I-76 & Bridge Street INTERCHANGE

I-76 and Bridge Street Interchange
Environmental Assessment

January 2015

Submitted by

Brighton

Prepared for

CDOT COLORADO Department of Transportation

I-76 and Bridge Street Interchange

Environmental Assessment

Submitted Pursuant to
42 USC (2)(c), 49 USC 303
By the
U.S. Department of Transportation
Federal Highway Administration
and the
Colorado Department of Transportation

Project Proponent
City of Brighton

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1-12-2015
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1/23/2015
Date

The Federal Highway Administration may publish a notice in the Federal Register, pursuant to 23 United States Code (USC) Section 139(l), once the decision document is approved. If such notice is published, a claim arising under federal law seeking judicial review of a permit, license, or approval issued by a federal agency for a highway or public transportation capital project shall be barred unless it is filed within 150 days after publication of a notice in the Federal Register announcing that the permit, license, or approval is final pursuant to the law under which the agency action is taken, unless a shorter time is specified in the federal law pursuant to which judicial review is allowed. If no notice is published, then the periods of time that otherwise are provided by the federal laws governing such claims will apply.

Availability of the I-76 and Bridge Street Environmental Assessment

Copies of the Environmental Assessment are available in hard copy format for public review at the locations listed below and/or by request from CDOT Region 1. Note that there is a charge for CDOT to print the document. The document is also available electronically on CDOT's website: www.coloradodot.info/library/studies/i76bridgestreetea and on Brighton's website:www.brightonco.gov/605/I-76-and-Bridge-Street-Interchange-Proje

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Submitting a Comment on the I-76 and Bridge Street Environmental Assessment

Comments can be submitted in writing to the City of Brighton through letter, e-mail, or website.

Letters can be addressed to:
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Brighton, CO 80601

E-mails can be sent to:
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The website form can be completed on Brighton's website:
www.brightonco.gov/605/I-76-and-Bridge-Street-Interchange-Proje

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Acronyms and Abbreviations

A	
AA	Assessment Area
AASHTO	American Association of State Highway and Transportation Officials
ACM	Asbestos-Containing Materials
ADT	Average Daily Traffic
AM	Ante Meridian/Morning
AOI	Area of Interest
APCD	Air Pollution Control Division
APE	Area of Potential Effect
B	
Brighton	City of Brighton
BMP	Best Management Practice
BO	Biological Opinion
C	
CAA	Clean Air Act
CDOT	Colorado Department of Transportation
CDOA	Colorado Department of Agriculture
CDPHE	Colorado Department of Public Health and Environment
CDPS	Colorado Discharge Permit System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNHP	Colorado Natural Heritage Program
CO	Carbon Monoxide
CPW	Colorado Parks and Wildlife
CRS	Colorado Revised Statutes
CSP	Central Shortgrass Prairie
CWA	Clean Water Act
D	
DRCOG	Denver Regional Council of Governments
dBA	A-Weighted Decibel
E	
EA	Environmental Assessment
EC	Executive Committee
EJ	Environmental Justice
EO	Executive Order
EPA	Environmental Protection Agency
ES	Executive Summary
ESA	Endangered Species Act

F	
FACWet	Functional Assessment of Colorado Wetlands
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
FTA	Federal Transit Administration
G	
GIS	Geographic Information Systems
GHG	Greenhouse Gas
GPS	Global Positioning System
H	
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
HUD	U.S. Department of Housing and Urban Development
I	
I-25	Interstate 25
I-70	Interstate 70
I-76	Interstate 76
I-80	Interstate 80
IAR	Interchange Access Request
L	
Leq	Equivalent Sound Level
Leq(h)	Hourly Equivalent Sound Level
LOS	Level of Service
LUST	Leaking Underground Storage Tank
LWCF	Land and Water Conservation Fund
M	
MBTA	Migratory Bird Treaty Act
MESA	Modified Environmental Site Assessment
MOA	Memorandum of Agreement
MP	Milepost
MPH	Miles per Hour
MPO	Metropolitan Planning Organization
MS4	Municipal Separate Storm Sewer System
MSAT	Mobile Source Air Toxic
MVRTP	Metro Vision Regional Transportation Plan
N	
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxides
NRCS	Natural Resources Conservation Service

NRHP	National Register of Historic Places
NWP 14	Section 404 Nationwide Permit 14: Linear Transportation Crossings
O	
O_3	Ozone
OHWM	Ordinary High Water Mark
P	
Pb	Lead
PBA	Programmatic Biological Assessment
PEM	Palustrine Emergent
PM	Post Meridian/Afternoon
$PM_{2.5}$	Particulate Matter 2.5 Micrometers in Diameter and Smaller
PM_{10}	Particulate Matter 10 Micrometers in Diameter and Smaller
PUD	Planned Unit Development
R	
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
RTD	Regional Transportation District
RTP	Regional Transportation Plan
S	
SH 7	State Highway 7
SH 52	State Highway 52
SIP	State Implementation Plan
SLS	System-Level Study
SO_2	Sulfur Dioxide
SPWRAP	South Platte Water Related Activities Program
STIP	State Transportation Improvement Program
SWMP	Stormwater Management Plan
T	
TIP	Transportation Improvement Program
TMA	Transportation Management Area
TMC	Turning Movement Counts
TNM	Traffic Noise Model
TSM	Transportation System Management
U	
Uniform Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act
US 36	U.S. Highway 36
US 85	U.S. Highway 85
US 287	U.S. Highway 287
USACE	U.S. Army Corps of Engineers
USC	United States Code
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
UST	Underground Storage Tank

V	
VMT	Vehicle Miles of Travel
VOC	Volatile Organic Compound
W	
WQCA	Water Quality Control Act
WQCC	Water Quality Control Commission
WUS	Waters of the U.S.

Executive Summary

Preparation of the I-76 and Bridge Street Interchange Project Environmental Assessment has been a cooperative effort among the Federal Highway Administration (FHWA) and the Colorado Department of Transportation (CDOT) as joint lead agencies and the City of Brighton (Brighton) as the project proponent. The intent of this Environmental Assessment (EA) is to determine transportation problems, identify alternatives to solve these problems, and analyze impacts of the alternatives to determine what the best solution is. The National Environmental Policy Act of 1969 (NEPA) requires federally funded projects that may have an impact on the environment to be analyzed through a rigorous process that allows the public to understand and comment on the benefits and impacts of the project.

This executive summary of the EA provides an overview of the project, including the project Purpose and Need, a description of the alternatives studied, and the potential impacts and mitigation. For details on the information provided in this executive summary, refer to the corresponding chapters.

ES.1 Project Description

The City of Brighton proposes to construct an interchange at Interstate 76 (I-76) and Bridge Street on the eastern side of Brighton in Adams County. The proposed interchange provides an opportunity to increase regional east-west connectivity across State Highway 7 (SH 7), which will become increasingly important with future population growth and increased travel demand. The adjacent interchanges on I-76 are at Bromley Lane to the south and at Baseline Road to the north. Exhibit ES-1 illustrates the location of the project in the regional context.

Exhibit ES-1. Location of the Project in the Regional Context

ES.2 Project Purpose and Need

The purpose of the project is to increase local and regional east-west connectivity, reduce the amount of travel delay through the planning horizon year of 2035, and improve traffic flow in the project area.

The need for the project results from the following issues:

- Lack of local and regional connectivity
- Current and future congestion
- Poor current and future traffic flow and delay on the surrounding roadway network

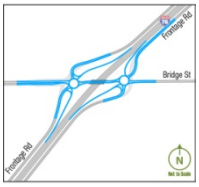
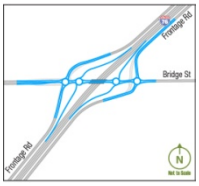
ES.3 Screening Process and Description of Alternatives

The project Purpose and Need was used to develop evaluation criteria to compare alternatives. Brighton, CDOT, and FHWA collaboratively established evaluation criteria for the following measures:

- The project Purpose and Need
- Infrastructure impacts, safety, drivers' expectations, truck traffic accommodation, and traffic operations
- Impacts to the natural and built environment

Following the evaluation process, out of the 12 initial alternatives, three Action Alternatives—along with the No-Action Alternative—were advanced for detailed analysis. Exhibit ES-2 lists the alternatives that are fully evaluated in this document and provides a brief description of each one. The Two-Roundabout Interchange Alternative is identified as the Preferred Alternative. More detail on the alternatives evaluation and screening process is available in Chapter 3, Alternatives Analysis.

Exhibit ES-2. Alternatives Evaluated

Alternative	Description
 No-Action	Includes existing, planned, and programmed roadway operations and maintenance improvements in the project area
 Preferred Alternative: Two-Roundabout Interchange	Combines the interstate frontage roads and ramp terminals to make a six-legged roundabout on each side of I-76
 Alternative 2: Four-Roundabout Interchange	Combines the interstate frontage roads into a roundabout and the ramp terminals into another roundabout, for two four-legged roundabouts on either side of I-76
 Alternative 3: Three-Roundabout Interchange	Combines the interstate frontage roads and ramp terminals into a six-legged roundabout on the west side; combines the ramp terminals into one four-legged roundabout and the interstate frontage roads into another four-legged roundabout on the east side

ES.4 Proposed Preferred Alternative

Although all of the Action Alternatives have similar impacts, per Brighton's preference, the Two-Roundabout Interchange Alternative was identified as the Preferred Alternative. This alternative was identified because:

- It includes only two roundabouts, instead of the three or four roundabouts included in Alternatives 2 and 3. This will simplify signage and markings and drivers' choices by consolidating ramp and frontage road access points into a single roundabout on each side of the highway.
- It is a simpler design with easy construction phasing that will create fewer anticipated traffic impacts during construction compared to Alternatives 2 and 3.
- It accommodates heavy truck turning movements more efficiently than Alternatives 2 and 3.

There are other minor differences between the Preferred Alternative and other Action Alternatives; however, they were not a deciding factor in identification of the Preferred Alternative. These minor differences include:

- The Preferred Alternative has no impact on the adjacent Speer Canal in the northwest quadrant of the interchange; therefore, it avoids the need to construct a retaining wall adjacent to Speer Canal, while Alternative 2 requires construction of this retaining wall.
- The Preferred Alternative will have permanent right-of-way impacts of 0.24 acre, and no full property acquisitions or relocations will be required. Alternative 2 requires 0.463 acre and Alternative 3 requires 0.108 acre of permanent right-of-way impacts.
- The Preferred Alternative will not conflict with the access point to the property in the southeast quadrant of the interchange, while Alternatives 2 and 3 require modifications to this property's access point.

ES.5 Impacts and Mitigations

Impacts to the built and natural environment in the project area have been analyzed for the No-Action Alternative and the three Action Alternatives. This project has minimal impacts to some of the resources and would not impact other resources. Based on data collection and the project team's expertise, some resources are not impacted by any of the alternatives, so they are not included in the detailed impacts and mitigations discussion in this document. These resources are:

- Energy
- Farmlands

- Floodplains
- Parks and Recreation
- Section 4(f) Properties
- Section 6(f) Resources
- Soils and Geology
- Visual Resources
- Environmental Justice (not present in the area)

Mitigation measures or best management practices (BMPs) are proposed to alleviate impacts from the Action Alternatives. Exhibit ES-3 outlines the evaluated resources and the anticipated impacts to these resources with each alternative.

Exhibit ES-3. Potential Impacts to Resources

Resource	Potential Impacts	
	No-Action Alternative	Action Alternatives
Transportation	Many intersections at Bromley Lane and Baseline Road will operate at Level of Service (LOS)* F by 2035	Expected to decrease congestion at Bromley Lane and Baseline Road and improve operations to LOS C or better; expected to decrease congestion and improve LOS at other local intersections by 2035; traffic on I-76 will not be impacted greatly by this project
Air quality	No impacts	Conforms with the 2035 Metro Vision Regional Transportation Plan (MVRTP); expected to have negligible impact on air quality by 2035
Traffic noise	No impacts	No permanent long-term noise impacts exceeding the standards are anticipated; however, temporary construction noise impacts are anticipated
Land use and zoning	Incompatible with future land use plans; does not support goals and objectives of local land use plans or address travel demand	Action Alternatives are compatible with existing and future land use plans in the project area and support the goals and objectives of adopted local land use plans
Right of way	No impacts	Approximately 0.108 acre to 0.463 acre of permanent right-of-way acquisition and 0.118 acre to 0.127 acre of temporary construction right-of-way impacts are anticipated
Socioeconomics	No impacts	There will be minimal temporary construction impacts, including detours
Utilities	No impacts	Possible adjustments and/or relocations for three to 16 utility lines are anticipated

Resource	Potential Impacts	
	No-Action Alternative	Action Alternatives
Biological resources	No impacts	There will be minimal impacts to natural vegetation and habitat; the possibility exists of spreading noxious weeds from within the project area to other areas not currently invaded
Wetlands	No impacts	All Action Alternatives will permanently impact 0.01 acre (585 square feet) of wetlands; there are no permanent or temporary impacts to open waters
Water resources and water quality	No impacts	Action Alternatives will increase the potential for erosion and movement of sediment due to ground disturbance; temporary impacts to a CDOT Municipal Separate Storm Sewer System (MS4) permitted area and existing stormwater drainage infrastructure are anticipated
Hazardous materials	No impacts	There are no identified known locations with hazardous materials contamination; it is possible to encounter unknown hazardous materials due to ground disturbance activities during construction
Historic properties	No impacts	There could be possible indirect impacts to previously uncovered archeological resources

**Congestion is measured in terms of LOS. The LOS is described by a letter designation from "A" to "F," with LOS A representing essentially uninterrupted flow with minimal delays and LOS F representing a breakdown of traffic flow with excessive congestion.*

ES.6 Next Steps

When this EA document is published, a 30-day public review and comment period will be conducted, including a public open house or an informational booth at a public function. The public review period will allow the public to offer input on the proposed Preferred Alternative.

When the public review period concludes, feedback received will be reviewed and incorporated into the decision document. The decision document will be either: (1) a Finding of No Significant Impact (FONSI), or (2) a Notice of Intent to prepare an Environmental Impact Statement (EIS).

During final design and through construction, the project team members will continue to coordinate and interact with stakeholders and community members.

Chapter 1: Introduction

This chapter provides a general introduction to the I-76 and Bridge Street Interchange Project, including the project area, project background, the agencies involved in the project, and an overview of the NEPA process.

1.1 Project Location and Background

The proposed I-76 and Bridge Street Interchange Project is located in Brighton, Colorado, in Adams County. Brighton is approximately 20 miles northeast of Denver and is within the Denver Regional Council of Governments (DRCOG) Transportation Management Area (TMA). Exhibit 1-1 shows the location of the project within the regional context.

Exhibit 1-1. Location of the Project in the Regional Context

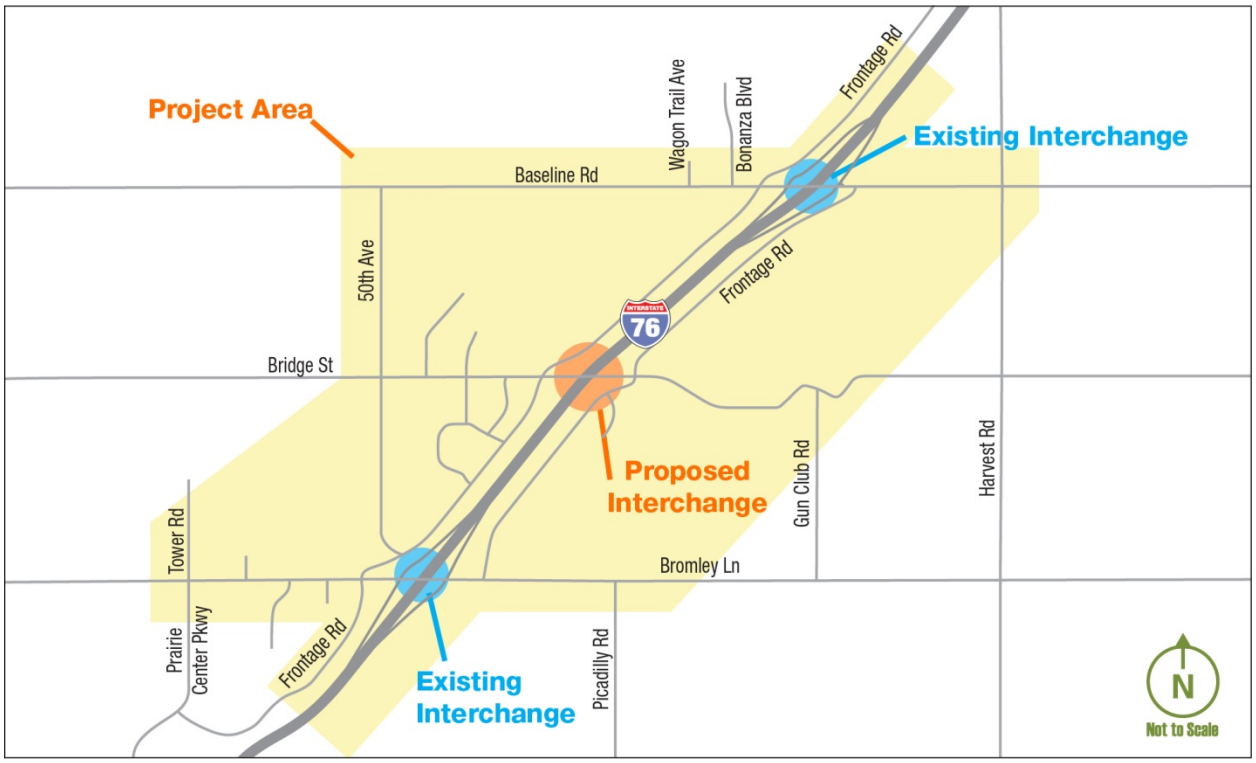
According to DRCOG's 2035 MVRTP, Bridge Street is a regionally significant roadway in the area that provides east-west connectivity through Brighton and is a critical roadway link between the cities of Brighton, Broomfield, Lafayette, and Boulder. However, the roadway does not have access to I-76. Except for Bridge Street, few alternate routes exist that provide connectivity to other area highways, such as U.S. Highway 36 (US 36), Interstate 25 (I-25), and U.S. Highway 85 (US 85).

Growth in high-density residential land use areas in Brighton will impact the transportation network. Most travelers use I-76 to reach employment centers south of Brighton throughout the greater Denver Metro area. Currently, there are only two interchanges that connect the high-density residential areas to I-76. These interchanges are located at I-76 and Bromley Lane and at I-76 and Baseline Road. This limited connectivity affects the mobility of regional and local trips and emergency vehicles. Trips with origins or destinations along Bridge Street are forced to use the Bromley Lane and Baseline Road interchanges, taking additional surface streets in the project area to reach them. This increases travel times (longer trip lengths due to out-of-direction travel) and traffic volumes at those interchanges and on the surface streets between the interchanges. A well-connected roadway network is essential to support the social, economic, and physical development of Brighton and the region.

Brighton proposes to construct an interchange at I-76 and Bridge Street at the location of the existing Bridge Street overpass in eastern Brighton. The existing Bridge Street overpass is approximately 1.25 miles north of the existing I-76 and Bromley Lane interchange and approximately 1.5 miles south of the existing I-76 and Baseline Road interchange.

A project area was preliminary identified to initiate the study. It is bounded approximately by Baseline Road on the north, Bromley Lane on the south, 50th Avenue and Tower Road on the west, and Picadilly Road and Harvest Road on the east. Exhibit 1-2 illustrates the project area location. The project area has been defined as an urban service area by the Brighton 2020 Comprehensive Plan and it also is considered an urban growth area by DRCOG. An urban service area is where most future development will occur over the next 20 years as defined in the comprehensive plan. An urban growth area is a place where urban growth and development is encouraged and supported, both locally and regionally.

Exhibit 1-2. I-76 and Bridge Street Interchange Project Area



Historically, from the early 1900s to the early 2000s, land within the project area primarily was used for agriculture. Since 2000, Brighton's population has grown by 60 percent. Brighton is transforming from a rural, agricultural town to a suburban community, which has changed the character of the area considerably. Suburban development is expected to continue in future years, as shown in Exhibit 1-3.

Exhibit 1-3. Anticipated Growth within the Project Area

Activity Unit	2010	2035
Households	1,496	5,177
Employment	586	764

Source: DRCOG Compass 4.0 version 3 regional travel demand model.

According to the Brighton 2020 Comprehensive Plan, future land use includes industrial, employment, mixed-use, high-density residential, and agricultural development. The project area is expected to have 346 percent household growth and 130 percent employment growth by 2035. A new high-density neighborhood is planned for the northwest corner of Bridge Street and I-76. This development is projected to introduce an additional 12,700 vehicles per day to the transportation network by 2035. Residential growth will outpace employment growth in the area.

The transportation system is integral to growth and development in the Denver Metro Region. DRCOG's 2035 MVRTP identifies a vision for a safe, accessible, and efficient transportation system that integrates with land use and maximizes regional benefits.

Brighton, which is located within DRCOG's Urban Growth Boundary, continues to transform from a rural, agricultural town into a suburban community. Development is expected to continue, making a well-connected roadway network essential to support the social, economic, and physical development of Brighton and the region.

Brighton is studying current and future travel patterns in the eastern portion of the community, where recently completed and imminent development is expected to impact important local and regional roadways, as well as I-76. Future improvements are needed within the project area to increase mobility and maintain system quality and safety.

Brighton has identified the need for improved connectivity with I-76 at Bridge Street and has proposed constructing an interchange at this location as a way to address this need. The System-Level Feasibility Study was approved by CDOT in October 2013. This led to the initiation of this EA.

Without the I-76 and Bridge Street interchange, travelers will continue to use the frontage roads and 50th Avenue to access the two existing interchanges at I-76 and Bromley Lane and I-76 and Baseline Road, resulting in increased delays, longer travel times, and poor operations. Growth in truck-oriented businesses is expected to occur to the east of I-76 and will place additional demands on the transportation system.

Deficiencies in the current and future transportation system in the project area include:

- Lack of sufficient local and regional east-west connectivity
- Increased amount of traffic congestion through the planning horizon year of 2035 at intersections in the project area
- Poor traffic flow and delay on the roadway network surrounding I-76 and Bridge Street

The proposed interchange is consistent with existing plans, including the 2012 Adams County Transportation Plan, the 2035 DRCOG MVRTP, and Brighton's 2014–2018 Capital Improvement Funding Plan.

1.2 Agencies Involved in the Project

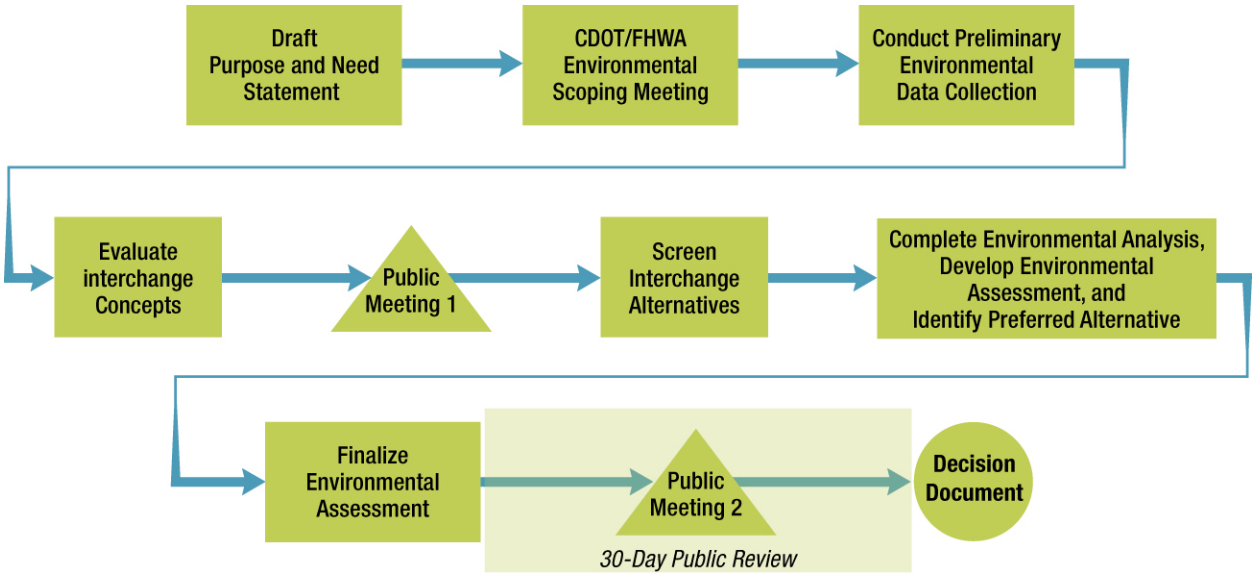
Key agencies partnered to identify and address transportation challenges and develop implementable solutions that meet the project Purpose and Need while aligning with the public and stakeholder expectations. Agencies and their associated roles and responsibilities are as follows:

- **Brighton.** Project Proponent; responsible for the overall project, including funding, construction, and maintenance
- **CDOT.** Joint Lead Agency; responsible for guiding the EA document development and engineering design elements
- **FHWA.** Joint Lead Agency; responsible for oversight of the NEPA process and approval authorization

1.3 NEPA Process

NEPA requires analysis of projects with a federal nexus (e.g., federal funding or approval) that may impact the environment. This is done through a rigorous process that allows the public and agencies to understand and comment on the benefits and impacts of the project. An EA is prepared when the significance of impacts of a transportation project is uncertain. This process allows decision makers to consider effects on the environment with other important considerations, such as need, feasibility, and cost. Part of this process includes stakeholder and public engagement. Exhibit 1-4 shows the EA process for this project. When the analysis is done, an EA is concluded with either: (1) a FONSI, or (2) a Notice of Intent to prepare an EIS.

Exhibit 1-4. I-76 and Bridge Street Interchange Project EA Process



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Chapter 2: Purpose and Need

This Purpose and Need chapter of the EA identifies and documents the current conditions using the analysis year of 2013 and the future conditions projected out to 2035 in the project area. Preparation of this EA has been a cooperative effort by the FHWA and CDOT as joint lead agencies, and Brighton is the project proponent.

2.1 Horizon Year of Analysis

Transportation modeling is used to create information to help make decisions about the future development of transportation systems. It is used as part of an overall transportation planning process that forecasts travel patterns for 15 years to 25 years into the future. The horizon year for this project is 2035, which is the year currently used for the Denver region's transportation planning process, guided by DRCOG. The year of 2035 also is used by CDOT as the horizon year in its current transportation plans for the state. Data for the year 2035 are based on available projections from DRCOG. They provide the foundation for developing and evaluating alternatives.

2.2 Purpose of the Project

The purpose of the project is to increase local and regional east-west connectivity, reduce the amount of travel delay through the planning horizon year of 2035, and improve traffic flow in the project area.

2.3 Need for the Project

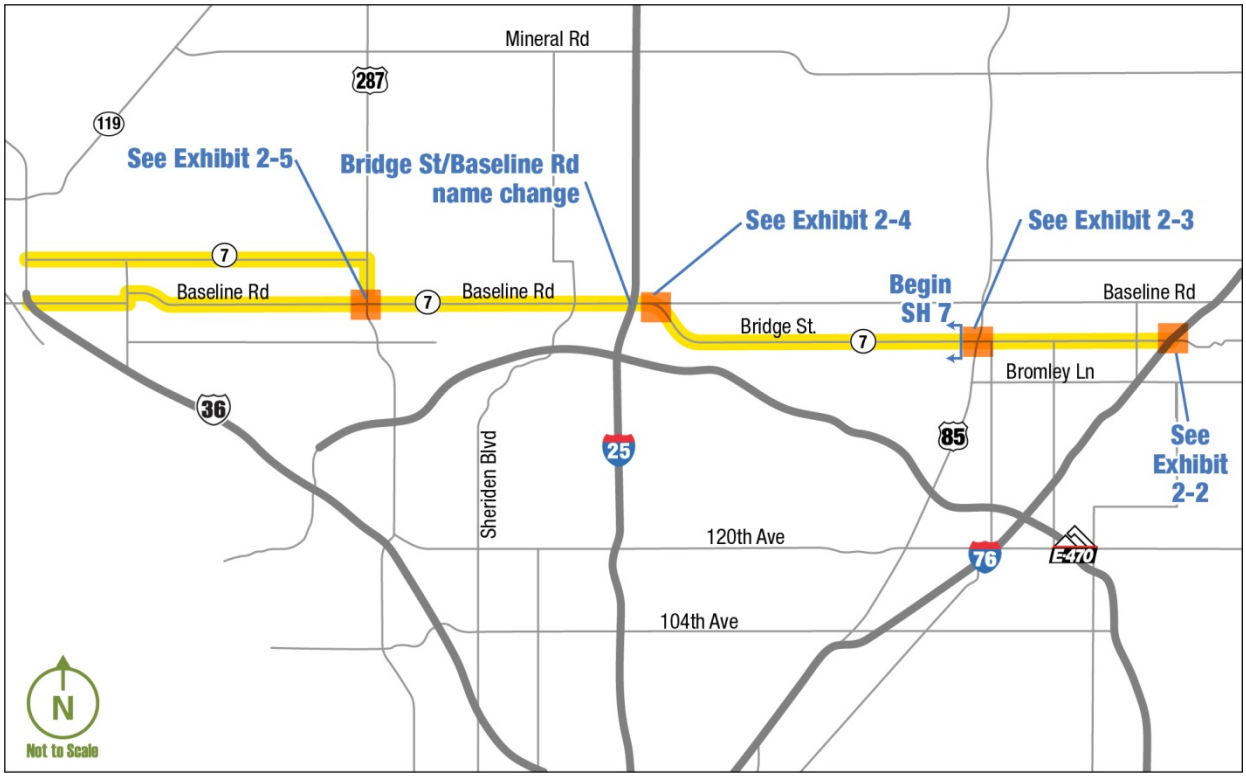
The need for the project results from the following issues, which are discussed in more detail in the subsequent subsections:

- Lack of local and regional connectivity
- Current and future congestion
- Poor current and future traffic flow and delay on the surrounding roadway network

2.3.1 Lack of Local and Regional Connectivity

Bridge Street is an east-west principal arterial roadway in Brighton that traverses through the heart of the city. Bridge Street has been designated by Brighton as its major east-west corridor since it can accommodate high travel speeds, as well as provide wide shoulders, limited access, and vehicle capacity that meet the design standards of a state highway. Bridge Street also serves as a regionally significant roadway that provides interchange connections at I-25 and US 85, as well as direct access via signalized intersections at SH 287 and US 36. Exhibit 2-1 shows the regional connectivity along Bridge Street.

Exhibit 2-1. Regional Connectivity



Bridge Street is designated as SH 7 to the west of US 85. SH 7/Bridge Street spans approximately 30 miles between Brighton/I-76 and Boulder/US 36. The lack of an interchange at Bridge Street and I-76 diminishes regional and local connectivity. SH 7/Bridge Street is the only roadway that passes through Brighton and provides connectivity as far west as Boulder, where it connects to US 36 in Boulder. In Brighton, traffic must travel either south to Bromley Lane or north to Baseline Road to access I-76.

During conversations with project team members, local emergency responders expressed concerns with the lack of connectivity at I-76 and Bridge Street. They noted that the distance between the Bromley Lane and Baseline Road interchanges forces them to travel out of the way to access the interstate, resulting in increased response times to incidents.

Bromley Lane and Baseline Road are the only existing roadways with interchanges at I-76 in Brighton, but they provide limited east-west connectivity for regional travel between Brighton and destinations to/from the west (where employment centers and other facilities are located). Neither of these two roadways meets state highway standards or provides grade-separated interchanges at US 85 or I-25. Bromley Lane is classified as a multi-lane principal arterial west of I-76 and a two-lane collector east of I-76. Baseline Road is classified as a two-lane minor arterial west of I-76 and a two-lane collector east of I-76. Exhibit 2-2 shows the connectivity of the local roadway network in Brighton at I-76.

Exhibit 2-2. Connectivity between the Local Network and I-76

As shown in Exhibit 2-3, a significant investment has been made in the interchange at Bridge Street and US 85. The interchange is grade separated with two large roundabouts. The interchanges at Bromley Lane and US 85 and at Baseline Road and US 85 are signalized, congested, at-grade intersections. SH 7/Bridge Street has a design standard that exceeds the local city streets, allowing it to carry higher traffic volumes due to wider lane widths, wider shoulders, and fewer access points. These factors contribute to higher speeds, less congestion, and the ability to carry more vehicles.

Exhibit 2-3. Connectivity between the Local Network and US 85

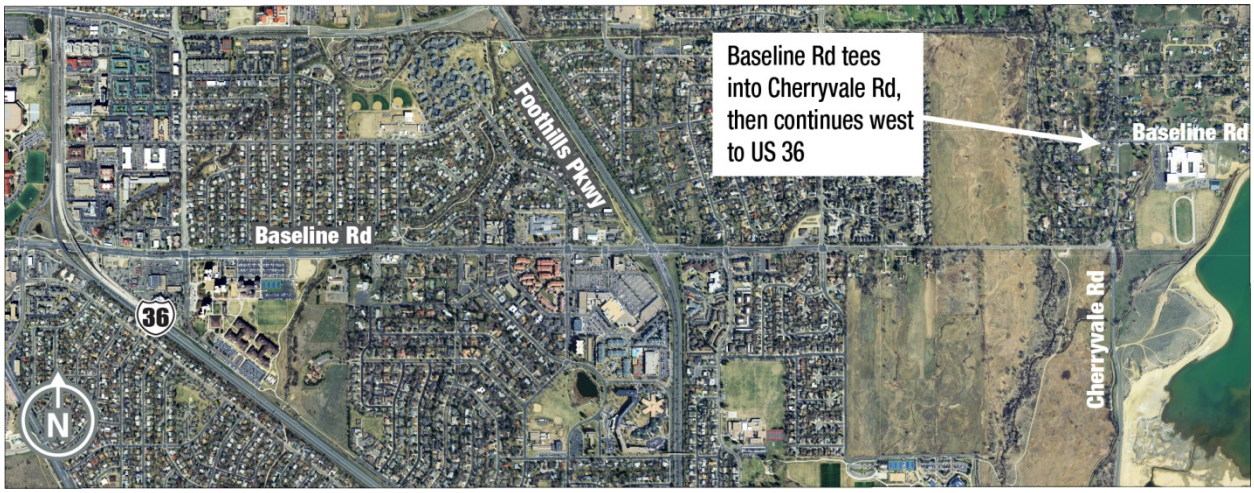
As shown in Exhibit 2-4, Bridge Street turns northwest and then continues west after it intersects with Baseline Road, which tees into SH 7/Bridge Street. At the junction, Baseline Road is stop controlled and Bridge Street is continuous. At this location and to the west, SH 7/Bridge Street changes names again and becomes SH 7/Baseline Road. While it is not uncommon for highways to have multiple names and overlapping routes, SH 7 is still the primary route.

Exhibit 2-4. Connectivity between the Local Network and I-25

There is a grade-separated interchange at I-25, to the west of which SH 7/Baseline Road connects to US 287 via a signalized intersection. At this point, SH 7 and Baseline Road diverge, with SH 7 aligned north/south coincidental with US 287 and Baseline Road continuing on an east/west alignment. To the west of US 287, SH 7 joins Arapahoe Road and continues on an east-west alignment into Boulder providing access to US 36 via a signalized intersection. Baseline Road continues on an east-west alignment to the west of US 287 and provides access to US 36 via a grade-separated interchange.

As shown in Exhibit 2-5, SH 7/Baseline Road tees into Cherryvale Road as it continues west. Then, drivers have two options: they can continue north and then west to SH 7 or south and then west onto Baseline Road. Both of these routes connect to US 36 in Boulder.

Exhibit 2-5. Connectivity between the Local Network and US 36



2.3.2 Existing and Future Congestion

As noted previously, the Brighton area currently has two interchanges at I-76: Bromley Lane and Baseline Road. The results of the existing traffic operational analysis indicate that the Bromley Lane interchange is the primary entry/exit point for residents of Brighton using I-76. The existing I-76 interchanges at Bromley Lane and Baseline Road, as well as the Bridge Street overpass over I-76, have been modeled to estimate current year (2013) and planning horizon year (2035) congestion. The traffic in the model for the year 2035 is based on the amount of growth anticipated in the area; these forecasts have been approved by DRCOG and are consistent with their projections for the project area (Brighton, 2013).

The existing and future congestion is measured in terms of LOS. The LOS is described by a letter designation from "A" to "F," with LOS A representing essentially uninterrupted flow with minimal delays and LOS F representing a breakdown of traffic flow with excessive congestion. Generally, LOS A through LOS D are considered acceptable levels of service.

Under existing traffic conditions, the interchanges at Bromley Lane and Baseline Road are beginning to show signs of congestion. The Bromley Lane interchange serves as the main access from I-76 to Brighton. The following locations on Bromley Lane currently operate at LOS E/F:

- The Bromley Lane and West Frontage Road intersection is a single-lane roundabout. The highest volumes of peak-period traffic are the southbound left turns and eastbound/westbound through-movements. These volumes result in increased congestion for eastbound vehicles attempting to enter the roundabout during the PM (evening) peak period, and the southbound approach during the AM (morning) peak period. These movements experience LOS E.

- The eastbound ramp junction with Bromley Lane is an all-way, stop-controlled intersection that operates at an overall LOS F during the evening peak. Vehicles exiting I-76 and turning left onto Bromley Lane experience congestion.

On Baseline Road, the high volume of side-street traffic combined with single-lane approaches results in congestion and LOS E at the following locations:

- The southbound approach of the West Frontage Road during the morning and evening peak hour
- The northbound approach of the I-76 eastbound off-ramp intersection during the evening peak hour

Exhibit 2-6 and Exhibit 2-7 show the existing peak period LOS for the AM and PM peak hours.

Exhibit 2-6. Existing 2013 LOS AM Peak Period

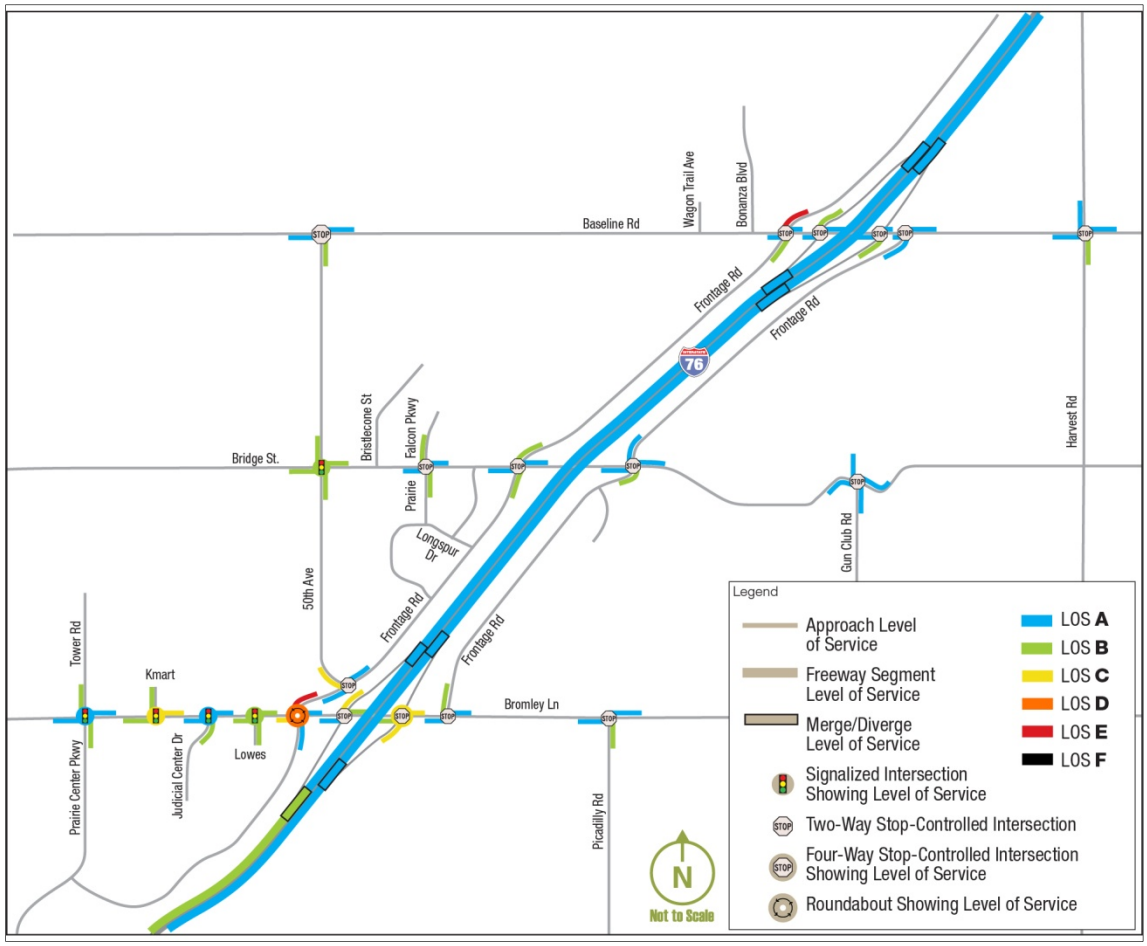
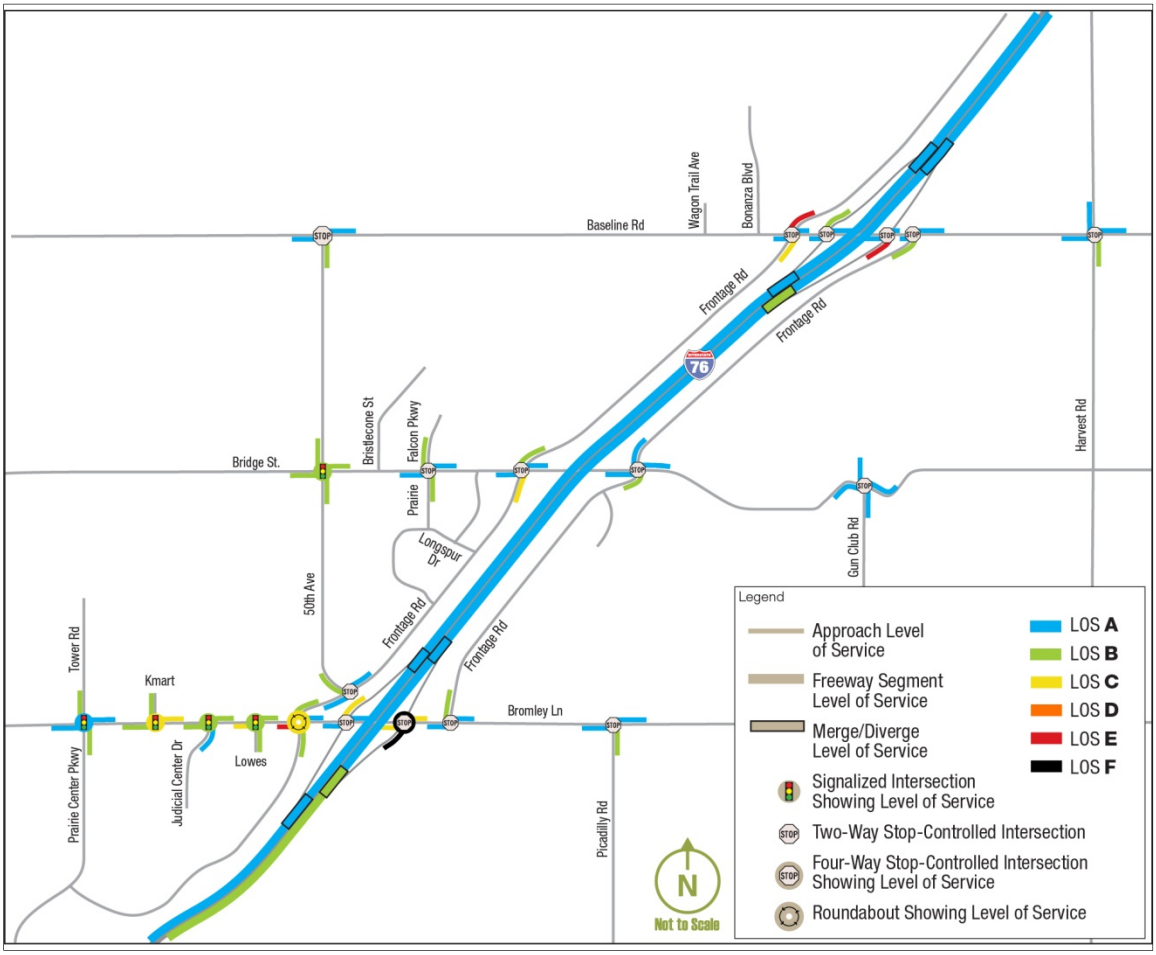


Exhibit 2-7. Existing 2013 LOS PM Peak Period



Eastern Brighton is growing rapidly, increasing demands on the existing infrastructure. Travel patterns on I-76 suggest the corridor provides important regional access for Brighton residents to employment centers in metropolitan Denver. However, current limited access to the interstate is not supportive of the development and population density in the area.

Future planned land uses for the area include additional industrial, employment, mixed-use, high-density residential use, and agricultural development. The area expects to have substantial residential population growth and development by 2035. Residential growth will outpace employment growth in the area, as discussed in Chapter 1 of this document. Growth in high-density residential areas will particularly impact the transportation network, since travelers are expected to use I-76 to reach employment centers south of Brighton throughout the greater Denver metro area. This includes a new high-density neighborhood currently being developed on the northwest corner of the Bridge Street overpass over I-76. This development is projected to introduce an additional 12,700 vehicles per day to the transportation network by 2035.

As traffic volumes increase in the future, further degradation of traffic operations is expected to occur in the project area. Travel patterns to, and volumes on, I-76 indicate that the interstate provides important regional access for Brighton residents to employment centers in metropolitan Denver. However, current interstate access is limited to interchanges at Baseline Road and Bromley Lane, which is not supportive of the development and population density in the area.

Increased daily and peak-hour volumes will impact operations along both Baseline Road and Bromley Lane, as well as operations of traffic using the mainline lanes of I-76, because of queuing on the ramps and an increase in merging and diverging maneuvers. The busiest peak time for both the Bromley Lane and I-76 interchange and the Baseline Road and I-76 interchange is the PM peak hour.

At Bromley Lane, the existing traffic volume is 6,900 vehicles per day, which will more than double by 2035 to approximately 16,100 vehicles per day. The PM peak-period traffic volumes are projected to increase considerably, from 1,000 in 2013 to 2,445 in 2035—more than doubling the current traffic volume. These volumes will exceed the facility's capacity, resulting in additional operational impacts at both the east and west roundabouts on Bromley Lane.

Exhibit 2-8 and Exhibit 2-9 illustrate projected 2035 peak period LOS for AM and PM. The projected increase in traffic volumes served at Bromley Lane intersections used to access I-76 will degrade operations to LOS E/F at several intersections:

- The southbound approach of 50th Avenue at West Frontage Road will operate at LOS F/F. The southbound approach on West Frontage Road at Bromley Lane will operate at LOS F/F in the peak periods. The westbound approach of Bromley Lane at the I-76 off-ramp will operate at LOS E in the AM peak period.
- The roundabout at Bromley Lane and West Frontage Road will degrade in operations to LOS F in both the AM and PM peak periods.
- Two of the three approaches at the intersection at Bromley Lane and the eastbound I-76 ramps will operate at LOS F in the AM peak period and all three approaches will operate at LOS F in the PM peak period.

At Baseline Road, unacceptable levels of service are anticipated at the following locations:

- The northbound and southbound approaches of the West Frontage Road at Baseline Road will operate at LOS E/F in the AM and PM peak periods, respectively. The volumes on Baseline Road reduce the number of available gaps for the vehicles attempting to turn left onto Baseline Road.
- The northbound approach of the I-76 eastbound ramp intersection at Baseline Road will operate at LOS F in the PM peak period.

All intersections and approaches along Bridge Street will operate at LOS D or better during AM and PM peak hours in 2035, with the following exceptions:

- The northbound approach of 50th Avenue will operate at LOS F during the PM peak period.
- The overall intersection operations at 50th Avenue during the PM peak period will degrade from LOS B in 2013 to LOS E in 2035.

Exhibit 2-8. Projected 2035 LOS AM Peak Period

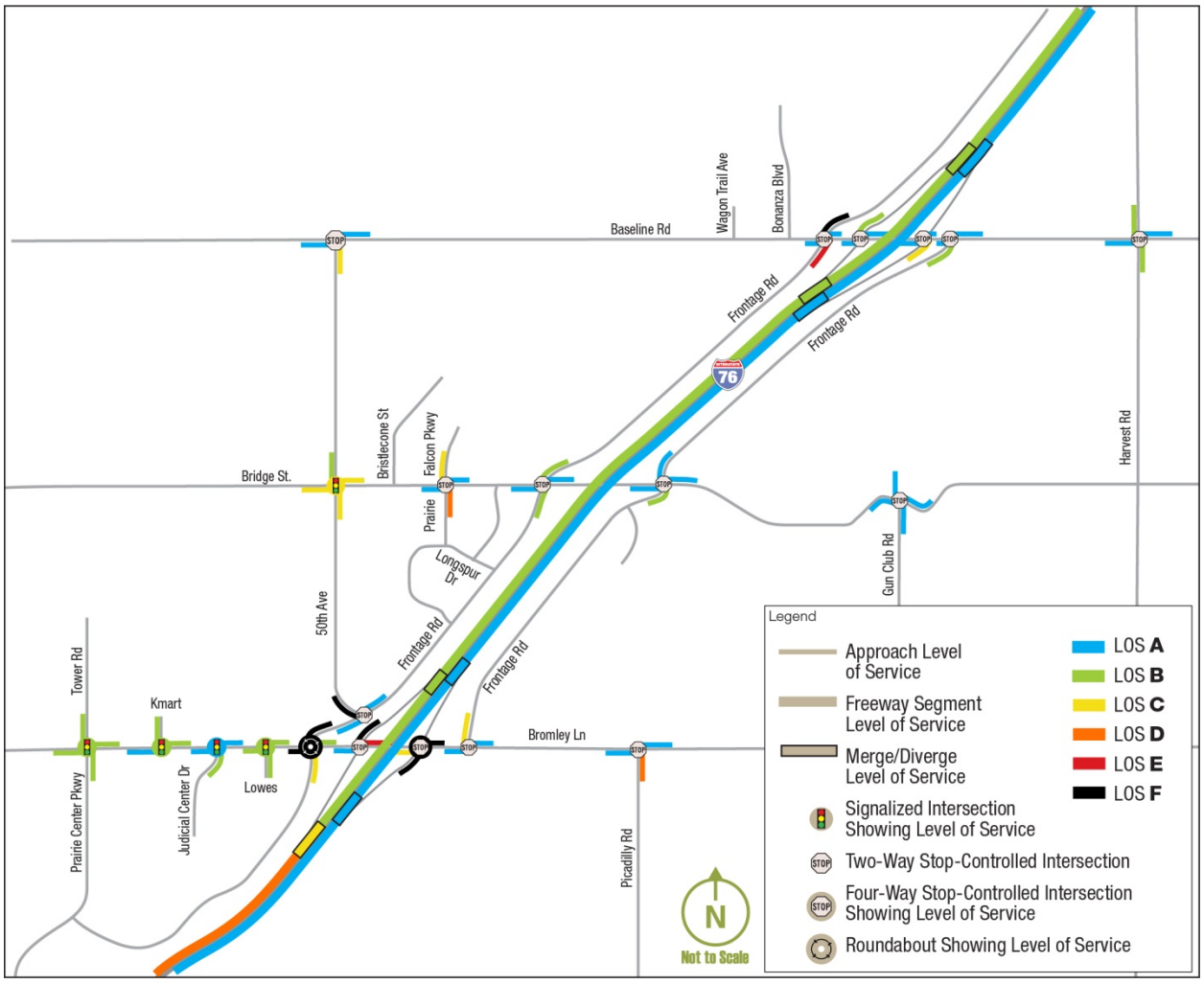
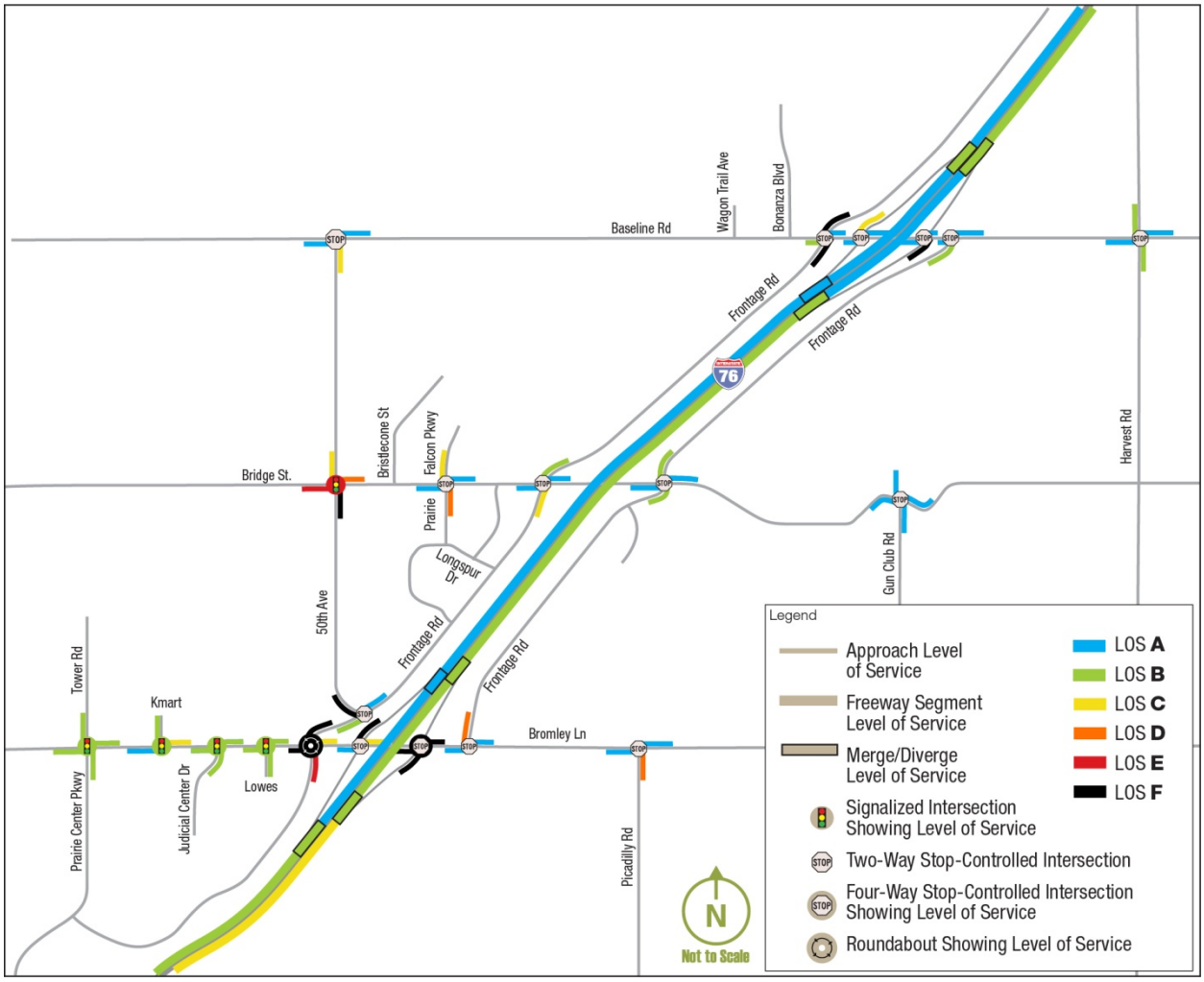


Exhibit 2-9. Projected 2035 LOS PM Peak Period



2.3.3 Poor Current and Future Traffic Flow and Delay

A key measure of operational efficiency and traffic flow in the project area is the amount of delay experienced by vehicles from Bridge Street to I-76 and vice versa. The traffic flow and delay is measured by queue backups/spill over into through-lanes and travel time/delays. Travel time is a measurement of the amount of time it can take during the peak hours to travel to a destination. For the purposes of this project, the delay is measured where traffic must traverse the project area and be able to access both the existing Bromley Lane interchange and the proposed Bridge Street interchange. The queue backups are related to the amount of traffic that either backs up onto the interstate from the ramp intersections or the amount of traffic at intersections that cannot find adequate gaps in traffic for turns so it backs up excessively on the arterial roads. Excessive backups are measured in terms of queues that spill into the through-lanes. When the queues spill into the through–lanes, this causes an unsafe condition for all traffic.

Travel time is a measurement of the amount of time it can take during the peak hours to travel to a destination. Delay occurs when the travel time is extended beyond the duration experienced in congestion-free travel. For the purposes of this project, travel time is measured from the intersection of Bridge Street and 50th Avenue to/from either the existing Bromley Lane interchange or the proposed new Bridge Street interchange to access I-76.

In Exhibit 2-10, Route 1 shows a potential route that vehicles take to access I-76 from Bridge Street and Route 2 shows a potential route to access Bridge Street from I-76 through the Bromley Lane Interchange. Routes 1 and 2 in the exhibit were selected because they represent a delay within the project area, which is a point farthest from the interchange for travelers headed to the metro area for their trips within the traffic study area.

Exhibit 2-10. Existing Bridge Street and 50th Avenue Delay to I-76

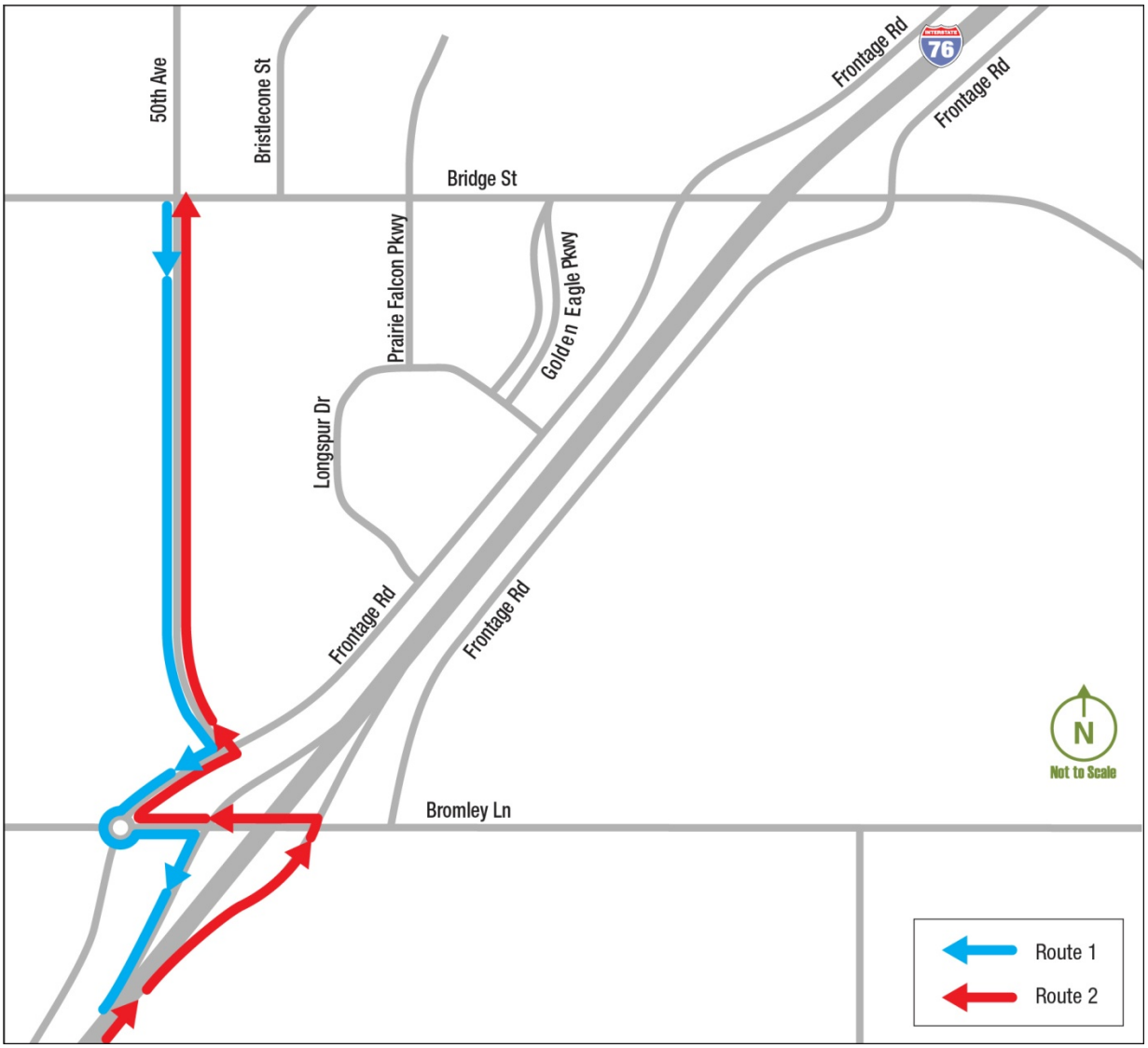


Exhibit 2-11 presents existing (2013) and 2035 No-Action delays calculated for the vehicles that use these routes.

The maximum increase in travel time along Route 1 (Bridge Street to I-76 westbound) in the PM peak in 2013 to 2035 is an increase in trip time of 3 minutes, 7 seconds per vehicle. The maximum increase in travel time for Route 2 (I-76 eastbound to Bridge Street) from the point selected in the PM from 2013 to 2035 is an increase in trip time of 3 minutes, 36 seconds per vehicle.

Exhibit 2-11. Bromley Lane Interchange Delay

Condition	Travel Time (in minutes and seconds per vehicle)			
	Route 1		Route 2	
	AM	PM	AM	PM
2013 Existing	3 minutes, 44 seconds	3 minutes, 10 seconds	3 minutes, 34 seconds	3 minutes, 27 seconds
2035 No-Action	6 minutes, 16 seconds	6 minutes, 17 seconds	6 minutes, 52 seconds	7 minutes, 3 seconds
Increase from 2013	**2 minutes, 32 seconds**	**3 minutes, 7 seconds**	**3 minutes, 18 seconds**	**3 minutes, 36 seconds**

Another measure to evaluate traffic flow and operation is a comparison between the queue lengths in the existing conditions and the projected queue lengths for the horizon year. Queue lengths are correlated to LOS at intersections, so intersections with LOS E and LOS F have longer queues.

The westbound I-76 off ramp at Bromley Lane in the AM and PM peak hours currently does not spill onto the interstate. In 2035, it is expected that the queue in both the AM and PM peak hours will spill onto the interstate and exceed the length of the off ramp.

The eastbound I-76 off ramp at Bromley Lane currently in the AM peak does not spill onto the interstate; however, the PM peak will back up onto the off ramp. In 2035, it is expected that the queue in the AM and PM peak hours will spill onto the interstate and exceed the length of the off ramp.

The roundabout at Bromley Lane is starting to fail and the backups are having an effect on the 50th Avenue/Frontage Road intersection as the queues build. In 2035, the roundabout will fail and back up Bromley Lane in all directions, but mostly in the AM and PM peak eastbound direction. This will have an effect on all directions, but mostly on the 50th Avenue/Frontage Road intersection, where the queues will spill into each other, clogging up both intersections.

The westbound I-76 off ramp at Baseline Road in the AM and PM peak hours currently does not spill onto the interstate. In 2035 during the AM and PM peak hours, the traffic also does not spill onto the interstate or back up on the off ramp.

The eastbound I-76 off ramp at Baseline Road in the AM and PM peak hours currently does not spill onto the interstate. In 2035 during the AM peak hour, the off ramp will not back up onto the ramp; however, in the PM peak hour, the queue will exceed the length of the off ramp and will spill onto the interstate.

Exhibit 2-12 shows the delay and queue length at intersections with Bromley Lane and Baseline Road that are projected to have long queue lengths on some or all of the approaches in both current conditions (2013) and planning horizon year (2035). Traffic operations are projected to worsen by 2035 and the amount of delay will increase.

Exhibit 2-12. Queue Length Delay Comparison

Intersection	Approach	2013 Existing Conditions (AM/PM)		2035 No-Action Alternative (AM/PM)	
		Delay (seconds/ vehicle)	95% Queue Length* (ft)	Delay (seconds/ vehicle)	95% Queue Length* (ft)
Bromley Lane					
50th Avenue and West Frontage Road	Eastbound	8.1/9.0	25/50	8.8/12.8	50/175
	Westbound	**	**	**	**
	Southbound[1]	18.2/10.8	150/50	>100/97.4	3250/625
West Frontage Road[2]	Eastbound	18.3/40.9	125/375	>100/>100	650/1450
	Westbound	6.2/5.3	75/75	14.1/20.6	150/150
	Northbound	9.1/14.3	25/50	17.2/37.3	25/100
	Southbound	46.0/13.8	350/100	>100/71.0	1,750/450
	Overall	25.1/21.0	n/a	>100/>100	n/a
Westbound I-76 Ramps	Eastbound	**	**	**	**
	Westbound	10.4/9.6	25/25	48.3/22.3	350/150
	Southbound[1]	16.4/16.7	25/25	>100/>100	n/a
Eastbound I-76 Ramps	Eastbound[1]	11.4/19.2	**	23.1/>100	**
	Westbound[1]	18.0/15.8	**	>100/54.5	**
	Northbound[1]	18.8/>100	**	>100/>100	**
	Overall	17.2/66.4	n/a	>100/>100	n/a
Baseline Road					
West Frontage Road	Eastbound	7.7/8.8	25/25	8.3/10.7	25/25
	Westbound	8.1/7.7	25/25	8.8/7.9	25/25
	Northbound[1]	14.6/19.9	25/50	44.0/>100	50/425
	Southbound[1]	35.5/35.3	150/100	>100/>100	4,125/3,250

Intersection	Approach	2013 Existing Conditions (AM/PM)		2035 No-Action Alternative (AM/PM)	
		Delay (seconds/ vehicle)	95% Queue Length* (ft)	Delay (seconds/ vehicle)	95% Queue Length* (ft)
Eastbound I-76 Ramps	Eastbound	7.8/7.7	25/25	8.6/8.1	25/25
	Westbound	**	**	**	**
	Northbound[1]	10.9/38.5	25/275	16.4/>100	50/1250

** The 95% queue is defined to be the queue length (in vehicles) that has only a 5-percent probability of being exceeded during the analysis time period.*

***Highway Capacity Manual (HCM) is limited in calculating values for these movements because the LOS is greater than F*

[1] Stop-controlled approach

[2] Roundabout

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Chapter 3: Alternatives Analysis

Twelve alternatives (including the No-Action Alternative) were initially considered for the I-76 and Bridge Street Interchange Project. This chapter introduces all the alternatives considered for this project, explains the evaluation and screening process, discusses the alternatives that are being evaluated in this document in detail, and identifies the Preferred Alternative.

3.1 Alternatives Development and Evaluation Criteria

A System-Level Feasibility Study was performed in 2013 to explore different alternatives for access to I-76 at Bridge Street. Twelve alternatives were developed during that study, including the No-Action Alternative. The alternatives considered resulted from agency collaboration, public outreach, and detailed environmental and technical analyses. An open house was held in July 2013 to present these alternatives and to solicit feedback from the public. Attendees included neighborhood/area residents and I-76 commuters.

The alternatives from the System-Level Feasibility Study are discussed and evaluated in this EA. Brighton, CDOT, and FHWA collaboratively established evaluation criteria to assess and compare these 12 alternatives. The comparative process was used to reduce the number of alternatives considered and to identify the Preferred Alternative. The project's evaluation criteria include the following:

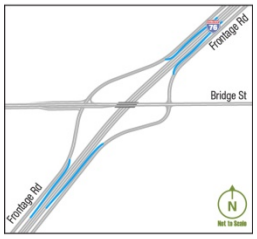
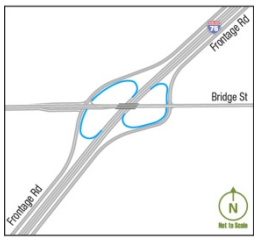
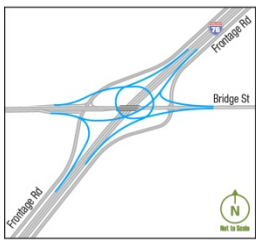
- The ability to meet the project Purpose and Need
- Infrastructure impacts
- Safety
- Drivers' expectations
- Truck traffic accommodation
- Traffic operations
- Impacts to the natural and built environment

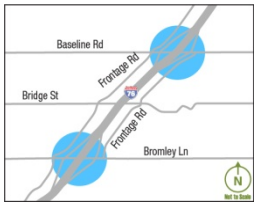
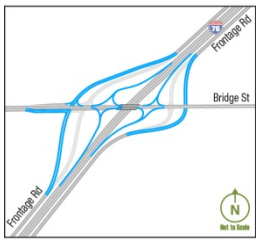
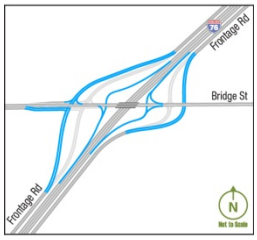
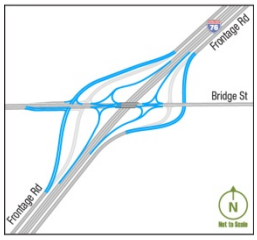
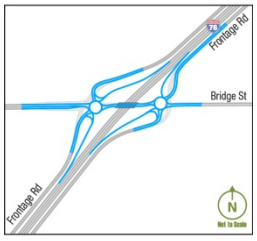
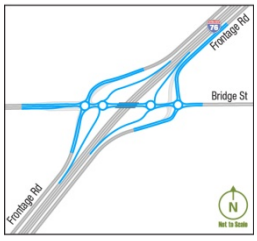
3.2 Description of Initial Alternatives and Summary of Screening Results

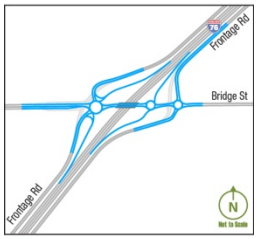
As part of the NEPA process, a reasonable range of alternatives and a No-Action Alternative were considered and evaluated. The term "reasonable" is defined by the Council on Environmental Quality (CEQ) as those alternatives that are "practical and feasible from a technical and economic standpoint using common sense" (CEQ NEPA's 40 Most Frequently Asked Questions). The No-Action Alternative does not meet the Purpose and Need for the project; however, per NEPA requirements, it is fully evaluated in the

document and used as a baseline for comparison. Exhibit 3-1 lists the alternatives that were considered initially.

Exhibit 3-1. Initial Alternatives

Alternative		Alternative Description
	No-Action	Includes existing, planned, and programmed roadway operations and maintenance improvements in the project area. The No-Action Alternative serves as the baseline for the analysis.
	Slip Ramps to the Frontage Roads	Turns frontage roads into partial collector-distributor roads with controlled stops on the frontage roads so the ramp traffic is free flowing. Auxiliary lanes are added along I-76.
	Modified Cloverleaf Interchange	A tight cloverleaf with signalized intersections at Bridge Street for the ramps and frontage roads. Short auxiliary lanes on I-76 for weaving, exiting, and entering interstate traffic.
	Fly-Over Interchange	Includes fly-over ramps for all movements.
	Half Diamond Interchange	Includes ramps on the southern side of Bridge Street.

Alternative		Alternative Description
	Transportation System Management (TSM)	Low-cost improvements to enhance mobility without building a new interchange at Bridge Street, including improving how the traffic signals function and redesigning the existing intersections, roundabouts, and interchanges.
	Single-Point Urban Interchange	Allows opposing left turns to proceed simultaneously by compressing two intersections of a diamond interchange into a single signalized intersection.
	Tight Urban Diamond Interchange	Type of compressed diamond interchange with two closely spaced signalized intersections at the crossing of the ramp terminals and Bridge Street.
	Diverging Diamond Interchange	Requires a widened bridge and multiple intersections at Bridge Street for the ramp movements. Provides ramps to/from I-76 with auxiliary lanes and multiple signalized intersections.
	Two-Roundabout Interchange	Combines the frontage roads and ramp terminals to make a six-legged roundabout on each side of I-76.
	Four-Roundabout Interchange	Creates two four-legged roundabouts on each side of I-76.

Alternative		Alternative Description
	Three-Roundabout Interchange	Combines the West Frontage Road and I-76 westbound ramps into a six-legged roundabout. The east side combines the eastbound ramp terminal into a four-legged roundabout and the frontage roads into another four-legged roundabout.

3.3 Screening Process and Results

Screening is the process used to evaluate the effectiveness of potential alternatives. The screening process consists of two stages of screening: Level 1A and Level 1B, which are discussed in more detail below.

3.3.1 Level 1A Screening—Meeting the Project Purpose and Need

During the first stage of the screening process, the project team assessed each alternative to determine whether it would meet the project Purpose and Need. Level 1A of screening resulted in elimination of three alternatives, as presented in Exhibit 3-2. Although the No-Action Alternative does not meet the project Purpose and Need, it was advanced for further evaluation as a baseline against which to compare the other alternatives.

Exhibit 3-2. Level 1A Alternatives Screening Results

Eliminated Alternative	Reason for Elimination
TSM	Does not meet the project Purpose and Need because it does not improve connectivity. This alternative does not address regional connectivity through SH 7 and will divert traffic to the local street network because it does not provide additional connection to I-76.
Fly-Overs Interchange	Does not meet the project Purpose and Need because it compromises traffic flow at adjacent interchanges and in other locations due to design constraints by interfering with the adjacent on and off ramps, causing weaving hazards and introducing operational deficiencies.
Half-Diamond Interchange	Does not meet the project Purpose and Need because it does not fully improve traffic flow and connectivity since it is not a full interchange and does not provide full movement and connectivity to and from I-76.

3.3.2 Level 1B Screening—Other Criteria Considered

In addition to whether the alternative met the project Purpose and Need, other criteria were considered to evaluate and compare the alternatives. Differentiating criteria helped determine which alternatives caused fewer impacts to the environment or had fewer design challenges than other alternatives. Each criterion is summarized below.

Preserve the Existing Infrastructure

FHWA, CDOT, and Brighton recognize the importance of sustainability and utilizing existing infrastructure to improve the roadway network when possible. In particular, the Bridge Street structure extending over I-76 was constructed in 1986 and maintains a CDOT Bridge Sufficiency Rating of 98 percent. Thus, alternatives that preserve this bridge are more desirable in the Level 1B screening process than those requiring new or widened bridges.

Safety

Safety is a top priority for CDOT and FHWA, particularly when introducing new access on the interstate system. The project team evaluated alternatives based on safety, as it was a differentiating factor. Those alternatives with fewer safety issues—such as opportunities for wrong-way travel or minimal weave distances—are more desirable in the Level 1B screening process.

Driver Expectancy

Driver expectancy was considered to be a differentiating factor because drivers could be less familiar with some interchange designs than others. Alternatives that increase a driver's ability to safely and efficiently move through the proposed interchange are more desirable in the Level 1B screening process.

Traffic Operations

All alternatives were designed to accommodate a potential increase in truck and vehicular traffic. Some alternatives had operational deficiencies with regard to queuing, storage, unnecessary traffic signals, and/or weave distances. Because these operational challenges could lead to safety problems and difficulties meeting design standards, alternatives with these consequences are less desirable in the Level 1B screening process.

The second stage of the screening process resulted in elimination of five additional alternatives from further consideration. Exhibit 3-3 shows the alternatives eliminated in Level 1B and the reasons for their elimination.

After elimination of the five additional alternatives in Level 1B, three Action Alternatives and a No-Action Alternative were recommended to move forward for detailed evaluation in this document. These Action Alternatives are discussed in the following section and include:

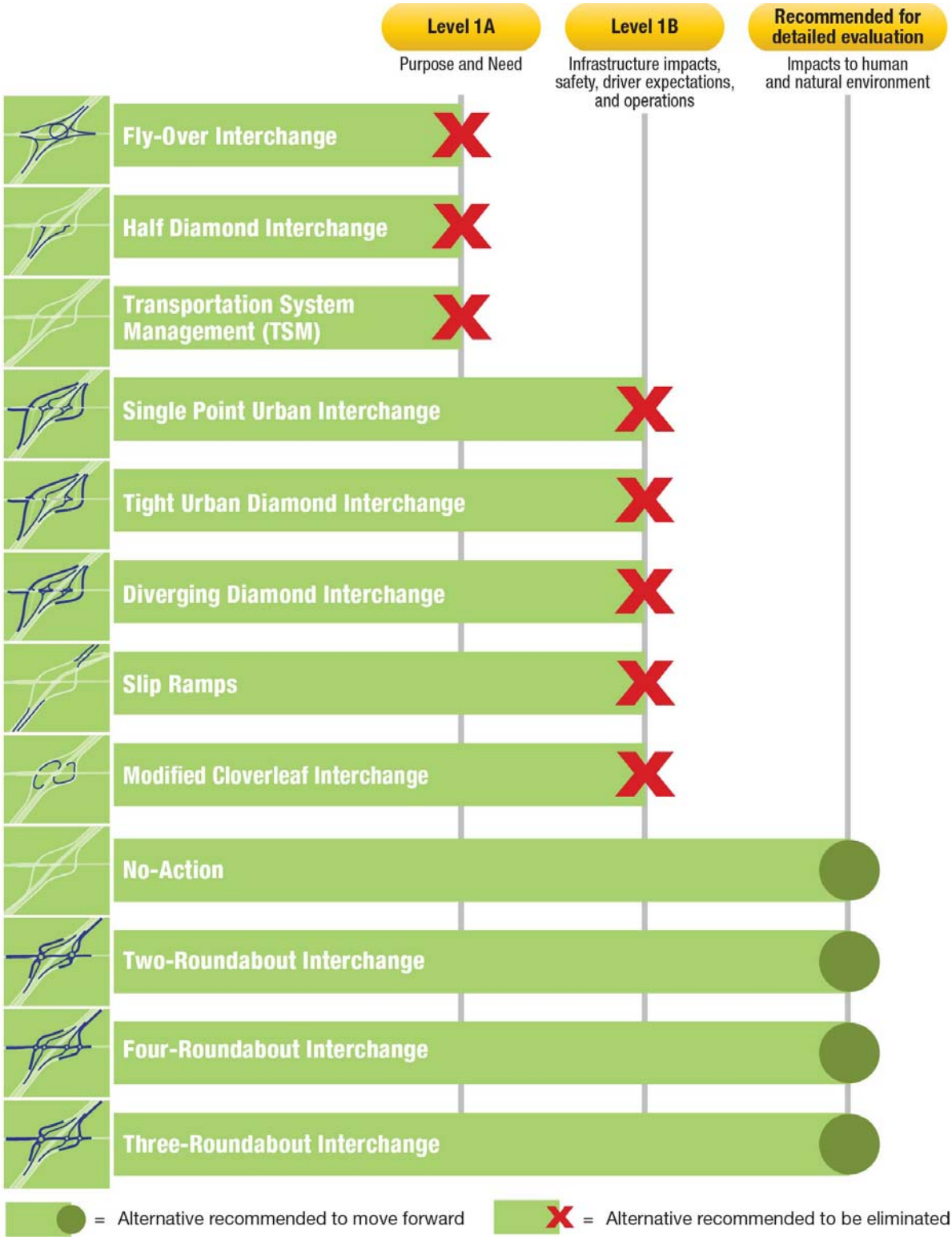
- Two-Roundabout Interchange (Preferred Alternative)
- Four-Roundabout Interchange (Alternative 2)
- Three-Roundabout Interchange (Alternative 3)

Exhibit 3-3. Level 1B Alternatives Screening Results

Eliminated Alternative	Reason for Elimination
Single-Point Urban Interchange	• Requires new or widened bridge to accommodate left turn movement, so it does not preserve the existing infrastructure. • Requires realignment of frontage road to meet spacing requirements, so it does not preserve the existing infrastructure. • Requires signalization of the single-point interchange and adjacent frontage roads on Bridge Street and impacts traffic flow, resulting in operational deficiencies.
Tight Urban Diamond Interchange	• Requires new or widened bridge to accommodate left-turn movements on Bridge Street, so it does not preserve the existing infrastructure. • Requires realignment of frontage road to meet spacing requirements, so it does not preserve the existing infrastructure. • Requires four traffic signals for the closely spaced intersections, resulting in operational deficiencies. • Safety is compromised with the addition of signalized intersections because of the increase in rear-end and right-angle collisions.
Diverging Diamond Interchange	• Requires new bridge for additional lanes to accommodate entering ramp traffic, so it does not preserve the existing infrastructure. • The grades of I-76 and the new bridge may require I-76 to be lowered or excessively raise the grade on Bridge Street to accommodate the additional lanes. Therefore, it does not preserve the existing infrastructure. • Requires realignment of frontage road to meet spacing requirements, so it does not preserve the existing infrastructure. • Signalization and signing is challenging, which impacts both driver expectancy and traffic operations.
Slip Ramps to frontage roads	• Drivers are less familiar with this type of interchange; therefore, there are concerns with driver expectancy. There is also the potential for wrong-way movements onto I-76 from the frontage roads, impacting safety. • Safety is compromised since this alternative requires that the frontage road through-traffic will need to be stopped to allow the I-76 exiting traffic to proceed onto the frontage road. • The frontage roads will need to be stop controlled in the counter flow direction of the off ramps to allow the exiting traffic from I-76 to proceed, resulting in operational issues. • Excessive delays in the peak hours at the stop-controlled intersections will increase, causing operational issues.
Modified Cloverleaf Interchange	• Tight spacing of ramps makes turn bay storage at Bridge Street intersections inadequate, resulting in traffic operations deficiencies and safety issues caused by the queue overflow to the adjacent lane. • Due to design restrictions, providing full movements and connecting frontage roads/ramps would be difficult without major modifications to existing infrastructure. • The weave length between ramp terminals does not meet minimum standards, resulting in poor traffic operations.

Exhibit 3-4 illustrates the process of comparing the preliminary alternatives, showing which alternatives moved forward for further analysis and which were eliminated.

Exhibit 3-4. Alternative Screening



3.4 Alternatives Recommended for Detailed Evaluation

Following Level 1A and 1B screening, three Action Alternatives—along with the No-Action Alternative—were moved forward for detailed analysis

The Two-Roundabout Interchange Alternative was recommended as the Preferred Alternative, while the Four-Roundabout Interchange is referred to as Alternative 2 and the Three-Roundabout Interchange is referred to as Alternative 3. The following subsections describe these alternatives in more detail.

3.4.1 No-Action Alternative

The No-Action Alternative serves as the baseline against which Action Alternatives are evaluated. For the purposes of this study, the No-Action Alternative is defined as the existing facilities within the project area. Under the No-Action Alternative, no further improvements, aside from ongoing operations and maintenance, would be made to the Bridge Street overpass at I-76.

3.4.2 Preferred Alternative: Two-Roundabout Interchange

The Preferred Alternative for this document is the Two-Roundabout Interchange. This alternative combines the frontage roads and ramp terminals to make one six-legged roundabout on each side of I-76 (see Exhibit 3-5). This alternative meets the project Purpose and Need and has only minor impacts to the existing built and natural environment, as will be discussed in Chapter 4, Affected Environment, Impacts, and Mitigation. It preserves the existing bridge, and avoids impacts to the Speer Canal to the northwest of the interchange.

Each roundabout has an outside diameter of 200 feet, including a 12-foot truck apron that provides large vehicles with a pathway through the roundabout, especially truck traffic. Both roundabouts have been placed off center of the existing Bridge Street center line to develop approach angles that will reduce right-of-way impacts and to regulate speed through the roundabout to improve safety. Splitter islands (a raised or painted traffic island that separates traffic in opposing directions of travel) also are included to slow traffic coming into the roundabouts and to help channelize traffic and provide pedestrian refuges when needed. The roundabouts are designed with an 18-foot single lane for circulation and exclusive right-turn bypasses for the ramp-to-frontage-road and frontage-road-to-ramp movements. This alternative does not conflict with the access point to the property in the southeast quadrant of the interchange and is expected to operate at LOS B in the horizon year of 2035. Exhibit 3-6 shows the conceptual design and traffic movement pattern of this alternative.

Exhibit 3-5. Preferred Alternative: Two-Roundabout Interchange Alternative

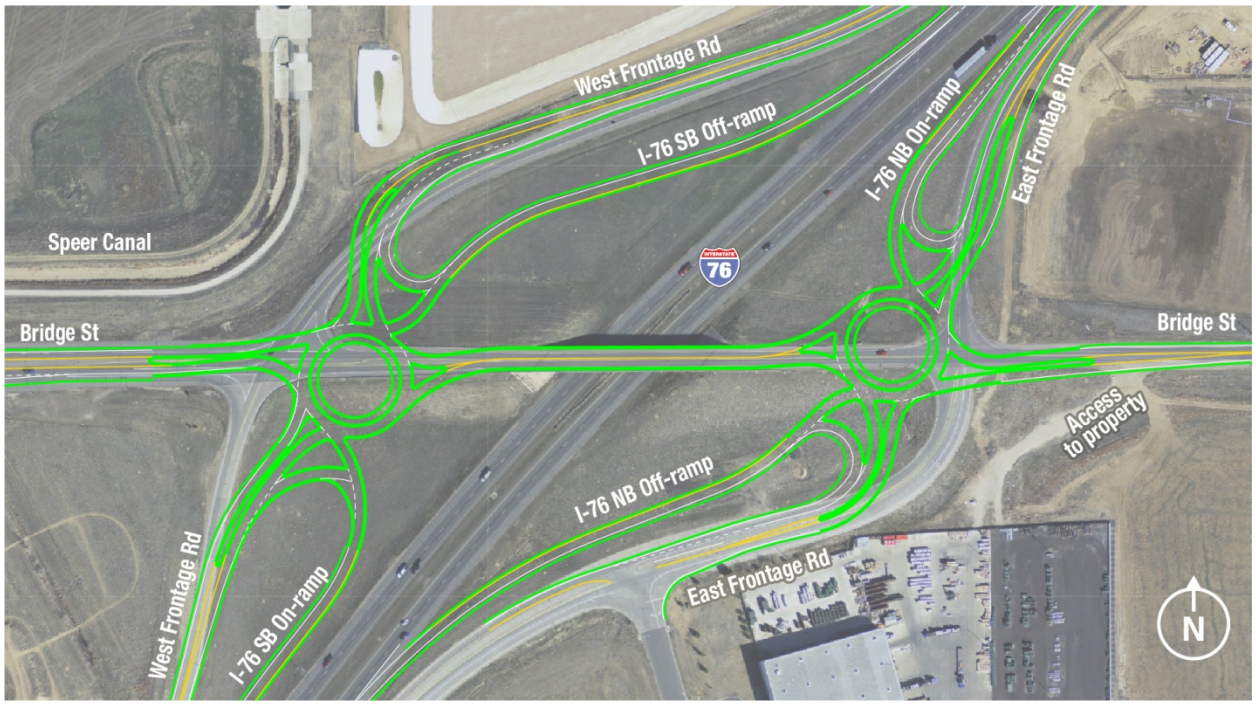
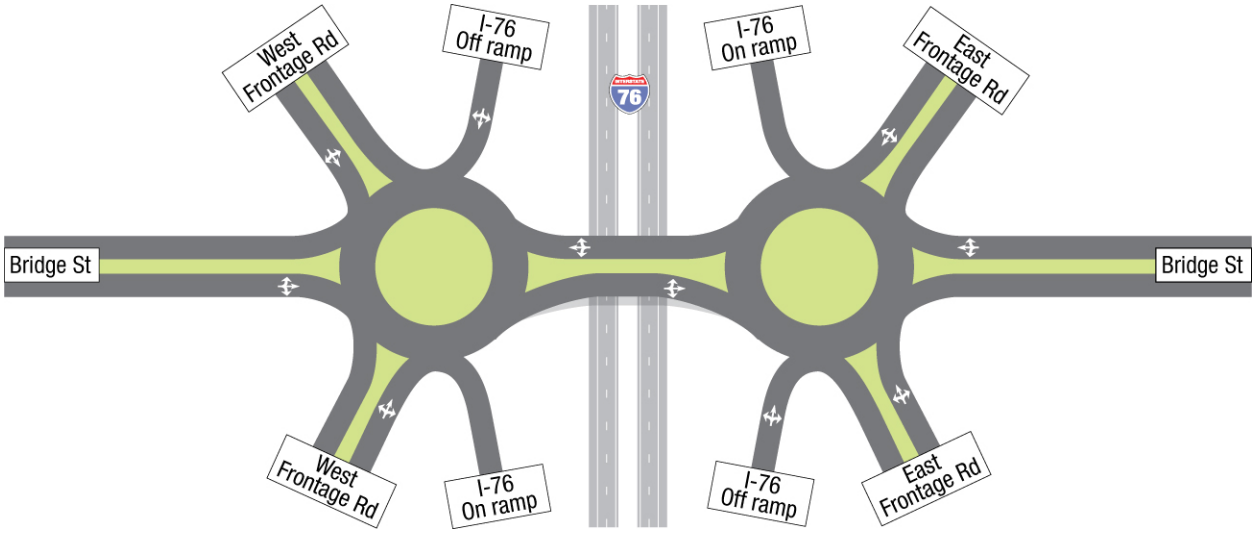


Exhibit 3-6. Conceptual Design and Traffic Movement Pattern of Preferred Alternative



3.4.3 Alternative 2: Four-Roundabout Interchange Alternative

Alternative 2 for this document is the Four-Roundabout Interchange Alternative. This alternative creates two four-legged roundabouts on each side of I-76 (see Exhibit 3-7). This alternative also meets the project Purpose and Need with only minor impacts to the existing built and natural environment, as discussed in Chapter 4, Affected Environment, Impacts, and Mitigation.

Each roundabout has an outside diameter of 150 feet, including a 12-foot truck apron for truck traffic. Each pair of the roundabouts has been placed slightly off center of the existing Bridge Street center line to develop approach angles to reduce right-of-way impacts and to regulate speed through the roundabout to improve safety. Splitter islands also are included to slow traffic coming into the roundabouts and to help channelize traffic and provide pedestrian refuges when needed. The roundabouts are designed with an 18-foot single lane for circulation and exclusive right-turn bypasses for the ramp-to-frontage-road and frontage-road-to-ramp movements.

This alternative will require construction of a retaining wall next to the Speer Canal on the northwest quadrant of the interchange due to close proximity of the road to the Speer Canal's ditch. It will impact the access point to the property located in the southeast quadrant of the interchange, requiring coordination with the property owner. In addition, there are right-of-way impacts on the northeast quadrant. This alternative is expected to operate at LOS B by the horizon year of 2035. Exhibit 3-8 shows the conceptual design and the traffic movement pattern of this alternative.

Exhibit 3-7. Alternative 2: Four-Roundabout Interchange Alternative

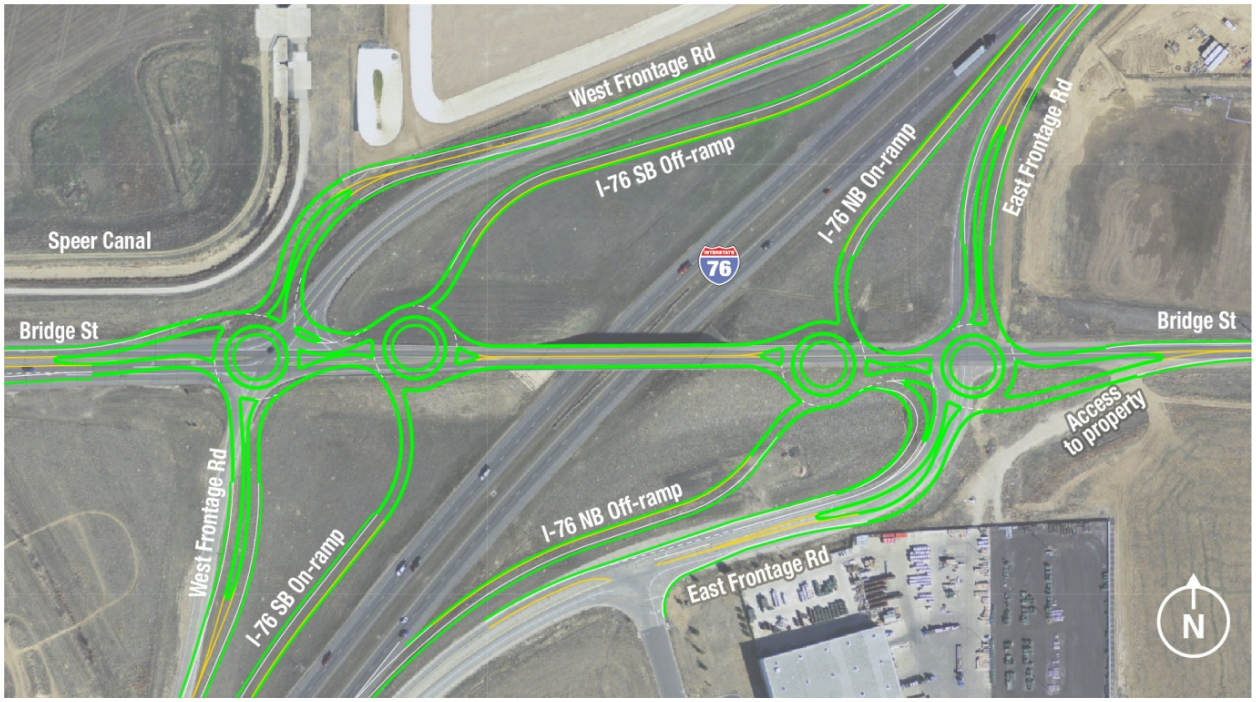
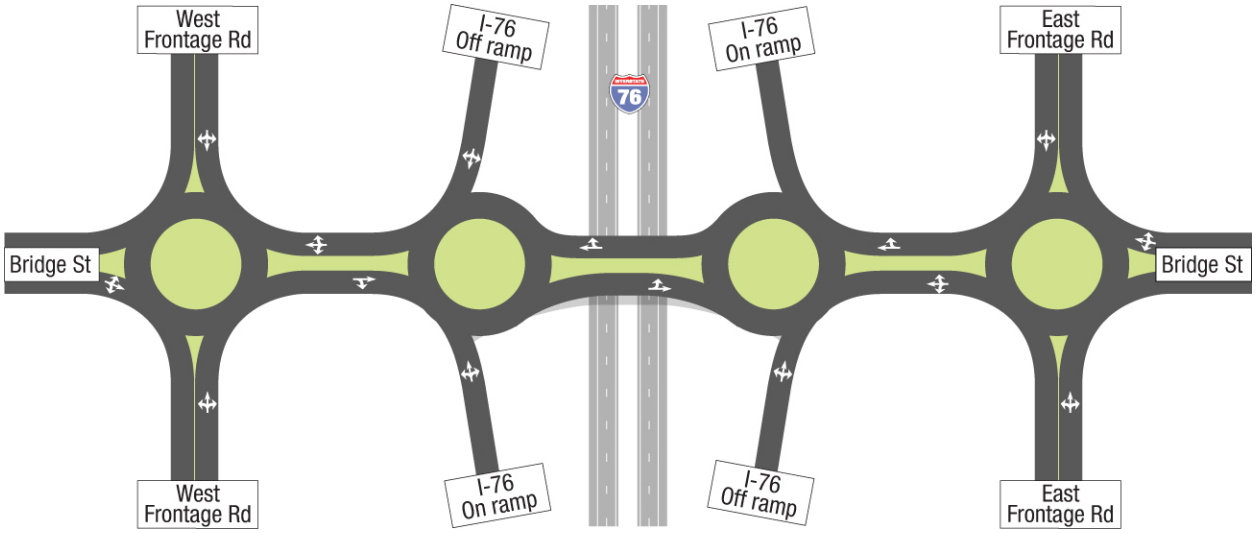


Exhibit 3-8. Conceptual Design and Traffic Movement Pattern of Alternative 2



3.4.4 Alternative 3: Three-Roundabout Interchange Alternative

Alternative 3 is the Three-Roundabout Interchange Alternative. This alternative consists of one large roundabout on the west side of I-76 and two smaller roundabouts on the east side of I-76 (see Exhibit 3-9). The West Frontage Road and I-76 westbound ramps are combined into one six-legged roundabout with an outside diameter of 200 feet, including a 12-foot truck apron. The east side combines the eastbound ramp terminal into a four-legged roundabout and the frontage roads into another four-legged roundabout. The smaller roundabouts on the east side have an outside diameter of 150 feet, including a 12-foot truck apron. This alternative meets the project Purpose and Need with only minor impacts to the existing built and natural environment, as discussed in Chapter 4, Affected Environment, Impacts, and Mitigation.

All roundabouts have been placed off center of the existing Bridge Street center line to develop approach angles to reduce right-of-way impacts and to regulate speed through the roundabout to improve safety. Splitter islands also are included to slow traffic coming into the roundabouts and to help channelize traffic and provide pedestrian refuges when needed. The roundabouts are designed with 18-foot single lanes for circulation and exclusive right-turn bypasses for the ramp-to-frontage-road and frontage-road-to-ramp movements. This alternative will impact the access point to the property located in the southeast quadrant of the interchange, requiring coordination with the property owner. In addition, there are right-of-way impacts on the northeast quadrant. This alternative is expected to operate at LOS B by the horizon year of 2035. Exhibit 3-10 shows the conceptual design and traffic movement pattern of this alternative.

Exhibit 3-9. Alternative 3: Three-Roundabout Interchange Alternative

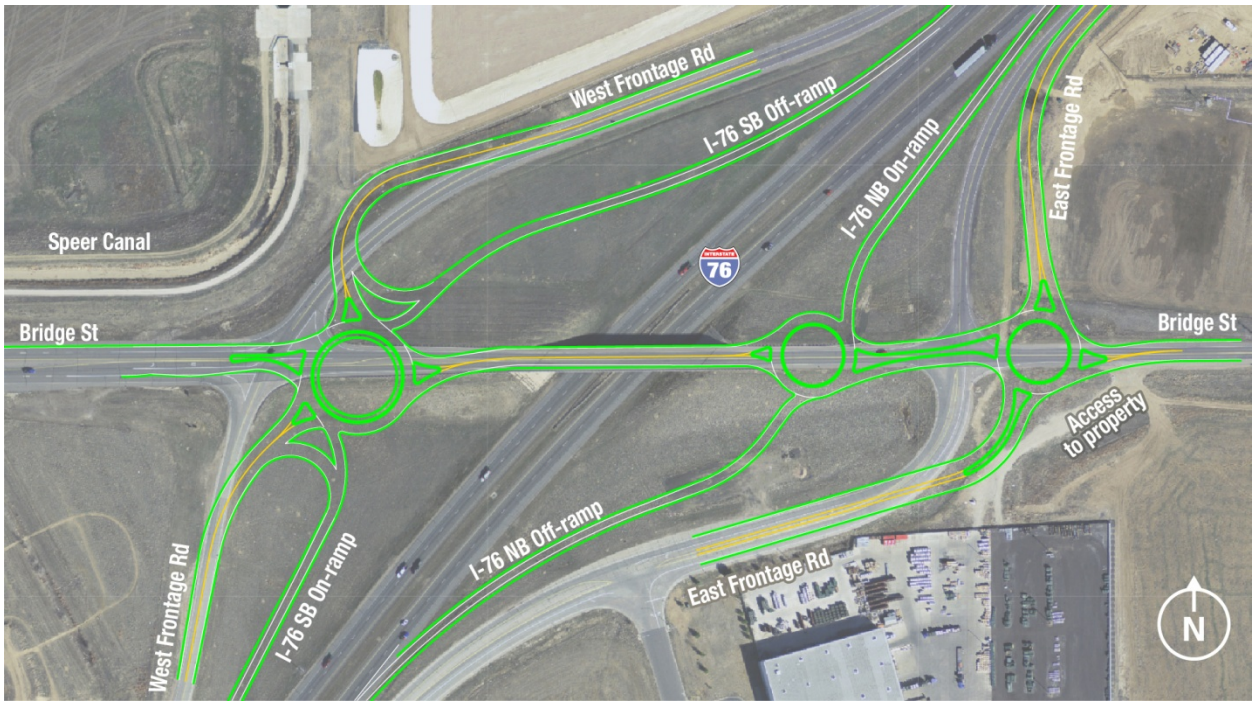
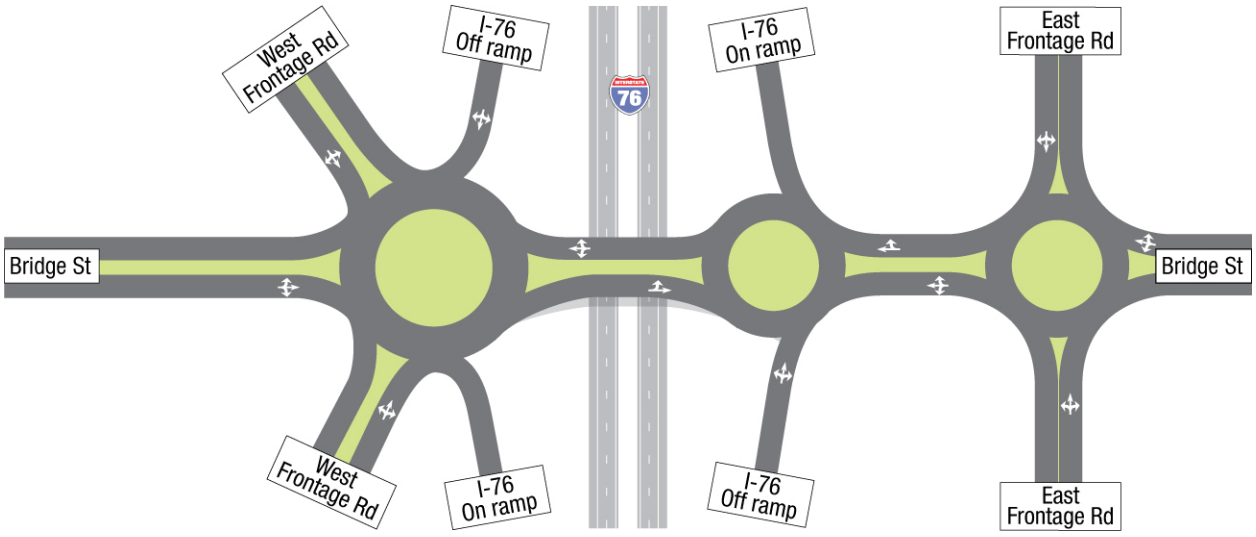


Exhibit 3-10. Conceptual Design and Traffic Movement Pattern of Alternative 3



3.4.5 Other Improvements required with the Action Alternatives

The addition of the interchange at Bridge Street will cause the Bridge Street and Prairie Falcon Parkway intersection to operate poorly due to rerouting traffic. Thus, some improvement measures will be required at this intersection. The Bridge Street and Prairie Falcon Parkway intersection is currently controlled by stop signs on Prairie Falcon

Parkway. With the addition of the interchange at I-76 and Bridge Street, more vehicles will drive on Bridge Street; therefore, the vehicles turning to and from Prairie Falcon Parkway and Bridge Street will have a longer wait at stop signs due to fewer gaps in through-traffic on Bridge Street. Based on traffic analysis, all Action Alternatives require a traffic signal at Prairie Falcon Parkway and Bridge Street to allow for turning vehicles' safe movements by the project's horizon year as part of this project. The signal may not be needed on opening day of the interchange, so it will be installed when it is justified based on the Manual on Uniform Traffic Control Devices requirements.

3.5 Identification of the Preferred Alternative

The Preferred Alternative generally is the one that would best meet the project Purpose and Need; minimize impacts to the social, economic, cultural, and natural environment; and be supported by the public and stakeholders. For this project, all the Action Alternatives meet the project Purpose and Need, have similar impacts to the existing built and natural environment, have similar construction cost, and are supported by the public and stakeholders.

Although all of the Action Alternatives have similar impacts, per Brighton's preference, the Two-Roundabout Interchange Alternative was identified as the Preferred Alternative. This alternative was identified as the Preferred Alternative because:

- It includes only two roundabouts, instead of the three or four roundabouts included in Alternatives 2 and 3. This will simplify signage and markings and drivers' choices by consolidating ramp and frontage road access points into a single roundabout on each side of the highway.
- It is a simpler design with easy construction phasing that will create fewer anticipated traffic impacts during construction compared to Alternatives 2 and 3.
- It accommodates heavy truck turning movements more efficiently than Alternatives 2 and 3.

There are other minor differences between the Preferred Alternative and other Action Alternatives; however, they were not a deciding factor in identification of the Preferred Alternative. These minor differences include:

- The preferred Alternative has no impact on the adjacent Speer Canal in the northwest quadrant of the interchange; therefore, it avoids the need to construct a retaining wall adjacent to Speer Canal, while Alternative 2 requires a retaining wall adjacent to Speer Canal.
- The Preferred Alternative will have permanent right-of-way impacts of 0.24 acre, and no full property acquisitions or relocations will be required. Alternative 2

requires 0.463 acre and Alternative 3 requires 0.108 acre of permanent right-of-way impacts.

- The Preferred Alternative will not conflict with the access point to the property in the southeast quadrant of the interchange, while Alternatives 2 and 3 require modifications to this property's access point.

Chapter 4: Affected Environment, Impacts, and Mitigation

This chapter summarizes the affected environment; discloses how the No-Action Alternative and the Action Alternatives, including the Preferred Alternative, are anticipated to impact the built and natural environment; and identifies the mitigation measures for implementation of the Preferred Alternative. The impact assessment was conducted in accordance with NEPA (42 United States Code [USC] 4332 (2)(c)) and FHWA's *Environmental Impact and Related Procedures* (23 Code of Federal Regulations [CFR] § 771.105). Additionally, both the CDOT *NEPA Manual* (CDOT, 2013) and *Environmental Stewardship Guide* (CDOT, 2005) were used in these analyses, along with applicable resource-specific guidance.

This study evaluated direct impacts and indirect impacts, as well as cumulative impacts, anticipated to result from implementation of the No-Action Alternative or any of the three Action Alternatives based on a conceptual level of design.

Direct impacts are those that are caused by the alternative and occur at the same time and place of the action. Indirect impacts are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Cumulative impacts are the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes these other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time. Temporary impacts are those that may occur for a short duration during the construction phase of the project.

A project area has been identified in Chapter 1, Introduction; it is approximately bounded by Baseline Road on the north, Bromley Lane on the south, 50th Avenue and Tower Road on the west, and Picadilly Road and Harvest Road on the east.

Each resource has a specific study area that is identified in this chapter under each section. For some resources, such as Transportation, the study area is the same as the project area; for many resources, the study area is the same as the construction envelope.

The construction envelope is inclusive of the construction limits for all three Action Alternatives. It includes the physical area that is anticipated to be disturbed during construction, which is the footprint of the Action Alternatives, plus a buffer around it to account for movement and storage of construction equipment, staging of materials, and space to build the design elements.

This chapter is divided into sections discussing impacts, benefits, and mitigation for each environmental resource. Each section includes subsections that explain the policy and guidelines for evaluating that resource, and discusses both common impacts to the resource and impacts that are specific to each alternative. Technical reports documenting resource analysis and agency consultation and outreach activities are included as appendices to this document.

These built and natural environment resources are discussed in the following subsections of this chapter:

- Transportation
- Air Quality
- Traffic Noise
- Land Use and Zoning
- Right of Way, Acquisitions, and Relocations
- Socioeconomics
- Utilities
- Biological Resources
- Wetlands and Waters of the U.S.
- Water Resources and Water Quality
- Hazardous Materials
- Historic Properties

Data collection for the I-76 and Bridge Street Interchange Project determined that the following resources will not be impacted by any of the alternatives:

- Soils and Geology
- Energy
- Farmlands
- Floodplains
- Visual Resources
- Parks and Recreation
- Section 4(f) Resources
- Section 6(f) Resources
- Environmental Justice

See Exhibit 4-1 for an explanation of these resource exclusions.

Exhibit 4-1. Environmental Resources Not Evaluated in Detail

Resource	Reason for Exclusion from Analysis
Soils and Geology	Although soils will be disturbed during construction of the Action Alternatives, disturbance will be minimal and best management practices will be employed to minimize erosion. A review of U.S. Geological Survey (USGS) and Natural Resources Conservation Service (NRCS) soil data indicates that no major geologic hazards or significant and geologically active faults occur in the area (NRCS, 2013). However, swelling soils exist in the area; if necessary, techniques will be applied to improve soil or ground suitability for roadway construction during project design. The project is not likely to be affected by or negatively affect soils and geologic conditions in the area. Therefore, the project will have no direct, indirect, temporary, or cumulative impacts on soils and geology under the No-Action Alternative or the Action Alternatives.
Energy	Energy impacts should be considered throughout the planning, design, development, construction, and use of a transportation project, such as the proposed interchange at I-76 and Bridge Street. During construction of any of the project alternatives, energy will be expended to operate machinery, transport materials, mix and pour concrete, and perform other work tasks. Although energy will be impacted during construction of the Action Alternatives, impacts will be minimal and best management practices will be employed to reduce impacts. Should an Action Alternative be implemented, reduced congestion could result in energy savings. Therefore, the project could have beneficial direct, indirect, temporary, or cumulative impacts on energy resources.
Farmlands	Farmlands are a valuable economic and cultural resource and are protected by the Farmland Protection Policy Act, 7 CFR Part 658. According to Part 658.2, Farmlands do not include: • Lands already in or committed to urban development; or • Lands identified as ‘‘urbanized area’’ (UA) on the Census Bureau Maps. The construction envelope is exempt from the Farmland Protection Policy Act, though the land has been used historically for agricultural activities, because the land is zoned for future development as residential, commercial, and industrial under current local comprehensive plans, including the City of Brighton 2020 Comprehensive Plan and DRCOG 2035 MVRTP (Brighton, 2012 and DRCOG, 2011). Therefore, the project will have no direct, indirect, temporary, or cumulative impacts on farmlands under the No-Action Alternative or the Action Alternatives.
Floodplains	A review of Federal Emergency Management Agency (FEMA) National Flood Insurance Rate Maps showed that no delineated flood zones exist within the construction envelope (FEMA, 2013, Map Panel #08001C0355H). Therefore, the project will have no direct, indirect, temporary, or cumulative impacts on mapped floodplains under the No-Action Alternative or the Action Alternatives.

Resource	Reason for Exclusion from Analysis
Visual Resources	No visually sensitive resources currently exist in the area. No impacts are expected to contrast with the visual character of the area or obstruct any key views. Therefore, the project will have no direct, indirect, temporary, or cumulative impacts on visual resources. While the standalone project will have no impacts on visual resources, the construction of new infrastructure provides an opportunity to enhance the visual character and aesthetics of the area through added vegetation.
Parks and Recreation	No trails or parks currently exist in the construction envelope. Dewey Strong Park is located approximately 800 feet to the south of Bridge Street on the west side of the I-76 frontage ramp. According to the City of Brighton Greenways and Trails Master Plan (Brighton, 2004), the I-76 Trail is proposed and will pass through the construction envelope. The trail generally will follow the west side of I-76, within existing CDOT right of way and connect to the Speer Canal Trail to the west of the project. The Bridge Street Trail is another proposed facility that would cross I-76 on Bridge Street, providing a pedestrian link between the east and west sides of the interstate. Neither funding nor a construction date for either of the trails has been identified.
Section 4(f) Resources	Section 4(f) of the Department of Transportation Act protects significant publicly owned parks, recreation areas, and wildlife and waterfowl refuges, as well as significant historic sites, whether they are publicly or privately owned. Future facilities, if in an approved plan such as a Master Recreation Plan, are afforded the same protection as existing parks and trails. The implementation of any of the Action Alternatives will not preclude the design and construction of either trail. Therefore, the project will have no direct, indirect, temporary, or cumulative impacts on Parks and Recreational resources protected under Section 4(f). Additionally, there are no historic resources present in the Area of Potential Effect that are eligible for or listed on the National Register of Historic Places. As such, historic resources protected under Section 4(f) will not be impacted.
Section 6(f) Resources	Land that was purchased or improved with Land and Water Conservation Funds is not present in the construction envelope.
Environmental Justice	Environmental Justice populations are present where: • The minority or low-income population of the affected area exceeds 50 percent; or, • The minority or low-income population percentage of the affected area is meaningfully greater than the minority population or low-income percentage in the general population or other appropriate unit of geographical analysis. For this analysis, the state, county, and city percentages were compared to the census data, determining that there are no low-income and/or minority populations in the project area.

4.1 Transportation

Transportation effects result from the impact of an action on the roadway network, including the users of the system. This section examines the impacts of the No-Action Alternative and Action Alternatives on transportation facilities within the project area. The study area for transportation is the same as the project area. See Chapter 1 for the limits of the project area. Transportation facilities include roadways, transit facilities and services, pedestrian and bicycle facilities, truck routes, and rail freight infrastructure and service.

4.1.1. What is the affected environment?

The existing transportation system in the project area is multi-modal and includes roadways, transit facilities and services, pedestrian and bicycle facilities, truck routes, and rail freight infrastructure and service. The project area is at a critical location in the transportation system, serving regional and local transportation needs for human and freight mobility within the Denver region and across Colorado. The project area was selected to include one interchange in each direction along the interstate from the location of the proposed interchange. From the location of the proposed Bridge Street interchange, adjacent interchanges are at Bromley Lane and Baseline Road. In addition, surface streets should be analyzed to the first signalized or major intersection beyond any interstate ramp junctions.

The Bridge Street overpass is approximately 1.25 miles north of the existing I-76 and Bromley Lane interchange and approximately 1.5 miles south of the existing I-76 and Baseline Road interchange. The current interchange spacing (approximately 2.5 miles between Bromley Lane and Baseline Road) is within accepted American Association of State Highway and Transportation Officials (AASHTO) guidelines.

The following sections describe the current multi-modal transportation system within the project area, the assessment of existing safety conditions, existing traffic volumes and patterns, and the results of the operational analysis.

Existing Roadway Facilities

The following is a brief description of the roadways that are contained within the boundaries of the project area based on their classifications in the DRCOG Regional Travel Demand Model.

I-76

I-76 is a four-lane interstate highway with a depressed median. The highway connects Interstate 70 (I-70) to the west with Interstate 80 (I-80) to the east. I-76 also intersects I-25 just north of downtown Denver and US 85 just south of Brighton. I-76 is defined as an east-west highway even though its orientation through Brighton is north-south.

I-76 is classified as FW: "Interstate System Freeway Facility," according to the CDOT highway access code. The facility is located in flat and rolling terrain from the beginning of the segment on the south end of the project area to the Baseline Road interchange. The section of I-76 northeast of the Baseline Road interchange is considered "Rural Interstate."

Currently, there are full movement interchanges on I-76 in the project area at Bromley Lane and Baseline Road, with Bridge Street being grade separated over I-76. Additional full movement interchanges are located one and two miles to the south of Bromley Lane, at 144th Avenue and 136th Avenue, respectively. State Highway 52 (SH 52), the first interchange north of the project area, is a full-movement interchange and is located six miles to the north of Baseline Road.

I-76 Frontage Roads

Two-lane frontage roads exist along both the east and west sides of I-76 between the Bromley Lane and Baseline Road interchanges. The West Frontage Road continues north of Baseline Road and south of Bromley Lane, but the East Frontage Road terminates at these roadways. The frontage roads allow traffic to circulate between the existing interchanges and Bridge Street, which does not have direct access to I-76.

Bromley Lane

Bromley Lane is a major east-west thoroughfare serving residential and commercial trips to Brighton. Bromley Lane is classified as a multi-lane "Principal Arterial" west of I-76 and a two-lane "Collector" east of I-76. The existing Bromley Lane overpass at I-76 is two lanes wide. Bromley Lane currently has a high density of access locations in the vicinity of the I-76 interchange and to the west toward Tower Road. There are a total of 13 full- and partial-movement access locations along Bromley Lane between Tower Road and the East Frontage Road (approximately one mile). Picadilly Road is the first major access location east of the East Frontage Road.

Bromley Lane provides full-movement access to/from I-76 via a diamond interchange. Bromley Lane passes over I-76 and intersects at a roundabout intersection with the West Frontage Road west of the southbound on ramp. Bromley Lane intersects with the northbound exit on and off ramps at a stop-controlled intersection. The intersection of Bromley Lane and the East Frontage Road is stop controlled.

Bridge Street

Bridge Street is a two-lane, east-west "Principal Arterial" in the project area. Bridge Street provides Brighton with direct access to I-25 and the northern portion of Thornton, as well as Broomfield and Boulder, all to the west of I-76. The existing Bridge Street overpass at I-76 is two lanes wide and there is no access to I-76. Bridge Street intersects with the West Frontage Road and East Frontage Road at stop-controlled intersections.

There are a total of seven major access locations on Bridge Street within the project area between 50th Avenue and Gun Club Road, which is a distance of about one mile.

Baseline Road

Baseline Road is an east-west roadway that is classified as a two-lane "Minor Arterial" west of I-76, and a two-lane "Collector" east of I-76. The existing Baseline Road overpass at I-76 is two lanes wide. Baseline Road provides full movement access to/from I-76 in the form of a standard diamond interchange. Baseline Road intersects with the West Frontage Road and East Frontage Road at stop-controlled intersections.

Baseline Road has a total of 10 access locations between 50th Avenue (to the west of I-76) and the East Frontage Road (approximately one mile). Harvest Road is the first major access location east of the East Frontage Road.

50th Avenue

Classified as a two-lane "Minor Arterial," 50th Avenue is a north-south roadway that runs between Baseline Road and the West Frontage Road near the Bromley Lane interchange. 50th Avenue provides direct access to large residential areas located just west of I-76 between Bromley Lane and Baseline Road. This arterial provides the shortest route for residents north of Bridge Street to access I-76 at the Bromley Lane interchange.

Existing System Connectivity and Access

North-south regional connectivity in the project area is limited to two access points to I-76, one at Bromley Lane and one at Baseline Road. This limited connectivity affects the mobility of regional trips, local trips, and emergency vehicles. Trips with origins or destinations along Bridge Street are forced to use the Bromley Lane and Baseline Road interchanges and other surface streets in the project area. This increases travel times (creating longer trip lengths due to out-of-direction travel) and traffic volumes at these interchanges and on the surface streets between the interchanges.

Existing Transit Services

No transit routes currently travel over the Bridge Street overpass; however, Regional Transportation District (RTD) Bus Route 120 and Bus Route R/RC/RX operate along Bridge Street, 50th Avenue, and Bromley Lane west of the proposed interchange (see Exhibit 4.1-1).

Exhibit 4.1-1. RTD Bus Route 120 and Bus Route R/RC/RX

Source: RTD, 2014

Existing Pedestrian and Bicycle Facilities

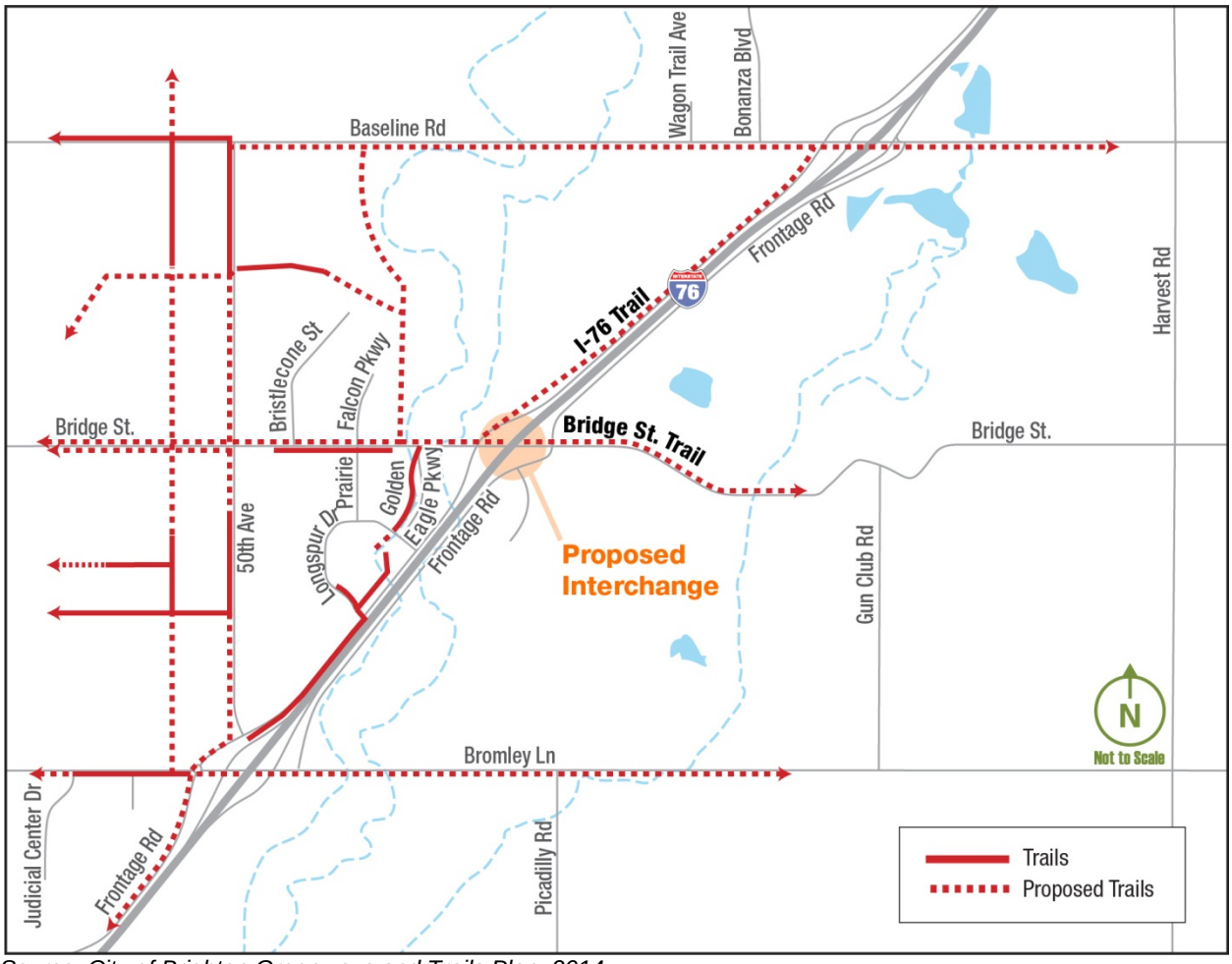
Brighton requires new developments to construct sidewalks on lots located adjacent to major or minor arterials or collectors, or adjacent to primary transportation routes to a public or private school within the city limits. Thus, sidewalk connections within the project area are driven by development. This concurrent process has resulted in gaps within the existing sidewalk system where development has not occurred yet. Where they do exist, sidewalks generally are separated from roadways and range from five feet to 10 feet in width. A 10-foot-wide paved path extends from 50th Avenue to Larkspur and is located approximately 50 feet away from the West Frontage Road.

As indicated by Brighton's sidewalk policy, sidewalks are a valuable asset to the community.

The City of Brighton Parks and Recreation Department developed the Greenways and Trails Plan with the mission, "to create an integrated system of high-quality multi-use

trails, greenways, bicycle, and pedestrian routes serving the people of Brighton and the surrounding communities. The system should link to enhance the larger regional and statewide trail system." There are no existing bike lanes through the proposed interchange on Bridge Street or on the frontage roads. There are two planned, multi-use trails through the proposed interchange: one on I-76 and one on Bridge Street (see Exhibit 4.1-2).

Exhibit 4.1-2. Existing and Proposed Trails in the Project Area



Source: City of Brighton Greenways and Trails Plan, 2014

The planned Bridge Street Trail extends beyond I-76. It will have a concrete surface, and is expected to be funded by developers as properties are developed. Portions of the trail have been constructed as 10-foot-wide paved paths separated from the roadway.

The nine-mile I-76 Trail follows I-76 along its length from Baseline Road to 112th Avenue using the transportation right of way, except for a one-mile portion shared with the proposed Prairie Center Parkway on-street trail. The proposed trail is planned to have a concrete surface.

Existing Truck Routes

Brighton has designated the following truck routes within the project area: I-76, Bridge Street, Baseline Road, Bromley Lane, and 50th Avenue (see Exhibit 4.1-3).

Exhibit 4.1-3. Truck Routes in the Project Area

Source: City of Brighton, 2013

Vehicle classification data were collected for a 24-hour weekday period (see Appendix A, *Transportation Technical Report*). The truck traffic percentages in the project area range between 4 percent and 27 percent on all roadways. I-76 is a major shipping route for destinations to the north along I-80, which is consistent with the high percentage (27 percent) of truck traffic on I-76. The land along I-76 east to Nebraska and north of Brighton has less residential development compared to the rest of Brighton and south to Denver. This causes the truck percentages to be relatively high. The observed percentages are likely

to decrease due to the future influx of residential and commercial land uses and the associated increase in passenger car traffic volumes.

Truck percentages on all roads east of I-76 and on Bridge Street west of I-76 are consistently higher than 10 percent because these roads have lower overall volumes compared to other facilities in the area. The data indicate trucks are using the frontage roads between Bridge Street and Baseline Road to gain access to/from I-76.

Methodology Used for Traffic Data Collection

To complete the traffic analysis, an extensive traffic data collection effort was undertaken in April 2013 for the project area. Data collected included:

- 24-hour average daily traffic (ADT) volumes
- Peak-hour (AM/PM) intersection turning movement counts (TMCs)
- 24-hour classification data

The results of this data collection are presented in detail in Appendix A, *Transportation Technical Report*.

The ADT data were collected over a 24-hour weekday period to represent typical traffic volumes and avoid possible atypical traffic patterns that may occur on the weekends.

The ADT counts provide a baseline for evaluating existing 2013 conditions and are used to help calibrate the travel demand models for future years. Based on the ADT counts, the peak hour for traffic volumes was determined to be from 7:00 a.m. to 8:00 a.m. for the AM (morning) peak and from 5:00 p.m. to 6:00 p.m. for the PM (evening) peak.

The peak-hour TMCs are used to help evaluate the operations of intersections under 2013 conditions. The existing TMCs also are used to develop future-year turning movement volumes. The TMC data were collected between the hours of 7:00 a.m. and 8:00 a.m. and from 5:00 p.m. to 6:00 p.m. on a Wednesday to represent typical weekday traffic volumes. The peak hours when TMCs would be affected were identified by Brighton staff based on their familiarity with traffic conditions in the area.

Existing 2013 Traffic Conditions

An operational analysis was completed for the 2013 existing conditions based on the collected data and using Highway Capacity Software (HCS). A detailed discussion on the methodologies and analysis tools used to complete the evaluation of existing and future conditions can be found in Appendix A, *Transportation Technical Report*.

The model provided the following results:

- For existing conditions, all of the basic freeway mainline segments and ramp merge/diverge areas operate at LOS B or better during AM and PM peak hours.
- The majority of the intersection approaches along Baseline Road currently operate at LOS B or better.
- The high volume of side-street traffic combined with single-lane approaches results in delays, queuing, and LOS E at the following locations:
  - The southbound approach of the West Frontage Road to Baseline Road during the AM and PM peak hours
  - The northbound approach of the eastbound ramp intersection to Baseline Road during the PM peak hour

Analysis indicates that Bridge Street is currently operating with volume levels well below the roadway capacity. Almost all intersections and approaches achieve LOS B or better during both AM and PM peak hours; therefore, currently there are no congestion, delay, or traffic flow issues on Bridge Street.

The amount of delay experienced by users of the transportation network as they travel through the intersections in the vicinity of I-76 or within the greater interchange areas indicates which areas may be experiencing congestion, operational issues, and increased potential for safety issues. Delay was calculated for the vehicles that use the existing Bromley Lane and Baseline Road interchanges and those that pass through the Bridge Street intersections near the location of the proposed interchange. The following is a list of the intersections included in the interchange area delay calculation:

- Bromley Lane at West Frontage Road, I-76 westbound ramps, I-76 eastbound ramps, and East Frontage Road; West Frontage Road at 50th Avenue
- Bridge Street at West Frontage Road and East Frontage Road
- Baseline Road at East Frontage Road, I-76 westbound ramps, I-76 eastbound ramps, and West Frontage Road

For this analysis, the actual delay values from HCS—even those in excess of 100 seconds—were used to compute the delay by each approach to the intersections. The maximum value for several approaches exceeds the maximum threshold for HCS, indicating substantial delay/congestion. The results of the intersection delay analysis are shown in Exhibit 4.1-4.

The majority of the delay occurs at the Bromley Lane interchange, which is consistent with the higher volumes being served by this interchange and roadway.

Exhibit 4.1-4. 2013 Intersection Delay Analysis Results

Interchange/Intersection	Total Delay (vehicle-hours/day)	
	AM	PM
Baseline Road	6.4	11.5
Bridge Street	1.4	1.9
Bromley Lane	20.2	39.8
Total	**28.0**	**53.2**

In existing conditions, the motorists are traveling from Bridge Street south to Bromley Lane, or vice versa, to gain access to/from I-76. Existing travel patterns indicate that motorists are currently using 50th Avenue to travel between Bridge Street and Bromley Lane. This trip is shown as Route 1 and Route 2 in Exhibit 4.1-5.

Travel times were computed by assuming vehicles are free flowing (traveling at the posted speed limits) between intersections. Then, the delay at each intersection along the route was added to the free-flow time to get a total trip time. For this analysis, the delay at the intersections was limited to no more than 100 seconds per vehicle, which is near the upper limits of the HCS threshold. Exhibit 4.1-6 shows the results of the existing travel time analysis for Routes 1 and 2. Under existing conditions, all trips between I-76 south of Bromley Lane and the 50th Avenue/Bridge Street intersection take more than 3.7 minutes (187 seconds) during the peak hours.

Exhibit 4.1-5. 2013 Peak Hour Travel Time Routes

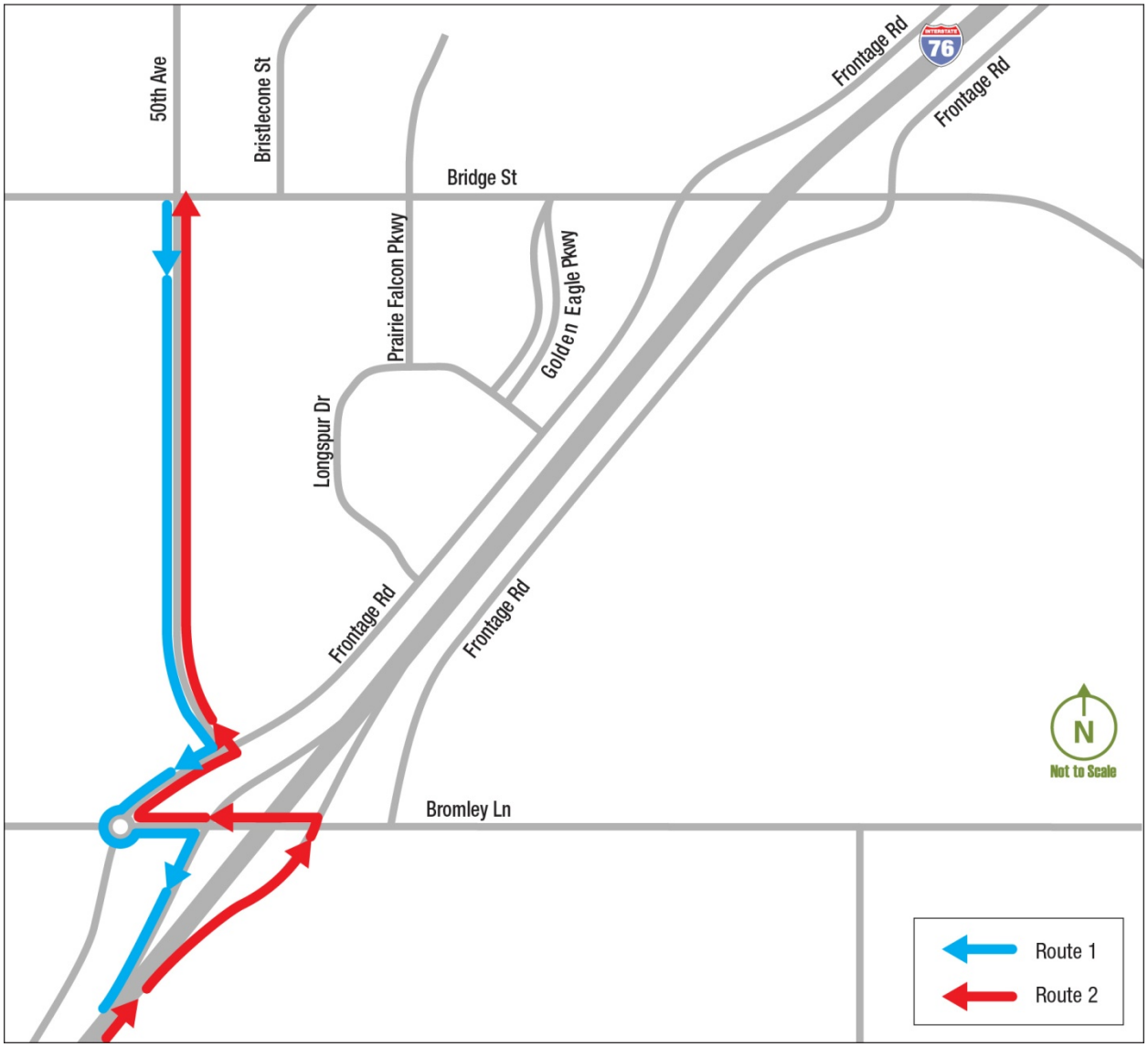


Exhibit 4.1-6. 2013 Travel Time Analysis Results for Routes 1 and 2

Condition	Travel Time (seconds per vehicle)			
	Route 1		Route 2	
	AM	PM	AM	PM
2013 Existing	224	190	214	207

Summary of 2013 Existing Conditions Analysis

The 2013 existing conditions indicate several issues in the current transportation system within the project area. Improvements are needed to address travel delay, distribute traffic efficiently, and support increased travel demands.

The results of the analysis show:

- The majority of the transportation system currently operates at LOS D or better
- Some of the transportation network elements, particularly at the Bromley Lane interchange, are beginning to show signs of congestion and are operating at LOS E/F during the peak hours
- Existing volumes on all segments of I-76 are well below the daily and hourly capacity levels of a four-lane freeway (192,000 vehicles per day for two-way traffic)

4.1.2. What are the impacts to transportation?

To evaluate the impacts of adding an interchange to I-76 at Bridge Street, a series of traffic operations analyses were completed. Horizon year projected traffic volumes were developed using the DRCOG 2035 regional travel demand model that was calibrated based on 2013 existing conditions traffic data, and expected development based on input from Brighton staff. The 2035 model volumes were adjusted using National Cooperative Highway Research Program (NCHRP) Report 255 techniques and then further adjusted to account for local traffic movements, intersection balancing, flows through interchanges, driveways, local road access, and other factors. A complete discussion on the methods for developing the future projected traffic volumes can be found in Appendix A, *Transportation Technical Report*.

Impacts to System Connectivity and Access

Connectivity in the project area will improve with the addition of a new access point at I-76 and Bridge Street. This access point will increase redundancy in the system and benefit mobility for regional trips, local trips, and emergency vehicles. Trips with origins or destinations along Bridge Street will have direct access to the interstate system and will no longer need to utilize frontage roads and additional surface streets to make regional connections. This will decrease travel times (shorter trip lengths with less out-of-direction travel) and traffic volumes at the Bromley Lane and Baseline Road interchanges and on the surface streets between the interchanges.

Impacts to Transit Service

No transit routes currently extend over the Bridge Street overpass. The addition of a new access point at I-76 and Bridge Street may provide an opportunity for RTD to adjust bus routes, schedules, and stops to provide more efficient service to the eastern Brighton area. Buses traveling in traffic will be impacted by changing travel patterns, though no direct or

negative impacts are anticipated along Bridge Street, 50th Avenue, or Bromley Lane west of the proposed interchange. No RTD rail line is planned for this project area.

Impacts to Pedestrian and Bicycle Facilities

Brighton requires new developments to construct sidewalks on lots located adjacent to a major or minor arterial, a collector, or adjacent to a primary transportation route to a public or private school within the city limits. The proposed interchange at I-76 and Bridge Street will not preclude or disrupt any existing or future investments in pedestrian and bicycle facilities in eastern Brighton.

According to CDOT's bicycle policy directive and Roadway Design Guide, bicycles are permitted on Bridge Street and the surrounding street network, with the exception of on I-76. The policy's directive is to provide transportation infrastructure that accommodates bicycle and pedestrian use of the highways in a manner that is safe and reliable for all highway users. The needs of bicyclists and pedestrians will be included in the planning, design, and operation of transportation facilities, as a matter of routine.

Under the Preferred Alternative, small direct positive impacts will occur from sidewalks and improved traffic operations. Positive indirect impacts may potentially occur from individuals using pedestrian and bicycle facilities to avoid the traffic congestion.

Impacts to Truck Routes

The proposed interchange at I-76 and Bridge Street will not impact the truck routes designated by Brighton. The Preferred Alternative is designed to accommodate trucks so that Bridge Street will continue to serve truck freight both locally and regionally. The additional access point to the interstate will benefit trucks by providing more direct routes to destinations and the interstate. Overall truck percentages are expected to remain consistent within the project area. However, truck percentages along the frontage roads are expected to decrease as a more direct regional connection is available.

Impacts to Safety

Safety is a critical consideration in determining the Preferred Alternative for the proposed interchange. No direct impacts to safety along I-76 or surrounding surface roads are anticipated with the addition of a new access point. In fact, the additional access point will benefit emergency response vehicles. The interchange and all conflict points will have adequate lighting; details on the exact locations and type of lighting will be decided in final design. More information on safety impacts is available in Appendix A, *Transportation Technical Report.*

The roundabouts are designed to improve safety and mobility in east Brighton. The Preferred Alternative meets driver expectations, limits conflict and decision points through the roundabouts, and provides a clear, direct route between I-76 and Bridge Street.

4.1.3. What were the results of the analysis for the 2035 No-Action Alternative?

As a result of growth in the area, the density in all segments between 2013 and 2035 increases along with traffic volumes. The majority of the basic freeway segments and ramp merge/diverge areas operate at LOS B or better during both peak hours, with the following exceptions:

- Westbound I-76 south of Bromley Lane operates at LOS D in the AM peak hour compared to LOS B in 2013
- Eastbound I-76 south of Bromley Lane operates at LOS C in the PM peak hour
- The Bromley Lane to westbound I-76 merge area operates at LOS C in the AM peak

The majority of intersection approaches at Baseline Road will operate at LOS C or better in 2035, with the following exceptions:

- The northbound and southbound approaches of the West Frontage Road to Baseline Road will operate at LOS E/F in the AM and PM peak hours. The volumes on Baseline Road reduce the number of available gaps for the vehicles turning left from the Frontage Road onto Baseline Road and will result in increased delays and queues on these approaches.
- The northbound approach of the I-76 eastbound ramp intersection will operate at LOS F in the PM peak hour. The stop-controlled approach will result in increased delays and queues.
- The eastbound off ramp queues are expected to be 1,250 feet long in the PM peak hour, compared to 275 feet in length currently during the PM peak hour. The eastbound off ramp is approximately 1,500 feet long, so spillback of the queue onto mainline I-76 still is not expected to occur.

Almost all intersections and approaches along Bridge Street will operate at LOS D or better in the 2035 No-Action Alternative AM and PM peak hours, with the following exceptions:

- The northbound approach of 50th Avenue will operate at LOS F with increased queues during the PM peak. This is due to the high volume of left-turning traffic using 50th Avenue from the Bromley Lane interchange to access westbound Bridge Street.
- The overall intersection operations at 50th Avenue during the PM peak will degrade from LOS B in 2013 to LOS F in 2035.

The projected traffic volume being processed by the intersections at Bromley Lane will result in increasing levels of congestion and LOS E/F at several intersections:

- The southbound approach of 50th Avenue at the West Frontage Road will degrade from LOS B/C in 2013 to LOS F/F in 2035.
- The southbound approach at the westbound ramps will degrade to LOS F/F in the peak hours. The westbound approach of Bromley Lane will operate at LOS E in the AM peak hour at this location. Queuing on the ramp will spill back onto mainline I-76, which will impact I-76 safety and operations.
- The roundabout at the West Frontage Road will degrade in operations to LOS F in both the AM and PM peak hours. Operations of 50th Avenue and the West Frontage Road will be negatively affected by queuing that will spill back from the roundabout.
- All of the approaches and the overall intersection at the eastbound I-76 ramps will operate at LOS F in both the AM and PM peaks. The operations at this intersection will cause queues onto mainline I-76, which will impact safety and operations.

The results of the 2035 No-Action Alternative interchange delay analysis are shown and compared to the existing condition in Exhibit 4.1-7. Total delay will increase substantially over the 2013 levels due to the increase in traffic volumes projected to use the roadway network.

- The Bromley Lane interchange area still will account for more than half of the overall delay
- The minimal traffic growth will result in minimal increases in delay along Bridge Street

The results of the delay analysis indicate drivers using the existing interchanges to access Brighton will experience increased delays and queues.

Exhibit 4.1-7. Comparison of 2013 Existing Conditions and 2035 No-Action Alternative Interchange Area Delay

Condition	Interchange	Total Delay (vehicle-hours/day)	
		AM	PM
2013 Existing	Baseline Road	6.4	11.5
	Bridge Street	1.4	1.9
	Bromley Lane	20.2	39.8
	Total	**28.0**	**53.2**
2035 No-Action Alternative	Baseline Road	442.3	486.2
	Bridge Street	1.8	3.7
	Bromley Lane	666.1	996.3
	Total	**1,110.2**	**1,486.2**

As traffic volume grows between 2013 and 2035, so will the amount of delay at many of the intersections in the project area, as indicated by the results of the operational and delay analyses. Without additional access to I-76 at Bridge Street, the preferred routes used by motorists to circulate through the area will experience increased trip times. Exhibit 4.1-8 shows the results of the travel time analysis using the same routes for existing conditions and the 2035 No-Action Alternative.

Exhibit 4.1-8. Comparison of 2013 Existing Conditions and 2035 No-Action Alternative Interchange Area Delay

Condition	Travel Time (seconds per vehicle)			
	Route 1		Route 2	
	AM	PM	AM	PM
2013 Existing	224	190	214	207
2035 No-Action Alternative	376	377	412	423

**Refer to Exhibit 4.1-5 for a description of the routes.*

4.1.4. What were the results of the analysis for the 2035 Action Alternatives?

This section describes the expected changes to the transportation network operations with the proposed interchange in 2035 at I-76 and Bridge Street. An operational analysis was completed for the different proposed Action Alternatives for the I-76 and Bridge Street interchange, which includes the addition of two ramp terminals and improvements to the existing frontage road intersections. As previously described, the alternatives under evaluation include the addition of two, three, or four roundabouts to accommodate the vehicle movements at the frontage roads and new ramp termini.

The analysis for each alternative was performed with the ARCADY model in Junctions 8 roundabout design and capacity analysis software. Preliminary geometric parameters were used with a 10-percent capacity reduction to correlate the results to recent U.S. traffic observations and provide conservative results. In addition to the ARCADY analysis, a Highway Capacity Manual (HCM) 2010 analysis was conducted in Junctions 8 to provide a comparison to the ARCADY results.

The results of the operational analyses for 2035 Action Alternatives are available in detail in Appendix A, *Transportation Technical Report*. All of the roundabouts in the three Action Alternatives will operate at LOS B or better in 2035, with a majority of the approaches and overall intersections operating at LOS A. Although the delay varied slightly between the three Action Alternatives, the operational results for all three Action Alternatives were the same.

The majority of the basic freeway segments and ramp merge/diverge areas operate at LOS C or better during both peak hours. The addition of the proposed interchange does result in

more LOS C operations of the freeway elements between Bromley Lane and Bridge Street due to the increased traffic volumes using the facilities.

Based on the results of the analysis, for intersections along Baseline Road:

- The addition of the I-76 and Bridge Street interchange does not result in the operational degradation of any additional transportation elements compared to the No-Action Alternative. The overall number of transportation elements operating at LOS E/F is less than the 2035 No-Action Alternative.
- The overall magnitude of the delays and queues at all elements will improve.
- The northbound approach of the West Frontage Road will operate at LOS C/E during the AM and PM peak hours, which is an improvement from the LOS E/F operations in the 2035 No-Action Alternative.
- The southbound approach of the West Frontage Road will continue to operate at LOS F in the AM and PM peak hours; however, the queues are expected to decrease when compared to the 2035 No-Action Alternative.
- The northbound approach of the eastbound I-76 off-ramp will operate at LOS F during the PM peak hour; however, the delay and queues are expected to decrease when compared to the 2035 No-Action Alternative.

Based on the results of the analysis, for intersections along Bridge Street:

- A reduction of vehicles traveling to Bromley Lane will result in improved operations at the 50th Avenue and Bridge Street intersection.
- Both the northbound and southbound Prairie Falcon Parkway approaches to Bridge Street will experience an increase in delay. Improving the connection of Bridge Street to I-76 with the proposed new interchange will draw more regional traffic to the segment of Bridge Street between 50th Avenue and I-76. This additional traffic on Bridge Street results in fewer gaps for vehicles to turn from the stop-controlled approaches onto Bridge Street. By 2035, the northbound and southbound approaches at this intersection will operate at LOS E/F in the AM and PM peak hours.

Based on the results of the analysis, for intersections along Bromley Lane:

- The intersection at 50th Avenue and West Frontage Road will improve from LOS F/F to LOS C/B during the AM/PM peak hours when compared to the 2035 No-Action Alternative.
- The West Frontage Road will continue to operate poorly (LOS F/F) in the peak hours, but the magnitude of the poor operations will be reduced, compared to the 2035 No-Action Alternative; delay is expected to decrease.

- The westbound ramp intersection will continue to operate poorly (LOS F/F) in both the AM and PM peak hours, but the magnitude of the poor operations will be reduced, compared to the 2035 No-Action Alternative. Delay and queues are expected to decrease, but queues are expected to spill back onto mainline I-76 during the AM peak hour, which will impact I-76 safety and operations.
- The eastbound ramp intersection will continue to operate poorly (LOS F/F) in both the AM and PM peak hours, but the magnitude of the poor operations will be reduced, compared to the 2035 No-Action Alternative; delay is expected to decrease, but queuing on the ramp will spill back onto mainline I-76, which will impact I-76 safety and operations.
- Queues between the closely spaced intersections along Bromley Lane will continue to create additional operational and safety issues. Operations at the intersections west of I-76 along Bromley Lane are very similar to the 2035 No-Action Alternative.

The following results of the Action Alternatives delay analysis are shown in Exhibit 4.1-9 and are compared to the results from the 2013 Existing Conditions and 2035 No-Action Alternative.

- The addition of the I-76 and Bridge Street interchange will reduce overall delay in the area below the 2035 No-Action Alternative levels, and by as much as 75 percent.
- The majority of the delay will continue to occur at the Bromley Lane interchange.
- As a matter of comparison, delay encountered at the proposed Bridge Street interchange will be similar to that experienced under existing traffic conditions at the Baseline Road interchange.

Exhibit 4.1-9. Comparison of 2013 Existing Conditions, 2035 No-Action Alternative, and 2035 Action Alternatives Interchange Area Delay

Condition	Interchange	Total Delay (vehicle-hours/day)					
		AM			PM		
2013 Existing	Baseline Road	6.4			11.5		
	Bridge Street	1.4			1.9		
	Bromley Lane	20.2			39.8		
	Total	**28.0**			**53.2**		
2035 No-Action Alternative	Baseline Road	442.3			486.2		
	Bridge Street	1.8			3.7		
	Bromley Lane	666.1			996.3		
	Total	**1,110.2**			**1,486.2**		
2035 Action Alternatives	Baseline Road	180.7			98.0		
	Bridge Street	7.4[1]	4.8[2]	5.3[3]	10.1[1]	6.8[2]	7.2[3]
	Bromley Lane	262.7			263.3		
	Total	**450.9[1]**	**448.3[2]**	**448.8[3]**	**371.4[1]**	**368.1[2]**	**368.5[3]**

[1]*Four-roundabout alternative*
[2]*Three-roundabout alternative*
[3]*Two-roundabout alternative (Preferred Alternative)*

The addition of the I-76 and Bridge Street interchange provides motorists with a choice of routes to complete their trip. Motorists who are currently traveling between the Bromley Lane interchange and the intersection of 50th Avenue and Bridge Street can use Route 1 or Route 2 (see Exhibit 4.1-10). With the proposed interchange, motorists can continue to use these routes or they can instead use Route 3 or Route 4 to reach the same destinations. The new routes are approximately twice as long as the original routes, but half of the distance is on I-76, which will allow traffic to travel at highway speeds.

Exhibit 4.1-10. 2035 Action Alternatives Peak Hour Travel Time Routes

The results of the 2035 Action Alternatives travel time analysis are shown in Exhibit 4.1-11 and described below.

- The travel times for Routes 1 and 2 are reduced compared to the No-Action Alternative, but they are still longer than 2013 travel times.
- Routes 3 and 4 travel times are shorter than the 2035 No-Action Alternative times for Routes 1 and 2 and are similar to 2013 travel times.

- Routes 3 and 4 travel times are similar to Routes 1 and 2 travel times for the existing conditions.

- Motorists have more route choices that will all save time, as much as three minutes, compared to the No-Action Alternative

Exhibit 4.1-11. 2035 Action Alternatives Travel Time Analysis Results

Condition	Travel Time (seconds per vehicle)*							
	Route 1**		Route 2**		Route 3**		Route 4**	
	AM	PM	AM	PM	AM	PM	AM	PM
2013 Existing	224	190	214	207	n/a	n/a	n/a	n/a
2035 No-Action Alternative	376	377	412	423	n/a	n/a	n/a	n/a
2035 Action Alternatives	301	220	245	369	211	218	233	220

**Note: Travel times were calculated for the four-roundabout alternative, which was determined to reflect the worst-case scenario.*
***Refer to Exhibit 4.1-10 for a description of the routes.*

Other Improvements

The addition of the interchange at Bridge Street does not result in all roadway segments operating at LOS D or better. Thus, some other improvement measures will be required. Adding an interchange at I-76 will result in rerouting traffic to the transportation network segments on and around Bridge Street. As a result, the northbound and southbound approaches to the intersection of Prairie Falcon Parkway will operate at LOS E/F during the peaks. Since the addition of the interchange resulted in this degradation in operations, the proposed project will need to improve this intersection to operate at LOS D or better. The addition of a traffic signal would provide the needed improvements. A traffic signal at this location would be an acceptable measure because the spacing of intersections along Bridge Street would better accommodate a traffic signal. This is the only improvement measure that would be related to the proposed interchange, and will be included as part of the project.

4.1.5. In summary, what are the effects to transportation?

In summary, the 2035 No-Action Alternative will:

- Increase the number of road segments that will operate at LOS E/F
- Increase delays and queues that motorists will experience
- Back traffic up on ramps for I-76, creating safety and operational issues
- Increase travel times between the I-76 and Bromley Lane interchange and the intersection of 50th Avenue and Bridge Street by as much as 200 seconds per vehicle

If the I-76 and Bridge Street interchange is not constructed, the structure at Bromley Lane will need to be rebuilt by the year 2025 to include widening as a means to accommodate additional capacity.

Pedestrian and bicycle operations and safety will be affected by growing congestion as traffic volumes increase along the existing streets, a negative direct impact of the No-Action Alternative.

By 2035, the Action Alternatives will:

- Meet the needs of the project Purpose and Need
- Improve overall connectivity to/from I-76 and Brighton
- Reduce the number of roadway segments operating at LOS E/F compared to the 2035 No-Action Alternative and 2013 existing conditions
- Reduce overall delay and queues at key intersections
- Save motorists as much as three minutes in travel time per vehicle over the No-Action Alternative while completing trips to destinations along Bridge Street and to the west of 50th Avenue
- Require the addition of a traffic signal or other mitigation measure at the Bridge Street and Prairie Falcon Parkway intersection
- Extend the life of the infrastructure at Bromley Lane to at least the year 2030, which is about five years longer than the No-Action Alternative

The Action Alternatives have similar overall impacts, but the Preferred Alternative was chosen because:

- It includes only two roundabouts, instead of the three or four roundabouts included in the other alternatives. This will simplify signage and markings and drivers' choices by consolidating ramp and frontage road access points into a single roundabout on each side of the highway.
- It is a simpler design with easy construction phasing that will create fewer anticipated traffic impacts during construction compared to the other alternatives.
- It accommodates heavy truck turning movements more efficiently than the other alternatives.

4.1.6. What are the mitigation measures?

Mitigation measures are not required since there are no adverse effects to transportation as a part of this project. When construction begins, temporary construction impacts may occur, which will be mitigated with traffic control and detours.

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4.2 Air Quality

In relation to transportation, air quality concerns focus on emissions from vehicles and particulate matter in the air caused by maintenance operations, such as sanding, or construction operations that cause fugitive dust. The study area for air quality is the I-76 and Bridge Street overpass, the frontage roads, and intersections within the project area, as well as any sensitive receptors adjacent to these facilities (see Exhibit 4.2-2).

4.2.1. What is the regulatory environment?

National air quality policies are regulated through the federal Clean Air Act of 1970 (CAA). As required by the CAA, the Environmental Protection Agency (EPA) established the National Ambient Air Quality Standards (NAAQS) for seven criteria air pollutants. These include ozone (O_3), carbon monoxide (CO), particulate matter 10 microns in diameter or smaller (PM_{10}), particulate matter 2.5 microns in diameter or smaller ($PM_{2.5}$), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and lead (Pb) (see Exhibit 4.2-1). The NAAQS represent thresholds based on specific adverse health and welfare effects associated with each pollutant. The Colorado Department of Public Health and Environment (CDPHE) has adopted the NAAQS; there are no additional ambient air quality standards specific to Colorado.

Exhibit 4.2-1. National Ambient Air Quality Standards, Criteria Pollutants

Pollutant	Averaging Time	NAAQS*	
		µg/m^{3*}	ppm*
Ozone (O_3)	8-Hour	—	0.075[1]
Carbon Monoxide (CO)	1-Hour 8-Hour	—	35 9
Sulfur Dioxide (SO_2)	3-Hour	—	0.5
Nitrogen Dioxide (NO_2)	Annual	—	0.053
Particulate Matter (PM_{10})	24-Hour	150	—
Particulate Matter ($PM_{2.5}$)	24-Hour Annual	35 12	— —
Lead (Pb)	Rolling 3-Month Average	0.15	—

Source: EPA, 2013
[1]The 2008 standard
**NAAQS = National Ambient Air Quality Standards; µg/m^3 = micrograms per cubic meter; ppm = parts per million*

The EPA has delegated authority to the CDPHE to administer many of the requirements of the CAA, including compliance with the NAAQS. Within the CDPHE, the Air Pollution Control Division (APCD) oversees air quality policies. The State Implementation Plan (SIP) establishes emission limits for different categories of vehicles that contribute pollutants, including motor vehicles, to avoid exceedances of the NAAQS. To comply with the SIP,

Metropolitan Planning Organizations (MPOs) are required to demonstrate that transportation plans and programs keep emissions within these limits.

If the level of any pollutant in an area exceeds the NAAQS, then the area is designated by the EPA as a nonattainment area for that pollutant. The geographic boundaries of nonattainment areas are determined by the EPA in consultation with the CDPHE. Nonattainment areas are required to prepare individual implementation plans for attaining the standard for each pollutant. After an area has reached the attainment levels set by the NAAQS, a maintenance plan must be prepared to ensure that the standard will continue to be met. After the maintenance plan is approved by the EPA, the area is re-designated as an attainment/maintenance area.

Construction of a new interchange at I-76 and Bridge Street is included in the conforming Statewide Transportation Improvement Program (STIP), the conforming 2012–2017 DRCOG Transportation Improvement Program (TIP), and the 2035 DRCOG Metro Vision Regional Transportation Plan (MVRTP). It is subject to CDOT oversight and state and federal air quality compliance.

4.2.2. What is the affected environment?

The project is in an attainment/maintenance area for CO and PM_{10}. However, neither was examined in detail because the proposed interchange and the intersection of Bridge Street and Prairie Falcon Parkway are both C or better and the vehicle mix is not expected to change much with the implementation of any alternative. Future truck percentages are expected to remain the same as those measured during existing conditions (Atkins, 2013). Therefore, particulate matter impacts for additional truck traffic are not expected to occur from any alternative.

For each alternative examined in this EA, the amount of mobile source air toxics (MSATs) emitted is proportional to the VMT, assuming that other variables, such as fleet mix, are the same for each alternative. The project is located in relatively rural area, with residential development to the west and industrial land use to the southeast (see Exhibit 4.2-2). All other surrounding land is vacant or agricultural land use.

Ozone is a regional pollutant and is analyzed at the regional level; ozone is addressed in conformity for DRCOG MVRTP and TIP. Overall, the trend shows that this pollutant is decreasing regionally. Further information can be found in Appendix B: *Air Quality Technical Report.*

Exhibit 4.2-2. Project Location Map

4.2.3. What are the impacts to air quality?

There will not be an impact to air quality from implementation of any of the Action Alternatives, or from the No-Action Alternative.

In general, future emissions from vehicles will be minimized through several federal regulations (such as emission standards) and regional controls (such as street sanding regulations). The Denver metropolitan area maintenance plans that are already in place for CO and PM_{10} will serve to avoid and minimize pollutant emissions from vehicles.

Although transportation projects can impact air quality during both the construction and maintenance/operation phases, air quality is primarily affected by increased traffic volumes and vehicle congestion.

No-Action Alternative

The No-Action Alternative will make no changes to the transportation network in the air quality study area, which means that it would not be consistent with the conditions that have been evaluated and adopted by the DRCOG MVRTP. Not building the interchange will not affect regional air quality conformity.

Due to cleaner vehicles, future daily air pollutant levels for most pollutants are predicted to be lower than current levels, even with more vehicles on the roads and no new interchange at I-76 and Bridge Street. There are no indirect impacts associated with the No-Action Alternative.

Action Alternatives

All of the Action Alternatives would have the same impact to air quality in the air quality study area. The impact discussion below is applicable to all Action Alternatives. A new interchange at I-76 and Bridge Street is included in the 2035 MVRTP and the relevant conformity documents, which demonstrates in the long term that the project conforms to the SIP. No sensitive receptors, residences, or crosswalks would be directly or indirectly impacted as a result of the implementation of any of the Action Alternatives. The project will not have any regional or local air quality impacts from implementation of the any of the Action Alternatives.

Carbon Monoxide

The results of the analysis show that, for any of the Action Alternatives, all signalized intersections in the air quality study area, as well as the proposed new signal at Prairie Falcon Parkway, would operate at LOS C or better during both the AM and PM peak-hour traffic in the year 2035. The EPA modeling guidance states that intersections which operate at LOS C or better are not likely to cause a violation of the federal 8-hour average CO standard. Therefore, hot spot modeling is not required and all of the alternatives are considered to meet regional-level air quality conformity requirements.

Additionally, the nearby signalized intersection of Bridge Street and 50th Avenue would operate at LOS C or better during both the AM and PM peak-hour traffic in the year 2035 for any of the Action Alternatives.

Particulate Matter

Total particulate matter levels may increase in the future because of more vehicles, but the preliminary analysis indicates the concentrations would still meet the NAAQS. Additional information can be found in Appendix B: *Air Quality Technical Report.* The qualitative analysis for PM_{10} showed that a new interchange at I-76 and Bridge Street or the proposed new signal at Prairie Falcon Parkway would not be likely to cause or contribute to violations of the PM_{10} NAAQS. Therefore, it would not have a major impact on local and regional air quality PM_{10} emissions. Construction of any Action Alternative will likely cause short-term increase in airborne particulate matter.

MSATs

The VMT estimated for each of the Action Alternatives is slightly higher than that estimated for the No-Action Alternative because the interchange may attract trips from alternate routes nearby. This increase in VMT means MSATs in the air quality study area under any of the three Action Alternatives would be higher than the No-Action Alternative. Traffic volumes at other nearby interchanges could be reduced due to a shift in travel patterns to use the proposed interchange; this would result in a decrease in emissions at those locations.

Because the estimated VMT for each of the three Action Alternatives is nearly the same, varying by less than 2 percent, it is expected that there would be no appreciable difference in overall MSAT emissions among the three Action Alternatives. Additionally, for any of the alternatives, emissions are virtually certain to be lower than current levels in the design year of 2035 as a result of the EPA's national control programs that are projected to reduce annual MSAT emissions by more than 80 percent from 2010 to 2050. Furthermore, under any of the Action Alternatives, overall future MSATs are expected to be lower than today due to implementation of the EPA's vehicle and fuel regulations.

4.2.4. What are the proposed mitigation measures?

Although motor vehicle emissions in the project area may increase, they are not expected to result in an exceedance of the NAAQS. Therefore, no air quality mitigation is required. However, since the construction of the project will require submittal of an Air Pollution Emission Notice and Application for Construction Permit from the APCD, preparation of a Fugitive Dust Control Plan will be required. Adherence to this plan will reduce air pollution resulting from construction activities.

Construction-phase air quality impacts (fugitive road dust and construction vehicle engine exhaust emissions) will be controlled by implementing the applicable BMPs listed below:

- Wetting exposed soils and soil piles for dust suppression
- Covering trucks hauling soil and other fine materials
- Stabilizing and covering stockpile areas
- Re-vegetating exposed areas
- Minimizing off-site tracking of mud and debris by washing construction equipment and temporary stabilization of disturbed areas
- Limiting vehicle speed of construction-related equipment when off road
- Prohibiting unnecessary idling of construction equipment
- Using low-sulfur fuel
- Locating diesel engines and motors as far away as possible from residential areas
- Locating staging areas as far away as possible from residential areas
- Requiring heavy construction equipment to use the cleanest available engines or to be retrofitted with diesel particulate control technology
- Using alternatives for diesel engines and/or diesel fuels (such as: biodiesel, liquefied natural gas, compressed natural gas, fuel cells, or electric engines) when possible
- Installing engine pre-heater devices to eliminate unnecessary idling during winter-time construction
- Prohibiting tampering with equipment to increase horsepower or to defeat the effectiveness of emission control devices
- Requiring construction vehicle engines to be properly tuned and maintained
- Using construction vehicles and equipment with the minimum practical engine size for the intended job

4.3 Traffic Noise

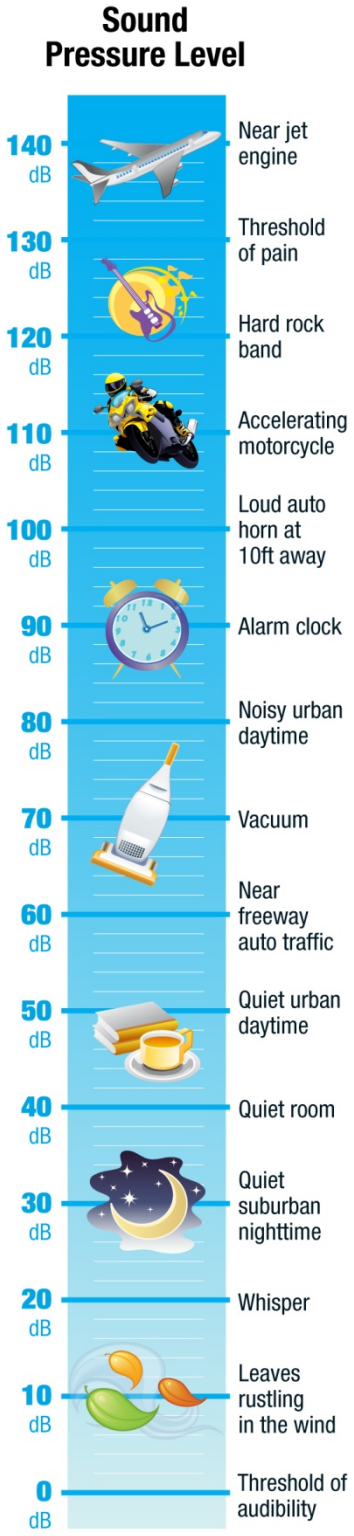
Noise generally is defined as unwanted or undesirable sound. Noise typically affects humans in three different ways: noise intensity or level, noise frequency, and noise variation with time. Proposed alterations to the highway system, including the construction of a new interchange, require an assessment of project impacts on noise intensity due to traffic. The study area for traffic noise is 500 feet from the proposed edge of roadway and any other associated improvements, and is shown in Exhibit 4.3-1.

Noise intensity, or loudness, is determined by how sound pressure fluctuates and is expressed in decibels (dB). The range of noise normally encountered can be expressed by values between 0 and 120 dB on the dB scale. A 3-dB change in sound level generally represents a barely noticeable change, whereas a 10-dB change typically would be perceived as a doubling of loudness.

The frequency of noise is related to the tone or pitch of the sound and is expressed in terms of cycles per second or Hertz. The human ear can detect a wide range of frequencies, from approximately 20 Hertz to 17,000 Hertz.

Because human sensitivity to sound varies from person to person, the A-weighting system is commonly used when measuring noise to provide a value that represents human response. Noise levels measured using this system are called A-weighted levels, and are expressed as dBA.

Because noise fluctuates during the course of a day, it is common practice to condense all of this information into a single number, known as an equivalent sound level (Leq). Leq represents an average sound level over a specified time period (typically 60 minutes), and the value then reflects the hourly equivalent sound level, or Leq(h).



4.3.1. What is the regulatory environment?

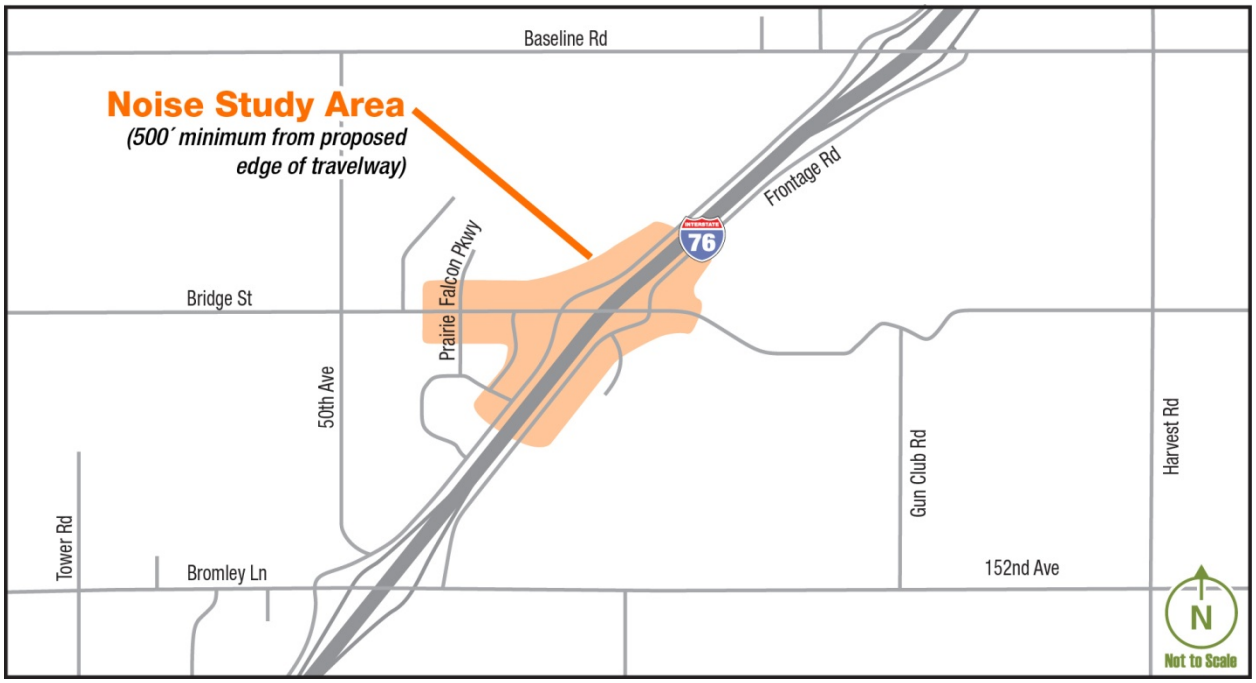
The following laws, regulations, and guidance are applicable to the analysis of traffic noise in this EA:

- National Environmental Policy Act of 1969
- Procedures for Abatement of Highway Traffic Noise and Construction Noise, Title 23 CFR §772
- FHWA's *Measurement of Highway-Related Noise* (1996)
- CDOT's *Noise Analysis and Abatement Guidelines* (2013)

4.3.2. What is the affected environment?

The noise study area (see Exhibit 4.3-1) is comprised of land uses typically found in suburban areas, including residential and commercial uses to the west of I-76 and industrial land uses to the east of I-76. Several residential neighborhoods are established west of I-76 along Bridge Street. Future development is expected as new residential units are planned to the west of I-76, including the Brighton Crossing master-planned community. At full build-out, the community will have more than 3,000 homes, townhomes, condominiums, and apartments.

Exhibit 4.3-1. Noise Study Area



Noise-sensitive sites are defined as any location where traffic noise may be adverse to the function and outdoor enjoyment of a property. CDOT and FHWA have established noise thresholds at which noise abatement must be considered for various types of noise-sensitive sites. These noise levels are referred to as the Noise Abatement Criteria (NAC). As presented in Exhibit 4.3-2, NAC vary according to the land use activity category. A traffic noise impact can occur under either of the following two separate criteria:

- Predicted traffic noise levels meet or exceed the NAC
- A substantial noise increase of 10 dBA over existing conditions is predicted

To adequately assess the noise impact of a proposed project, both criteria must be analyzed. If impacts are identified, noise abatement measures must be considered and implemented if they are determined to be both feasible and reasonable.

The study area is comprised mainly of NAC B (residential) areas. The NAC B receptors occur on the west side of I-76. There is an industrial building that is located east of I-76 and south of Bridge Street, which is an NAC F activity category. It was not included in the model because it has no impact criteria, as shown in Exhibit 4.3-2.

Exhibit 4.3-2. CDOT Noise Abatement Criteria

Activity Category	Activity $L_{eq}(h)$ (dBA)	Description of Land Use Activity Category
A	56 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	66 (Exterior)	Residential.
C	66 (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	51 (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	71 (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	N/A	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, ship yards, utilities (water resources, water treatment, electrical), and warehousing.
G	N/A	Undeveloped lands that are not permitted for development.

Source: CDOT, 2013

The existing conditions noise analysis was performed in accordance with the requirements of 23 CFR §772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise," using methodology established by CDOT's *Noise Analysis and Abatement Guidelines*. Predicted noise levels were produced using the FHWA Traffic Noise Model (TNM), version 2.5.

All measured and predicted noise levels are expressed in dBA using A-weighting. The hourly equivalent noise levels are defined as the equivalent average sound level that, in a given hourly period, contains the same acoustic energy as the time-varying sound for the same hourly period.

Noise from traffic emanates from four primary sources: the tire/road interface, engines, aerodynamics, and exhaust stacks. Each of these is considered in the TNM 2.5 model. The dBA-weighted numbers are used to determine the effect upon potential noise-sensitive sites.

To validate the computer noise model, field measurements were taken within the study area following procedures documented in FHWA's *Highway Traffic Noise: Analysis and Abatement Guidance*. Exhibit 4.3-3 shows the noise-monitoring locations for validating the computer noise model. Data collection efforts focused on exterior locations at noise-sensitive dwelling units within the NAC B land uses. Within the study area, there are two neighborhoods that have NAC B land use. One neighborhood, called Bromley Park, is located west of I-76 and south of Bridge Street, extending to 50th Avenue. The second neighborhood, called Brighton Crossing, is located west of I-76 and north of Bridge Street, extending to 50th Avenue.

Field validation measurements were conducted in the vicinity of noise-sensitive sites, where safe access to monitoring sites existed, where a representative sampling of free-flow traffic could be obtained, and where roadway geometry remained relatively constant. Data collection occurred mid-afternoon when drivers on I-76 were driving at or near free-flow speeds. The CDOT *Noise Analysis and Abatement Guidelines* state that field measurements can be taken at any time; however, it is best to measure when traffic is relatively free-flowing at or near the posted speed limit. Directional counts of all automobile, medium truck, and heavy truck traffic were taken for both directions of I-76 and both the east and west frontage roads.

Validation occurs when measured noise levels are within 3 dBA of the modeled value. Exhibit 4.3-4 summarizes the model validation counts and the additional noise readings collected within the study area.

Exhibit 4.3-3. Noise-Monitoring Locations

Exhibit 4.3-4. Study Area Model Validation Counts and Noise Readings at Noise-Monitoring Locations

Locations	Distance from Edge of Pavement (feet)	Field Reading (dBA)	Model Result (dBA)	Difference (dBA)
1	115	65.4	64.7	0.7
2	164	64.9	67.8	-2.9
3	350	62.6	62.1	0.5

Based on CDOT's *Noise Analysis and Abatement Guidelines*, 66 dBA was used as the threshold noise level in the analysis of the existing conditions in the study area for the NAC B activity category (see Exhibit 4.3-2). Noise studies typically use the loudest noise

conditions in determining the noise levels. The loudest or worst noise hour is the hour with the highest volume of traffic traveling at the fastest, congestion-free speeds. The existing noise conditions range from 45 dBA to 62 dBA.

Worst-case conditions on the I-76 mainline and all other roadway segments included in the model were determined to occur during the PM peak period, and those volumes were used in the noise model.

4.3.3. What are the impacts to noise?

Traffic-generated noise levels for the Action Alternatives were calculated using TNM 2.5 for the 2035 horizon year. Model inputs included the proposed roadway alignments, traffic volumes, vehicle speed, and truck percentages. To closely model the undulating terrain in the study area, topographic information based on one-foot contours was added to the model. Building rows were added to the model to represent the rows of houses along Bridge Street and on either side of Prairie Falcon Parkway.

Results of the noise models are discussed in upcoming subsections. In general, the 2035 $L_{eq}(h)$ values for the receptors within the study area are expected to range from 49 dBA to 65 dBA for the Action Alternatives, with an average of 54.8 dBA. Based on the results of the model, noise impacts are not expected to occur at any receptor for the Action Alternatives. To see detailed results of the analysis, review Appendix C, *Traffic Noise Technical Report*.

All receptors with the NAC B activity category within 500 feet of the highway edge of pavement (existing or proposed) were included in the model. A signal is proposed at the intersection of Bridge Street and Prairie Falcon Parkway as part of the project, so all receptors with the NAC B activity category within 500 feet of the edge of pavement (existing or proposed) also were included in the model. Areas of future planned development were identified on the west side of I-76, both north and south of Bridge Street. However, no building permits have been issued for any of those parcels, so they were not included in this noise study. All of the residential receivers that were included in the noise models are shown in Exhibit 4.3-5. Detailed information for the residential receivers, with the corresponding receiver numbers, is shown in Exhibit 4.3-6.

Exhibit 4.3-5. Noise Receivers Included in TNM

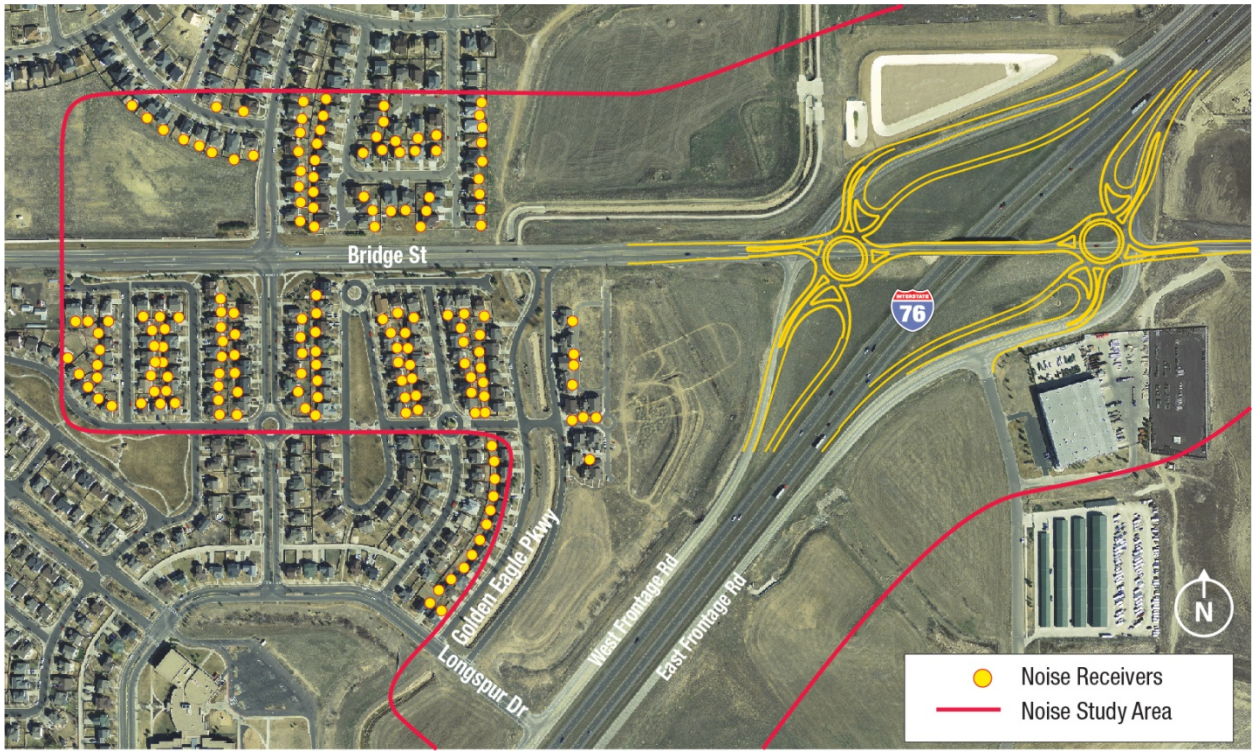
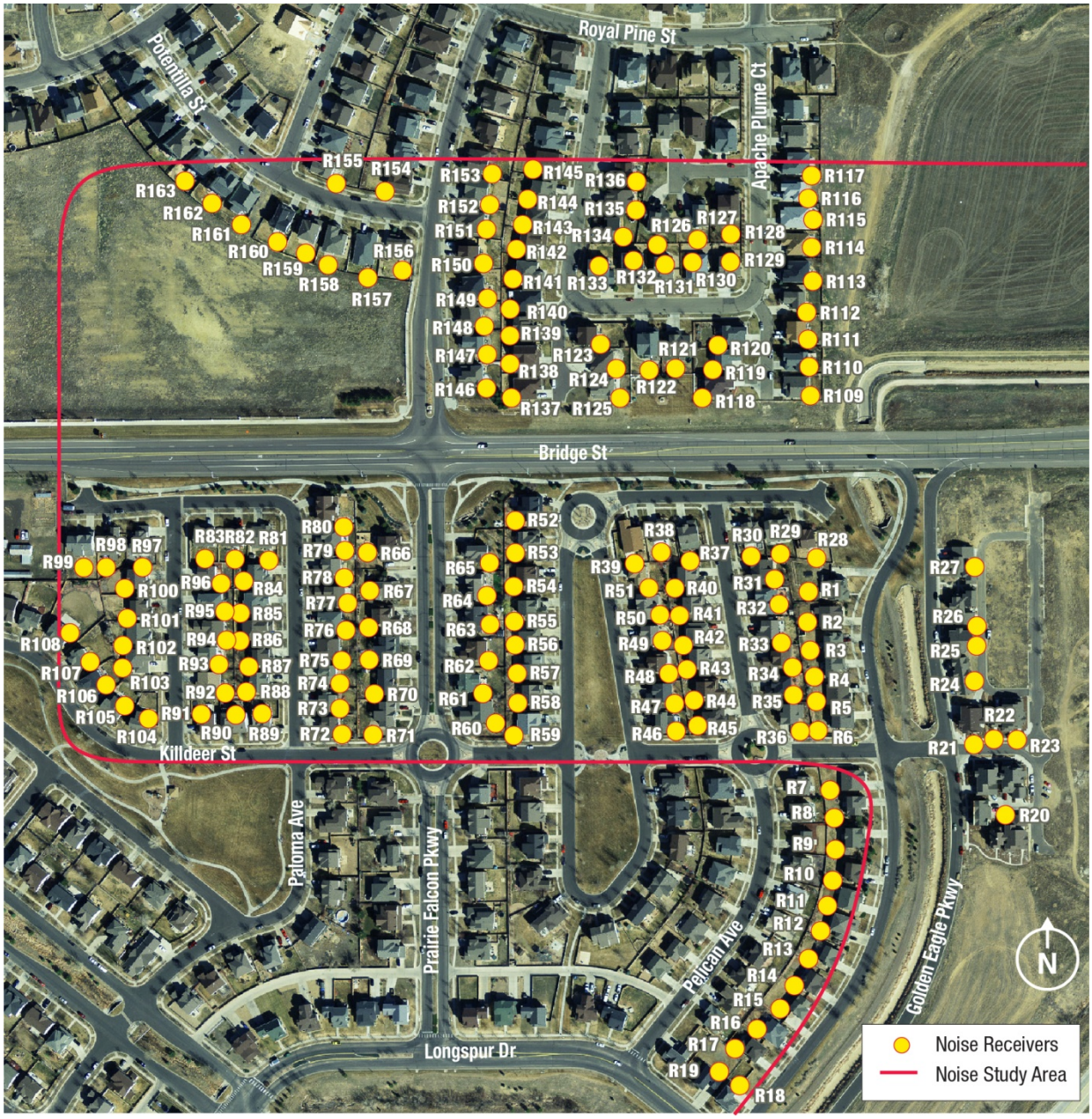


Exhibit 4.3-6. Detailed Noise Receiver Information



No-Action Alternative

The only change between the existing conditions and the No-Action Alternative noise models is the amount of traffic. By 2035, the increase in traffic on the existing road network will cause an increase in traffic noise for all dwelling units, but by no more than 4 dBA. Noise levels for the No-Action Alternative range between 47 dBA and 64 dBA. Since no receptors will experience an increase in noise greater than 10 dBA or a noise level greater than the NAC threshold, there are no noise impacts under the No-Action Alternative.

Action Alternatives

The Action Alternatives will draw more traffic to Bridge Street. The increase in volume will create higher noise levels in the neighborhoods surrounding the Bridge Street and Prairie Falcon Parkway intersection, which is reflected in the model results. The frontage road adjacent to this neighborhood is projected to carry about half the volume in all Action Alternatives as compared to the No-Action Alternative. While the amount of traffic using the freeway facilities will be similar in this and all other Action Alternatives, approximately 100 vehicles in each direction will use the ramps instead of the mainline. These 200 cars will travel at a lower speed when using the ramps, resulting in less noise.

The noise levels in Action Alternatives range between 49 dBA and 65 dBA. No receptor experiences more than a 5-dBA increase in noise compared to existing conditions. Since no receptor will experience noise levels above the NAC threshold or experience a substantial increase in noise, there will be no traffic noise impacts for Action Alternatives.

The results for the Existing, 2035 No-Action Alternative, and 2035 Action Alternatives are summarized in Exhibit 4.3-7. Detailed results of the noise analysis can be found in Appendix C, *Traffic Noise Technical Report*.

Exhibit 4.3-7. Noise Analysis Results Summary

Alternative	Predicted Noise Range $L_{eq}(h)$ (dBA)		Total Number of Dwelling Units in the Study Area	Number of Dwelling Units that Exceed NAC Threshold	Number of Dwelling Units with a Substantial Noise Increase > 10 dBA
	Min	Max			
Existing	45	62	182	0	N/A
2035 No-Action Alternative	47	64	182	0	0
2035 Action Alternatives	49	65	182	0	0

Construction Noise

Construction noise will present the potential for short-term impacts to those receptors located along the corridor and along designated construction access routes. However, these impacts are difficult to predict. It is anticipated that a portion of the construction will occur at night to minimize traffic disruption. The primary source of construction noise is expected to be diesel-powered equipment—such as trucks and earth-moving equipment—and construction activities—such as demolition hammers on trackhoes, rubble load outs, and tailgate and bucket bang.

Construction noise at off-site receptor locations usually will be dependent on the loudest one or two pieces of equipment operating at the moment. Noise levels from diesel-powered equipment range from 80 dBA to 95 dBA at a distance of 50 feet. Noise impacts are

expected to occur during the day and night, but only in isolated areas along the project corridor.

At Bridge Street, Brighton limits end approximately one-half mile east of I-76, so all the residential units in the study area are within Brighton boundaries. This project will abide by all appropriate city codes as they pertain to construction noise. If noise levels during construction are expected to exceed the limits from the city code, the contractor must obtain the necessary ordinance variance.

4.3.4. What are the proposed mitigation measures?

The following recommendations for mitigation measures are proposed. Since there are only temporary noise impacts with construction of the Action Alternatives, no permanent noise mitigation is recommended. However, prior to construction, all relevant permissions will be acquired. Each construction contractor shall submit a work plan outlining work schedules and intended mitigation measures prior to initiating construction.

The following BMPs will be recommended for the contractor, as applicable:

- Use noise blankets on equipment and quiet-use generators
- Minimize construction duration in residential areas as much as possible
- Minimize night-time activities in residential areas as much as possible
- Re-route truck traffic away from residential streets where possible
- Combine noisy operations to occur in the same time period

Potential BMPs for consideration include:

- Eliminate slamming of truck beds, truck tailgates, and equipment buckets
- Idle down equipment engines when the equipment is not in use
- Maintain all equipment to meet manufacturer's specifications
- Schedule trucks properly to minimize long queues
- Minimize back-up distances for trucks and other equipment
- Install localized noise shielding around compressors and other equipment when in close proximity to residences.

Contractors also will consider maintaining contact with the public through a 24-hour telephone line for questions and concerns and to provide schedules of planned construction activities.

For more information on construction noise issues, see FHWA's *Highway Construction Noise Handbook* (2006).

Local Agency Coordination

Local government officials can promote compatibility between land development and highways by ensuring that NAC B, C, and E type development is restricted or limited within the projected areas impacted by traffic noise. Noise contours will be provided to local officials as part of this project. These contours can be used to establish compatible development of currently undeveloped parcels or compatible redevelopment in areas where land use changes. NAC E sites should use this information to situate outdoor-use areas associated with office buildings and commercial centers away from the roadway.

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4.4 Land Use and Zoning

Transportation projects are generally a response to the way surrounding land is used and managed. It is important to consider the compatibility of a proposed project with surrounding land uses and management policies (both future and present). The study area for land use and zoning is comprised of the parcels immediately adjacent to the construction envelope.

4.4.1. What is the regulatory environment?

Laws, regulations, and guidance applicable to land use include federal transportation acts; Section 1010 of the Urban Park and Recreation Recovery Act of 1978. Brighton has a 2020 Comprehensive Plan, which governs land use and zoning along with its Land Use and Development Code.

4.4.2. What is the affected environment?

The following local and regional planning documents were reviewed and supplemented with a site visit and zoning maps:

- Brighton 2020 Comprehensive Plan (City of Brighton, 2009)
- Adams County Comprehensive Plan (Adams County, 2012)
- DRCOG 2035 MVRTP (DRCOG, 2011)

Brighton's local municipal plan also was supplemented with information from the DRCOG 2035 MVRTP and Adams County's Comprehensive Plan to conceptualize future land use (DRCOG, 2011; Adams County, 2012). The 2035 MVRTP is a long-range plan for the growth and development of the Denver metropolitan area and is updated every five years. The Adams County Comprehensive Plan was established in 2004 and provides goals, policies, and a future land use plan for the County (Adams County, 2012).

The land use and zoning study area is located within the DRCOG Metro Vision 2035 Urban Growth Area. The DRCOG Urban Growth Area defines where urban development will take place in the region over the next 25 years, and it is estimated that at least a 10 percent increase in overall density between 2000 and 2035 will occur in the Urban Growth Area (DRCOG, 2011). The Adams County Comprehensive Plan maps the I-76 and Bridge Street intersection study area as "Municipal Area" (Adams County, 2012). Future land uses in these areas are governed by the municipalities, in coordination with the County. Therefore, future land use would follow the above-mentioned City of Brighton Comprehensive Plan and DRCOG 2035 MVRTP.

Current Land Use and Zoning

The project is located in a historically rural area to the northeast of the City and County of Denver in Brighton, Adams County, Colorado, which is experiencing suburban development. It is located within the DRCOG metropolitan region.

Current zoning in the land use and zoning study area is commercial, agricultural, industrial, residential, state-owned, or park/open space designations. Current land uses in the land use and zoning study area generally are compatible with zoning (Exhibit 4.4-1). There is a Charter School (Bromley East Charter School) and a park (Dewey Strong Park) to the south that is outside the land use and zoning study area and will not be impacted.

Brighton zoning designations show the area surrounding the project to be Planned Unit Development (PUD) (City of Brighton, 2014). According to the City of Brighton Land Use Code, PUD is a project that treats a planned developed with multiple residential units as one entity.

To the west of the land use and zoning study area there are several current or planned residential communities. These include Bromley Park (south of Bridge Street, west of I-76), Brighton East Farms (north of Bridge Street, west of I-76), and Brighton Crossing (just west of Brighton East Farms) (Exhibit 4.4-1). The Brighton Crossing master planned community to the west is expected to have more than 3,000 homes, townhomes, condominiums, and apartments at full build out.

East and south of the land use and zoning study area there are agricultural properties as well as some light industrial/commercial development, including offices, a water treatment plant, and a storage facility (Exhibit 4.4-1).

Future Land Use and Zoning

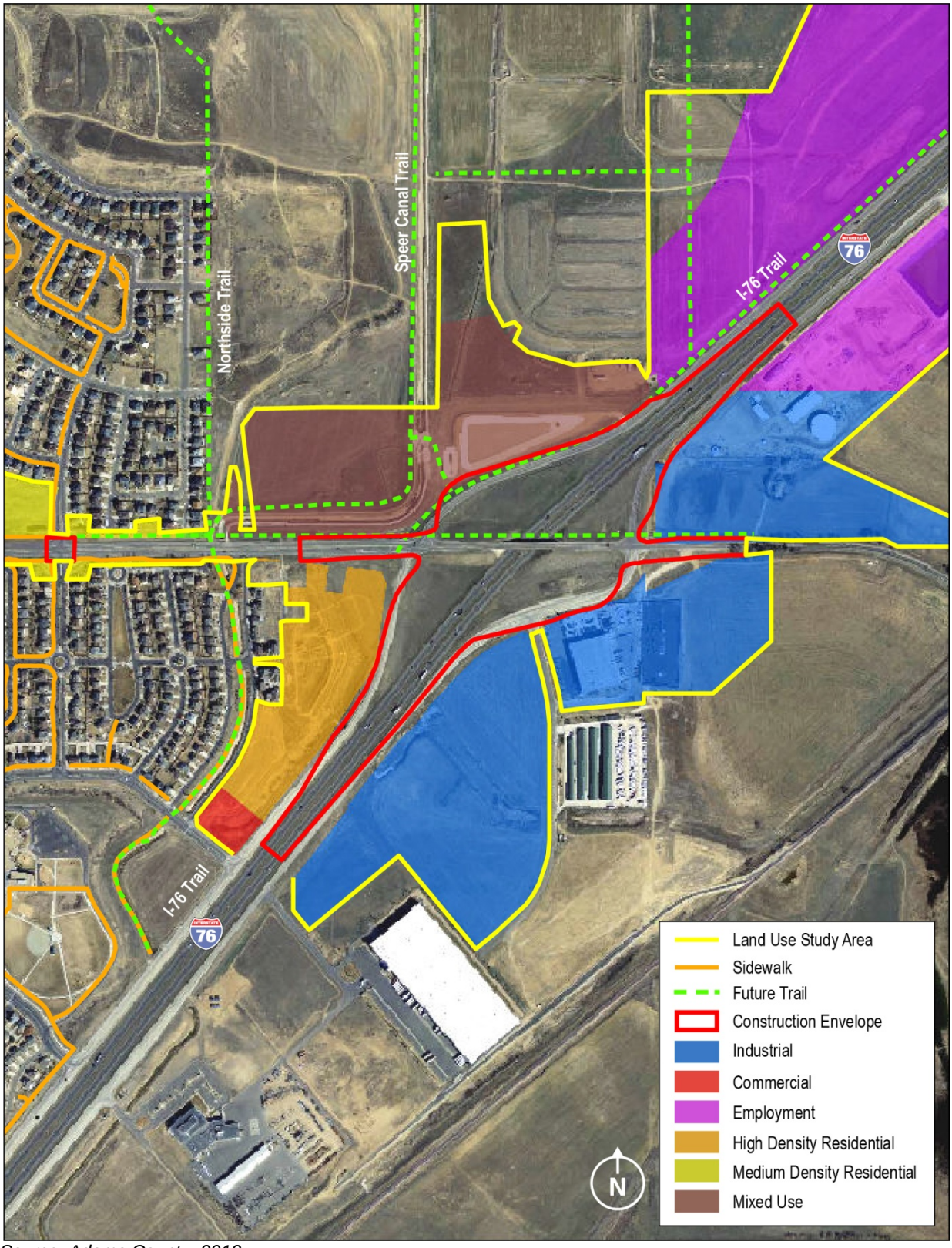
The City of Brighton's 2020 Comprehensive Plan designates nine future land use types in the proximity of land use and zoning study area (Exhibit 4.4-2). These include:

- **Agricultural:** Area that has an emphasis on protecting and preserving agricultural and farming culture
- **High-Density Residential:** Area with a density of five or more residences per acre
- **Mixed Use (residential, commercial, and office):** Areas that have different uses that are compatible with each other
- **Parks and Open Space:** Areas open to the public for recreational or conservation purposes

Exhibit 4.4-1. Existing Land Use and Zoning in Study Area

Source: Adams County, 2012

Exhibit 4.4-2. Future Land Use and Zoning in Study Area



Source: Adams County, 2012

- **Medium-Density Residential:** Area with a density between two and a half and five residences per acre
- **Commercial:** Areas with retail, service, and office uses
- **Public Lands:** Areas that are owned, operated, or dedicated to use by government, non-profit, or quasi-public entities
- **Employment:** Areas with primarily office and/or light industrial uses
- **Industrial:** Areas that are manufacturing, assembling, and warehouse uses, as well as research, design, and office uses.

4.4.3. What are the impacts to land use and zoning?

Land use and zoning impacts were evaluated based on the conversion of non-transportation right of way to a transportation use.

No-Action Alternative

Planned development is still expected to occur and will generate additional travel demand and access needs in the project area. The No-Action Alternative is not compatible with future land use plans, since it does not support the growth, projected travel demand, and access needs of the future. No land uses will be converted to transportation facility under the No-Action Alternative.

The current zoning in the land use and zoning study area is not in conflict with the No-Action Alternative. No direct impacts or major concerns regarding zoning were identified. The No-Action Alternative could have the indirect effect of slowing planned development by reducing the attractiveness of the area due to lack of direct access to I-76 and congestion on the route to access I-76.

Action Alternatives

All of the Action Alternatives will have the same impacts to land use and zoning. They all are compatible with existing and future land use plans in the land use and zoning study area and support the goals and objectives of adopted local land use plans. Traffic demand in the land use and zoning study area is anticipated to increase in the future due to planned development, resulting in the need to provide workers, residents, and visitors better access to the interstate. Local and regional land use plans are in place to help guide this increase in activity.

All of the three Action Alternatives, which include the construction of an interchange as well as installation of a new traffic signal at Prairie Falcon, will improve mobility in the land use and zoning study area and allow for better access to and from I-76 for future PUD, as well as current commercial, industrial, and residential properties. Small amounts of

agricultural, industrial, and state exempt/owned properties will be converted to a transportation use under the Action Alternatives due to the construction of the interchange. There are no land use or zoning impacts associated with the new traffic signal. Construction will not impact the existing land uses and is not expected to directly affect access to any parcels. In addition, the current zoning is not in conflict with the Action Alternatives.

All Action Alternatives could have the indirect effect of hastening planned development by improving the attractiveness of the area with the addition of direct access to I-76. They all would provide better access to and from planned future development off of I-76, thus helping to relieve existing and projected traffic pressure at the existing intersection area.

4.4.4. What are the proposed mitigation measures?

No land use or zoning mitigation is required.

4.5 Right of Way, Relocations, and Acquisitions

Right of way is land that is assigned a use for a transportation purpose. For example, right of way can be used for roads, bridges, and transit facilities, as well as associated supporting features, such as roadside ditches, clear zones, and bus stops. In operating and maintaining the transportation system, agencies sometimes need to acquire land and convert its use to transportation. In some cases, acquisition of land for this purpose requires relocation of homes, businesses, or other types of land uses. The study area for right of way, relocations, and acquisitions includes the parcels that are in or immediately adjacent to the construction envelope.

4.5.1. What is the regulatory environment?

All acquisition of property must adhere to the applicable Colorado state and federal laws and regulations regarding acquisition and relocation. For any person(s) whose real property interests may be impacted by this project, the acquisition of those property interests will comply fully with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, (Uniform Act). The Uniform Act is a federally mandated program that applies to all acquisitions of real property or displacements of persons resulting from federal or federally assisted programs or projects. It was created to provide for and ensure the fair and equitable treatment of all such persons. To further ensure that the provisions contained within this act are applied "uniformly", CDOT requires Uniform Act compliance on any project for which it has oversight responsibility, regardless of the funding source. Additionally, the Fifth Amendment of the United States Constitution provides that private property may not be taken for a public use without payment of "just compensation." All impacted owners will be provided notification of the acquiring agency's intent to acquire an interest in their property, including a written offer letter of just compensation specifically describing those property interests. A Right-of-Way Specialist will be assigned to each property owner to assist them with this process.

In certain situations, it may also be necessary to acquire improvements that are located within a proposed acquisition parcel. In those instances where the improvements are occupied, it becomes necessary to "relocate" those individuals from the subject property (residential or business) to a replacement site. The Uniform Act provides for numerous benefits to these individuals to assist them both financially and with advisory services related to relocating their residence or business operation. Although the benefits available under the Uniform Act are far too numerous and complex to discuss in detail in this document, they are available to both owner occupants and tenants of either residential or business properties. In some situations, only personal property must be moved from the real property and this is also covered under the relocation program. As soon as feasible, any person scheduled to be displaced will be furnished with a general written description of the displacing agency's relocation program, which provides, at a minimum, detailed information related to eligibility requirements, advisory services and assistance, payments,

and the appeal process. It will also provide notification that the displaced person(s) will not be required to move without at least 90 days' advance written notice. For residential relocatees, this notice cannot be provided until a written offer to acquire the subject property has been presented, and at least one comparable replacement dwelling has been made available. Relocation benefits will be provided to all eligible persons regardless of race, color, religion, sex, or national origin. Benefits under the act, to which each eligible owner or tenant may be entitled, will be determined on an individual basis and explained to them in detail by an assigned Right-of-Way Specialist.

4.5.2. What is the affected environment?

The project is located mostly within existing I-76 and Bridge Street right of way, which is owned by CDOT and Brighton, respectively. However, in areas, the construction envelope of all three Action Alternatives extends farther out, so the right of way study area includes parcels outside the transportation right of way. Property ownerships of the right of way were determined using parcel data obtained from Adams County (2013).

Existing Right-of-Way Ownership

As mentioned above, the majority of the right of way study area lies within designated transportation right of way. The areas immediately adjacent to the existing Bridge Street overpass over I-76 that fall outside of the current transportation right of way generally are undeveloped and zoned as agricultural, residential, industrial, or state-exempt properties. The state-exempt properties are owned by CDOT, United Water and Sanitation District, East Cherry Creek Valley Water District, and the South Beebe Draw Metropolitan District. Based on current data, there are 18 parcels owned by 11 entities located within the right of way study area (see Exhibit 4.5-1). Areas adjacent to the Prairie Falcon Parkway and Bridge Street intersection are residential.

4.5.3. What are the impacts to right of way, relocations, and acquisitions?

Right of way required for the project was identified by overlaying the footprints of the Action Alternatives on parcel ownership maps.

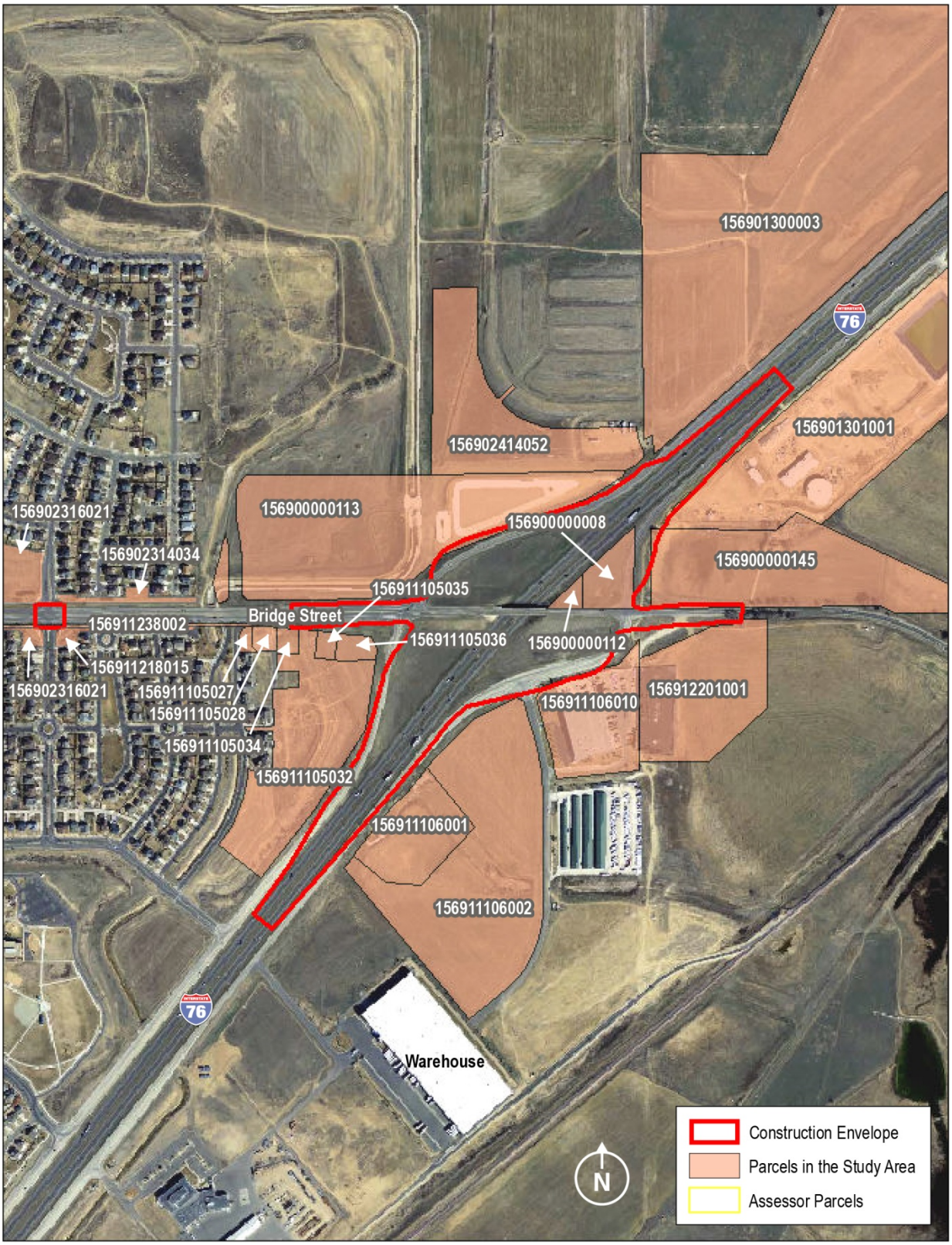
No-Action Alternative

There will be no direct or indirect impacts to right of way under the No-Action Alternative.

Action Alternatives

There will be direct temporary and permanent impacts to right of way from all three Action Alternatives. "Permanent impacts" to right of way means acquisition of the property, whereas "temporary impacts" means the area will be impacted only during construction. Exhibit 4.5-2 summarizes the right-of-way impacts by Action Alternative only for those impacted parcels. Of the three Action Alternatives, Alternative 2 will have the greatest amount of permanent impacts: 20,174 square feet (0.5 acre). The Preferred Alternative will have permanent impacts of 10,457 square feet (0.2 acre), and Alternative 3 will have the

Exhibit 4.5-1. Parcels within the Right of Way Study Area



least amount of permanent impacts to right of way with 4,718 square feet (0.1 acre). All Action Alternatives will require partial acquisitions of parcels without impacts to any structures, and include the same three parcels: one agricultural property, one industrial property, and one state-exempt property. No full property acquisitions or relocations will be required under any of the three Action Alternatives (parcels 156900000112 and 156900000008, which are within the construction envelope, are owned by CDOT). Temporary construction impacts will be similar between all three Action Alternatives: between 5,159 and 5,570 square feet (0.118 acre to 0.127 acre) (see Exhibit 4.5-3). All right-of-way impacts are due to the construction of the interchange, not the new signal at the Prairie Falcon Parkway and Bridge Street intersection.

Exhibit 4.5-2. Permanent Right-of-Way Impacts to Parcels

Parcel Number	Owner	Zoning	Permanent Impact (square feet)		
			Preferred Alternative	Alternative 2	Alternative 3
156901301001	East Cherry Creek Valley Water	Exempt	0	0	0
156900000145	Newton Catherine A and Bishop Norah C	Agricultural	991	155	155
156900000113	United Water and Sanitation District	Exempt	7,914	16,214	1,019
156911106010	Western United Electric	Industrial	1,552	3,805	3,544
Total Impacts (square feet)			**10,457**	**20,174**	**4,718**
Total Impacts (acres)			**0.240**	**0.463**	**0.108**

Source: Adams County, 2013
Notes: The number of impacted properties and the resultant impacted areas estimated above are preliminary and subject to change, upon completion of more advanced design.

Exhibit 4.5-3. Temporary Right-of-Way Impacts to Parcels

Parcel Number	Owner	Zoning	Temporary Impact (square feet)		
			Preferred Alternative	Alternative 2	Alternative 3
156901301001	East Cherry Creek Valley Water	Exempt	53	54	54
156900000145	Newton Catherine A and Bishop Norah C	Agricultural	766	378	380
156900000113	United Water and Sanitation District	Exempt	2,765	2,867	2,763
156911106010	Western United Electric	Industrial	1,575	2,271	2,236
Total Impacts (square feet)			**5,159**	**5,570**	**5,433**
Total Impacts (acres)			**0.118**	**0.127**	**0.124**

Source: Adams County, 2013
Notes: The number of impacted properties and the resultant impacted areas estimated above are preliminary and subject to change, upon completion of more advanced design.

4.5.4. What are the proposed mitigation measures?

For any person(s) whose real property interests may be impacted by this project, the acquisition of those property interests will comply fully with the Uniform Act. The Uniform Act is a federally mandated program that applies to all acquisitions of real property or displacements of persons resulting from federal or federally assisted programs or projects. It was created to provide for and ensure the fair and equitable treatment of all such persons. To further ensure that the provisions contained within this act are applied "uniformly," CDOT requires Uniform Act compliance on any project for which it has oversight responsibility, regardless of the funding source. Additionally, the Fifth Amendment of the United States Constitution provides that private property may not be taken for a public use without payment of "just compensation." All impacted owners will be provided notification of the acquiring agency's intent to acquire an interest in their property, including a written offer letter of just compensation specifically describing those property interests. A Right-of-Way Specialist will be assigned to each property owner to assist them with this process.

In certain situations, it may also be necessary to acquire improvements that are located within a proposed acquisition parcel. In those instances where the improvements are occupied, it becomes necessary to "relocate" those individuals from the subject property (residential or business) to a replacement site. The Uniform Act provides for numerous benefits to these individuals to assist them both financially and with advisory services related to relocating their residence or business operation. Although the benefits available under the Uniform Act are far too numerous and complex to discuss in detail in this document, they are available to both owner occupants and tenants of either residential or business properties. In some situations, only personal property must be moved from the real property and this is also covered under the relocation program. As soon as feasible, any person scheduled to be displaced will be furnished with a general written description of the displacing agency's relocation program, which provides, at a minimum, detailed information related to eligibility requirements, advisory services and assistance, payments, and the appeal process. It will also provide notification that the displaced person(s) will not be required to move without at least 90 days' advance written notice. For residential relocatees, this notice cannot be provided until a written offer to acquire the subject property has been presented, and at least one comparable replacement dwelling has been made available. Relocation benefits will be provided to all eligible persons regardless of race, color, religion, sex, or national origin. Benefits under the act, to which each eligible owner or tenant may be entitled, will be determined on an individual basis and explained to them in detail by an assigned Right-of-Way Specialist.

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4.6 Socioeconomics

Socioeconomic resources are features within the community that contribute to the local economy, enhance the quality of life, and support community cohesion. The study area for socioeconomic resources includes parcels and planned developments that are immediately adjacent to the construction envelope as well as the broad characteristics of the County and Brighton.

4.6.1. What is the regulatory environment?

Socioeconomic resources are regulated and guided by Sections 109(h) and 128 of Title 23 of the United States Code on Highways, and the Americans with Disabilities Act of 1990. Section 109(h) requires consideration of adverse impacts, including socioeconomic impacts, in the decision making of federal agencies. Section 128 also mandates consideration of economic and social effects of transportation projects by state Departments of Transportation. In relation to transportation, the Americans with Disabilities Act protects individuals with mental and physical disabilities against discrimination and requires that they be reasonably accommodated.

4.6.2. What is the affected environment?

The socioeconomic resources study area is located within Brighton in Adams County. The area is primarily agricultural/rural, but is currently experiencing substantial suburban development.

Demographics and Household Characteristics

From 1990 to 2000, the number of Adams County housing units increased 24 percent. Between 2000 and 2010, Adams County housing continued to grow at 17.7 percent. According to the Adams County Comprehensive Plan, roughly 80 percent of the County's housing units are located within municipalities (Adams County, 2012), such as Brighton.

In addition, Adams County's population is projected to increase from 443,603 in 2010 to 668,802 in 2035—a growth of approximately 50 percent (Department of Local Affairs, 2014). During this same timeframe, Brighton's population is expected to grow from 33,352 to 36,178 (DRCOG, 2014).

Economic Characteristics

Both Adams County and Brighton experienced an increase in unemployment between 2000 and 2010, with the County having a slightly higher unemployment rate in 2010 (7.6 percent) than Brighton (6.0 percent) (see Exhibit 4.6-1).

Exhibit 4.6-1. Employment and Unemployment Characteristics in Adams County and Brighton

Geography	Adams County	Brighton
Employment 2000	67.2%	61.4 %
Employment 2010	63.3%	59.6%
Unemployment 2000	3.3%	4.5%
Unemployment 2010	7.6%	6.0%

Source: Census 2013 (2010-2012 American Community Survey 3-Year Estimates)

The largest percentage of workers in Adams County works in educational services, health care, and social assistance; the retail trade; and professional, scientific, management, administrative, and waste management services (see Exhibit 4.6-2). Similarly, in Brighton, the largest percentages of workers are in educational services, health care, and social assistance; and in the retail trade. However, construction is also a large employment sector in Brighton (see Exhibit 4.6-2).

Exhibit 4.6-2. Employment by Sector in Adams County and Brighton

Employment Sector	Adams County	Brighton
Agriculture, forestry, fishing and hunting, and mining	1.6%	5.1%
Construction	9.9%	11.3%
Manufacturing	9.0%	8.6%
Wholesale trade	3.9%	3.0%
Retail trade	12.2%	12.0%
Transportation, warehousing, and utilities	7.5%	9.3%
Information	2.7%	2.3%
Finance, insurance, and real estate, including rental and leasing	5.7%	6.2%
Professional, scientific, management, administrative, and waste management services	11.9%	6.7%
Educational services, health care, and social assistance	16.2%	14.2%
Arts, entertainment, recreation, accommodation, and food services	9.5%	7.5%
Public administration	4.4%	6.8%
Other	5.4%	7.0%

Source: Census 2013 (2010-2012 American Community Survey 3-year estimates)

Residential Development and Community Resources

The socioeconomic resources study area is made up of primarily undeveloped lands. There is residential development to the west, with some agricultural and commercial/light industrial land to the south and east. There are three subdivisions/neighborhoods in the socioeconomic resources study area:

- **Bromley Park (a residential development).** Located on the south side of Bridge Street, west of I-76. There is a small portion of Bromley Park north of Bridge Street and west of I-76. Non-residential development in Bromley Park is south of Bridge Street and east of I-76.
- **Brighton East Farms.** Located on the north side of Bridge Street, west of I-76; this is a new planned development, but no permits have been issued yet.
- **Brighton Crossing.** Located north of Bridge Street and west of I-76, but adjacent to the west edge of the Brighton East Farms subdivision. Brighton Crossing is a master planned community with plans for more than 3,000 homes, townhomes, condominiums, and apartments at full build-out.

The closest community facilities to the socioeconomic resources study area are the Bromley East Charter School and Dewey Strong Park (Exhibit 4.6-3). Both are located approximately 800 feet from the existing Bridge Street overpass to the west of I-76 and are outside the socioeconomic resources study area. Additionally, emergency responders are located almost 3 miles to the west of the Bridge Street overpass at Station #2. In order to access I-76, they must use either Bromley Lane or Baseline Road.

4.6.3. What are the impacts to socioeconomics?

Impacts to socioeconomic resources were evaluated by identifying resources present, evaluating whether there will be direct effects due to right-of-way acquisition, and identifying effects to the function of these resources.

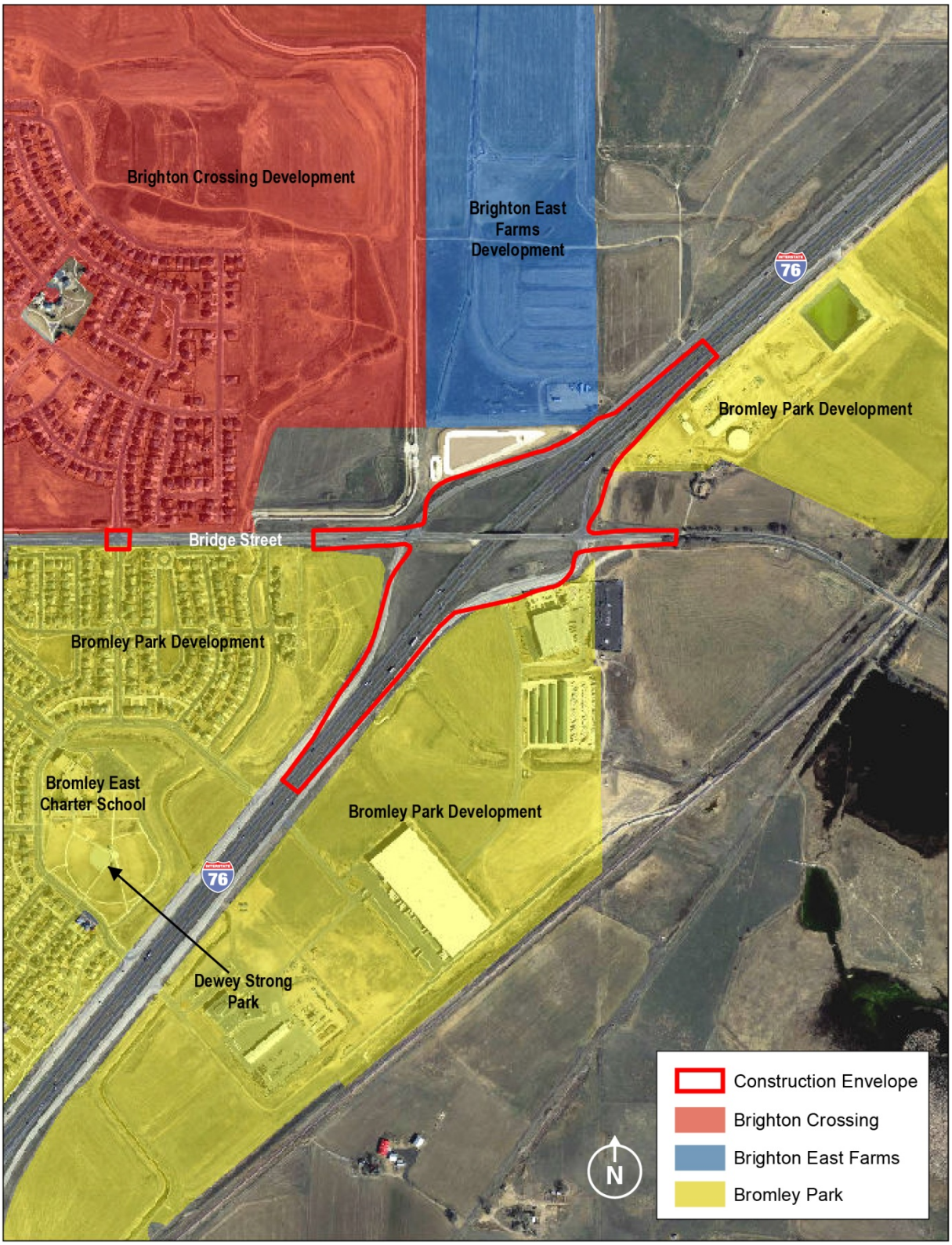
No-Action Alternative

There will be no impact to demographics and household or economic characteristics, community facilities, or neighborhoods as a result of the No-Action Alternative. However, the lack of direct access could negatively affect the area as it may be less attractive to residents and may add time to emergency service responses.

Action Alternatives

Impacts to socioeconomic resources are the same for all Action Alternatives. These are described below.

Exhibit 4.6-3. Residential Development and Community Resources in the Socioeconomic Resources Study Area



Permanent Impacts to Demographics and Household Characteristics

Brighton is transforming from a rural, agricultural town to a more suburban community. Residential development around the I-76 and Bridge Street intersection is both currently occurring and planned to occur. With this growth in population comes additional travel demand. Many of the community's new residents need access to I-76 to commute to the Denver metropolitan area. The new signal at Prairie Falcon and Bridge Street would not have an impact on demographics and household characteristics. Implementation of any of the Action Alternatives would be a positive impact since they all decrease travel time to/from I-76, which, in turn, also may reduce emergency service response time; both of these positive impacts could make the area more attractive to residents.

Construction of any of the Action Alternatives at I-76 and Bridge Street will provide residents with a more direct access to I-76 and faster travel to and from the Denver metropolitan area.

Permanent Impacts to Economic Characteristics

There are no employment centers or businesses providing a tax base within the socioeconomic resources study area; therefore, there will be no direct permanent impact to places of employment.

Permanent Impacts to Residential Development and Community Resources

There are no community resources within the immediate socioeconomic resources study area; therefore, there will be no impacts to these resources from the interchange or the new signal at Prairie Falcon and Bridge Street. Although there are residential communities to the west of the socioeconomic resources study area and new residential development is proposed, I-76 and Bridge Street already exist, so neighborhoods and communities will not be fragmented or cut off by any of the Action Alternatives. None of the Action Alternatives will affect the rate of development as the City manages growth through its building permitting process and the socioeconomic resources study area is already slated for development with the exception of the area immediately to the east of the construction envelope which is zoned industrial. All of the alternatives support the planned development in the area.

Temporary Impacts

During construction of any of the alternatives there will be increased noise, dust, and detours in traffic patterns. Detours could affect any driver using Bridge Street near I-76 including residents, commuters, and emergency service providers. There will also be a temporary economic growth within the region due to construction related jobs.

4.6.4. What are the proposed mitigation measures?

Since there are no permanent adverse impacts anticipated with any of the Action Alternatives, no mitigation is required. Mitigation measures for temporary impacts related to dust include wetting soils, covering trucks hauling soil and other fine materials, re-vegetating exposed areas, and using low-sulfur fuel. A complete list of air quality BMPs can be found in Section 4.2 of this EA. BMPs for noise impacts include the implementation of best management practices including using noise blankets and quiet-use generators, minimizing construction duration and construction proximity to residences at night, and re-routing truck away from residential areas where possible. A complete list of noise-related BMPs can be found in Section 4.3 of this EA. There also will be coordination with the emergency providers prior to construction, signage for all detours, and advance notice to the traveling public of detours and construction.

4.7 Utilities

A utility is a line, facility, or system that produces, transmits, or distributes various commodities that directly or indirectly serve the public. A utility can be private, public, or cooperatively owned. Commodities that are distributed through utilities include communications, cable television, electricity, lighting, heat, gas, oil, crude products, water, steam, sewer, stormwater, or any other similar service including any fire or police signal system or street lighting system. The study area for assessing impacts to utilities is the construction envelope, as shown in Exhibit 4.7-1.

Utilities carry commodities people use in their everyday lives for survival and convenience. They also carry products away to maintain safe, sanitary, and aesthetically pleasing conditions. Disruption to utilities during project construction can have negative economic, safety, quality of life, and other effects, further explaining their importance.

4.7.1. What is the affected environment?

Various public and private utilities are located within the utilities study area, including electric, cable TV, water, sanitary and storm sewer, communications, gas, and fiber optic. Electric, communications, and gas line utilities generally are privately owned and/or corporately operated to serve local communities. Water and sewer facilities typically are provided by local governments to residents and businesses within their jurisdictional boundaries.

The potential for utility impacts usually occurs during construction. Because the construction limits for all Action Alternatives are similar, a combination of all construction limits, called the construction envelope, was used to identify the location of potential impacts to existing utilities. Exhibit 4.7-1 shows the utilities study area used for all alternatives.

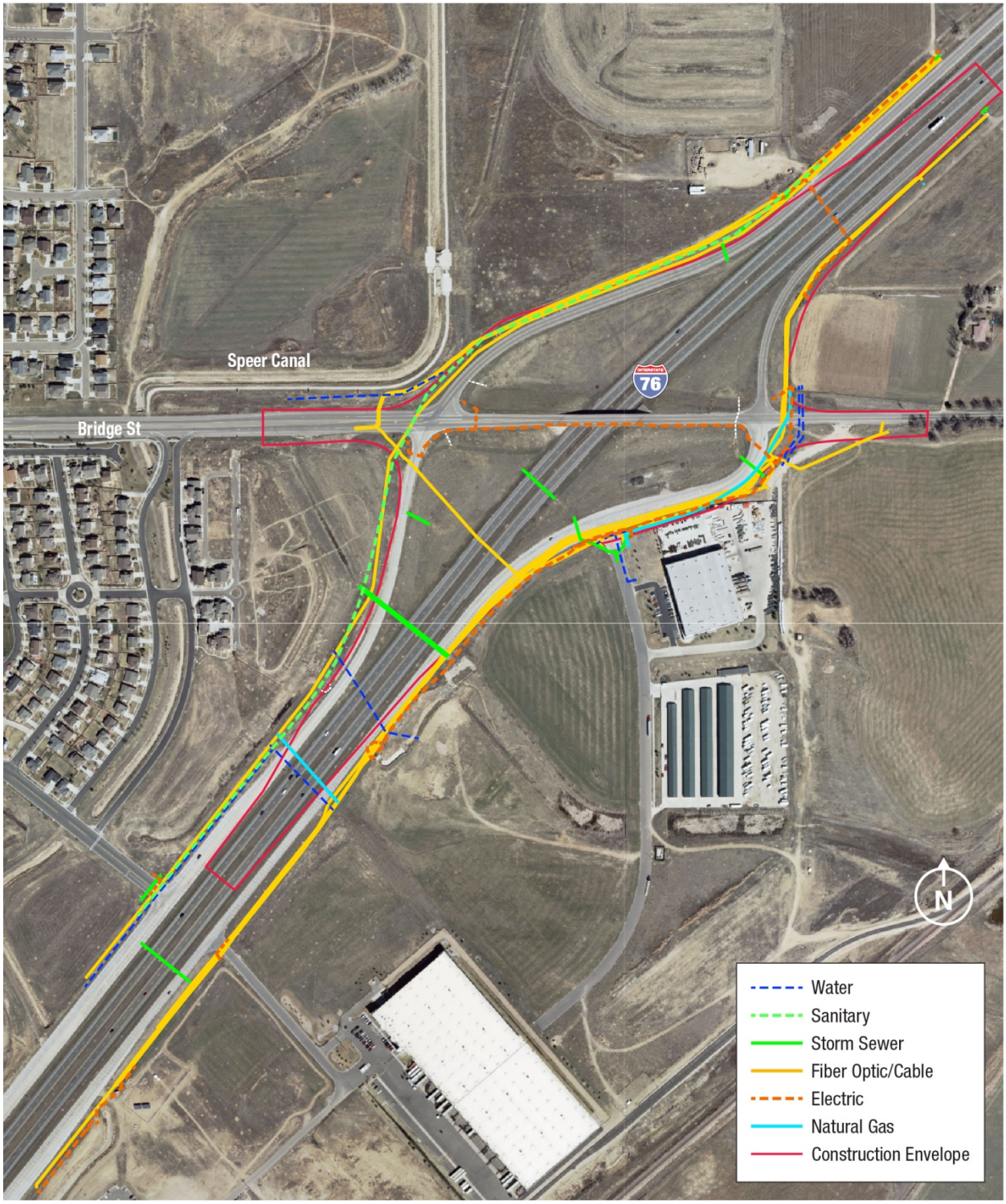
To prepare the utilities inventory and analyze potential conflicts, design drawings, spatial data, mapping, and other information available from the respective utility owners were studied.

The following subsections describe the existing utilities within the construction envelope that may be impacted by the project.

Water

Water lines provide filtered potable water to homes and businesses. There are eight water lines identified within the construction limits (see Exhibit 4.7-1). They are all underground and are owned by either United Water and Sanitation or the City of Brighton Water Department.

Exhibit 4.7-1. Existing Utilities within the Study Area



Sanitary Sewer

Sanitary sewers carry sewage from homes and businesses to wastewater treatment plants through a system of underground pipes. There is only one sewer line within the construction envelope (see Exhibit 4.7-1), and it is owned by the City of Brighton and United Water and Sanitation.

Storm Sewer

A storm sewer system can consist of curbs, gutters, drains, inlets, pipes, and open ditches that convey rainfall and other water drainage (but not sewage) to streams, lakes, or other surface water bodies. There are 21 storm sewer lines throughout the construction envelope (see Exhibit 4.7-1) all owned by CDOT.

Fiber Optics/Cable

Fiber optic lines are used as a medium for telecommunications and computer networking using pulses of light to carry data along strands of glass or plastic. They operate at higher bandwidths and frequencies than traditional copper wire carrying electrical signals, so they have much higher throughput, or capacity. Fiber optic material generally has replaced copper wire used traditionally for trunk lines in communications systems.

Approximately 12 fiber optic lines cross or run parallel to the roadway within the construction envelope (see Exhibit 4.7-1). The fiber optic and cable lines are owned by Sprint, CenturyLink, or ATT.

Electric

Two substantial underground electric power transmission lines cross the construction envelope (see Exhibit 4.7-1). In some locations, local power lines branch off the main transmission line. The electric utility lines are owned by United Power.

Natural Gas

Two existing natural gas lines are near, cross, or run parallel to the roadway (see Exhibit 4.7-1) and are owned by Xcel Energy.

An additional gas line is being proposed to cross I-76 and the frontage roads in the northern edge of the utilities study area, and then will run parallel to East Frontage Road, crossing under Bridge Street, traveling toward the south end of the utilities study area.

4.7.2. What are the impacts to the utilities?

Utility conflicts were identified by comparing the approximate construction limits with the location of major utilities. Evaluation of utility impacts used the following definitions and assumptions:

- Relocations—A utility would be moved horizontally and/or vertically to provide adequate clearances and avoid conflict.
- Adjustment—A utility would be affected by the proposed improvement, but would not require relocation. For example, adjustments to utilities might include extending pipes or culverts, extending or adding protective casings, moving inlets and associated pipes, and modifying the elevations of manholes or valves.
- A utility that crosses a roadway or ramp would likely result in an adjustment of the utility, at a minimum.
- A utility attached to a bridge would result in either an adjustment, relocation, or no impact.
- A utility running along a crossing or parallel surface street affected by construction likely would require adjustment or potential relocation.
- A utility running parallel to the roadway likely would be unaffected if it is deep enough to avoid excavation impacts.

Utility impacts were evaluated to determine if they result in adjustment or relocation of the utility lines. The subsections below present these findings.

No-Action

With the No-Action Alternative, no further improvements will be made to Bridge Street; therefore, there will be no direct, indirect, temporary, or cumulative effects to utilities.

Action Alternatives

It is probable that many of the underground utility lines are deep enough to avoid excavation impacts. Utility lines that are located under the proposed roadway will need to be relocated. With the Preferred Alternative, approximately three utility lines will need to be adjusted and 13 lines will need to be relocated. With Alternative 2 and Alternative 3, three utility lines will need to be adjusted and either 16 or 15 utility lines, respectively, will need to be relocated.

Construction of the interchange will impact some above-ground electric boxes, water valves, and light poles, which will need to be adjusted.

Exhibit 4.7-2 shows a summary of potential impacts to utilities by each alternative.

Exhibit 4.7-2. Summary of Potential Utility Impacts

Utilities	Utility Impacts Adjustment (minor)/Relocation (major)			
	No-Action Alternative	Preferred Alternative	Alternative 2	Alternative 3
Water	0/0	0/0	0/1	0/0
Sanitary sewer	0/0	0/1	0/1	0/1
Storm sewer	0/0	2/6	2/6	2/6
Fiber Optics/Cable	0/0	0/6	0/7	0/7
Electric	0/0	1/0	1/0	1/0
Natural Gas	0/0	0/0	0/1	0/1
Totals	**0/0**	**3/13**	**3/16**	**3/15**

4.7.3. What are the proposed mitigation measures?

Wherever possible, impacts to utilities will be avoided through close coordination with municipalities and utility companies during design and construction. In all cases, coordination with jurisdictions, utility companies, and other utility owners is an important component of any highway construction project. Proper coordination, planning, and design will reduce delays and improve cost efficiency. Where effects cannot be avoided, this coordination will facilitate mitigation efforts.

In some cases, utilities are an integral part of the design of an alternative. The following mitigation measures will be used to address effects:

- Conduct early coordination with utility owners to modify designs to avoid or minimize conflicts.
- Schedule service disruptions to coincide with periods of lower demand.
- Minimize service disruptions by connecting to active utilities wherever possible.
- Encase or provide protective cover over any impacted underground utilities, as necessary. This might include utilities under new or reconstructed roads or where existing cover will be reduced over a utility.
- Coordinate with utility owners and operators to identify construction requirements and financial responsibilities for relocations based upon easements, license agreements, ownership, or other existing agreements covering the use of affected utilities.
- Identify and improve any utility concerns that can be addressed as part of project implementation.

- Integrate above-ground utilities that are impacted by the project into the design, hide them from sight within the design, and/or design them to be aesthetically pleasing to the greatest extent practical.
- Move above-ground utilities underground to the greatest extent practical.

The effects to utilities during construction of the Action Alternatives will be temporary. During construction, the impacted utilities will be protected, interrupted, and/or relocated as necessary. Upon completion of construction, all major utilities will be returned to a condition equivalent to what currently exists, or they may even be improved by replacement of old material with new material.

4.8 Biological Resources

For the purposes of this EA, biological resources assessed included fish and wildlife, migratory birds, threatened and endangered species (state and federal), and vegetation. The study area for biological resources is the land and water features that are within the construction envelope and within a half-mile buffer around the envelope for raptors, as required by Colorado Parks and Wildlife (CPW).

4.8.1. What is the regulatory environment?

Regulations applicable to biological resources include the following federal and state regulations:

- **Noxious Weed Act:** The Colorado Department of Agriculture (CDOA) Noxious Weed Act of 2003 (CRS 35-5-101; CRS 35-5.5-101; EO D-006-99) defines and prioritizes management objectives for state-designated noxious weeds.
- **The United States Endangered Species Act (ESA):** Protects federally listed plant and animal species with the goal of ensuring their long-term survival.
- **The Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act:** Vegetation clearing, earth moving, bridge demolition, and other construction activities have the potential to disrupt nesting activity or destroy nests of bird species protected under the MBTA.
- **The Colorado Nongame, Endangered, and Threatened Species Conservation Act:** Provides some protection within the state for listed species and establishes the state's intent to protect endangered, threatened, or rare species.
- **Prairie Dog Protection:** The policy that will be followed is the CDOT Impacted Black-Tailed Prairie Dog Policy (CDOT, 2009).

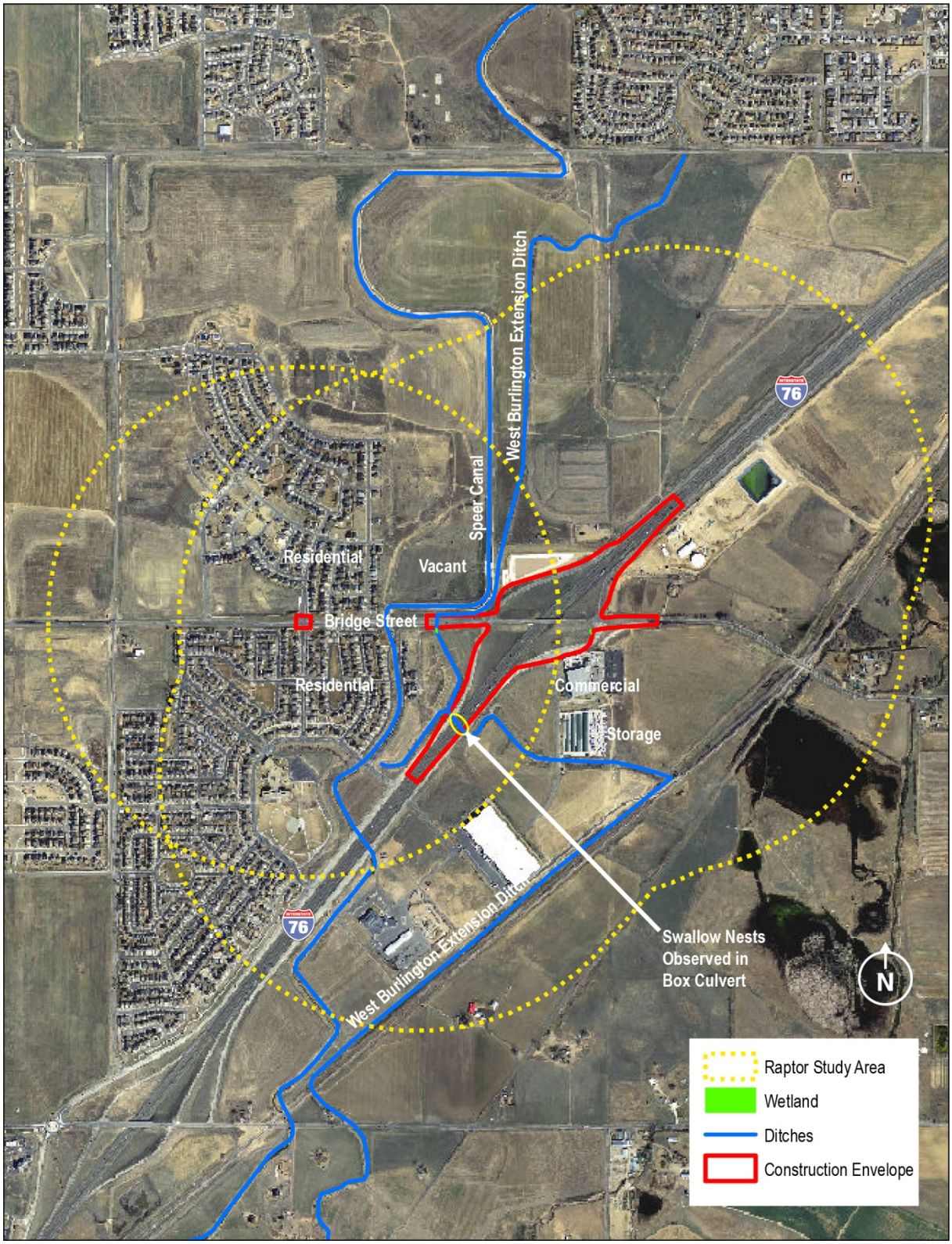
4.8.2. What is the affected environment?

The affected environment consists of previously disturbed areas adjacent to an interstate highway and associated access roads. The following subsections discuss the existing habitat and vegetation, noxious weeds, and animal and plant species in the biological resources study area (see Exhibit 4.8-1).

Habitat and Vegetation

Habitat types within the biological resources study area include upland native or planted grasses intermixed with sporadic weedy roadside species, wetland habitat, and landscaped areas. The dominant species along much of the upland habitats include smooth brome (*Bromus inermis*), crested wheatgrass (*Agropyron cristatum*), sand dropseed (*Sporobolus cryptandrus*), bulbous bluegrass (*Poa bulbosa*), sideoats grama (*Bouteloua curtipendula*),

Exhibit 4.8-1. Biological Resources Study Area



and needle and thread grass (*Hesperostipa comata ssp. comata*), little bluestem (*Schizachyrium scoparium*), common herbaceous species are kochia (*Bassia scoparia*), curly dock (*Rumex crispus*), and alfalfa (*Medicago sativa*). Scattered shrubs and trees in these areas include rabbitbrush (*Chrysothamnus nauseous*), Siberian elms (*Ulmus pumila*), and plains cottonwoods (*Populus deltoides*).

Dominant species in the wetland areas include narrowleaf cattail (*Typha angustifolia*), marsh muhly (*Muhlenbergia racemosa*), curly dock, and giant ragweed (*Ambrosia trifida*).

Noxious Weeds

Noxious weeds are present in the biological resources study area, but they are relatively few in number and do not cover large areas. Weed species identified are those commonly found in the Front Range.

Four species of weeds on the CDOA Noxious Weed List were observed during the site visit, scattered throughout the biological resources study area (CDOA, 2013) (Exhibit 4.8-2).

Exhibit 4.8-2. Noxious Weeds within the Biological Resources Study Area

Common Name	Scientific Name	State Weed List*	U.S. Department of Agriculture Code (USDA, 2013)	Density in Study Area
Scotch Thistle	*Onopordum acanthium*	B	ONAC	Low
Puncturevine	*Tribulus terrestris*	C	TRTE	Medium
Cheatgrass	*Bromus tectorum*	C	BRTE	Medium
Field Bindweed	*Convolvulus arvensis*	C	COAR4	High in discreet locations

Source: Pinyon, 2013

* *List A—Species are designated for eradication, and require prevention of seed production or development of reproductive propagules.*
List B—Species are managed and controlled by a noxious weed management plan, with the goal of stopping the continued spread of these species.
List C—Species for which a project would develop management plans with the goal of supporting jurisdictions that choose to require management of those species (CDOA, 2013).

Threatened, Endangered, and Sensitive Species

Federally listed species, state-listed species, and migratory birds with the potential to be impacted by the project and that are considered threatened, endangered, and sensitive species are discussed in detail in the following subsections.

Federally Listed Species

Per the U.S. Fish and Wildlife Service (USFWS), there are nine federally listed species with the potential to occur in, or be impacted by, any construction projects in Adams County (USFWS, 2014), including building a new interchange at I-76 and Bridge Street. Suitable habitat for these nine species is not located in the biological resources study area (see

Exhibit 4.8-3). Further information can be found in Appendix D: *Biological Resources Technical Report.*

Exhibit 4.8-3. Federally Listed Threatened and Endangered Species and Their Potential to Occur in the Biological Resources Study Area

Common Name	Species	Federal Status*	Habitat	Potential for Occurrence in Study Area
Birds				
Least Tern	*Sternula antilarum*	FE	Nests in summer along reservoirs, lakes, and rivers with bare sandy shorelines or islands	None; occur downstream of biological resources study area and are listed in county because they can be affected by South Platte River depletions
Mexican Spotted Owl	*Strix occidentalis lucida*	FT	Mature, old-growth forests that possess complex structural components; canyons, riparian, and conifer communities	None; suitable habitat does not occur in the biological resources study area
Piping Plover	*Charadrius melodus*	FT	Wetlands, lakeshores, and marshes; nesting habitat is along reservoirs, lakes, and rivers with bare sandy/pebbly areas with sparse vegetation	None; occur downstream of biological resources study area and are listed in county because they can be affected by South Platte River depletions
Whooping Crane	*Grus americana*	FE	Utilizes wetlands, irrigated meadows, and reservoir edges as stopovers during migration	Low; could occur during migration, although unlikely; also occur downstream of the biological resources study area and can be affected by South Platte River depletions

Common Name	Species	Federal Status*	Habitat	Potential for Occurrence in Study Area
Fish				
Pallid Sturgeon	*Scaphirhynchus albus*	FE	Known population in Mississippi River from Missouri to the Gulf of Mexico	None; occur downstream of biological resources study area and are listed in county because they can be affected by South Platte River depletions
Mammals				
Preble's Meadow Jumping Mouse	*Zapus hudsonicus preblei*	FT	Occurs along Front Range of Colorado along permanent or intermittent streams in areas with herbaceous cover and adequate cover of shrubs and trees	None; suitable habitat does not occur in the biological resources study area
Plants				
Colorado Butterfly Plant	*Gaura neomexicana var. coloradensis*	FT	Stream channel sites that are periodically disturbed, sub-irrigated alluvial soils along streams; open meadows on floodplains, including riparian areas	None; suitable habitat does not occur in the biological resources study area
Ute Ladies'-Tresses Orchid	*Spiranthes diluvialis*	FT	Sub-irrigated alluvial soils along streams; open meadows on floodplains, including riparian areas	None; suitable habitat does not occur in the biological resources study area
Western Prairie Fringed Orchid	*Platanthera praeclara*	FT	Mesic to wet unplowed tall-grass prairies and meadows	None; occur downstream of biological resources study area and are listed in county because they can be affected by South Platte River depletions

Source: USFWS, 2014
**Federal status abbreviations: FT = federally listed as threatened; FE = federally listed as endangered*

State-Listed Species

Colorado Parks and Wildlife lists 74 species of amphibians, birds, fish, mammals, reptiles, and mollusks as endangered, threatened, or of special concern within the state of Colorado (CPW, 2013). The majority of these species are not expected to occur in the biological resources study area because the study area is outside of their range and/or appropriate habitat is not present. According to the Colorado Natural Heritage Program (CNHP)

Tracking List and habitat requirements, eight state-listed sensitive species were identified with the potential to occur within the biological resources study area (CNHP, 2012) (see Exhibit 4.8-4). Two state-listed species also are on the federal list—the Preble's meadow jumping mouse (PMJM) and Mountain Plover—and are assessed in the Federally Listed Species section of this document. More information can be found in Appendix D: *Biological Resources Technical Report.*

Exhibit 4.8-4. State-Listed Threatened and Endangered Species and Their Potential to Occur in the Biological Resources Study Area

Common Name	Species	State Status*	Habitat	Potential for Occurrence in Study Area
Amphibians				
Northern Leopard Frog	*Lithobates pipiens*	SC	Typical habitats include wet meadows and the banks and shallows of marshes, ponds, glacial kettle ponds, beaver ponds, lakes, reservoirs, streams, and irrigation ditches	Low; suitable habitat exists along the West Burlington Extension Ditch in the biological resources study area
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	ST	Habitat includes reservoirs and rivers; in winter, they also may occur locally in semi-deserts and grasslands, especially near prairie dog towns	Low; could occur during migration or winter roosting, although unlikely due to the lack of large trees in the biological resources study area
Ferruginous Hawk	*Buteo regalis*	SC	Preferred habitat is arid and semiarid grassland, foothills or mid-elevation plateaus with few trees; Avoids cultivated fields and developed areas	None; suitable habitat does not occur in the biological resources study area
Mammals				
Black-footed Ferret	*Mustela nigripes*	SE	Occurs in grasslands or shrublands in association with prairie dog colonies	None; population has been extirpated in Colorado, with the exception of managed experimental populations
Black-Tailed Prairie Dog	*Cynomys ludovicianus*	SC	Habitat consists of intermixed shrublands, sagebrush habitat, and/or shortgrass and mixed-grass prairies; occurs in central and south-central Colorado	None observed in the biological resources study area

Common Name	Species	State Status*	Habitat	Potential for Occurrence in Study Area
Reptiles				
Common Garter Snake	*Thamnophis sirtalis*	SC	Inhabits marshes, ponds, and the edges of streams and for the most part restricted to aquatic, wetland, and riparian habitats along the floodplains of streams	Low; very minimal habitat exists along the West Burlington Extension Ditch in the biological resources study area

Sources: CNHP, 2012; USFWS, 2014
**State status abbreviations: ST = state listed as threatened; SE= state listed as endangered; SC = state listed Species of Concern*

Migratory Birds

The grassy upland areas and small trees in the biological resources study area could be used as nest sites. Additionally, there are a few large trees to the west in the southern portion of the biological resources study area and to the east within the half-mile raptor biological resources study area that could be used by nesting raptors. These habitats are within the nesting raptor buffer area for many species (CPW, 2008). During the site visit, Cliff Swallow (*Petrochelidon pyrrhonota*) nests were observed in the concrete box culvert of the West Burlington Extension Ditch that passes under I-76 (see Exhibit 4.8-1).

4.8.3. What are the impacts to biological resources?

Biological resources were overlaid onto the No-Action and Action Alternatives construction envelope to identify areas of potential direct and indirect impacts.

No-Action Alternative

There will be no direct impacts to biological resources under the No-Action Alternative.

Action Alternatives

All three Action Alternatives will have very similar impacts to biological resources, with the only difference being the slight difference in footprint of each Action Alternative. Impacts for all three alternatives are discussed below.

Habitat and Vegetation

There will be minimal direct permanent impacts to habitat and vegetation in the biological resources study area due to the construction of the interchange and no permanent impact form the installation of a new traffic signal at Prairie Falcon. The majority of construction-related activities will occur within existing right of way, which has been previously disturbed; therefore, impacts to natural vegetation and habitat will be minimal.

Noxious Weeds

There would be direct permanent and temporary impacts caused by noxious weeds from the construction of any of the Action Alternatives. Project-related construction could introduce new noxious weeds into the biological resources study area or increase the abundance of existing noxious weeds. Construction activities include mobilization of construction vehicles, excavation and transport of borrow material and topsoil, land clearing, and reclamation. Removal of existing vegetation and disturbance of soils could encourage germination and spread of weed seeds and roots. Airborne seeds from noxious weeds present in areas adjacent to the project could germinate in areas where vegetation has been removed.

Indirect impacts from construction of any of the Action Alternatives could include the spread of noxious weeds from within the area to other areas not currently invaded.

Threatened, Endangered, and Sensitive Species

Since the biological resources study area lacks suitable habitat for four of the nine federally listed threatened and endangered species, the project will likely have no effect on them. These four species include the Colorado butterfly plant, Ute ladies'-tresses orchid, Preble's meadow jumping mouse, and the Mexican Spotted Owl.

Five of these nine federally listed species have been listed in Exhibit 4.8-3 because they could occur south of the biological resources study area along the South Platte River. This project and others that occur in the Platte River basin have the potential to deplete water in tributaries of the Platte River through practices such as using water for dust suppression and soil moisture treatments. Depleting water in the watershed could adversely affect the five species.

Migratory Birds

There would be permanent and temporary impacts to vegetation habitat in the biological resources study area due to the construction of the interchange, although the area has been previously disturbed. Construction activities could negatively affect migratory birds' nesting activities due to associated noise, vibration, and human activity.

No raptor nests were observed in or around the biological resources study area; however, limited suitable habitat does occur in the area, primarily within large trees less than a half-mile southwest and east within the raptor area. There will be potential for raptors to nest in these areas prior to construction; therefore, there is the potential to impact raptors within the CPW buffer that has been established for nesting raptors.

Cliff Swallow nests were observed in the existing box culvert structure of the West Burlington Extension Ditch under I-76. Therefore, work near the culvert could have the potential to impact nesting swallows.

4.8.4. What are the proposed mitigation measures?

CDOT and FHWA are participating in the South Platte Water Related Activities Program (SPWRAP) and have submitted a Programmatic Biological Assessment to the USFWS. A Biological Opinion (ES/CO: ES/LK-6-CO-12-F-020) was issued. Mitigation measures for potential impacts to downstream species are outlined in the Programmatic Biological Assessment and Biological Opinion (PBA/BO). Therefore, any depletion and associated adverse effect to the five downstream species will be mitigated through CDOT's participation in the SPWRAP.

The mitigation strategies that will be used to limit impacts to biological resources during construction are described in the subsections below.

Noxious Weeds

There are weeds in the biological resources study area, but they do not dominate the study area and do not cover large areas. Therefore, a noxious weed management plan is not recommended. However, during construction, the project is required to minimize the spread of noxious weeds according to the revised Sections 207, 212, and 217 of the CDOT Standard Specifications, and to implement the standard CDOT BMPs designed to prevent the spread of noxious weeds, which are:

- Minimize soil disturbance to the greatest extent possible
- Clean all equipment will be thoroughly before entering the construction site
- Do not stage equipment in weed-infested areas
- Coordinate weed management efforts with local jurisdictional agencies and adjacent landowners to the greatest extent possible
- Use herbicide immediately adjacent to wetlands and/or water bodies only if the label indicates that the use is appropriate for such areas
- Re-seed all disturbed soil with a pure live seed tested for germination and purity within seven days of completion of work during the growing season
- Do not use "A" horizon soil material currently supporting noxious weed cover of more than 10 percent as topsoil during re-vegetation
- Do not import topsoil due to the potential for spread of noxious weeds
- Monitor and re-treat all areas treated for noxious weeds during construction if necessary to prevent re-establishment of noxious weeds
- Use only compost that is Seal of Testing Assurance certified weed-free; weed-free is defined and regulated by the Weed Free Forage Act, Title 35, Article 27.5, CRS

Federally Listed Threatened and Endangered Species

A total of nine federally listed threatened and endangered species have the potential to occur in the biological resources study area. Four of these will not be impacted. Mitigation for five federally listed downstream species will follow the PBA/BO mitigation from the SPWRAP.

Migratory Birds

Impacts to birds protected under the MBTA will follow CDOT Specification 240: *Protection of Migratory Birds*. This includes the following:

Tree and Shrub Removal or Trimming:

- Tree and shrub removal or trimming will occur before April 1 or after August 31 if possible. If tree and shrub removal or trimming will occur between April 1 and August 31, a survey for active nests will be conducted by a biologist within the seven days immediately prior to the beginning of work in each area or phase of tree and shrub removal or trimming.
- If an active nest containing eggs or young birds is found, the tree or shrub containing the active nest will remain undisturbed and protected until the nest becomes inactive. The nest will be protected by placing fence (plastic) a minimum distance of 50 feet from each nest to be undisturbed. This buffer dimension may be changed if determined appropriate by a biologist and approved by the CDOT Engineer. Work will not proceed within the fenced buffer area until the young have fledged or the nests have become inactive.
- If the fence is knocked down or destroyed by the Contractor, the CDOT Engineer will suspend the work, wholly or in part, until the fence is satisfactorily repaired at the Contractor's expense. Time lost due to such suspension will not be considered a basis for adjustment of time charges, but will be charged as contract time.

Grasses and Other Vegetation Management:

- Due to the potential for encountering ground nesting birds' habitat, if work occurs between April 1 and August 31, the area will be surveyed by a biologist within the seven days immediately prior to ground-disturbing activities. The Contractor will notify the CDOT Engineer at least 10 working days in advance of the need for a biologist to perform the survey.
- The undisturbed ground cover—to 50 feet beyond the planned disturbance, or to the right-of-way line, whichever is less—will be maintained at a height of six inches or less beginning April 1 and continuing until August 31 or until the end of ground disturbance work, whichever comes first.
- If birds establish a nest within the survey area, an appropriate buffer of 50 feet will be established around the nest by a biologist. This buffer dimension may be changed

if determined appropriate by a biologist and approved by the CDOT Engineer. The Contractor will install fence (plastic) at the perimeter of the buffer. Work will not proceed within the buffer until the young have fledged or the nests have become inactive.

- If the fence is knocked down or destroyed by the Contractor, the CDOT Engineer will suspend the work, wholly or in part, until the fence is satisfactorily repaired at the Contractor's expense. Time lost due to this suspension will not be considered a basis for adjustment of time charges, but will be charged as contract time.

Work on Structures:

- The Contractor will perform work on structures in a manner that does not result in a taking of migratory birds protected by the MBTA. The Contractor will not perform the work on structures during the primary breeding season, April 1 through August 31, unless he takes the following actions:
  1. The Contractor will remove existing nests prior to April 1.
  2. During the time that the birds are trying to build or occupy their nests, between April 1 and August 31, the Contractor will monitor the structures at least once every three days for any nesting activity.
  3. If birds have started to build any nests, the nests will be removed before they are completed. Water will not be used to remove the nests if nests are located within 50 feet of any surface waters.
  4. Installation of netting may be used to prevent nest building. The netting will be monitored and repaired or replaced as needed. Netting will consist of a mesh with openings that are three quarters of an inch by three quarters of an inch or less.
- If an active nest becomes established, i.e., there are eggs or young in the nest, all work that could result in abandonment or destruction of the nest will be avoided until the young have fledged or the nest is unoccupied, as determined by a biologist and approved by the CDOT Engineer. The Contractor will prevent construction activity from displacing birds after they have laid their eggs and before the young have fledged.
- If the project continues into the following spring, this cycle will be repeated. When work on the structure is complete, the Contractor will remove and properly dispose of netting used on the structure.

Potential Impact to Raptors Protected under the MBTA

Pre-construction surveys for nesting raptors will be carried out in accordance with CPW's *Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors* guidelines for pre-construction surveys (See Appendix D of the *Biological Resources Technical Report*).

Impacts to raptors identified will follow CPW's *Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors* guidelines (See Appendix D of the *Biological Resources Technical Report*).

4.9 Wetlands and Open Waters

Wetlands and open waters are important natural resources that provide a number of functions in the project area, including improving water quality, providing aquatic and wildlife habitat, and helping with flood protection. The study area for wetlands and open waters includes the water features that are in or adjacent to the construction envelope.

4.9.1. What is the regulatory environment?

Wetland resources are protected under Section 404 of the Clean Water Act (CWA) and under EO 11990, Protection of Wetlands (Federal Register, 1977). Many wetlands and open water features are considered jurisdictional Waters of the U.S. (WUS) by the USACE. Projects that will discharge dredged or fill materials into waters of the U.S., including wetlands, are subject to permitting by the USACE.

Non-jurisdictional wetlands are not subject to permitting by USACE under Section 404. However, all federal agencies are required to avoid and minimize wetland impacts to the greatest extent possible, per EO 11990. To be consistent with FHWA policies, CDOT follows guidelines that require mitigation of impacts to all wetlands, regardless of jurisdiction, on a 1:1 ratio.

4.9.2. What is the affected environment?

A site visit of the wetlands study area was performed on September 12, 2013, to identify and delineate existing wetlands and other water features within the wetlands study area (see Exhibit 4.9-1). The wetland delineation was completed in accordance with the 1987 USACE *Wetland Delineation Manual* (USACE, 1987), and the 2010 *Regional Supplement to the Corps of Engineers Wetland Delineation; Great Plains Regional Supplement* (USACE, 2010).

Wetlands

Two palustrine emergent (PEM) wetlands were delineated (WL-01 and WL-02) (Cowardian, et al., 1979) (see Exhibit 4.9-2). WL-01 is located on the southwest corner of the intersection of East Frontage Road and Bridge Street on the east side of I-76 and is within the construction envelope. It was dominated by narrowleaf cattails (*Typha angustifolia*), an obligate herbaceous wetland species. WL-02 was delineated south of Bridge Street and west of I-76 and West Frontage Road and is adjacent to the construction envelope. WL-02 was dominated by narrowleaf cattails, marsh muhly (*Muhlenbergia racemosa*), giant ragweed (*Ambrosia trifida*), and curly dock (*Rumex crispus*).

Exhibit 4.9-1. Wetlands and Open Waters within the Wetlands Study Area

The wetland areas are grouped into Assessment Areas (AAs) to analyze the functional capacity of the wetlands, per CDOT's Functional Assessment of Colorado Wetlands (FACWet) methodology. AAs typically are based on hydrogeomorphic class, wetland type, and location. The two wetland zones in the wetlands study area have been grouped into a single AA (AA-1) based on hydrogeomorphic class, wetland type, and plant community. As noted, WL-01 and WL-02 are both PEM wetlands with similar hydrological sources.

The overall FACWet Functional Capacity Index for AA-1 was 0.67, meaning that there has been obvious alteration and degradation of the wetland, but that it still supports basic wetland functioning, albeit at an impaired level. There are three main stressors for AA-1:

1. The presence of the I-76 corridor and frontage roads
2. Nearby commercial, residential, and industrial development
3. The presence of weeds

These three stressors contribute to the degradation of the functioning of migration and dispersal of organisms that use the wetland, the water source, and distribution of water within AA-1, the outflow of water from AA-1, the geomorphology, and the chemical environment.

Additional information on wetlands, including FACWet and USACE data forms and figures, can be found in Appendix E: *Wetland Finding Report.*

Open Waters

The primary hydrologic features within the wetlands study area is the West Burlington Extension Ditch and the Speer Canal, which both flow toward the north. The wetlands study area also receives stormwater runoff from the surrounding roadways, including I-76 and Bridge Street. Three open waters were delineated in the wetlands study area (OW-1, OW-2, and OW-3) (see Exhibit 4.9-1). OW-1 is a small open water area just north of the West Burlington Extension Ditch, northeast of the ditch crossing at I-76. The West Burlington Extension Ditch (OW-2) is located in the southern portion of the wetlands study area, and crosses I-76 via a box culvert in an east-west direction. Water in both the ditch and OW-1 was likely the result of heavy rains prior to the field survey, since the survey was completed during a period of unusually heavy rain in September 2013. The Speer Canal (OW-3) is located in the northwest portion of the wetlands study area, northwest of the I-76 and Bridge Street overpass.

4.9.3. What are the impacts to wetlands and open waters?

Wetlands and open waters were measured by collecting global positioning system (GPS) data in the field. This information then was overlaid with the alternatives' design to identify potential impacts.

No-Action Alternative

There will be no permanent or temporary impacts to wetlands or open waters under the No-Action Alternative.

Action Alternatives

All three Action Alternatives will have the same impacts to wetlands (see Exhibit 4.9-2). There will be 0.01 acre (585 square feet) of permanent impact to WL-01. There will be no permanent impact to WL-02. There could be temporary impacts to either wetland area during construction. None of the Action Alternatives will have any permanent or temporary impacts to open waters.

Exhibit 4.9-2. Impacts to Wetlands

Wetland ID	Wetland Location	Wetland Classification*	Total Wetland Area Acreage (sq. ft.)	Action Alternatives Permanent Impact[1] Acreage (sq. ft.)	No-Action Alternative Permanent Impact Acreage (sq. ft.)	Jurisdictional Status[2]
WL-01	Southwest corner of the intersection of East Frontage Road and Bridge Street, on the east side of I-76	PEM	0.01 ac (585 sq. ft.)	0.01 ac (585 sq. ft.)	0.00 ac (0 sq. ft.)	Unlikely, but assumed Jurisdictional
WL-02	South of Bridge Street, and west of I-76 and West Frontage Road	PEM	0.02 ac (872 sq. ft.)	0.00 ac (0 sq. ft.)	0.00 ac (0 sq. ft.)	Jurisdictional
Total Wetland Impacts				**0.01 (585 sq. ft.)**	**0.00 ac (0 sq. ft.)**	—

PEM = Palustrine emergent wetland
[1] *Impact is the same for all three Action Alternatives*
[2] *Assumed jurisdictional status based on project review; USACE consultation will be held during final design of the project*

Construction activities disturb the ground, which increases the likelihood of noxious weeds becoming established. Final construction plans have not been developed yet; therefore, it is not known precisely how much indirect impact could result from those activities. Mitigation recommendations are included below and are applicable regardless of the construction plans.

4.9.4. What are the proposed mitigation measures?

Per Section 404 of the CWA, impacts to wetlands and other water features must be avoided, minimized, or mitigated (in order of preference). During the design process, impacts to wetlands were avoided to the greatest extent possible. It was not possible to avoid impact to WL-1 due to the location of the I-76 northbound off ramp and radius needed to allow for truck movements exiting the interstate. The impacted wetland will be mitigated in accordance with CDOT and USACE policy. It is assumed that the wetland is jurisdictional, though consultation with USACE will take place at final design. An NWP is anticipated, along with compliance with CDOT mitigation standards.

The wetlands study area was evaluated for the potential for onsite mitigation for the 0.01 acre (585 square feet) of permanent impacts to wetlands. Because of insufficient natural hydrology and right of way requirements, the successful re-establishment of wetlands would be difficult. Major drainage, hydrological improvements, and slope changes will be needed for onsite mitigation. Onsite mitigation will result in a costly and time-consuming process, with no guarantee of the establishment of a successful wetland habitat. Instead of pursuing this mitigation option, the project can purchase credits from a wetland mitigation bank. Three USACE-approved banks are located within the same watershed as the project, including the Middle South Platte, Mile High, and Riverdale Wetland Mitigation Banks. If credits are purchased, they would likely be purchased from one of these three banks.

Temporary impacts could result from construction activities. These impacts will be minimized by the implementation of a Stormwater Management Plan (SWMP). The potential for the spread of noxious weeds will be minimized by re-seeding upland and wetland areas disturbed by construction with native species, in accordance with Sections 207, 212, and 217 of the CDOT Standard Specifications, and by implementing the standard CDOT BMPs. This information is summarized in Appendix E: *Wetland Finding Report.*

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4.10 Water Resources and Water Quality

Water resources and water quality can be affected by the operation and maintenance of transportation facilities, as well as by construction of the transportation system. The study area for water resources is the construction envelope.

4.10.1. What is the regulatory environment?

The federal CWA was established to protect and restore the quality of the nation's navigable waters. The CWA requires states to classify the intended uses (designated uses) of all surface water bodies and to develop criteria to protect the designated uses of these water bodies. The state of Colorado has established regulations that identify these designated uses and water quality standards.

The state of Colorado passed the Water Quality Control Act (WQCA) to fulfill the provisions set forth in the CWA. A nine-person commission was formed to serve as a governing body responsible for developing and maintaining a comprehensive and effective program for the prevention, control, and abatement of water pollution and for water quality protection throughout the state. The Colorado Water Quality Control Commission (WQCC) is tasked with the authority to create and amend the WQCA Regulations. The following WQCA Regulations are applicable to the water resources study area:

- Regulation #42, Site-Specific Water Quality Classifications and Standards for Ground Water (Colorado Department of Public Health and Safety (CDPHE, 2006)
- Regulation #61, Colorado Discharge Permit System Regulations (CDPHE, 2011)
- Regulation #31, The Basic Standards and Methodologies for Surface Water (CDPHE, 2012a)
- Regulation #41, The Basic Standards for Ground Water (CDPHE, 2012b)
- Regulation #38, Classifications and Numeric Standards for South Platte River Basin, Laramie River Basin, Republic River Basin, Smoky Hill River Basin (CDPHE, 2013)

4.10.2. What is the affected environment?

Any water bodies that could receive runoff from the I-76 and Bridge Street overpass and frontage roads can be impacted by this project. The bodies of water impacted by the project include surface water and groundwater and are discussed in more detail in the following subsections.

Surface Water

Much of the water resources study area is developed with road surfaces. During precipitation events, typical transportation-related pollutants—including grease, oil, de-

icing salts, sediment, and other nutrients—may wash into the adjacent surface water bodies.

The I-76 and Bridge Street Interchange Project study area (see Exhibit 4.10-1) is located within the South Platte River Basin, which has a drainage area of approximately 24,300 square miles (USGS, 2013). Streams within the basin are utilized for agricultural and urban uses resulting in low flows for dilution of contaminants. Alteration of the natural flow regime due to the use of the streams over time has degraded native aquatic habitat along the streams.

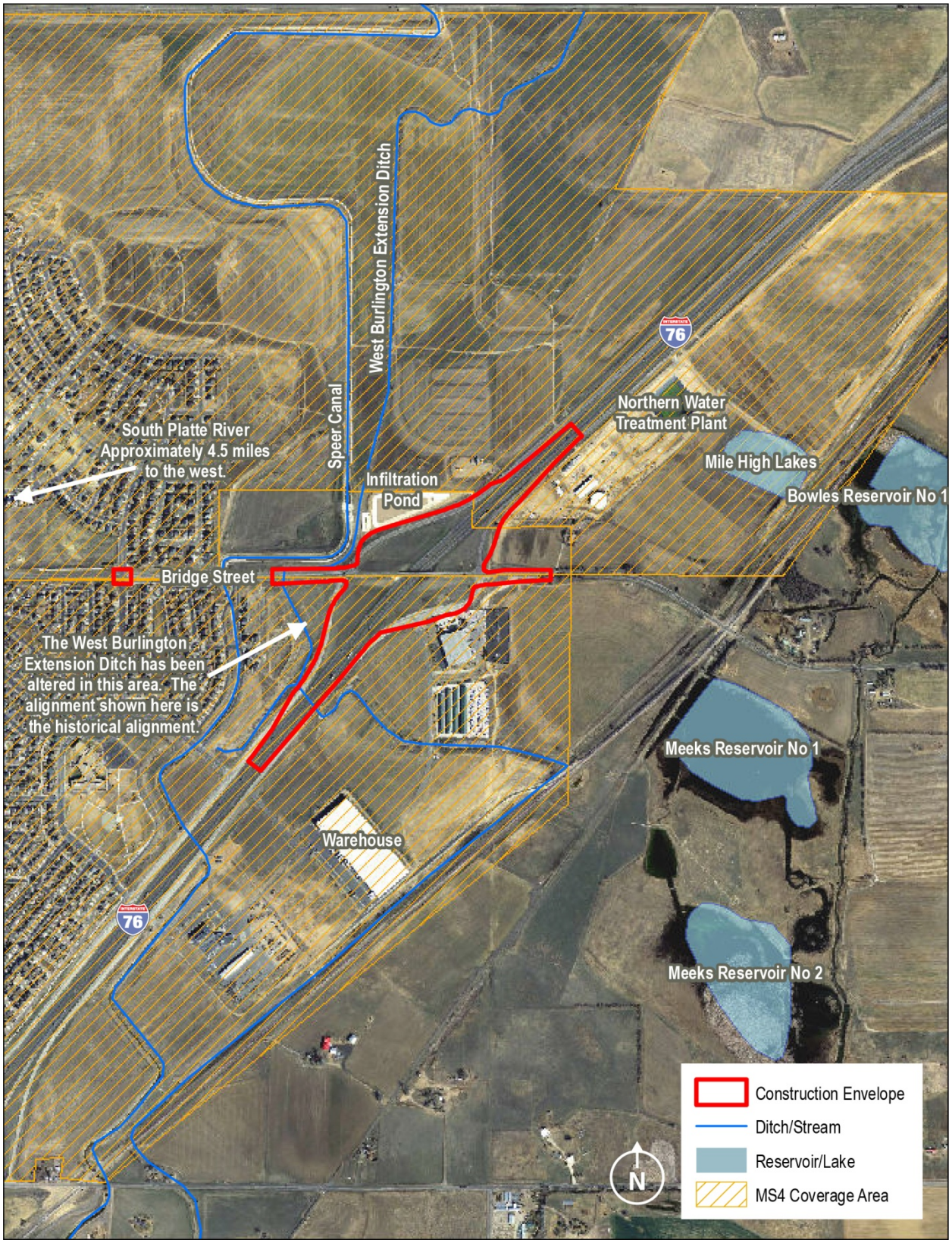
The South Platte River is located approximately 4.5 miles west of the construction envelope. Meeks Reservoir Numbers One and Two are located approximately one-half mile southeast of the water resources study area, with Bowles Reservoir Number One located approximately one-half mile east. One of the Mile High Lakes is located approximately one quarter mile east of the water resources study area. Runoff from the water resources study area does not directly enter any of the reservoirs.

The Speer Canal and West Burlington Extension Ditch are located adjacent to the west overpass, and an infiltration pond is located adjacent to the northwest. The Northern Water Treatment Plant, including two detention ponds, is located east-northeast of the water resources study area. Stormwater drainage infrastructure is present to collect runoff from the existing roadways.

The designated use classifications for this segment include: (1) Aquatic life (warm 2), (2) Recreation E, (3) Water supply, and (4) Agriculture. Use classifications are defined as follows:

- **Aquatic life (warm 2)**: Waters not capable of sustaining a wide variety of cold water animals or plant life
- **Recreation E**: Waters where primary contact uses have been documented or are presumed present
- **Water supply**: Waters suitable or intended to become suitable for potable water supplies
- **Agriculture**: Surface waters suitable or intended to become suitable for irrigation or crops that are not hazardous as drinking water for livestock

Exhibit 4.10-1. Water Resources within the Water Resources Study Area



Water quality standards also consist of criteria to protect designated beneficial uses, not to exceed a specific concentration (e.g., odor). Numeric criteria are based upon data and assessment of the harmful effects of a pollutant, and are specified as chemical concentration or other physical characteristic, such as temperature. The standards established by the WQCC serve to maintain water quality for designated uses or to improve the water quality. If numeric standards for a stream segment cannot be met after the application of required controls and effluent limitation, Section 303(d) of the CWA requires the EPA to list that stream segment as "impaired." Impaired streams are subject to additional requirements and control measures under the CWA. The stream segments located near the water resources study area are not impaired; therefore, they are not subject to additional requirements.

Those construction projects that occur on state and interstate highways and the respective right of way within the jurisdictional boundaries of CDOT that are within Municipal Separate Storm Sewer System (MS4) areas, including new highway projects and significant highway modifications, require a CDOT MS4 permit. Portions of the water resources study area are located within the CDOT MS4 permit coverage area (CDOT, 2007).

Groundwater

Typically, groundwater flow direction mimics topography. Based on the topographic conditions of the water resources study area, the groundwater flow direction is likely toward the east-southeast. Groundwater at the water resources study area occurs at approximately 20 feet below ground surface (Hillier, et al, 1983). Two permitted groundwater wells for residential use were identified within the water resources study area (CDWR, 2013).

The water resources study area has historically been utilized for agriculture. The current alignment of I-76 has served as a transportation corridor since at least the mid-1940s. Residential, commercial, and light industrial development has occurred near the water resources study area since the early-2000s. No regulated material facilities have been identified at or near the water resources study area. Based on the historical use of the water resources study area, groundwater is likely not contaminated (Pinyon, 2013).

4.10.3. What are the impacts to water resources?

Water quality impacts were examined in relation to the amount of new impervious surface that would be added to the existing transportation network associated with the No-Action Alternative and the three Action Alternatives.

No-Action Alternative

No permanent or temporary impacts to surface water or groundwater will occur under the No-Action Alternative. Existing impacts to water quality may continue. Runoff containing pollutants from the existing bridge and road surfaces will continue to wash into nearby

water resources (reservoirs, canal, ditch, infiltration, and detention ponds) during precipitation events.

Action Alternatives

All three Action Alternatives will result in ground disturbance and increase the potential for erosion and movement of sediment from the site into surface waters due to an increase in impervious surface area. The increased impervious surface is due to the construction of the interchange, not the installation of a new traffic signal at Prairie Falcon. The Preferred Alternative will increase the impervious surface area by approximately 214,320 square feet; Alternative 2 will increase the impervious surface area by approximately 214,550 square feet; and Alternative 3 will increase the impervious surface area by approximately 214,440 square feet from the existing conditions. Due to the increase in impervious surface area resulting from any of the three alternatives, it is assumed that both erosion control for construction and post-construction permanent features or adjustments to existing features will be necessary to manage the increased runoff.

The Speer Canal, West Burlington Extension Ditch, and the infiltration pond will not be directly impacted by any of the Action Alternatives. All three Action Alternatives will require the relocation or removal of the piping system associated with the stormwater drainage infrastructure. The culvert that channels the flow from the West Burlington Extension Ditch under Bridge Street at the western portion of the water resources study area likely will not be impacted by any of the Action Alternatives.

The reservoirs located east and southeast of the water resources study area will not be directly impacted by any of the Action Alternatives. The water treatment facility located east-northeast of the water resources study area and groundwater wells near the water resources study area also will not be directly impacted.

The Action Alternatives will impact a CDOT MS4 permitted area. Section 402(p)(3)(B) of the CWA states that municipal stormwater permits will require controls to reduce the discharge of pollutants from the MS4 to the maximum extent practicable (MEP).

Any of the Action Alternatives could indirectly impact surface waters due to ground disturbance during the construction of the new interchange and the unlikely potential to encounter subsurface contaminants that could be released into the environment.

Disturbance and erosion of underlying soil, stockpiles, and access roads during construction can contribute to increased runoff into surface water bodies. Accidental spills from machinery, drilling activities, and storage tanks can affect water quality during construction. Staging areas located adjacent to the infiltration pond, canal, or nearby reservoirs could have water quality impacts.

4.10.4. What are the proposed mitigation measures?

BMPs will be utilized during construction and the storm sewer system will be permanently upgraded. The CDOT MS4 permit requires stormwater evaluations and implementation of adequate mitigation to ensure compliance with applicable control regulations, water quality standards, and the CWA. In compliance with the permit requirements, strategies will be developed and implemented that include a combination of structural and non-structural BMPs, a regulatory mechanism to require post-construction implementation of BMPs, and adequate long-term operation and maintenance of BMPs.

In compliance with CDOT's MS4 permit, the following guidance documents will be utilized:

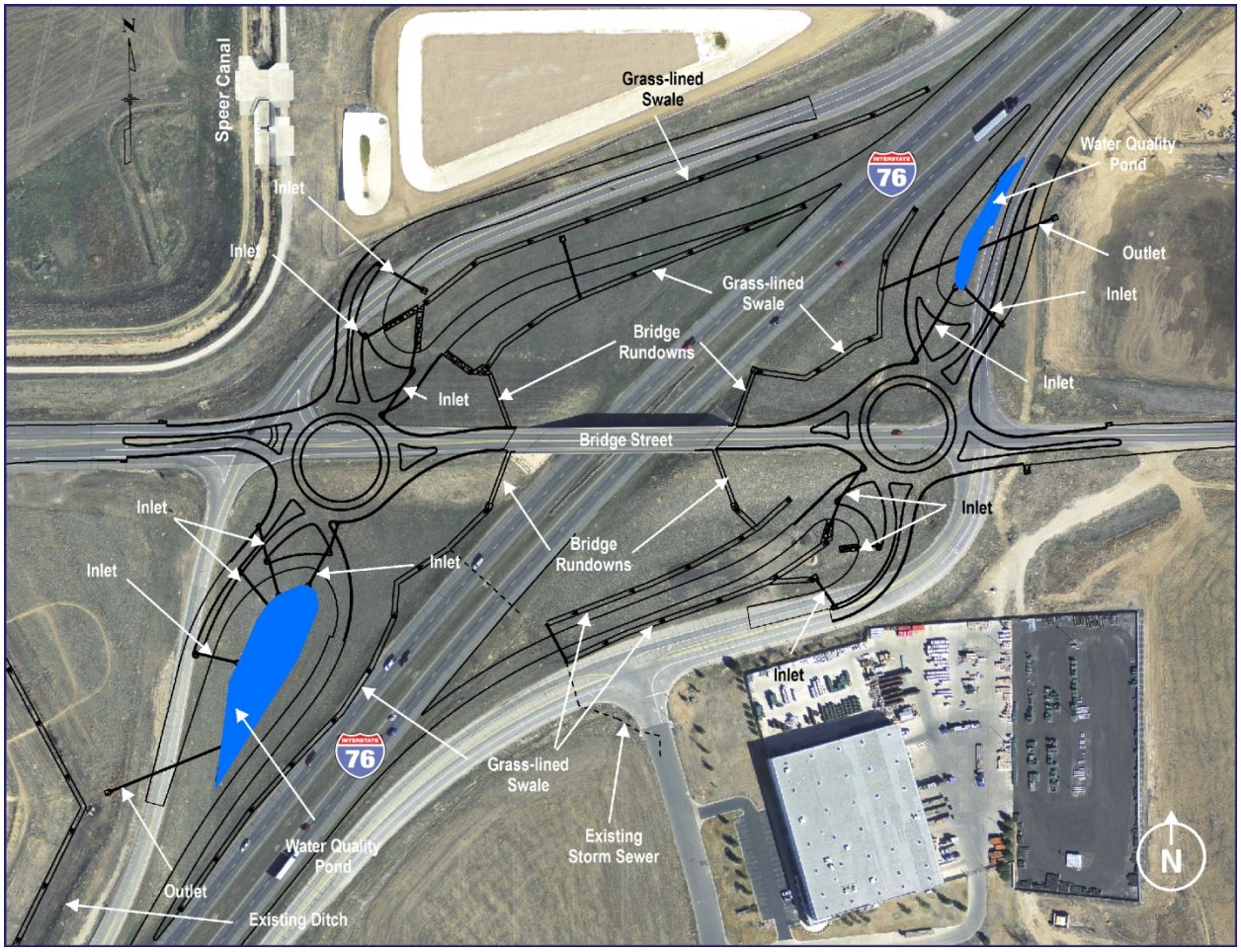
- CDOT's *Erosion Control and Stormwater Quality Guide* (updated 2002)
- CDOT's *Drainage Design Manual* (Drainage Manual) (updated 2004)
- CDOT's *Standard Specifications for Road and Bridge Construction* (Specifications) (updated 2011)

Under *CDOT's current MS4 permit, 100 percent water capture a*nd treatment for new impervious surfaces and resurfaced areas is required. To comply with this requirement, the following design elements have been included in the Action Alternatives: rundowns at each bridge abutment, grass-lined swales, curb and gutter with inlets, and a water quality pond that will be built in the southwest quadrant of the interchange (see Exhibit 4.10-2). Regulations and guidance that are current at the time of final design and construction will be followed for this project.

Construction BMPs

Best management practices from the *Erosion Control and Stormwater Quality Guide* will be utilized during construction to reduce construction-related and/or long-term operation impacts to water resources and water quality as appropriate (CDOT, 2002). A stormwater management plan (SWMP) will be developed.

Exhibit 4.10-2. Permanent Water Quality BMPs



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4.11 Hazardous Materials

Hazardous materials may exist within the area at facilities that generate, store, or dispose of these substances, or at locations of past releases of these substances. Examples of hazardous materials include asbestos, lead-based paint, heavy metals, dry-cleaning solvents, and petroleum hydrocarbons (e.g., gasoline and diesel fuels) that could be harmful to human health and the environment.

The study area for hazardous materials is the construction envelope; to evaluate the potential for hazardous materials to be encountered, a records search of known hazardous materials was completed within a half mile of the existing Bridge Street overpass.

4.11.1. What is the regulatory environment?

Hazardous materials are regulated by various state and federal regulations. NEPA, as amended (42 USC §4321 et seq., Public Law 91-190, 83 Stat. 852), mandates that decisions involving federal funds and approvals consider environmental effects from hazardous materials. Other applicable regulations include the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 USC §9601 et seq.), which provides federal authority for the identification, investigation, and cleanup of sites throughout the United States that are contaminated with hazardous substances (as specifically designated in the Act) and the Resource Conservation and Recovery Act of 1976 (RCRA) (42 USC §321 et seq.), which establishes a framework for the management of both solid and hazardous waste.

The federal Hazardous and Solid Waste Amendments of 1984 establishes a new comprehensive regulatory program for underground storage tanks (UST) containing petroleum products and hazardous chemicals regulated under CERCLA. Hazardous waste USTs are regulated under the RCRA hazardous waste program. The CDPHE regulates solid waste under the Colorado Solid Waste Regulation (6 Code of Colorado Regulations [CCR] 1007-2). CDPHE requires all solid waste be disposed of, treated, or recycled at designated facilities approved by the CDPHE and local jurisdictions. This is the Colorado equivalent to Subtitle D of RCRA.

4.11.2. What is the affected environment?

The project is located in a historically rural area that is currently experiencing limited residential and commercial development. I-76 has existed in this area since the late 1960s. A residential community is located west of the hazardous materials study area, with agricultural land located to the north. Agricultural properties are located east and south of the hazardous materials study area, with light industrial/commercial development, including offices, a storage facility, and a water treatment facility.

Based on the environmental records search conducted for federal, state, and local environmental resources, no hazardous material facilities of concern were identified within the hazardous materials study area. Refer to Appendix F: *Modified Phase I Environmental Site Assessment (MESA) Technical Report* for additional information.

4.11.3. What are the impacts to hazardous materials?

A MESA was conducted in accordance with the CDOT *Hazardous Materials Document Guide* (CDOT, 2011) and follows the ASTM E1527-05, "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process" (Phase I Standard), with the following exceptions: (1) interviews were not conducted, and (2) building interiors were not accessed.

Based on search distances identified in the Phase I Standard, no hazardous materials are located within the hazardous materials study area. Detailed information regarding the review of environmental agency records, historical records, physical setting information, and site reconnaissance were included in the MESA (see Appendix F).

No-Action Alternative

The No-Action Alternative will not directly or indirectly disturb hazardous material sites, since there will be no ground-disturbing activities that could encounter hazardous material sites and no hazardous material sites have been identified within the hazardous materials study area.

Action Alternatives

Hazardous material sites were not identified in the study area; therefore, implementation of any of the three Action Alternatives likely will not encounter hazardous materials. However, ground-disturbing activities during construction both either the interchange or during the installation of the new traffic signal could encounter unknown hazardous materials and disperse soil or groundwater contamination.

The potential to encounter hazardous materials increases with greater area of ground disturbance. The ground disturbance of the three Action Alternatives is similar. Alternative 2 will have the greatest area of ground disturbance: 25,744 square feet (approximately 0.6 acre). The Preferred Alternative will have 15,615 square feet (approximately 0.4 acre) of ground disturbance, and Alternative 3 will have the least amount of ground disturbance: 10,151 square feet (approximately 0.2 acre).

Temporary truck transport along detour routes during construction of the interchange could result in additional spills outside typical transportation routes for all three Action Alternatives. However, any of the Action Alternatives will result in improved safety, decreasing the potential for spills associated with crashes compared to the No-Action Alternative.

Encountering hazardous materials may affect the construction budget and schedule, particularly if previously unidentified contamination is found. Though unlikely within the hazardous materials study area, the acquisition of properties may require additional site investigation and monitoring to evaluate site conditions before and during construction, and construction activities may require the offsite disposal of contaminated soil and debris in permitted facilities.

4.11.4. What are the proposed mitigation measures?

Recommended mitigation measures for potential encounters with unknown hazardous materials include the following:

- Complete ASTM-compliant Phase I Environmental Site Assessment for properties considered for right-of-way acquisition.
- Adhere to CDOT Specification 250—Environmental, Health, and Safety Management by workers onsite during construction activities.
- Adhere to CDOT Specification 250.07—Asbestos-Containing Material (ACM) Management and CDOT Asbestos-Contaminated Soil Management Standard Operating Procedure, in the unlikely event that suspected ACM is encountered. Additionally, depending on the type of ACM, this material also will be abated in accordance with either Section 5.5 of the Solid Waste Regulations, or Regulation No. 8 of the Air Quality Control Commission Regulations.
- Prepare and implement site-specific health and safety plans and material management plans to address potential hazardous materials that are encountered during construction. These plans will consist of specific measures to protect worker and public health and safety, as well as programs to manage contaminated materials during construction.
- Implement standard construction measures for fugitive dust control, as well as stormwater erosion and sediment controls to minimize the spread of potentially contaminated soil.
- Stop work in the event that unknown contaminated media is encountered during construction until the contamination is properly evaluated and measures developed to protect worker health and safety.
- Obtain any necessary permits if dewatering of contaminated groundwater occurs during construction. Contained water will either be treated and discharged onsite or characterized and removed offsite to a permitted disposal facility.
- Properly close wells or septic systems disturbed (if any) during construction activities in accordance with applicable regulations and guidelines.

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4.12 Historic Properties

Historic properties are individual sites, districts, buildings, structures, or objects, generally 50 years of age or older, that are listed or eligible for listing on the National Register of Historic Places (NRHP). Archaeological sites can be historic or prehistoric and include remains of past cultures.

An area of potential effects (APE) was created that includes the area in which it could be reasonably expected that the proposed undertaking has the potential to directly or indirectly cause alterations to the character-defining elements of historic properties. The APE for historic resources encompassed, and was larger than, the construction envelope, whereas the APE for archaeological resources was limited to the proposed construction envelope proper. Appendix G contains documentation of the efforts between CDOT and the State Historic Preservation Office (SHPO).

4.12.1. What is the regulatory environment?

Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended, outlines the process that federal agencies must follow when their actions have the potential to affect historic properties. It also requires consultation with the SHPO, Tribal Historic Preservation Officers, and Native American tribes.

Historic resources are those that are listed or may be eligible for inclusion on the NRHP. Resources qualifying for the NRHP must retain sufficient integrity (of location, design, setting, materials, workmanship, feeling, and association) and:

A. Be associated with events that have made a significant contribution to the broad patterns of our history;

B. Be associated with the lives of persons significant in our past;

C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. Have yielded, or may be likely to yield, information important in prehistory or history.

In addition, Section 101(d)(6)(B) of the NHPA requires that federal agencies consult with any Native American tribe that attaches religious and cultural significance to historic properties that may be affected by the project. This requirement applies regardless of the location of the historic property. Per 36 CFR 800.2[c][2][ii][a], federal agencies must provide tribes with a reasonable opportunity to:

- Identify their concerns about historic properties;
- Advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance;
- Articulate their views on the undertaking's effects on such properties; and
- Participate in the resolution of adverse effects.

Consultation with a Native American tribe recognizes the unique government-to-government relationship between the federal government and Native American tribes. Federal agencies must be sensitive to the fact that historic properties of religious and/or cultural significance to one or more tribes may be located on ancestral, aboriginal, or ceded lands beyond modern reservation boundaries (36 CFR 800.2[c][2][ii][d]).

4.12.2. What is the affected environment?

No archaeological resources were identified within the project archaeological APE. Historic resources include the Speer Canal (5AM515), the West Burlington Extension Ditch Canal Culvert (5AM1397), the historic West Burlington Extension Ditch (5AM519.2), and a ranch-style house (21955 E. 160th Avenue) (5AM3125). The Bridge Street bridge (CDOT Number E-18-AO) was constructed in 1986 and is not yet 50 years old, thus it was not evaluated for the purposes of Section 106 (see Exhibit 4.12-1). Details below summarize the NRHP eligibility status for the four identified resources; additional information can be found in Appendix G.

Speer Canal (5AM515):

The Speer Canal (5AM515) was realigned and constructed in 2000. The Canal and the West Burlington Ditch cross each other and are separated by a siphon within the APE (see Exhibit 4.12-1). It is not eligible for the NRHP because it is not old enough.

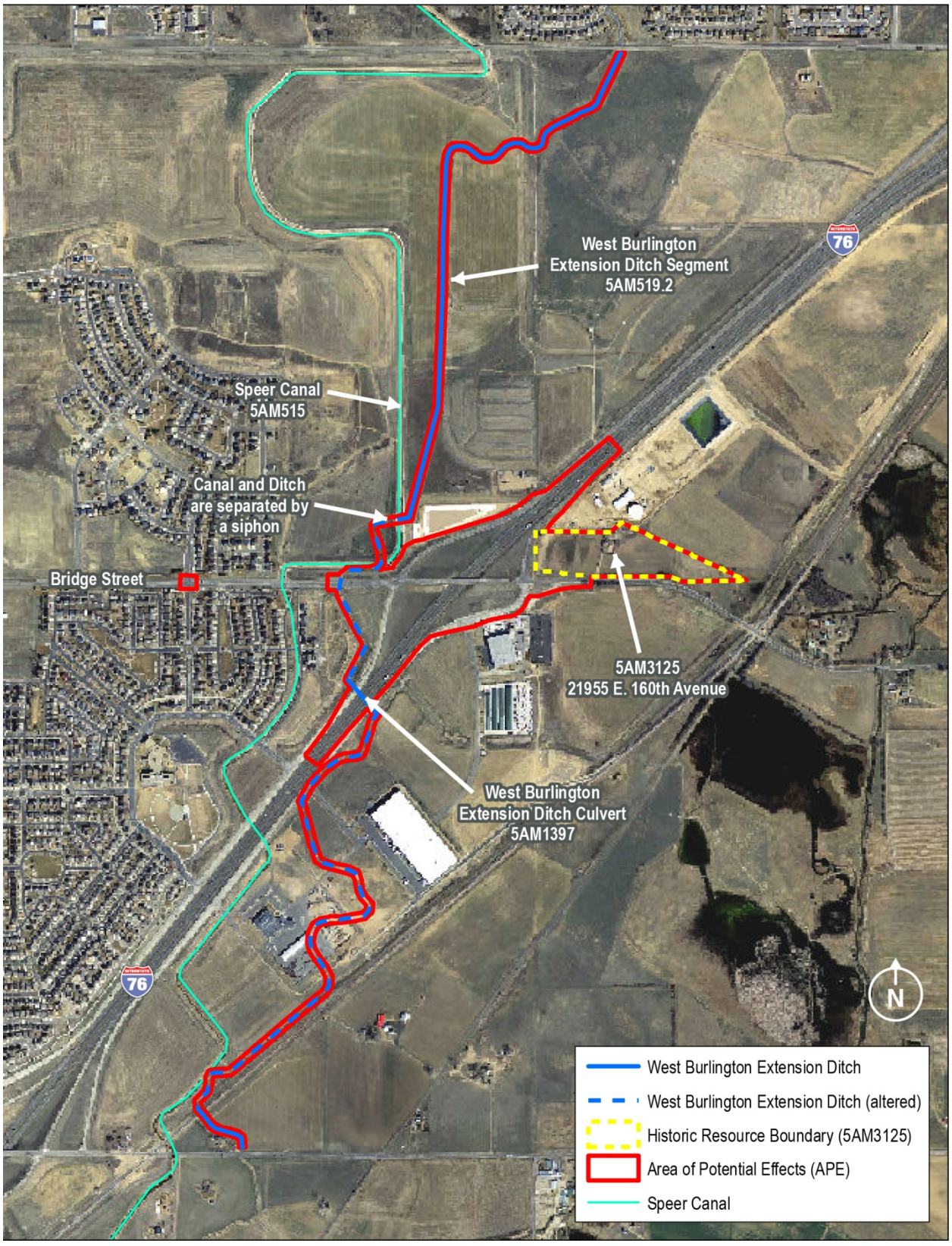
West Burlington Canal Culvert (5AM1397):

In 2002, as a part of the Colorado State Bridge survey, the West Burlington Canal Culvert (5AM1397) was officially determined not to be eligible.

21955 East 160th Avenue (5AM3125):

The property at 21955 East 60th Avenue, including the ranch-style house, was determined not to be eligible as part of the consultation with the State Historic Preservation Officer regarding this project.

Exhibit 4.12-1 Historic Properties Study Area and APE



West Burlington Extension Ditch (5AM519.2):

In 1988, the overall resource of the West Burlington Extension Ditch was determined not to be eligible. However, because this resource was documented twenty-six (26) years ago and there have been changes to the evaluation of linear resources since then, the entire ditch was re-evaluated for this project. Due to its association with the Standley Lake Irrigation System, which is operated by the Farmer's Reservoir Irrigation Company (FRICO), the overall resource is being treated as eligible to the NRHP for the purposes of Section 106. Segment 5AM519.2 does not retain integrity and does not support the overall eligibility of the entire ditch.

Native American Consultation

In January 2014, FHWA contacted the following twelve federally recognized tribes with an established interest in Adams County, Colorado, and invited them to participate as consulting parties:

- Comanche Nation of Oklahoma
- Cheyenne and Arapaho Tribes of Oklahoma
- Cheyenne River Sioux Tribe
- Apache Tribe of Oklahoma
- Crow Creek Sioux Tribe
- Kiowa Tribe of Oklahoma
- Northern Arapaho Tribe
- Northern Cheyenne Tribe
- Oglala Sioux Tribe
- Pawnee Nation of Oklahoma
- Rosebud Sioux Tribe
- Standing Rock Sioux Tribe

FHWA offered to initiate formal consultation with each tribe, under the provisions of Section 106. FHWA invited each tribe to identify traditional cultural and religious sites within the APE, evaluate the significance of these sites, and indicate how this project might affect them. Should the project impact historic properties of religious or cultural significance to tribes, those tribes were invited to participate in deciding how best to avoid, minimize, or mitigate such impacts.

To date, other than the Comanche Nation of Oklahoma, none of the other tribes have responded; the Comanche Nation indicated in a letter included in Appendix G: *Agency*

Consultation Documentation, that there are no properties that are NRHP eligible in the APE.

4.12.3. What are the impacts to archaeological and historic resources?

There are no known archaeological sites in the archaeological APE; as such, there are no anticipated impacts to these resources.

West Burlington Extension Ditch Segment (5AM519.2)

The resource is located in the APE; however, no part of the ditch will be disturbed during construction. A new visual element—the highway on and off ramps—will be introduced; however, the segment in this area has been completely destroyed, so new visual elements will not impact the segment. Because the subject segment was determined non-supporting of the eligibility of the overall resource, the project will result in a finding of no adverse effect with regard to the resource 5AM519, including segment 5AM519.2.

21955 East 160th Avenue (5AM3125):

The property, including the ranch- style house, is located adjacent to the proposed interchange to I-76 within the APE. All three Action Alternatives include the acquisition of property from the western portion of the property as well as the acquisition of a temporary easement for construction staging. Below in Exhibit 4.12-2 are the acres of property acquisitions for each alternative for the property.

Exhibit 4.12-2 Acres of Property Acquisition

Alternative	Permanent Acquisition	Temporary Easement
Preferred Alternative	990.66 sq ft	765.99 sq ft
Alternative 2	155.00 sq ft	378.00 sq ft
Alternative 3	155.09 sq ft	380.29 sq ft

The ranch-style house on the property is located approximately 645 feet from the alternative with the largest right-of-way acquisition (Preferred Alternative) and will not be directly impacted by the construction. The construction of I-76 required temporary easements on the property in 1956, 1976, and 2004, so the resource property has already had changes to its setting from previous highway construction.

A new interchange at this location will introduce new visual elements. Although the introduction of a new highway interchange somewhat changes the visual appearance, there are no changes to the current overpass and the new visual element will be negligible. While these are changes, they are alterations that will occur in areas of the property already impacted by modern alterations. In addition, the resource was determined to be not eligible for the NRHP, so CDOT has made a finding of no historic properties affected related to the project and any potential impacts to this resource.

4.12.4. What are the proposed mitigation measures?

Mitigation for historic resources is not required since there were no permanent adverse effects to historic resources.

When construction begins, if any subsurface archaeological materials are encountered (artifacts including, but not limited to, historic debris such as bottles, dishware, household or industrial items; prehistoric stone tools, such as projectile points or other flaked stone items; or historic or prehistoric features, such as foundations, stone wall remains, and hearths), work will be halted in the vicinity of the find immediately, and the CDOT Senior Archaeologist will be promptly notified.

The site of the materials encountered—the "find"—will be secured and work will remain halted until the discovery can be evaluated and/or removed by a qualified professional archaeologist. If warranted, additional archaeological testing or data recovery may be necessary before work can be resumed in the vicinity of the find. If bones of potential human origin are encountered during construction, ground-disturbing work must be stopped in the vicinity of the discovery, and the Adams County Sheriff, the Colorado State Archaeologist, and the CDOT Senior Archaeologist will be promptly notified. Work cannot resume in the vicinity of the find until clearance is granted.

4.13 Cumulative Impacts

Cumulative impacts result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency or person undertakes the action (CEQ, 40 CRF 1500–1508). CEQ recommends that cumulative impact analyses examine resources that could be affected by the action(s) under investigation. Therefore, not all resource areas are evaluated in this section; only those for which permanent impacts are anticipated to result from the implementation of the any of the Action Alternatives are examined in this EA.

The resources that were evaluated for cumulative impacts as a part of this EA are:

- Transportation
- Land Use
- Right of Way, Relocations, and Acquisitions
- Biological Resources
- Wetlands
- Water Resources and Water Quality

For the purpose of the cumulative impacts assessment, the three Action Alternatives studied in the EA are addressed as one alternative. The difference in right of way impacts is negligible, at only 0.35 acre of impacted land, and there are no differences in impacts to the other resources under evaluation for cumulative effects.

4.13.1. What is the regulatory environment?

CEQ's regulations require the consideration of cumulative impacts in NEPA documents (CEQ, 1997). There are several supporting guidance documents, including:

- FHWA: *Secondary and Cumulative Impact Assessment in the Highway Project Development Process*
- CEQ: *Considering Cumulative Effects under NEPA*
- CEQ: *Regulations Implementing NEPA*
- EPA: *Consideration of Cumulative Impacts in EPA Review of NEPA Documents*

4.13.2. What is the timeframe for analysis?

To assess cumulative impacts, a period of time for which impacts have occurred or may occur must be established. This duration should be long enough to allow for identification of trends and short enough to be meaningful. For transportation projects, a period of 20 to 30 years into the future is commonly used, as it matches the long-term transportation planning horizon of most states. In establishing a time in the past as a beginning point for

examining changes to resources of interest, factors such as potential large or "tipping point" changes in resources—including land use, development, or key events, as well as the availability of data from which to establish a baseline—are considered. For this cumulative impacts assessment, the following timeframes were established:

- The analysis extends back to the mid-1960s based on when the planning for I-76 was underway and when photographic imagery for the cumulative study area was readily available.
- The analysis extends forward to 2035. This corresponds to the design horizon used for regional transportation planning.

Thus, the timeframe for cumulative impacts analysis for the I-76 and Bridge Street Interchange EA extends from approximately 1960 to approximately 2035; a span of 75 years.

4.13.3. What is the cumulative study area for the analysis?

The study area for cumulative impacts is roughly one half-mile centered on the Bridge Street overpass. This encompasses the transportation facilities that may be directly or indirectly impacted by implementation of an Action Alternative. It also includes the existing and planned developments that are in or adjacent to the construction envelope.

4.13.4. What were the past actions that affected resources in this cumulative impact assessment?

I-76 is a critical link in the U.S. transportation system because it connects to I-80 and I-70, two of the longest interstate routes in the nation. Construction of I-76 technically began in 1958 (CDOT, 2014). However, the majority of the construction kicked off in the mid-1960s. Until 1975, both the western segment of I-76 and a portion of eastern I-76 were signed as Interstate 80S (I-80S). In July 1976, I-80S was renumbered and signed to I-76 in accordance with American Association of State Highway and Transportation Officials (AASHTO) policy to remove the letter suffixes from interstate routes and to avoid the confusion of this route with Interstate 80.

The section of I-76 that passes through the cumulative study area was upgraded to an interstate in 1966. Since the 1980s, residential, industrial, and commercial development in the Brighton area has been increasing. Development immediately surrounding the cumulative study area did not start until the early 2000s with the Bromley Park residential development to the southwest, and the Brighton Crossing residential development beginning shortly thereafter to the northwest. It was during this time that the Speer Canal was re-aligned to its current position and the West Burlington Extension Ditch was altered through the cumulative study area. Exhibit 4.13-1 through Exhibit 4.13-6 illustrate the development of the cumulative study area during the following years: 1964, 1978, 1988, 1999, 2002, and 2011.

As shown in Exhibit 4.13-1, there are only a few farmsteads in the cumulative study area and immediate vicinity in 1964. There is a road along the current Bridge Street alignment, as well as the alignment that will become I-80S and ultimately I-76.

No development or changes in land use occurred between 1964 and 1978, as illustrated in Exhibit 4.13-2.

Between 1978 and 1988, the transportation system evolved to include frontage roads along I-76 and a grade separation between I-76 and Bridge Street. It appears that land in the area may have been further divided into smaller parcels as shown in Exhibit 4.13-3, although it was still used for agricultural purposes.

Land use in the cumulative study area and vicinity remained agricultural through 1999, as shown in Exhibit 4.13-4.

By 2002, development in the form of a residential community on the west and commercial/industrial land uses on the east has occurred as shown in Exhibit 4.13-5.

By 2011, the aerial photography, shown in Exhibit 4.13-6, shows increased residential development and commercial activity. In addition, it appears that a median was filled in between the northbound and southbound lanes.

Exhibit 4.13-1. Study Area—1964

Aerial Source: EDR, 2013

Exhibit 4.13-2. Study Area—1978

Aerial Source: EDR, 2013

Exhibit 4.13-3. Study Area—1988

Aerial Source: EDR, 2013

Exhibit 4.13-4. Study Area—1999

Aerial Source: EDR, 2013

Exhibit 4.13-5. Study Area—2002

Aerial Source: EDR, 2013

Exhibit 4.13-6. Study Area—2011

Aerial Source: EDR, 2013

4.13.5. What are the present actions that affect resources in this cumulative impact assessment?

Recent developments in the cumulative study area include approval by Brighton for the development of two residential subdivisions: Bromley Park and Brighton Crossing (see Exhibit 4.13-7). In addition, a third subdivision, Brighton East Farms, has been preliminarily platted, but remains undeveloped; it is a reasonably foreseeable future action (see Exhibit 4.13-7). The most recent development in the area, the Northern Water Treatment Plant to the northeast, was constructed in 2012.

4.13.6. What are the reasonably foreseeable future actions that are anticipated to affect resources in this cumulative impact assessment?

As mentioned above, residential development is occurring in the cumulative study area and, as part of this growth, Brighton plans to require the developer to build sidewalks (see Exhibit 4.13-8). Details of each development are listed below.

- **Bromley Park (south of Bridge Street, west of I-76):** Currently, this development is platted; however, only the configured portion has been developed. It is zoned single-family residential and will cover approximately 11 acres at full build-out. Development is anticipated soon; however, full plans have not yet been submitted to Brighton for approval.

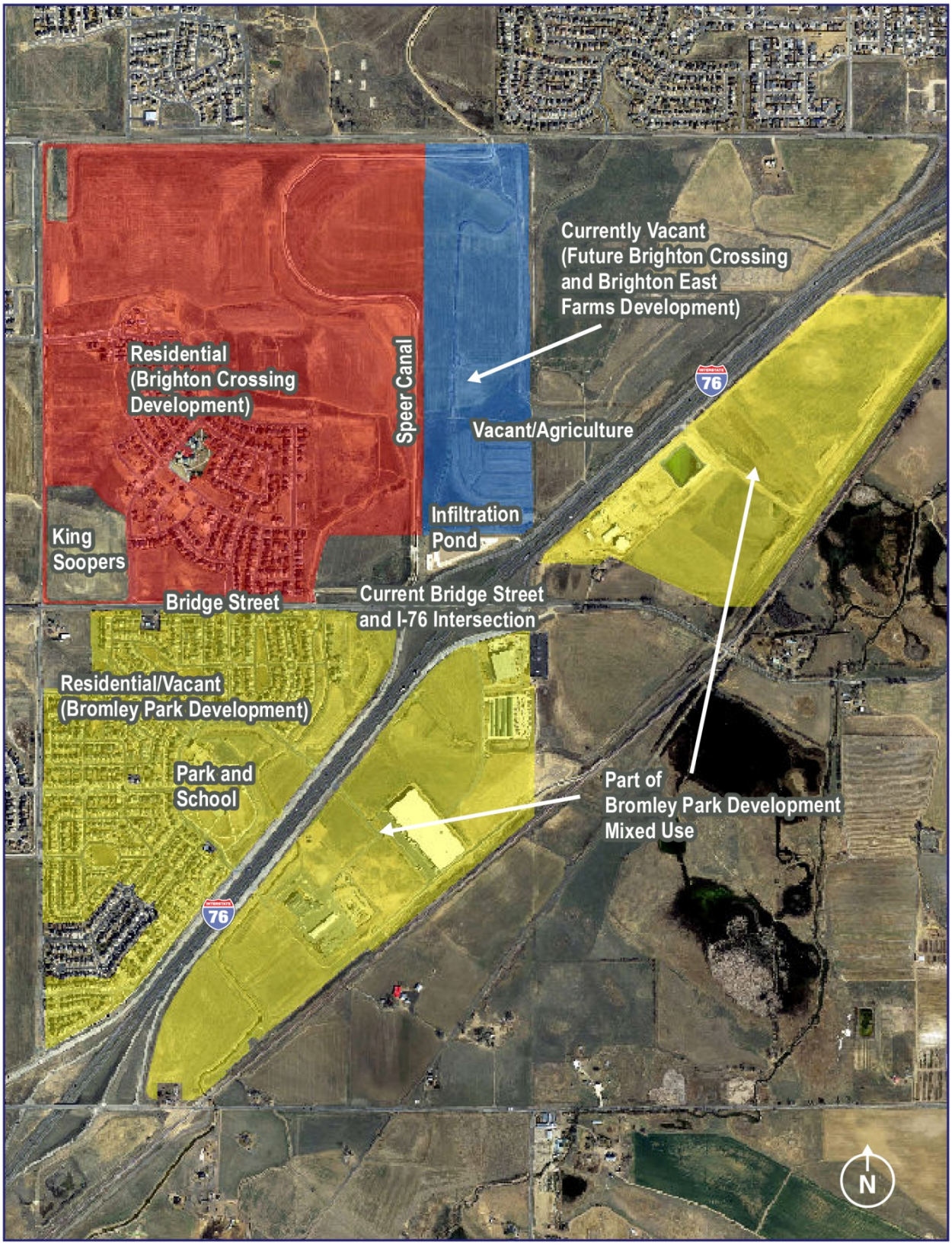
- **Brighton East Farms (north of Bridge Street, west of I-76):** This area has been preliminarily platted only. It will be approximately 581 acres at full build-out.

- **Brighton Crossing (just west of Brighton East Farms):** This development has been mostly built out; however, some additional development is anticipated. At full build-out, it will cover approximately 434 acres encompassing more than 3,000 homes, townhomes, condominiums, and apartments. It also will include a King Soopers grocery store at the northeast corner of Bridge Street and North 50th Avenue, which is nearing completion.

Exhibit 4.13-7. Study Area—Current and Planned Land Uses (2014)

Aerial Source: ESRI, 2014

Exhibit 4.13-8 Study Area—Future



Aerial Source: ESRI, 2014

4.13.7. What are the cumulative impacts of the Action Alternatives?

The impacts from the other past, present, and reasonably foreseeable future actions listed above when combined with the impacts expected under any of the Action Alternatives are described below by resource.

Transportation

Major infrastructure was built in the 1960s and 1970s with the development of I-76. Minor improvements to local streets followed and supported the slow growth and land use changes in the area. As Brighton transforms from a rural, agricultural town into a suburban community, demands are being placed on the existing transportation network. Transportation resources in the cumulative study area are becoming more congested due to increasing population and changes in land use. There are interchanges at both Bromley Lane and Baseline Road on I-76, but no direct access from Bridge Street. There are three transportation projects currently planned for the cumulative study area: the new interchange at I-76 and Bridge Street and two proposed trails (Bridge Street Trail and I-76 Trail; both are for transportation and recreational uses). The proposed new interchange will improve mobility and reduce congestion and the proposed trails will enhance multimodal connectivity. Implementation of either one of the trails is independent of the interchange construction and is not affected by any of the alternatives. Additional information on the transportation network can be found in Section 4.1 of this EA.

When combined with other past, present, and reasonably foreseeable future actions, none of the Action Alternatives are expected to negatively impact transportation resources. This project will improve connectivity, safety, and access in the region. Overall, this will improve the local roads and the approaches to I-76. However, in general, congestion will continue to increase in the area.

Land Use, Right of Way, Relocations, and Acquisitions

Past and current land uses are primarily agricultural with residential development taking place to the west of I-76 and industrial development occurring to the east. Development has the following effects:

- Reducing wildlife habitat by converting it from its natural state
- Likely reducing wetlands and affecting waters of the U.S. in the process
- Increasing the prevalence of noxious weeds

Development has added to the amount of impervious surface, increasing runoff that can negatively affect water quality. Construction of transportation facilities in the cumulative study area also has contributed to these effects. However, these impacts have been limited in the study area due to the low density of development to date.

Urbanization and development of large portions of the cumulative study area also have not fully occurred yet. In the future, much of the currently undeveloped land within the study area will be developed in accordance with Brighton's approved zoning and future planned growth. The acquisition of right of way by any of the Action Alternatives and conversion of small amounts of land to a transportation use will not have long-term cumulative impacts on land use within the cumulative study area. Additional information on land use, right of way, and relocations, and acquisitions can be found in Sections 4.4 and 4.5 of this EA.

When combined with other past, present, and reasonably foreseeable future actions, none of the Action Alternatives are expected to negatively impact land use or right of way. The Action Alternatives support the planned land uses in the area. However, due to continued development and an increase in the rate of conversion, it is expected that undeveloped land will decrease over time.

Biological Resources

Past uses of the cumulative study area—primarily agricultural uses and urbanization—have altered the habitat for many native species. This project will impact a small amount (approximately 0.2 acre under the Preferred Alternative) of roadside land that is not ideal habitat for wildlife. The study area does not include habitat for state-listed or federally listed threatened or endangered species, although there is the potential for species downstream in the Platte River to be impacted. These potential impacts are mitigated through the SPWRP.

Continued development has the effect of further reducing wildlife habitat by converting it from its natural state and increasing the prevalence of noxious weeds. Proposed development will further reduce the amount of habitat available for use by wildlife within the cumulative study area—primarily migratory birds. The continued urbanization and conversion of agricultural will degraded will degrade and reduce available habitat in the future. Noxious weeds may be spread through implementation of this and other reasonably foreseeable projects. However, BMPs will be used to minimize this impact. Additional information on biological resources can be found in Section 4.8 of this EA.

The contribution of impacts to biological resources from any of the Action Alternatives is small after the implementation of BMPs and mitigation measures. However, continued development is expected to reduce natural areas and habitat.

Wetlands and Open Waters

Historically, development has led to a cumulative loss of wetlands in the vicinity of the project. Planned development in the vicinity may continue to reduce the acreage and quality of wetlands. However, through mitigation of the small wetland zone impacted by this project, no net loss to wetlands will occur in the watershed due to the construction of a new interchange at Bridge Street and I-76. Impacts to jurisdictional wetlands associated with planned development will be offset by BMPs and mitigation; however, mitigation is

not required for non-jurisdictional wetland and due to land use changes an overall reduction in wetlands is expected. Additional information on wetlands and WUS can be found in Section 4.9 of this EA.

When combined with other past, present, and reasonably foreseeable future actions, the Action Alternatives are not expected to negatively impact wetlands and open waters.

Water Quality

Although historically an agricultural area, development has added to the amount of impervious surface over time, increasing runoff from impervious surfaces; this can negatively affect water quality. Construction of the transportation system has contributed to the increase in impervious surface. Development will increase the amount of impervious surface, which, in turn, could increase runoff that can negatively affect water quality. However, with new standards, BMPs, and mitigation methods required for development by Brighton, these effects will be less than previously incurred. Additional information on water quality can be found in Section 4.10 of this EA.

The construction of any of the three Action Alternatives will add impervious surface and will result in additional runoff. However, requirements to comply with local, state, and federal stormwater regulations will control and minimize the impacts of this and future development. The project will result in a negligible increase of impervious surface when added to existing and future development in the cumulative study area and will improve water quality above existing conditions as there are currently no BMPs for run-off from the Bridge Street and I-76 intersection. When combined with other past, present, and reasonably foreseeable future actions, none of the Action Alternatives are expected to negatively impact water quality.

Conclusion

Continued development in Brighton and the County are expected to change the character of the area. The impacts of this project when added to the past, present, and reasonably foreseeable future development in the cumulative study area will not result in major cumulative impacts to the key resources evaluated after mitigation of the direct impacts of the project is completed.

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4.14 Summary of Impacts and Mitigation for the Preferred Alternative

Mitigation Commitment #	Mitigation Category	Impact from NEPA Document	Mitigation Commitment	Responsible Branch	Timing/Phase of Construction Mitigation to be Constructed
1	Air Quality	Fugitive road dust and engine exhaust emissions during construction activities	Since construction of the project will require submittal of an Air Pollution Emission Notice and Application for Construction Permit from the APCD, preparation of a Fugitive Dust Control Plan will be required. Construction phase air quality impacts (fugitive road dust and engine exhaust emissions) will be controlled by implementing the measures listed below: - Wetting exposed soils and soil piles for dust suppression. - Covering trucks hauling soil and other fine materials. - Stabilizing and covering stockpile areas. - Re-vegetating exposed areas. - Minimizing off-site tracking of mud and debris by washing construction equipment and temporary stabilization. - Limiting vehicle speed of construction-related equipment when off road. - Prohibiting unnecessary idling of construction equipment. - Using low-sulfur fuel. - Locating diesel engines and motors as far away as possible from residential areas. - Locating staging areas as far away as possible from residential areas. - Requiring heavy construction equipment to use the cleanest available engines or to be retrofitted with diesel particulate control technology. - Using alternatives for diesel engines and/or diesel fuels (such as: biodiesel, liquefied natural gas, compressed natural gas, fuel cells, or electric engines). - Installing engine pre-heater devices to eliminate unnecessary idling during winter time construction. - Prohibiting tampering with equipment to increase horsepower or to defeat emission control devices effectiveness. - Requiring construction vehicle engines to be properly tuned and	CDOT Construction Engineering	Prior to and during construction

Mitigation Commitment #	Mitigation Category	Impact from NEPA Document	Mitigation Commitment	Responsible Branch	Timing/Phase of Construction Mitigation to be Constructed
			maintained. - Using construction vehicles and equipment with the minimum practical engine size for the intended job.		
2	Noise	Construction noise	The following BMPs will be required by the contractor, as applicable: - Use noise blankets on equipment and quiet-use generators - Minimize construction duration in residential areas as much as possible - Minimize night-time activities in residential areas as much as possible - Re-route truck traffic away from residential streets where possible - Combine noisy operations to occur in the same time period Potential BMPs for consideration include: - Eliminate slamming of truck beds, truck tailgates, and equipment buckets - Idle down equipment engines when the equipment is not in immediate use - Maintain all equipment to meet manufacturer's specifications - Schedule trucks properly to minimize long queues - Minimize back-up distances for trucks and other equipment - Install localized noise shielding around compressors and other equipment when in close proximity to residences.	CDOT Design Engineer and Construction Engineer	During Construction

Mitigation Commitment #	Mitigation Category	Impact from NEPA Document	Mitigation Commitment	Responsible Branch	Timing/Phase of Construction Mitigation to be Constructed
3	Right of Way	Property acquisition	Acquisition: For any person(s) whose real property interests may be impacted by this project, the acquisition of those property interests will comply fully with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, (Uniform Act). The Uniform Act is a federally mandated program that applies to all acquisitions of real property or displacements of persons resulting from Federal or federally assisted programs or projects. It was created to provide for and insure the fair and equitable treatment of all such persons. To further ensure that the provisions contained within this act are applied "uniformally", CDOT requires Uniform Act compliance on any project for which it has oversight responsibility regardless of the funding source. Additionally, the Fifth Amendment of the United States Constitution provides that private property may not be taken for a public use without payment of "just compensation." All impacted owners will be provided notification of the acquiring agency's intent to acquire an interest in their property including a written offer letter of just compensation specifically describing those property interests. A Right of Way Specialist will be assigned to each property owner to assist them with this process. Relocation: In certain situations, it may also be necessary to acquire improvements that are located within a proposed acquisition parcel. In those instances where the improvements are occupied, it becomes necessary to "relocate" those individuals from the subject property (residential or business) to a replacement site. The Uniform Act provides for numerous benefits to these individuals to assist them both financially and with advisory services related to relocating their residence or business operation. Although the benefits available under the Uniform Act are far too numerous and complex to discuss in detail in this document, they are available to both owner occupants and tenants of either residential or business properties. In some situations, only personal property must be moved from the real property and this is also covered under the	CDOT Right-of-Way Specialist	Pre-construction

Mitigation Commitment #	Mitigation Category	Impact from NEPA Document	Mitigation Commitment	Responsible Branch	Timing/Phase of Construction Mitigation to be Constructed
			relocation program. As soon as feasible, any person scheduled to be displaced shall be furnished with a general written description of the displacing Agency's relocation program which provides at a minimum, detailed information related to eligibility requirements, advisory services and assistance, payments, and the appeal process. It shall also provide notification that the displaced person(s) will not be required to move without at least 90 days advance written notice. For residential relocatees, this notice cannot be provided until a written offer to acquire the subject property has been presented, and at least one comparable replacement dwelling has been made available. Relocation benefits will be provided to all eligible persons regardless of race, color, religion, sex or national origin. Benefits under the Act, to which each eligible owner or tenant may be entitled, will be determined on an individual basis and explained to them in detail by an assigned Right of Way Specialist.		
4	Socioeconomics	Temporary construction impacts including dust, noise, and coordination with emergency providers	Mitigation measures for temporary impacts related to dust include wetting soils, covering trucks hauling soil and other fine materials, re-vegetating exposed areas, and using low-sulfur fuel. A complete list of air quality BMPs can be found in Section 4.2 of this EA. BMPs for noise impacts include the implementation of best management practices including using noise blankets and quiet-use generators, minimizing construction duration and construction proximity to residences at night, and re-routing truck away from residential areas where possible. A complete list of noise-related BMPs can be found in Section 4.3 of this EA. There also will be coordination with the emergency providers prior to construction, signage for all detours, and advance notice to the traveling public of detours and construction.	CDOT Construction Engineer	Before and During Construction

Mitigation Commitment #	Mitigation Category	Impact from NEPA Document	Mitigation Commitment	Responsible Branch	Timing/Phase of Construction Mitigation to be Constructed
5	Utilities	Potential to impact underground utility lines	- Coordinate with utility owners to modify designs to avoid or minimize conflicts. - Minimize service disruptions by connecting to active utilities, and scheduling to coincide with periods of lower demand. - Encase or provide protective cover over any impacted underground utilities. - Coordinate with utility owners and operators to identify construction requirements and financial responsibilities for relocations. - Identify and improve any utility concerns that can be addressed as part of project implementation. - Integrate above-ground utilities that are impacted by the project into the design, hide them from sight within the design, and/or design them to be aesthetically pleasing to the greatest extent practical. - Move above-ground utilities underground to the greatest extent practical. - Relocate many of the utilities within the covered section or in bridge structures.	CDOT Design Engineer and Construction Engineer	Final Design/ During Construction
6	Biological Resources (Noxious weeds)	Potential spread of noxious weeds within the study area	There are weeds in the study area, but these are relatively few in number and not covering large areas. Therefore, a noxious weed management plan is not recommended. However, during construction, the project is required to minimize the spread of noxious weeds according to the revised Sections 207, 212, and 217 of the CDOT Standard Specifications, and for implementing the standard CDOT Best Management Practices. CDOT has Best Management Practices designed to prevent the spread of noxious weeds, which are: - Soil disturbance will be minimized to the extent possible; - Staging of equipment will not be permitted in weed-infested areas; - Weed management efforts will be coordinated with local jurisdictional agencies and adjacent landowners to the extent possible; - Herbicide may be used immediately adjacent to wetlands and/or water bodies only if the label indicates that the use is appropriate for such areas; - All disturbed soil will be re-seeded with a pure live seed	CDOT Environmental, CDOT Design Engineer, and CDOT Construction Engineer	During Construction

Mitigation Commitment #	Mitigation Category	Impact from NEPA Document	Mitigation Commitment	Responsible Branch	Timing/Phase of Construction Mitigation to be Constructed
			tested for germination and purity within seven days of completion of work during the growing season; - "A" horizon soil material currently supporting noxious weed cover of more than 10% will not be used as topsoil during re-vegetation; - Topsoil will not be imported due to the potential for spread of noxious weeds; - All areas treated for noxious weeds during construction will be monitored and re-treated, if necessary, to prevent re-establishment of noxious weeds; and - Any compost used will be Seal of Testing Assurance weed-free. - Weed-free is defined and regulated by the Weed Free Forage Act, Title 35, Article 27.5, CRS.		
7	Biological Resources (Threatened and Endangered Species)	Potential adverse effect to the five downstream species in the Platte River	Mitigation for five federally listed downstream species will follow the PBA/BO mitigation from the SPWRAP.	CDOT Environmental	Ongoing
8	Biological Resources (Migratory Birds)	Potential impacts to songbirds/ ground birds protected under the MBTA	Impacts to birds protected under the MBTA will follow CDOT Specification 240: Protection of Migratory Birds. This generally includes the following.	CDOT Environmental, CDOT Design Engineer, and CDOT Construction Engineer	Pre-construction

Mitigation Commitment #	Mitigation Category	Impact from NEPA Document	Mitigation Commitment	Responsible Branch	Timing/Phase of Construction Mitigation to be Constructed
9	Biological Resources (Migratory Birds)	Potential impacts to songbirds/ ground birds protected under the MBTA	**Tree and Shrub Removal or Trimming:** - Tree and shrub removal or trimming shall occur before April 1 or after August 31 if possible. If tree and shrub removal or trimming will occur between April 1 and August 31, a survey for active nests will be conducted by a biologist within the seven days immediately prior to the beginning of work in each area or phase of tree and shrub removal or trimming. The Contractor shall notify the Engineer at least ten working days in advance of the need for a biologist to perform the survey. - If an active nest containing eggs or young birds is found, the tree or shrub containing the active nest shall remain undisturbed and protected until the nest becomes inactive. The nest shall be protected by placing fence (plastic) a minimum distance of 50 feet from each nest to be undisturbed. This buffer dimension may be changed if determined appropriate by a biologist and approved by the Engineer. Work shall not proceed within the fenced buffer area until the young have fledged or the nests have become inactive. - If the fence is knocked down or destroyed by the Contractor, the Engineer will suspend the work, wholly or in part, until the fence is satisfactorily repaired at the Contractor's expense. Time lost due to such suspension will not be considered a basis for adjustment of time charges, but will be charged as contract time.	CDOT Environmental, CDOT Design Engineer, and CDOT Construction Engineer	Pre-construction
10	Biological Resources (Migratory Birds)	Potential impacts to songbirds/ground birds protected under the MBTA	**Grasses and Other Vegetation Management:** - Due to the potential for encountering ground nesting birds' habitat, if work occurs between April 1 and August 31, the area shall be surveyed by a biologist within the seven days immediately prior to ground disturbing activities. The Contractor shall notify the Engineer at least ten working days in advance of the need for a biologist to perform the survey. - The undisturbed ground cover to 50 feet beyond the planned disturbance, or to the right-of-way line, whichever is less, shall be maintained at a height of 6 inches or less beginning April 1 and continuing until August 31 or until the end of ground disturbance work, whichever comes first. - If birds establish a nest within the survey area, an appropriate	CDOT Environmental, CDOT Design Engineer, and CDOT Construction Engineer	Pre-construction

Mitigation Commitment #	Mitigation Category	Impact from NEPA Document	Mitigation Commitment	Responsible Branch	Timing/Phase of Construction Mitigation to be Constructed
			buffer of 50 feet will be established around the nest by a biologist. This buffer dimension may be changed if determined appropriate by a biologist and approved by the Engineer. The Contractor shall install fence (plastic) at the perimeter of the buffer. Work shall not proceed within the buffer until the young have fledged or the nests have become inactive. - If the fence is knocked down or destroyed by the Contractor, the Engineer will suspend the work, wholly or in part, until the fence is satisfactorily repaired at the Contractor's expense. Time lost due to such suspension will not be considered a basis for adjustment of time charges, but will be charged as contract time.		
11	Biological Resources (Migratory Birds)	Potential impacts to songbirds/ ground birds protected under the MBTA	**Work on Structures:** - The Contractor shall prosecute work on structures in a manner that does not result in a taking of migratory birds protected by the MBTA. The Contractor shall not prosecute the work on structures during the primary breeding season, April 1 through August 31, unless he takes the following actions: 1. The Contractor shall remove existing nests prior to April 1. If the Contract is not awarded prior to April 1 and a biologist has removed existing nests, then the monitoring of nest building shall become the Contractor's responsibility upon the Notice to Proceed. 2. During the time that the birds are trying to build or occupy their nests, between April 1 and August 31, the Contractor shall monitor the structures at least once every three days for any nesting activity. 3. If birds have started to build any nests, the nests shall be removed before they are completed. Water shall not be used to remove the nests if nests are located within 50 feet of any surface waters. 4. Installation of netting may be used to prevent nest building. The netting shall be monitored and repaired or replaced as needed. Netting shall consist of a mesh with openings that are ¾ inch by ¾ inch or less.	CDOT Environmental, CDOT Design Engineer, and CDOT Construction Engineer	Pre-construction

Mitigation Commitment #	Mitigation Category	Impact from NEPA Document	Mitigation Commitment	Responsible Branch	Timing/Phase of Construction Mitigation to be Constructed
12	Biological Resources (Migratory Birds)	Potential impact to raptors protected under the MBTA	Pre-construction surveys for nesting raptors in accordance with CPW's Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors guidelines for pre-construction surveys (See Appendix C of the Biological Resources Technical Memorandum). Impacts to raptors identified will follow CPW's Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors guidelines (See Appendix C of the Biological Resources Technical Memorandum).	CDOT Environmental	Pre-construction
13	Wetlands and Waters of the US	There would be 0.01 acre (585 square feet) of permanent impacts to WL-01.	CDOT requires that all wetlands be mitigated, regardless of USACE jurisdiction. Additionally, provisions in NEPA also may require non-jurisdictional wetlands, open waters, or other aquatic features to be mitigated. On-site mitigation will result in a costly and time-consuming process, with no guarantee of the establishment of a successful wetland habitat. One option is for the project to purchase credits from a wetland mitigation bank. Three USACE-approved banks are located within the same watershed as the project, including the Middle South Platte, Mile High, and Riverdale Wetland Mitigation Banks. If credits are purchased, they would likely be purchased from one of these three banks.	CDOT Environmental	Pre-construction
14	Wetlands and Waters of the US	Temporary impacts could result from construction activities related to implementation of the Preferred Alternative. Construction activities disturb the ground, which increases	These temporary impacts will be minimized by the implementation of a Stormwater Management Plan (SWMP). Construction activities disturb the ground, which increases the likelihood of noxious weeds becoming established. This will be minimized by re-seeding upland and wetland areas disturbed by construction with native species in accordance with Sections 207, 212, and 217 of the CDOT Standard Specifications, and for implementing the standard CDOT Best Management Practices (BMPs).	CDOT Environmental, CDOT Design Engineer, and CDOT Construction Engineer	During Construction

Mitigation Commitment #	Mitigation Category	Impact from NEPA Document	Mitigation Commitment	Responsible Branch	Timing/Phase of Construction Mitigation to be Constructed
		the likelihood of noxious weeds becoming established.			
15	Water Resources and Water Quality	Direct and temporary impacts to surface waters and groundwater.	In compliance with CDOTs MS4 permit, the following guidance documents will be utilized: 1) CDOT Erosion Control and Stormwater Quality Guide (updated 2002); CDOT Drainage Design Manual (updated 2004); and CDOT Standard Specifications for Road and Bridge Construction (last updated 2011). Under CDOT's current MS4 permit, 100 percent water capture and treatment for new impervious surfaces and resurfaced areas is required. To comply with this requirement, the following design elements have been included in the Action Alternatives: rundowns at each bridge abutment, grass-lined swales, curb and gutter with inlets, and a water quality pond which will be built in the southwest quadrant of the interchange. Regulations and guidance that are current at the time of final design and construction will be followed for this project.	CDOT Environmental, CDOT Design Engineer, and CDOT Construction Engineer	Final Design
16	Water Resources and Water Quality	Construction impacts to water resources	Best management practices from the Erosion Control and Stormwater Quality Guide will be utilized during construction to reduce construction-related and/or long-term operation impacts to water resources and water quality as appropriate (CDOT, 2002) including development of a SWMP.	CDOT Environmental, CDOT Design Engineer, and CDOT Construction Engineer	During Construction
17	Hazardous Materials	Acquisition of Right of Way	Complete ASTM-compliant Phase I Environmental Site Assessment for properties considered for right-of-way acquisition.	CDOT Environmental	Pre-construction

Mitigation Commitment #	Mitigation Category	Impact from NEPA Document	Mitigation Commitment	Responsible Branch	Timing/Phase of Construction Mitigation to be Constructed
18	Hazardous Materials	Potential to encounter hazardous materials	- Obtain any necessary permits if dewatering of contaminated groundwater occurs during construction. Contained water will either be treated and discharged onsite or characterized and removed offsite to a permitted disposal facility. Proper closure of wells or septic systems disturbed (if any) during construction activities in accordance with applicable regulations and guidelines. - Preparation and implementation of site-specific health and safety plans and material management plans to address potential hazardous materials that are encountered during construction. These plans will consist of specific measures to protect worker and public health and safety, as well as programs to manage contaminated materials during construction. - Implementation of standard construction measures for fugitive dust control, as well as stormwater erosion and sediment controls to minimize the spread of potentially contaminated soil. - Adhere to CDOT Specification 250 – Environmental, Health, and Safety Management by workers onsite during construction activities. - Stop of work in the event that unknown contaminated media is encountered during construction until the contamination is properly evaluated and measures developed to protect worker health and safety.	CDOT Construction Engineer	Pre-construction and During construction
19	Hazardous Materials	Potential to encounter ACM	Adhere to CDOT Specification 250.07 – Asbestos-Containing Material (ACM) Management and CDOT Asbestos-Contaminated Soil Management Standard Operating Procedure, in the unlikely event that suspected ACM is encountered. Additionally, depending on the type of ACM, this material will also be abated in accordance with either Section 5.5 of the Solid Waste Regulations, or Regulation No. 8 of the Air Quality Control Commission Regulations.	CDOT Construction Engineer	During construction
20	Transportation	Construction impacts to transportation	- Follow applicable standards regarding traffic control, road closures, and detours due to construction - Coordinate with transit agencies if service disruptions are anticipated to any routes due to construction activities	CDOT Design Engineer, and CDOT Construction Engineer	During construction

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Chapter 5: Agency Collaboration and Public Involvement

This chapter describes the communication and coordination that has occurred with stakeholders during the EA process. Coordination with stakeholders focused on gathering input on interchange area issues and alternatives, as well proactive, open communication with potentially affected property owners and agency representatives.

5.1 Goals of Agency Collaboration and Public Involvement

Per the CDOT *NEPA Manual*, "Public involvement is a process by which the influence of various stakeholders is organized in relationship to decision making …" (CDOT, 2013). The overall goal of the agency collaboration and public involvement process is to solicit input through a transparent, open, and dynamic process that includes community members, businesses, agencies, and stakeholders. This process helps the project team identify and document any issues, suggestions, comments, or concerns and incorporate them in the planning and decision-making process.

5.2 Agency Collaboration

Key agencies partnered throughout this project to identify and address transportation challenges and develop implementable solutions that meet the project Purpose and Need while aligning with the public and stakeholders' expectations. Agencies and their associated roles and responsibilities are as follows:

- **Brighton:** Project Proponent; responsible for the overall project, funding, construction, and maintenance
- **CDOT:** Joint Lead Agency; responsible for guiding the EA document development and engineering design elements; the Colorado Transportation Commission (CTC) makes a decision for approval based on the 1601 requirements
- **FHWA:** Joint Lead Agency; responsible for oversight of the NEPA process and approval authority

A charter document was developed when the project started to provide a clear description of the interagency team's purpose and identify their responsibilities during the planning, design, and approval of the project. The executed charter document is included in Appendix H: *Outreach and Support Documentation*.

The project team members from the collaborative agencies met once a month throughout the study to address issues and concerns, participate in collaborative discussions, and consider comments from the community members, businesses, and stakeholders.

5.3 Other Agency Coordination

The project team consulted with DRCOG for guidance on the Plan Amendment Cycle and associated schedule. As the lead agency for regional transportation planning, DRCOG prepares transportation plans and programs associated with improving air quality. DRCOG is required to show air quality conformity of its fiscally constrained RTP and TIP with the SIP before these plans and programs are adopted. DRCOG has approval authority for inclusion in the RTP.

In addition, pursuant to Section 106 requirements, the project team coordinated with SHPO for concurrence on Determinations of Eligibility and Effects for the project.

5.4 Public Involvement

Several strategies to engage the community are used to create an ongoing dialogue about the project with different ways to distribute and collect feedback.

5.4.1 Project Webpage

Brighton has developed a dedicated webpage on their city website to distribute project information and updates. This webpage can be accessed at www.brightonco.gov/605/I-76-and-Bridge-Street-Interchange-Project. The webpage provides updates on the project and an opportunity for the public to submit comments. Public meeting/open house notices are posted on the webpage at least 10 days prior to the meeting. Meeting summaries and materials are available on the webpage after the meetings to provide information to those who could not attend the meeting in person.

5.4.2 Public Open House

A public open house was conducted on July 31, 2013, from 4:00 p.m. to 7:00 p.m. at the Brighton Armory located at 300 Strong Street, Brighton, CO 80601, to introduce the project to the general public and stakeholders and solicit input on the proposed alternatives. The open house format of this meeting allowed for the public to arrive and leave at their convenience and have an opportunity to speak to project team members individually or in groups. Project team members—who consisted of members of the consultant team, Brighton staff, and representatives from CDOT and FHWA—were available at the meeting to discuss the project and answer any questions. The public was invited to the open house through Brighton's website and press releases. Meeting notices also were mailed to more than 300 recipients in the project area. The project has generated little interest and no controversy among the public.

Community members and I-76 commuters who attended the open house generally were more supportive of the roundabout alternatives than other interchange configurations.

5.4.3 Design Focus Group

As the alternatives were refined, key stakeholders were contacted for input on the design. A focus group was formed, including local representatives from the school district, parks and recreation department, emergency response, and police department. This focus group met on March 4, 2014, to review the design options that had been developed thus far and discuss any fatal flaws, concerns, or ideas based on their expertise. The key outcomes of this meeting are listed below:

- Providing adequate signage in the roundabouts was proposed as a way to improve efficiency
- The Preferred Alternative design was supported by the group as a way to help relieve traffic at the I-76 and Bromley Lane roundabout during peak hours
- The school district will adjust their routes to take advantage of the proposed interchange to access the bus garage located along Bridge Street more efficiently
- The design should accommodate a crossing at Bridge Street to accommodate future bicycle and pedestrian traffic
- Decorative landscaping or lighting is desired in the final design of the roundabouts

5.4.4 Elected Officials Outreach

Before making major project decisions, the project team met with elected officials on a regular basis to brief them on project progress and recommendations. One working session on July 9, 2013, was conducted with elected officials of the City Council to provide information and updates on the project, answer questions, and solicit input on the recommended alternatives. The workshops were open to the public and included presentations followed by a question-and-answer session.

A presentation also was made to the Brighton City Council on May 13, 2014, at 6:00 p.m. The purpose of this presentation was to update the City Council regarding the project schedule, Preferred Alternative, impacts, and costs, and to solicit input before the EA was published.

5.5 Reaction to the Preferred Alternative

The project received a letter from CDOT, a collaborating and a joint lead agency (available in Appendix H: *Outreach and Support Documentation*), in support for the Two-Roundabout Alternative as the Preferred Alternative for the following reasons:

- Improves local and regional connectivity
- Improves traffic flow and access on Bromley Lane and Baseline Road

- Extends the time before improvements are needed at Bromley Lane and Baseline Road
- Is a familiar solution, since roundabouts are already in use in the community

5.6 Future Agency Collaboration and Public Involvement Opportunities

A 30 day public review period will begin once the EA is signed to gather public input for consideration. The project team members will continue to coordinate and interact with stakeholders and community members to inform them of the upcoming project activities and answer questions.

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List of Preparers

Name/Responsibility	Project Task
Atkins	
Anahita Behrad NEPA Specialist	Document management; document support, including NEPA process, alternatives analysis, purpose and need development, and utilities
Tina Brand Graphic Designer	Graphic design
Ken DePinto, PE Project Manager	Project manager, Alternative development and screening, and quality assurance
Andrea Garcia Quality Assurance	Quality assurance of technical analyses
Andrew Holton, PE Lead Engineer	Conceptual design, alternative development and screening, and water quality BMP design
Jeff Kullman, PE Principal in Charge	Project director and alternative development and screening
Karol Miodonski, PE, LEED AP BD+C, CFM Noise and Traffic Specialist	Noise and traffic analyses
David Sprague, PE Traffic Engineer	Transportation resources assessment
Jenifer Sullivan Technical Editor	Technical editing and quality assurance
Roberta Whitfield Document Specialist	Documentation support and word processing
Kristie Wilson, EIT Design Engineer	Conceptual design and utilities analysis

Name/Responsibility	Project Task
Pinyon	
Amanda Cushing Environmental Specialist	Water quality and hazardous materials analysis
Mark Daniels Environmental Specialist	Air quality technical review
Scott Epstein Quality Assurance	Quality assurance of technical analyses
Lauren Evans, PE EA Oversight	Document oversight, including quality assurance of technical analyses
Amy Kennedy EA Manager	Subconsultant project manager, purpose and need, impact assessment and mitigation planning, and cumulative impact assessment
Robyn Kullas Environmental Specialist	Water quality and hazardous materials analyses
Matt Santo Environmental Specialist	Land use and zoning, right of way, socioeconomic resources, environmental justice, biological resources, and wetlands and water of the U.S analyses and cumulative impact assessment
Tyler Sparks Air Quality Specialist	Air quality assessment
Jen Wahlers Historian	Historic resource eligibility and effects determination
Liz Walker Historian	Historic resource eligibility and effects determination

Glossary

Acquisition: Acquisition is the process of obtaining right of way by negotiation and/or eminent domain proceedings. Negotiation would involve getting the owner to convey, dedicate, or possibly option the property to the public agency. Just compensation must be paid in all acquisitions or takings.

Alignments: Alignments refer to the geometric design elements that define the horizontal and vertical configuration of the roadways.

Average daily traffic (ADT): Average 24-hour traffic volume of a given location on a typical weekday.

Arterial highway: An arterial highway is a general term denoting a highway primarily for through-traffic, usually on a continuous route.

At-grade: At-grade means a combination of horizontal alignments and vertical grade lines that intersect.

Best Management Practices (BMPs): The best management practices are schedules of activities, practices, and procedures to prevent or reduce pollution of waters of the United States. Such practices include planning strategies, operating procedures, and physical practices to control site runoff.

Capacity: Capacity is the number of vehicles that can traverse a point or section of a lane or roadway during a set time period under prevailing roadway, traffic, and control conditions.

CDOT: The Colorado Department of Transportation, which manages the network of highways within the state.

Census block groups: The smallest geographic area for which the Bureau of the Census collects decennial census data.

Census tract: Small, relatively permanent statistical subdivisions of a county.

Cross section: A cross section is the view of the vertical plane cutting through the roadway, laterally perpendicular to the center line, showing the relationship of the various components of the roadway.

Culvert: A culvert is a structure under a roadway, usually for drainage. It is a bridge-class culvert if it has a clear opening of 20 feet or more measured along the centerline of the roadway between extreme ends of the openings for multiple boxes or multiple pipes that are 60 inches or more in diameter.

Construction Envelope: The physical area that is anticipated to be disturbed during construction of the project.

Decibel: A decibel is a basic unit of sound pressure level. Decibels are logarithmic expressions of sound pressure levels.

Delay: The additional travel time experienced by a driver, passenger, or pedestrian due to circumstances that impede the desirable movement of traffic. It is measured as the time difference between actual travel time and free-flow travel time.

Design capacity: Design capacity refers to an estimated capacity, usually based on vehicles per day or design hourly volume that is used to determine the design of a highway, i.e. number of lanes and other considerations.

Design year: Projects are planned and designed to meet the future, anticipated needs and characteristics of a certain year. This is referred to as the design year. Typically, the design year for roadways is 20 years after the construction year. For bridges, the design year is typically greater.

Diamond Interchange: The most common interchange design, usually consisting of four ramps (two entrance ramps and two exit ramps). Diamond interchanges have a diamond shape when viewed from the air.

Directional Interchange: The directional interchange generally has more than one highway grade separation, with direct connections for the major turning movements.

Drainage channels and side slopes: Side slopes provide a transition from the roadway shoulder to the original ground surface and transmit runoff from the road to a drainage channel.

Endangered species: An endangered species is any species that is in danger of extinction throughout all or a significant portion of its range.

Environmental Assessment (EA): A public document produced as part of the federal National Environmental Policy Act (NEPA) process that evaluates potential impacts of transportation projects to determine whether an Environmental Impact Statement (EIS) is necessary.

Erosion control: Erosion control includes protection of soil from dislocation by water, wind, or other agents.

Federal Highway Administration (FHWA): The branch of the federal Department of Transportation that oversees the national highway system. The FHWA works with CDOT on projects affecting national highways in Colorado.

Finding of No Significant Impact (FONSI): A Finding of No Significant Impact, or FONSI, is a public decision document by a federal agency under NEPA that briefly presents the reasons why an action will not have a significant effect on the built or natural environment and for which an EIS, therefore, will not be prepared.

Frontage road: A frontage road is a roadway that could parallel the bypass in some areas for the purpose of safely and efficiently collecting and distributing traffic between the higher-speed regional bypass and the lower-speed local street system.

Functional class: Functional class is a description of a highway segment's design purpose (interstate, freeway, expressway, arterial, collector, or local) and location (urban or rural). Among other things, functional class defines a highway segment's eligibility for federal funding.

Grade: A grade is the slope of a roadway, channel, or natural ground.

Grade separation: A grade separation is the crossing of two highways or a highway and a railroad at different levels.

Hazardous materials: Materials that pose a risk to human health or the environment.

Highway structure: Highway structure is a general term to refer to various highway design features that are of particular concern to utility installations, i.e., bridges.

Historic properties: Buildings, structures, objects, sites, or districts with historical or archeological significance that are listed in, or eligible for listing in, the National Register of Historic Places.

Impermeability: Impermeability refers to the resistance an asphalt pavement has to the passage of air and water into or through the pavement.

Interchange: Interchange is a system of interconnecting roadways in conjunction with one or more grade separations that provides for the movement of traffic between two or more roadways or highways on different levels. A proposed interchange will be designated as an interchange when the construction contract has been awarded, regardless of whether it is open to the public.

Intersection: An intersection is any at-grade connection with a roadway, including two roads or a driveway and a road.

Level of service: Level of service is a measure of traffic flow and congestion. As defined in the Highway Capacity Manual, it is a qualitative measure describing operational conditions within a traffic stream; generally described in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

Median: The median is the physical separation provided between opposing lanes of traffic.

Mitigation: Mitigation is a technique or means of reducing impacts to resources or to the natural environment. Mitigation includes avoiding the impact altogether by not taking a certain action or parts of an action; minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

MS4: The abbreviation for Municipal Separate Storm Sewer System, a system used for collecting or conveying stormwater that is not a combined sewer or part of a publicly owned treatment works.

National Ambient Air Quality Standards (NAAQS): The nationwide health-based air quality standards that have been established by the U.S. Environmental Protection Agency.

NEPA: The National Environmental Policy Act, established by Congress in 1969, requires a federal agency to document the environmental impact of its actions, including an evaluation of alternatives.

Noise abatement criteria (NAC): Noise abatement criteria are absolute sound levels, provided by FHWA, used to determine when a noise impact occurs.

Noise barrier: A noise barrier is a solid wall or earth berm located between the roadway and receiver location, which breaks the line of sight between the receiver and the roadway noise sources.

Public involvement: Public involvement is an ongoing phase of the project planning process that encourages and solicits public input and provides the public the opportunity to become fully informed regarding project development.

Queuing: The formation of lines of automobiles waiting on a stop-controlled facility.

Retaining walls: Retaining walls are vertical walls used to retain earth. A wall for sustaining the pressure of earth or filling deposited behind it.

Right of Way (ROW): Right of way is a general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to transportation purposes. Right of way is the entire width of land between the public boundaries or property lines of a highway. This may include purchase for drainage.

Signal timing: The coordinated timing of a sequence of traffic signals that allows vehicles to progress along an arterial or cross an arterial. The goal of signal timing is to minimize delay (the time a vehicle must wait at a signal) at intersections.

Single-Point Urban Interchange: An interchange design similar to the diamond interchange, but with all ramps controlled by a single set of traffic signals.

Scoping: Scoping is the process that occurs prior to the preparation of an EIS. Scoping may include a meeting or series of meetings, an environmental analysis, and interagency coordination. Any information that is gathered will be used and provides the basis for the preparation of the EIS.

Section 4(f) property: A significant publicly owned park, recreation area, wildlife and waterfowl refuge, or historic property (including archeological sites) protected by Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 USC 303).

Shoulder: The shoulder is the paved portion of the highway outside of the travel lane.

Tight Diamond Interchange: An interchange design that shifts the entrance and exit ramps closer to the freeway than in a traditional diamond interchange. This interchange type requires less land than a traditional diamond interchange.

Trip generation: Trip generation is the procedure by which estimates of the number of trips produced and attracted by the zone within an urban area are developed.

Turning movement: Turning movement is the traffic making a designated turn at an intersection.

Vehicle miles of travel (VMT): Vehicle miles of travel is a unit to measure vehicle travel made by a private vehicle, such as an automobile, van, pickup truck, or motorcycle. Each mile traveled is counted as one vehicle mile regardless of the number of persons in the vehicle.