumes. Federal Boulevard is also one of the RTD's busiest cross-town bus routes, providing access to multiple cities as well as to the West Corridor LRT at the Decatur-Federal LRT station (CCD, 2012b).

Between West 7<sup>th</sup> and West 10<sup>th</sup> Avenues, the existing typical section consists of two northbound lanes, three southbound lanes, and a center-turn lane. At the West 8<sup>th</sup> Avenue and Federal Boulevard intersection, the center lane becomes a dedicated left-turn lane in both the northbound and southbound directions. The existing pedestrian zone generally consists of a 5-foot-wide attached sidewalk on both sides of the Boulevard, with the exception of the eastern portion of Federal Boulevard between West Severn Place and West 8<sup>th</sup> Avenue. In this area, the pedestrian zone consists of an 8-foot-wide sidewalk and 10-foot grass buffer between the roadway and sidewalk.

At West 10<sup>th</sup> Avenue northbound, the existing roadway cross-section includes three northbound lanes, three southbound lanes, and a center-turn lane. Similar to the West 8<sup>th</sup> Avenue intersection, the center-turn lanes are dedicated left-turn lanes at the West 10<sup>th</sup> Avenue, West Holden Place, and West Howard Place intersections. In addition, a separate right-turn lane extends from West Howard Place. In the southbound direction, a separate, fourth lane exists just north of the Federal Boulevard Bridge over Lakewood Gulch, as the bridge over the Gulch was reconstructed for additional capacity as part of the RTD FasTracks project.

The existing pedestrian zone north of West 10<sup>th</sup> Avenue consists of an approximately 5-foot-wide attached sidewalk on the western portion of Federal Boulevard until approximately 160 feet south of West 12<sup>th</sup> Avenue. At this location, the pedestrian zone consists of a 5-foot segment of sidewalk with an 8-foot grass buffer, which extends approximately 130 feet north of West 12<sup>th</sup> Avenue. The pedestrian zone continues along the western portion of Federal Boulevard as an approximately 10-foot-wide attached sidewalk, until West Howard Place. Along the eastern portion of Federal Boulevard, the pedestrian zone generally consists of a 5-foot-wide sidewalk and a 10-foot grass buffer area, with the exception of the approximately 200-foot area in the vicinity of the bus-pullout area south of West Holden Place. The pedestrian zone consists of 10-foot wide sidewalks between West Holden Place and West Howard Place.

*Traffic Operations*

**Traffic Volumes and Capacity Analysis**

Traffic volumes remain consistently heavy over long periods of the day with 41,300 vpd reported in May 2013 for the combined southbound and northbound traffic. Percentages of traffic occurring in the peak hours are approximately 6 percent (2787 vehicles) and 8 percent (3387 vehicles) for the morning and evening hours, respectively. The traffic volumes on Federal Boulevard result in the West 8<sup>th</sup> Avenue and Federal Boulevard intersection operating at a LOS E during the evening peak period in the year 2013 (TSH, 2014b). All other intersections operated at LOS C or better during the 2013 peak periods (Table 1). In urbanized areas, LOS D is generally considered to be acceptable for peak hour operations during the morning and evening, which coincide with the morning and evening commute.

**Table 1. Existing and 2035 No-Action Level of Service at Signalized Intersections**

Intersection	Level of Service (Average Delay per vehicle in seconds for LOS F Intersections)			
	Existing (2013)*		Projected (2035)	
	AM	PM	AM	PM
West Holden Place	A	A	A	C
West 10 <sup>th</sup> Avenue	B	B	D	F (92)
West 8 <sup>th</sup> Avenue	C	E	F (122)	F (164)

Source: TSH, 2014b

Note:

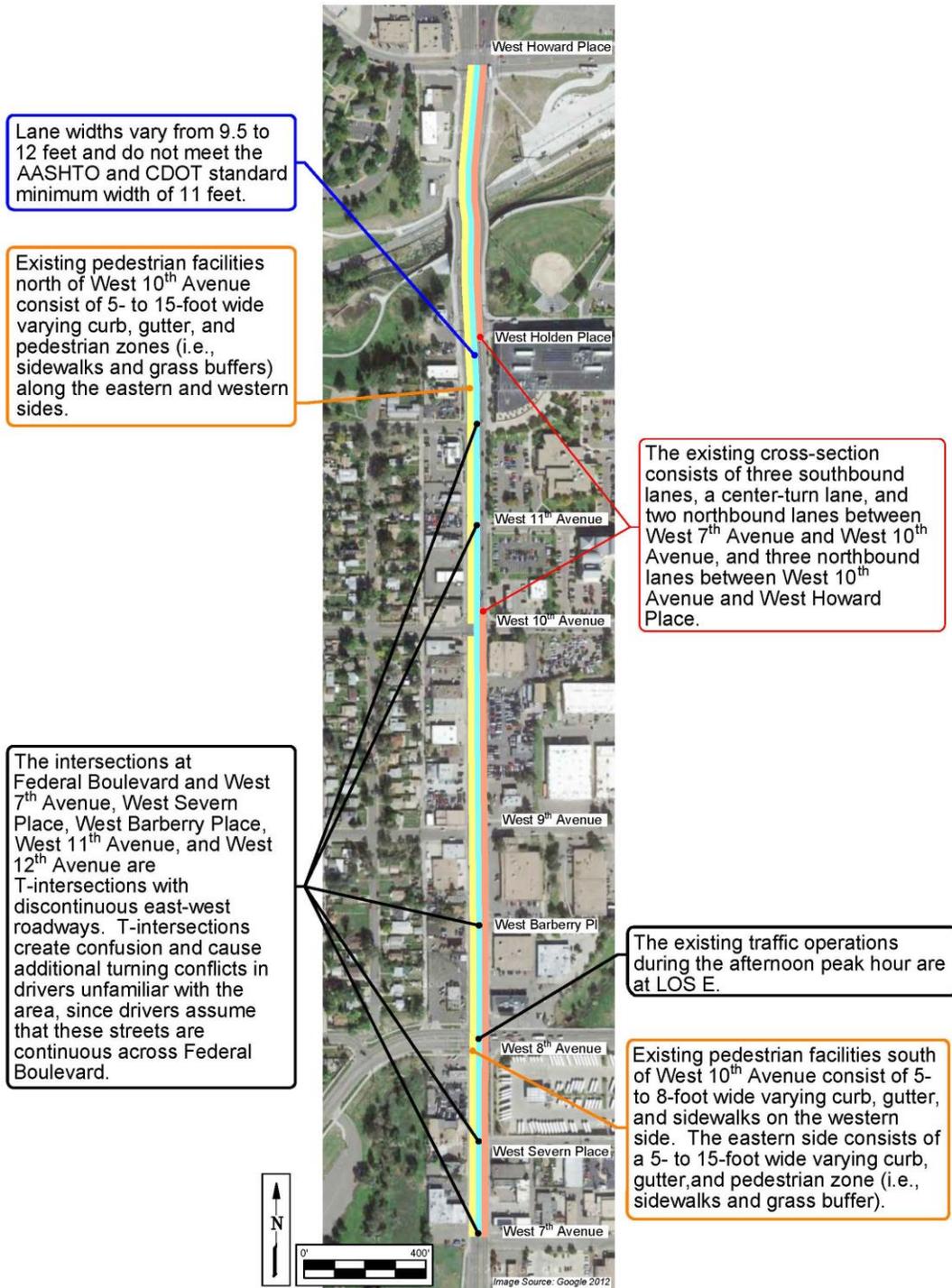
\* Existing volumes derived as outlined in Federal Boulevard (5<sup>th</sup> Avenue to Howard Place) Planning and Environmental Linkage Study Traffic report dated June 2009 using volumes from May 2013 DRCOG traffic counts on Federal Boulevard north of West 8<sup>th</sup> Avenue.

The ADT in 2007 between West 5<sup>th</sup> and West Howard Place, as documented in the PEL Study in 2007 was measured as approximately 40,700 vpd, which is only slightly less than that of 2013. The *Federal Boulevard (5<sup>th</sup> Avenue to West Howard Place) Traffic Report* identifies a directional split with approximately 47 percent of the peak daily traffic in the northbound direction and 53 percent in the southbound direction, which is attributed to the lane difference created by two northbound and three southbound lanes (FHU, 2009c). It is likely that similar conditions currently exist as documented during the PEL Study, given the lack of change in the cross-section of Federal Boulevard between West 5<sup>th</sup> Avenue and West Howard Place.

**Traffic Flow**

The flow of traffic throughout the Study Area was also evaluated as part the PEL Study and associated *Traffic Report*. The following roadway characteristics and deficiencies relating to the flow of traffic through the Study Area were identified (Figure 5):

Figure 5. Existing Operational and Roadway Deficiencies



- Lane widths within the Study Area vary from 9.5 to 12 feet, which do not meet the AASHTO and CDOT standard minimum width of 11 feet for multi-lane roadways (CDOT, 2005). The center median is a painted two-way, center-turn lane which also varies in width from 9.5 to 12 feet.
- Non-signalized intersections are located throughout the Study Area. This results in uncontrolled access to and from Federal Boulevard, which may impact traffic flow and decrease safety throughout the Study Area.
- The intersections of Federal Boulevard and West 7<sup>th</sup> Avenue, West Severn Place, West Barberry Place, West 11<sup>th</sup> Avenue, and West 12<sup>th</sup> Avenue are offset or “T-intersections.” Offset intersections can create confusion and cause turning conflicts in drivers unfamiliar with the area, since the drivers may assume that these streets are continuous across Federal Boulevard.
- As previously mentioned, the existing cross-section generally consists of three southbound lanes, a center-turn lane, and two or three northbound lanes. A third northbound lane does not exist between West 7<sup>th</sup> and West 10<sup>th</sup> Avenues but is present between West 10<sup>th</sup> Avenue and West Howard Place. The imbalance of travel lanes throughout the Study Area creates an inconsistency and discontinuity of travel, as areas to the north and south of the Project Area have differing roadway cross-sections. To the south of the Project Area, the roadway has been widened as part of the Federal Boulevard Alameda Avenue to 5<sup>th</sup> Avenue project. That project consisted of the addition of third northbound lane, roadway widening, and pedestrian-zone widening along with other signal, intersection, and curb improvements (CDOT, 2007; CDOT, 2008b). To the north of the Project Area, there is a six through-lane cross-section from immediately south of the Federal Boulevard and West Howard Place intersection north to Colfax Avenue.

### *Safety*

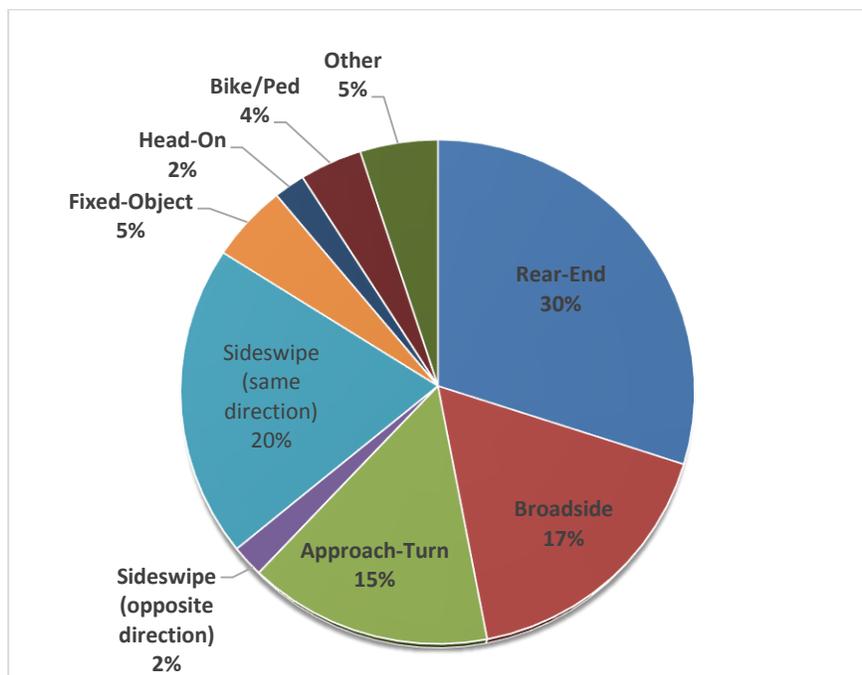
The *Updated Corridor Accident Data Memorandum* describes the crash history for the period between January 1, 2009, and December 31, 2013. Overall five-year crash rates were three to five times higher than the 2011 statewide-average rates (TSH, 2014a); this is consistent with the information presented as part of the PEL Study and supporting *Safety Assessment* (FHU, 2009a; FHU, 2009b). Property-damage only crashes were 3.1 times higher than expected; injury crashes were 4.5 times higher than expected; and crashes involving fatalities were 2.3 times higher than expected (TSH, 2014a).

A total of 300 crashes were reported within the Study Area during the 2009 to 2013 period, the majority of which occurred at signalized intersections, mid-block intersections, or were a result of driveway access-related issues in the Study Area (TSH, 2014). The intersections of Federal Boulevard at West 8<sup>th</sup> Avenue and West 10<sup>th</sup> Avenue experienced the highest frequency of crashes according to the PEL, with a total of 104 crashes at these two intersections. To be consistent with the PEL Study, TSH also evaluated crashes within 100 feet of these two intersections. During the 2009 to 2013

period, there were a total of 137 crashes in the vicinity of these two intersections. This is a decrease from the PEL Study data, as 155 crashes were reported from 2001 to 2003 in the same areas, which may be a result of the overall reduction of traffic in the Study Area (TSH, 2014).

Of the 300 crashes in the Project Area, the most prevalent type of crash was rear-end crashes followed by sideswipes, at 30 and 20 percent of all crashes, respectively (Figure 6). Furthermore, the roadway constraints, lane imbalances, and heavy traffic resulted in a high percentage of broadside and approach-turn crashes resulting from driveway access. This is consistent with information provided in the PEL Study; however, the major difference is the reduction in rear-end crashes (from 40 to 30 percent) and increase in sideswipe crashes (from 11 to 20 percent), as discussed in more detail below.

**Figure 6. Crash Type Distribution on Federal Boulevard between 2009 and 2013**



Source: Updated Corridor Crash Data Memorandum (TSH, 2014)

### **Rear-End Crashes**

Rear-end crashes occurring on Federal Boulevard accounted for 30 percent (90 crashes) of the total crashes between 2009 and 2013. During the PEL Study, a disproportionate number of crashes in the northbound direction were attributed to the lane imbalance as well as the narrow roadway, which occurs through the section south of West 10<sup>th</sup> Avenue where there are two northbound and three southbound lanes. The narrow roadway with little avoidance room for northbound vehicles likely contributes to the frequency of rear-end crashes through this section.

The Study Area is heavily developed and has numerous driveways between West 7<sup>th</sup> Avenue and West Howard Place. This high density of roadway-access points is likely also

a contributing factor to the large number of rear-end crashes. Rear-end crashes accounted for 8 percent of the driveway-related crashes in the Project Area (TSH, 2014). Vehicles turning to access driveways slowdown, which in turn slows down the vehicles behind them and causes inconsistent driving speeds. Additionally, there are four bus routes that extend in the Project Area and nine bus stops (including four in the northbound and five in the southbound directions). Currently, with the two-lane configuration northbound, when the bus stops, it blocks the right lane and traffic must stop behind it or swerve into the left northbound lane to continue travel. This may also contribute to the large volume of rear-end crashes. The PEL Study documented these types of crashes as the most prevalent between January 2001 and December 2003, as they accounted for 40 percent of crashes in the corridor between 5<sup>th</sup> Avenue and West Howard Place.

### **Head-On and Sideswipe (Same Direction and Opposite Direction) Crashes**

Sideswipe crashes accounted for 20 percent (60 total crashes) in the same direction and 2 percent (6 total crashes) in the opposite direction (head-on) crashes between 2009 and 2013; this is the second most common type of crash in the Study Area during that time. The current lane width on Federal Boulevard between West 7<sup>th</sup> Avenue and West Howard Place varies between 9.5 and 12 feet. The narrow width likely contributes to sideswipe crashes for vehicles traveling in the same direction. Opposite-direction-of-travel sideswipe crashes are likely due, in part, to the center left-turn lane. The PEL Study documented sideswipe and head-on crashes as the fourth most prevalent (11 and 3 percent, respectively) between January 2001 and December 2003.

### **Broadside Crashes**

Broadside crashes accounted for 17 percent (51 total crashes) of the crashes in the Project Area, making these the third most-common type of crash between 2009 and 2013. The high number of access points and non-signalized intersections likely contributes to these types of crashes. Furthermore, broadside crashes accounted for 36 percent of crashes that occurred as a result of driveway access-related incidents. This information is consistent with the data presented in the PEL Study, which documented this type of crash as 16 percent of the total between 2001 and 2003.

### **Approach-Turn Crashes**

Approach-turn crashes occur when a vehicle that is turning left across the opposite direction of travel is hit by another vehicle; these are sometimes referred to as “T-bone” crashes. On Federal Boulevard between West 7<sup>th</sup> Avenue and West Howard Place, 15 percent of crashes (45 total crashes) were approach turn, making this type the fourth highest type of crash in the Project Area between 2009 and 2013. Furthermore, approach-turn crashes accounted for 33 percent of crashes that occurred as a result of driveway access in the Project Area. During the PEL Study, there were a disproportionate number of crashes in the northbound direction, which was attributed to the lane imbalance that forces northbound vehicles to cross three lanes instead of two lanes

southbound-turning vehicles must cross (FHU, 2009a). Furthermore, the PEL Study noted that crashes which occurred between West 5<sup>th</sup> and West 10<sup>th</sup> Avenues were likely the result of the narrower roadway in this section of Federal Boulevard (FHU, 2009a). Overall, the updated crash data are consistent with the data presented in the PEL Study; however, approach-turn crashes were the second most prevalent crash type at that earlier time.

### **Fixed-Object Crashes**

Drivers crashing into fixed objects, such as curbs, utility poles, fencing, trees, or structures, accounted for 5 percent of crashes (15 total crashes) in the Project Area between 2009 and 2013. Narrow lanes widths may have added to the number of crashes, particularly in the instance when the crash occurred while a driver was entering or exiting Federal Boulevard. The numerous utility poles and their close spacing may contribute to crashes involving these objects. This information is consistent with the data presented in the PEL Study, which documents this crash type as 4 percent of the total crashes between 2001 and 2003.

### **Pedestrian and Bicycle Crashes**

While pedestrian and bicyclist crashes were the least prevalent type of incident reported at 4 percent of the total (at 2 and 1 percent respectively in the PEL Study), the potential for bodily injury is high (TSH, 2014b). The PEL Study identified the primarily causes of these incidents in the Study Area as:

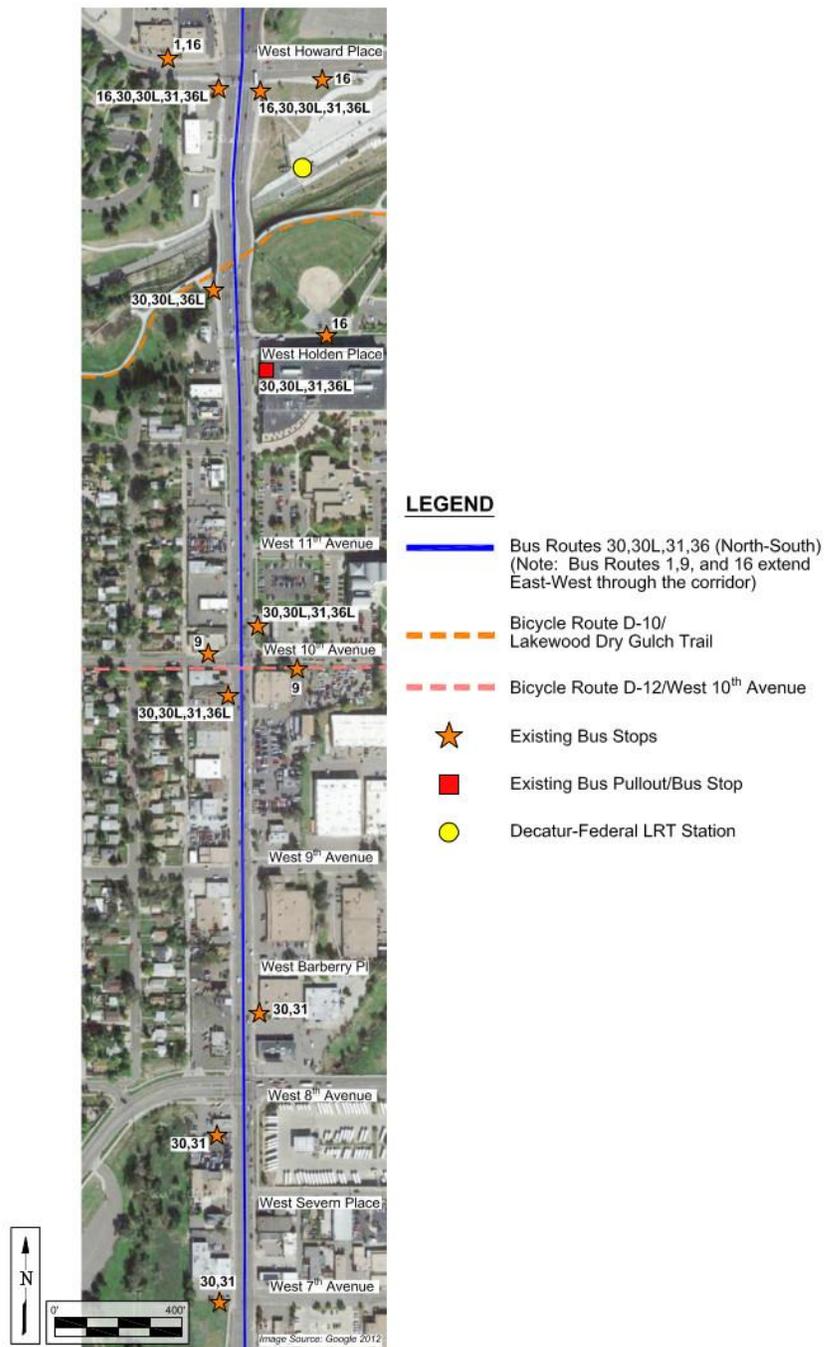
- Discontinuity of space for sidewalks, which forces pedestrians and bicyclists to make their own route between sidewalk segments
- Lack of compliance with current ADA standards for parts of the corridor making it inaccessible for some individuals
- Lack of a buffer zone between the sidewalk and edge of roadway potentially leads them closer to the roadway than is desirable
- Lack of a dedicated bicycle lane on Federal Boulevard, which results in some cyclists utilizing the sidewalks, which leads to pedestrian/bicyclist conflicts due to the narrow width of the existing sidewalk
- Absence of pedestrian refuges and crosswalks, which leads to a greater number of vehicle and pedestrians and bicyclists conflict points and forces pedestrians and bicyclists to make their own route crossing the roadway
- Multiple curb cuts and access points, which leads to a greater number of vehicle and pedestrians/bicyclists conflict points

Based upon information collected by the DRCOG, Federal Boulevard was documented having the second highest number of fatal pedestrian crashes in the Denver region, with 42 fatal pedestrian crashes between 2001 and 2010 (DRCOG, 2012).

*Multi-Modal Connectivity*

Multi-modal connectivity is the ability to provide connections between different modes of transportation. For this Project, modal connectivity is focused on interactions between vehicles, pedestrian, bicycle, and public transportation (Figure 7).

**Figure 7. Multi-Modal Connectivity**



### **Personal Vehicle**

Several features in the Study Area affect personal-vehicle travel and the ability of vehicle drivers to connect with other modes of transportation (i.e., discontinuous travel, numerous points of access, offset intersections, projected increase of congestion) as previously discussed. However, the recently constructed Decatur-Federal LRT station and associated park-n-Ride facility improved conditions for vehicle drivers to make multi-modal connections in the area.

The Decatur-Federal LRT station was constructed in 2013 and contains 1,900 parking spaces, which provides access for personal-vehicle drivers to utilize the LRT system (RTD, 2014b). In addition, five bus-route connections are available at the station or in the immediate vicinity, providing access to the bus system (Figure 7). For the year 2025, it was projected that the station would result in 9,900 daily boardings and alightings, 24 percent of which would be from personal-vehicle access (FTA, 2003). In 2013, there was average of 42 vpd (4 percent capacity) at the Decatur-Federal station park-n-Ride facility (RTD, 2014b). Current bus ridership (discussed below) indicates high boarding and alightings at the Decatur-Federal LRT station, which may be the result of personal-vehicle drivers using the park-n-Ride facilities (RTD, 2014b). This reflects the station's location and automobile access from major arterials including Federal Boulevard, Colfax Avenue, and US 6 (RTD, 2003b); this is consistent with the projected conditions documented in the PEL Study.

### **Pedestrian Activity**

The existing pedestrian zone between West 7<sup>th</sup> and West 10<sup>th</sup> Avenues generally consists of an approximately five-foot attached sidewalk on both sides of the Boulevard, with the exception of its eastern side between West Severn Place and West 8<sup>th</sup> Avenue. In this area, the pedestrian zone consists of an approximately 8-foot-wide sidewalk and 10-foot-wide grass buffer between the roadway and sidewalk. The existing pedestrian zone north of West 10<sup>th</sup> Avenue consists of an approximately 5-foot-wide attached sidewalk on the western side of Federal Boulevard until approximately 160 feet south of West 12<sup>th</sup> Avenue. At this location, the pedestrian zone consists of a 5-foot segment of sidewalk with an 8-foot-wide grass buffer which extends approximately 130 feet north of West 12<sup>th</sup> Avenue. The pedestrian area continues along the western side of Federal Boulevard as an approximately 10-foot-wide attached sidewalk until West Howard Place. Along the eastern side of Federal Boulevard, the pedestrian zone generally consists of a 5-foot-wide sidewalk and 10-foot-wide grass buffer, with the exception of the approximately 200-foot area in the vicinity of the bus-pullout area south of West Holden Place. The pedestrian area consists of 10-foot-wide sidewalks between West Howard Place and West Howard Place.

Pedestrian access to the Decatur-Federal LRT station includes a stairway ramp and sidewalks that extend from the bus structure at the Federal Boulevard and West Howard Place intersection to the LRT platforms (RTD, 2014d).

Consistent with the conditions documented in the PEL Study, there are numerous existing curb cuts, curb ramps, and sidewalks that do not meet ADA nor local and State standards. This deficiency can make it difficult for people to access the bus stops or local businesses. Although some ramps are in adequate condition, the pavement adjacent to the ramps is often in poor condition, thus making it unsuitable for wheelchair access. Additionally, the multiple curb cuts and access points also add to pedestrian conflict points with vehicles (FHU, 2009). There are signalized crosswalks provided along Federal Boulevard at the following intersections in the Project Area: West 8<sup>th</sup> Avenue, West 10<sup>th</sup> Avenue, West Holden Place, and West Howard Place.

Community facilities are typically centers of activity that cause pedestrians to travel along or cross Federal Boulevard for access. The community facilities identified within or in the vicinity of the Project Area include:

- Several public parks, recreational trails, and bicycle routes
- Barnum Recreation Center and Weir Gulch Trail access (360 Hooker Street)
- Rude Recreation Center and Lakewood Gulch Trail access (2855 West Holden Place)
- Denver Department of Human Services (1200 Federal Boulevard)
- Denver Community Credit Union (1065 Federal Boulevard)
- Decatur-Federal LRT station
- Four schools
- Multiple places of religious worship

Federal Boulevard is designated as an Enhanced Bus Transit Corridor as documented in the *Pedestrian Master Plan* (CCD, 2004) and *Blueprint Denver* (CCD, 2002). As part of this designation the following guidelines are recommended in order to improve the pedestrian level of quality and provide minimum acceptable characteristics for pedestrian zones:

- 16-foot-minimum pedestrian zone with 8-foot-minimum tree lawn (either green or hardscaped) and an 8-foot minimum detached sidewalk
- Curb ramps at every intersection
- Benches or shelters at most transit stops
- Pedestrian signals at all signalized intersections
- Crosswalks, signage, pedestrian refuges, and other safety features defining the pedestrian environment at major intersections

### **Bicycle Mobility**

Federal Boulevard is not a designated bicycle route; however, two routes extend across the Project Area in an east-west orientation (Figure 6). Bicycle route D-12 extends along

West 10<sup>th</sup> Avenue and route D-10 follows the Lakewood Gulch Trail at the northern portion of the Project Area (CCD, 2012a and DRCOG, 2014). Due to a lack of signage it may not be clear to bicyclists where the D-10 and D-12 bicycle routes cross Federal Boulevard. This can result in bicyclists riding in traffic along Federal Boulevard which, due to narrow lane widths and the high volume of traffic, can make it unsafe.

The construction of the Decatur-Federal LRT station in April 2013 improved regional bicycle mobility as bicycles may be loaded onto any LRT vehicle through the bike-n-Ride facilities. The Decatur-Federal LRT station has 10 bike racks and 20 bike lockers available for bicyclists (Monroe, 2014). This availability provides bicyclists with an additional transportation options for commuting and/or recreational activities as well as accessing the greater Denver metropolitan area. As part of the RTD and CCD collaboration during the West Corridor LRT project, the bridge over Lakewood Gulch was reconstructed with reconfigured bicycle-route access points.

### **Bus Public Transit**

Four bus routes provide north-south services along Federal Boulevard between West 7<sup>th</sup> Avenue and West Howard Place (Figure 7). Three other routes provide east-west mobility through the Project Area and local area.

- **Route 30 South Federal.** This route is one of the primary bus services along Federal Boulevard. It provides all-day service between the Wadsworth-Hampden park-n-Ride and the Colfax and Federal Transfer Center serving the Decatur-Federal LRT station. Intermittent northbound service is provided from the Wadsworth-Hampden park-n-Ride throughout the day, with regular northbound service every 10 to 15 minutes during peak hours and 15- and 30-minute service during off-peak hours. Southbound service generally consists of a 30-minute peak and one-hour off-peak schedule. The service schedule is consistent with conditions documented in the PEL Study.
- **Route 30L South Federal Limited.** This route provides additional service during both the morning and evening peak hours between the Wadsworth-Hampden park-n-Ride and downtown Denver (i.e., Champa Street and 20<sup>th</sup> Street); it serves the Decatur-Federal LRT station as well. Service includes six northbound and one southbound trip during the morning-peak time as well as one northbound and six southbound trips during the evening-peak time, which is an increase in service since the PEL Study.
- **Route 31 Federal Crosstown.** This route is a second primary bus routes along Federal Boulevard; it services Federal Boulevard at various stops including the Federal and Evans Transfer Center; US 36 and the Westminster park-n-Ride; and the Front Range Community College. This route also makes a connection to the Decatur-Federal LRT station. Route 31 provides all-day and late-night service with 30-minute off-peak and 15-minute peak schedules in the northbound direction. The southbound service is intermittent between Front Range Community College

and the Decatur-Federal station; however, it extends between the Decatur-Federal station and the Federal and Evans Transfer Center with frequent service (ranging from 10 to 30 minutes) throughout both the day and the evening. The route was not documented during the PEL Study, as it was created as part of the West Corridor LRT implementation to enhance north-south corridor movement as discussed below.

- **Route 36L Fort Logan Limited.** This route provides additional service during both the morning and evening peak hours between the Littleton Downtown station and the downtown Denver (i.e., Champa Street and 20<sup>th</sup> Street) as well as providing connection to the Decatur-Federal LRT station. Service includes six northbound and four southbound trips during the morning peak period and six northbound and nine southbound trips during the evening-peak period. The service is consistent with conditions documented as part of the PEL Study.
- **Route 9 West 10<sup>th</sup> Avenue.** This route provides an east-west connection along West 10<sup>th</sup> Avenue between the Lakewood-Wadsworth station and downtown Denver (e.g., Civic Center). Service is provided every 30 minutes in the eastbound and westbound directions all day, excluding late at night. This route was not documented as part of the PEL Study.
- **Route 16 West Colfax Avenue.** This route provides an east-west connection along Colfax Avenue between Golden and downtown Denver (i.e., Civic Center Station). At Federal Boulevard, it exits Colfax Avenue to serve the Decatur-Federal station by circling West Howard Place and West Holden Place. Service west of the Oak Street station is intermittent; however, service throughout the remainder of the route generally runs every 20 minutes during peak hours and 30 minutes during off-peak hours. This route was not documented as part of the PEL Study.
- **Route 1 West 1<sup>st</sup> Avenue.** This route provides an east-west connection between Lakewood Commons, through downtown Denver and the 16<sup>th</sup> Street Mall, to Glendale. The route services the northern portion of the Project Area as it exits Federal Boulevard and extends down West 14<sup>th</sup> Avenue at West Howard Place. This route was not documented as part of the PEL Study.

Five bus stops are located in the southbound direction on Federal Boulevard in the Study Area. Of the five southbound bus stops, four are located in the immediate vicinity of a signalized intersection, and one stop is located south of a non-signalized intersection (Federal Boulevard and West 7<sup>th</sup> Avenue). There is one bus stop that provides a shelter for bus riders. In general, pedestrian zones consist of an approximately five-foot-wide attached sidewalk throughout this area (Figure 7).

Four northbound bus stops are located within the Study Area, three of which are equipped with a shelter for bus riders. In addition to a shelter, a bus pullout is located in front of the Denver Department of Human Services building at 1200 Federal Boulevard; the pedestrian zone in this location is an approximately 10-foot-wide attached sidewalk.

The remainder of the northbound bus stops are curbside; the pedestrian zone in these areas consists of an approximately five-foot attached sidewalk. Existing bus stops and pullouts are shown on Figure 7. All stops in the Project Area (i.e., northbound and southbound) are ADA accessible.

Buses stop in the right through lane on Federal Boulevard to pick up and drop off passengers. Between West 7<sup>th</sup> and West 10<sup>th</sup> Avenues, northbound traffic flow is limited to a single lane when a bus stops. This condition causes operational and safety problems including added congestion and diminished safety as vehicles try to merge into the left lane to avoid being stopped behind a bus.

As part of implementation of the West Corridor LRT in spring 2013, the bus network was restructured to promote a successful integration of bus and rail services (RTD, 2012). Although bus headways generally remained the same in the Project Area, all routes and trip times were adjusted to meet trains at the new station. In addition, the service changes focused on moving the focal point of the corridor from the Colfax-Federal Transfer Center to the new Decatur-Federal LRT station. Routes 1, 30, and 31 now bypass the former Colfax-Federal Transfer Center in both directions and serve Decatur-Federal LRT station on an adjoining street (i.e., Route 1 on 14<sup>th</sup> Place as well as Routes 30 and 31 on Federal Boulevard). Route 16 now serves the Decatur-Federal LRT station at the bus facility on West Howard Place. Limited Routes 30L and 36L did not serve Colfax-Federal Transfer Center, but they do now serve Decatur-Federal LRT station on Federal Boulevard. Limited Route 16L did not serve Colfax-Federal Transfer Center and does not serve Decatur-Federal LRT station; however, the non-limited Route 16 does serve the Decatur-Federal LRT station. Route 9 did not change in the area of Federal Boulevard (Monroe, 2014).

Further, north-south bus-route operations along Federal Boulevard were streamlined to provide direction connections to LRT and downtown Denver (RTD, 2012). Routes 30 and 31 were coordinated to provide local bus service at 7.5-minute headways between Colfax Avenue and Evans Avenue on Federal Boulevard, with an added, limited service route during the peak hours to provide more frequent service during those times (Monroe, 2014). Service associated with Route 49 North Lowell was eliminated from the transit system since documented in the PEL Study; this route provided service between the Colfax-Federal Transfer Center and 46th Avenue-Wolff Street intersection during morning and evening peak hours.

Bus ridership is considered very strong for the segment of the Federal Boulevard corridor located within the Project Area (Monroe, 2014). In general, average weekday ridership, based upon daily totals collected for boardings and alightings from August 2013 to January 2014, indicates that there is a higher frequency of alightings in the peak morning hours and boardings in the evening peak hours, with the highest frequency of trips beginning or ending at the Decatur-Federal LRT station (RTD, 2014c) (Table 2). This supports the notion that Federal Boulevard is predominantly used for “pass-through” trips (CCD, 2008), which likely correlates to commuting patterns to downtown Denver.

**Table 2. Average Weekday Boarding and Alighting by Bus Route**

Route/Direction	Segment	Boardings in Segment	Boardings Percent of Total Route	Alightings in Segment	Alightings Percent of Total Route
Route 30 South Federal (Northbound)	6 <sup>th</sup> Avenue to Decatur-Federal LRT station	71	6	565	46
Route 30 South Federal (Southbound)	Decatur-Federal LRT station to West 7 <sup>th</sup> Avenue	92	28	6	2
Route 30L South Federal Limited (Northbound)	West 10 <sup>th</sup> Avenue to Decatur-Federal LRT station	27	14	30	16
Route 30L South Federal Limited (Southbound)	Decatur-Federal LRT station to West 10 <sup>th</sup> Avenue	45	18	27	11
Route 31 Federal Crosstown (Northbound)	6 <sup>th</sup> Avenue to Decatur-Federal LRT station	889	24	626	17
Route 31 Federal Crosstown (Southbound)	Decatur-Federal LRT station to West 7 <sup>th</sup> Avenue	940	24	802	20
Route 36L Fort Logan Limited (Northbound)	West 10 <sup>th</sup> Avenue to Decatur-Federal LRT station	49	10	72	15
Route 36L Fort Logan Limited (Southbound)	Decatur-Federal LRT station to West 10 <sup>th</sup> Avenue	50	12	40	9

Source: RTD, 2014c

### **Light Rail Transit**

The West Rail Line is a 12.1-mile LRT corridor whose construction began in 2009 and opened in April 2013 as part of the RTD FasTracks project. The LRT line connects downtown Denver with West Denver and Lakewood, terminating at the Jefferson County Government Center in Golden; this LRT corridor has a total of 12 stations. The West Rail Line provides consistent and reliable LRT service to areas west of Denver with 8-minute peak and 15-minute off-peak service between downtown Denver and the Decatur-Federal LRT station, and 15-minute peak and off-peak (RTD, 2014b). The Decatur-Federal station is located at Federal Boulevard and West Howard Place, in the northern portion of the Project Area.

The Decatur-Federal station is the first station on the West Rail Line west of the downtown Denver area. Facilities at this station include:

- Park-n-Ride facilities (1,900 parking spaces)
- Bicycle storage (10 bike racks and 20 bike lockers) as well as bike-boarding capabilities on all LRT trains

- Canopies at all LRT platforms
- Bus connections to Routes 16, 30, 30L, 31, and 36L; bus shelters are provided at all of the bus gates
- Specialized turnstiles that are in operation for events at the Sports Authority Field at Mile High (Miller, 2014)

The Decatur-Federal LRT station is located near major roadways, low- to medium-density land uses, important transit routes, and special event centers (e.g., Sports Authority Field at Mile High). The station functions as an important transportation hub for Park-n-Ride commuters, bus transfers, and the many residents and workers from nearby neighborhoods and businesses including bicyclists and pedestrians (FTA, 2003).

Ridership averages 2,292 total weekday boardings at the Decatur-Federal station, as documented from the August 2013 schedule. In the eastbound direction, a total of 682 boardings and 503 alightings have been documented; in the westbound direction, a total of 546 boardings and 561 alightings (RTD, 2013). Information regarding modal split was not available at the time of this Technical Memorandum; however, for the year 2025, it was projected that the station would result in 9,900 daily boardings and alightings, with a modal split of 24 percent automotive, 70 percent bus, and 6 percent pedestrian access (FTA, 2003).

### *Traffic Projections for 2035*

Projected traffic volumes on Federal Boulevard were prepared based upon the No-Action Alternative using data for 2035 (FHU, 2009a). Daily traffic-volume forecasts for 2035 are in the 53,000 to 55,000 vpd range on Federal Boulevard in the Project Area; this range indicates an approximately 30 percent increase in volume compared with the 2001 to 2003 traffic operations (FHU, 2009c). Operations forecasts project a continued degradation to an unacceptable level of congestion (LOS F or failing) during both the peak morning and peak afternoon hours for the West 8<sup>th</sup> Avenue intersection and during the peak afternoon hours for the West 10<sup>th</sup> Avenue intersection. Furthermore, with increased congestion under the No-Action Alternative, it is likely that overall safety in the corridor would be impacted, potentially leading to an increase in crashes.

## IMPACT ASSESSMENT

The Proposed Action has a potential to impact traffic operations and safety within the Project Area, as summarized in Table 3, below.

**Table 3. Transportation Impacts**

Resource	Proposed Action	No-Action Alternative
<p>Federal Boulevard is a principal north-south urban arterial roadway that operates under the jurisdiction of CDOT as SH 88. Federal Boulevard provides access to several major east-west roadways and currently serves large vehicular volumes combined with high frequency bus service and high pedestrian volumes. Federal Boulevard also provides access to the West Corridor LRT at the Decatur-Federal LRT station.</p>	<p><b>Permanent Impacts:</b></p> <p>Improved safety and traffic operations through the addition of a third northbound lane between West 7<sup>th</sup> Avenue and West 10<sup>th</sup> Avenue; upgrading lane widths to meet standards between West 10<sup>th</sup> Avenue and West Howard Place; construction of a raised median throughout the Project Area; reduced congestion by adding capacity; improved multi-modal connectivity by bringing the sidewalks up to ADA standards; additional signage for bicycle routes; improved access to the Weir Gulch Trail; and new signage for the Weir Gulch Trail would result if the Proposed Action were implemented.</p> <p><b>Temporary Impacts:</b></p> <p>Temporary impacts during construction activities could impact transportation facilities through roadway and lane closures, detours, and increased congestion and travel time.</p>	<p><b>Permanent Impacts:</b></p> <p>Given the projected increase in volumes and resultant congestion, implementation of the No-Action Alternative would result in continued degradation of safety and traffic operations, increased congestion, and lack of improved multi-modal connectivity.</p> <p><b>Temporary Impacts:</b></p> <p>No temporary impacts would occur if the No-Action Alternative is implemented.</p>

## MITIGATION MEASURES

The recommended control measures that will be included as part of the final design and implementation for the Proposed Project are summarized in Table 4, below.

**Table 4. Transportation Mitigation Measures**

Resource	Proposed Action
<p>Temporary Impacts to Access during Construction</p>	<p>During final engineering design, access points (i.e., new, modified, or combined) will be identified in a formal access-control plan prepared for the Proposed Action from West 7<sup>th</sup> Avenue to West Howard Place along Federal Boulevard. All access points will be constructed in accordance with CCD and ADA standards.</p>

## STAKEHOLDER COORDINATION

The CCD has continued to provide opportunities for public involvement between the PEL Study in 2009 and initiation of this EA. A public meeting was held in August 14, 2014 prior to the completion of this EA to solicit further comment on and discussion of the Project. A Spanish-speaking translator was present at the open house, and materials were presented in both English and Spanish; Korean translation was available upon request. Stakeholder coordination will continue to take place throughout the Project’s development and construction.

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**Transportation Resources for the Federal Boulevard Improvements EA**

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